

Cornwall Council and Plymouth City Council

River Tamar Crossings Study

Final Report



Project Ref: 26705/001

Doc Ref: R001/rev08

July 13

Peter Brett Associates LLP
Caversham Bridge House
Waterman Place
Reading
Berkshire
RG1 8DN
T: 0118 9500761
F: 0118 9597498
E: reading@peterbrett.com

This page is intentionally blank

Document Control Sheet



Project Name: River Tamar Crossings Study

Project Ref: 26705/001

Report Title: Final Report

Doc Ref: R001/rev08

Date: July 13

	Name	Position	Signature	Date
Prepared by:	Alastair Mackie	Associate		
Reviewed by:	Bob Pinkett	Partner		19/07/2013
Approved by:	Bob Pinkett	Partner		19/07/2013
For and on behalf of Peter Brett Associates LLP				

Revision	Date	Description	Prepared	Reviewed	Approved
1	10.07.12	Revised draft - client review	AM	RWP	RWP
2	30.07.12	Draft v2	AM	RWP	RWP
3	07.09.12	Final Draft	AM	RWP	RWP
4	08.10.12	Final Draft - further revisions	AM	RWP	RWP
5	12.12.12	Final Draft - further revisions	AM	RWP	RWP
6	22.03.13	Final Draft - further revisions	AM	RWP	RWP
7	09.06.13	Final Draft – further revisions	AM	RWP	RWP
8	19.07.13	Final Draft – further revisions	AM	RWP	RWP

Peter Brett Associates LLP disclaims any responsibility to the Client and others in respect of any matters outside the scope of this report. This report has been prepared with reasonable skill, care and diligence within the terms of the Contract with the Client and generally in accordance with the appropriate ACE Agreement and taking account of the manpower, resources, investigations and testing devoted to it by agreement with the Client. This report is confidential to the Client and Peter Brett Associates LLP accepts no responsibility of whatsoever nature to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.

© Peter Brett Associates LLP 2013

This page is intentionally blank

Contents

1	Introduction.....	5
2	Context.....	7
3	Situation Review	13
4	Demand Forecasts.....	45
5	Option Development.....	71
6	Option Appraisal.....	89
7	Conclusions	91
8	Recommendations and Project Plan	94

River Tamar Crossings Study
Final Report

Executive Summary

This study seeks to develop a strategy to manage the demand for travel across the River Tamar, in the short, medium and long term. It considers the operation and utilisation of current facilities, their ability to cope with forecast increases in demand, opportunities to increase capacity at these facilities or through new infrastructure in the wider Plymouth sub-region, and projects to manage demand.

Our analysis of current and future options focussed on:

- Tamar Bridge - road and pedestrian/cycle crossing; and the associated highways infrastructure
- Torpoint and Cremyll Ferries
- Rail services and infrastructure
- Local bus services via both the Tamar Bridge and Torpoint Ferries
- Walk and cycle
- Travel Planning and 'Smarter Choices' initiatives

We have established that the current demand for Tamar crossings is broadly being met by the mix of modes and travel choices available. By modelling the impact of all agreed, planned and proposed developments, both in Plymouth and South East Cornwall, we have then sought to establish the key points when capacity becomes a constraint on any of the existing modes and when intervention may be required.

The level of demand for highway trips across the Tamar Bridge has been modelled using Plymouth City Council's highways and public transport models. 2009 is the base year for the modelling and a comparison of forecast demand flows and capacity over the subsequent 30 years was undertaken. We reviewed east- and west-bound flows separately for the AM and PM peak periods, highlighting the critical points at which capacity is reached in both directions in the absence of mitigation measures.

On the principal demand flows, i.e. AM peak eastbound towards Plymouth and PM peak westbound from Plymouth, demand only reaches capacity after 2040.

Dynamic traffic control is used to maximise the overall Tamar Bridge capacity, but this means that future demand becomes critical much sooner for the tidal flow movements, from Plymouth to Cornwall in the morning and returning in the afternoon peak period, when the single traffic lane on the Tamar Bridge and in the Saltash Tunnel operates. The first critical point is the westbound AM movement over the bridge: demand is already in excess of 90% of capacity today and when modelled is forecast to exceed capacity by 2018.

The next critical point relate to the eastbound PM flow. Demand reaches 90% of capacity for the Saltash Tunnel in 2023 and 100% in 2027. Flows on the A38 east of Pemros Road Roundabout reach 90% of capacity in 2032 and 100% in 2036. Because observed flows suggest the recession has slowed traffic growth significantly the critical points may be reached 3 - 5 years later, but still need consideration unless alternative travel patterns – greater use of sustainable modes, etc. – can be achieved through intervention by the two Councils.

Therefore the Tamar Bridge is not a constraint on current levels of development planned in Plymouth or South East Cornwall. However the location of both new housing and employment uses in the future should be considered in terms of the future travel demand patterns and the spare capacity to absorb growth on the Tamar Bridge that we have identified in this study.

The Torpoint Ferry is approaching capacity in the AM peak eastbound and PM peak westbound, with the current growth (as modelled) reaching capacity. While observed flows are lower because of the recession and therefore capacity on westbound peak (the main concern) may be reached up to 3 – 5 years later, early consideration is needed to offer alternative travel options in advance of medium to long term investment in physical infrastructure. It is important to recognise that the Torpoint Ferry capacity will be a key factor in any development decisions in south east Cornwall and planning policy should reflect this future constraint on growth in terms of local housing allocations, for example.

On rail and other modes we found limited opportunities to provide additional capacity. While a metro style rail operation appears attractive, the constraints on the line, locations of stations, high investment cost and competition from local buses limit the rail option. The provision of new park and ride facilities in Saltash, for example, is unlikely as its viability is dependent on high levels of transfer and securing substantial new funding for the site and its on-going operation. New waterborne services are again theoretically appealing, but the need for trips to reach Plymouth city centre without transfer to other modes make this option difficult to operate commercially without local authority subsidy. Walking and cycling can be improved with investment in better infrastructure and the Councils should continue to raise awareness and increase participation, to achieve mode shift.

Following analysis of the model data, consultation with stakeholders, workshops and brainstorming, a number of options were developed to meet the anticipated growth in demand for travel between South East Cornwall and Plymouth. These range both in the scale of impact on capacity and in the timescale of delivery, providing a range of solutions as demand grows, from “quick wins” through to major infrastructure investment. This includes the question of whether a new bridge, either on a new or existing alignment, is required in the longer term.

The majority of options we developed reflect the need to be ready to incrementally improve supply - by increasing Tamar Bridge capacity, introducing new bus services, etc. - but importantly by managing demand - through implementing travel behaviour change programmes and the use of variable pricing. In the context of a bridge network steadily approaching capacity, the successful managing of demand, particularly for single occupancy car use, has the potential to use the network more efficiently and thereby extend the ‘do-nothing’ modelling forecasts set out in this report. However, the full potential for variable pricing and other demand management mechanisms needs to be fully understood in this complex mix of urban and rural travel that occurs in and around the bridge.

The options as identified in Projects 1 – 17 are given initial costs estimates, with significant caveats and are grouped as short, medium and long term packages. Not all Projects need to be progressed together – some are alternative strategies or infrastructure options – and further work will be needed on all to develop detailed project plans. Note that they are a mix of revenue and capital costs, with some funded externally by developers and operators, others needing council funding. Maximum costs of the short term (2013-2017) package would be in the order of £270,000, medium term (2018-2023) £1.5m and long term (2024-2034) £2.5m.

There is no evidence to suggest that the demand case is sufficiently robust to justify a new bridge crossing. The benefit of any such investment would, in any event, be constrained by the capacity of the A38, which at two lanes in each direction has similar capacity to the existing bridge (assuming implementation of the infrastructure projects identified).

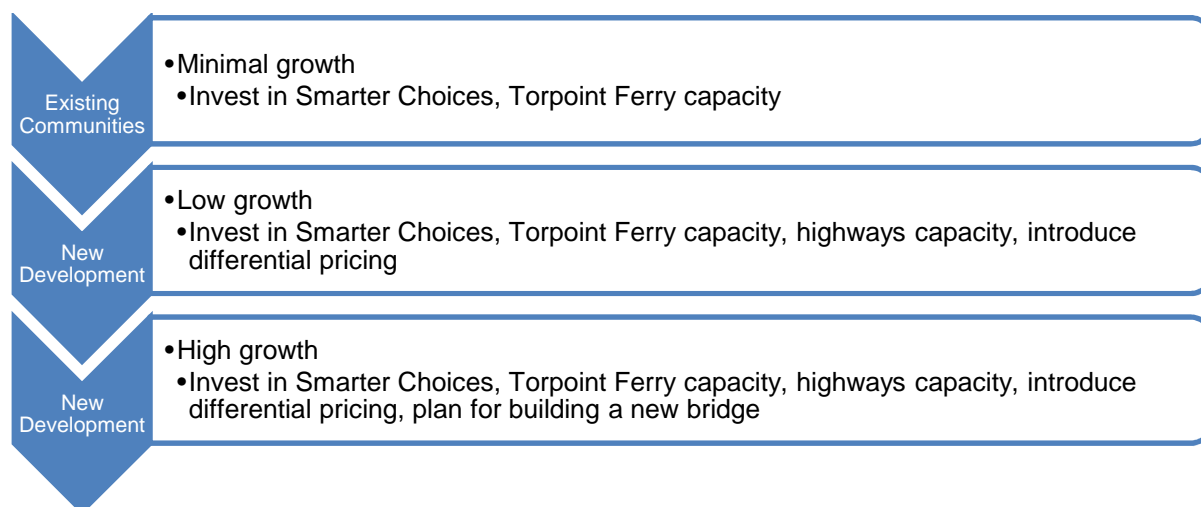
In summary there are established and well managed crossings of the Tamar that meet current demand and with limited development growth can meet future demand, with careful interventions on pricing and offering attractive sustainable travel alternatives. There are effectively three growth scenarios to be planned for:

- Minimal growth – Meeting the needs of the baseline existing population, with no more than organic growth and no significant local government or central government intervention in promoting development.

River Tamar Crossings Study

Final Report

- Low growth - With limited residential and employment development, particularly as proposed by the Cornwall Local Plan: Strategic Policies (2013) for example. This is more likely to occur if the current recessionary trend continues for the medium term and central government promotion of growth is unsuccessful.
- High growth – With significant levels of residential and employment development, as proposed by Plymouth City Council Core Strategy (2007) and the previous draft Cornwall Core Strategy (2011). This is more likely to occur with an improved economy and/or central government incentives for planning.



1 Introduction

1.1 Background

The River Tamar forms a major physical barrier between South East Cornwall and Plymouth, constraining travel across the river to four main crossings:

- the Tamar Bridge at Saltash for vehicle, cycle and pedestrian movements;
- the adjacent Royal Albert Bridge for rail passengers;
- the Torpoint Ferry for vehicles, cycles and pedestrians; and
- the Cremyll Ferry for foot passengers and cyclists.

These facilities cater for an already significant travel demand between South East Cornwall and Plymouth: for example 14% of jobs in Plymouth are held by residents of Cornwall and there are many Plymouth residents who travel to work in Cornwall. With major economic growth anticipated in the sub-region over the next thirty years, the prospect of a potentially considerable increase in travel demand raises questions about the ability of the current infrastructure to cope in the long term.

This study is therefore intended to determine the long term package of Projects required to manage the demand for travel across the Tamar. It considers the operation and utilisation of current facilities, their ability to cope with forecast increases in demand, opportunities to increase capacity at these facilities or through new infrastructure in the wider Plymouth sub-region, and Projects to manage demand.

1.2 Objectives

The overall aim of the study is to provide a long term strategy for management of demand for the Tamar Crossings such that strategic improvements can be programmed, developed and costed, and funding sought. Specific objectives are:

- To evaluate the existing Tamar Crossings to determine residual capacity
- To evaluate the impacts of development in Saltash and Plymouth will have on the residual capacity of the crossings on the basis of the existing travel patterns / mode split
- To investigate and evaluate options to increase the residual useful life of the existing crossings by increasing capacity, managing demand or other initiatives
- To determine and test a preferred package of Projects to optimize the capacity of the existing infrastructure
- To evaluate the potential to construct a new bridge and compare in economic and transport terms this option to the preferred package of Projects.

1.3 Methodology

The methodology adopted for the study is a combination of desktop review of existing literature, consultation with stakeholders, site audits and original research. Our approach has been to consider each mode or facility individually, initially assessing current operations and identifying residual capacity, constraints to growth and opportunities for development.

Results for each mode and its infrastructure have then been aggregated to give total residual capacity which has been compared with forecast future demand, based on our modelling of the transport impacts of anticipated economic development in the sub-region.

Options to address the potential shortfall have then been generated, developed and appraised to give a short list of Projects that represent the most effective, affordable, deliverable, and value for money solutions. These have then been combined to develop an optimal package of interventions, capable of implementation in the short to medium term. This package has also been compared with a long term option to construct a new high level road bridge across the Tamar in the vicinity of the current road and rail bridges.

1.4 Report Structure

The demographics and policy context regarding planning, transport and economic development within the study area is summarised in chapter 2 and a situation audit of current infrastructure and services is set out by mode in chapter 3. Chapter 4 provides a summary of proposed land development over the study period from which forecast travel demand is estimated. Options to manage and cater for this demand are identified in chapter 5 and then appraised for different scenarios in chapter 6. Finally, conclusions are drawn together in chapter 7 and recommendations for the way forward are given in chapter 8.

2 Context

2.1 Introduction

This study is focussed on developing proposals to enable communities on both sides of the Tamar to ensure their continued access to jobs, homes, education, healthcare and leisure. To establish the future demand for transport links, whatever the mode, we need to understand the nature of the communities in both South East Cornwall and Plymouth that will depend on the Tamar crossings for many years to come.

The study area has been identified as the areas adjoining the River Tamar in Plymouth and South East Cornwall, from Plymouth Sound to north of the A38 Tamar Bridge. We have also broadly considered the potential for new crossings further north of the existing road and rail bridges at Saltash, but have not developed specific proposals for enhancing capacity on the Tamar Line rail bridge or the Gunnislake A390 road bridge, for example.

2.2 Demographics

2.2.1 Plymouth

Plymouth had a total population of 258,700 in 2010, which represents a growth of 17,700 (7%) since 2001. Much of this growth has been in the 20-29 age group, with smaller increases in the over 60 population. The development of full time higher education provision in the city is identified as a key component of the growth, although not the sole reason. The population density was 3,243 people per sq. km in 2010, and was lower at 3,020 in 2001, again possibly reflecting student residential growth and flat developments. Plymouth has a high level of households without access to a car, reflecting the compact nature of the city, good urban public transport but also in some areas higher levels of deprivation. Therefore to gain access to work or leisure opportunities in South East Cornwall, for example, there will be greater reliance on sustainable modes and particularly ferry and bus for many Plymouth residents.

2.2.2 South East Cornwall

Using Cornwall Council's 'Cornwall Gateway' Community Network Area grouping there is a predominantly rural population of 31,300 in South East Cornwall, with the main urban centres being Saltash with 16,000, Torpoint with 8,500, and Millbrook 2,200 (2007 ONS). The population has grown 5% since the 2001 census. The previous Caradon District Council area included Liskeard and Looe, and had a population of 84,000 in 2010 and a density of 127 people per sq. km (121 in 2001). A larger percentage of the area's population is of retirement age (21.8%) than seen regionally (19.6%) or nationally (16.5%). Car ownership is higher in the rural parishes of South East Cornwall than the average in the south west, but conversely high numbers of households in Torpoint have no access to a car. Again this reflects the need for the continued ferry and bus links to Plymouth.

2.3 Social

A good indicator of social issues in an area is the Index of Multiple Deprivation 2010, which is used to combine a number of indicators, covering a range of economic, social and housing issues, into a single deprivation score for output areas in England. As social welfare issues are also reflected in access to services and mobility generally it is useful to see whether improved travel opportunities across the Tamar will help to lessen identified levels of deprivation in the sub-region.

2.3.1 Plymouth

In Plymouth there are significant levels of deprivation, with the city having the second highest level in the south west after Bristol. Of 160 'output areas' in Plymouth 41 are within the 20% most deprived in England and 17 are in the 10% most deprived. Much of this is concentrated in areas to the west of the

city and therefore this has direct relevance to improving access to employment, education and services via the Tamar Crossings. Areas such as Devonport are recognised as having difficulties in accessing jobs, healthcare and other facilities, whether in the city or more widely.

2.3.2 South East Cornwall

The South East Cornwall areas with significant deprivation are limited to the Torpoint East ward, which is in the top 20% of deprived wards in England and some parts of Saltash with high scores. Otherwise the rural areas score relatively well in terms of the Index of Multiple Deprivation. Again the specific indices which relate to 'barriers to services' are higher where public transport is poor or car ownership low.

2.4 Economic

2.4.1 Plymouth

When considering the Indices of Multiple Deprivation it is significant that Plymouth is 45th within the 326 local authorities in England for employment deprivation and this reflects continued concerns about recent economic growth as measured by jobs created or retained in the city. The trend, particularly during the recent recession, also reflects the changing employment patterns of a city moving from industrial to service sector jobs. The Plymouth Growth Board recently reported that "The latest evidence suggests that Plymouth was hit relatively hard by the downturn of 2008/9, with sharp contractions in its manufacturing, distribution & retail and construction sectors." Total employment in the city grew in line with the national average (1.1% p.a. between 1999 and 2009) which was slower than Cornwall (2.5% pa) and Devon (2.3% pa), but faster than Bristol (0.3% pa) and Swindon (0.2%).

The significance of the slow job growth in Plymouth for the Tamar Crossings is considered later in the future demand scenarios, but as manufacturing and general industrial jobs have reduced, particularly associated with the Dockyards and MoD activities on the western side of the city, the travel patterns associated with them have also changed. Residents of Torpoint are less likely to have a walk and ferry link to a job in Devonport and potentially may now need to drive to an industrial estate on the eastern side of the city, for example. Similarly, Saltash public transport users travelling to the city centre for service sector jobs may now find they need to use different bus services or drive to access jobs in Derriford, for example.

2.4.2 South East Cornwall

The economy of South East Cornwall is clearly different to that of Plymouth, in scale and sectors, but similar trends can be identified. Saltash and Torpoint are still the focus for industrial and service jobs in the area, with the MOD still having a strong presence in Torpoint with HMS Raleigh. The relationship with Plymouth also drives local job growth, as access to the large Plymouth economy supports demand for commercial sites in parts of South East Cornwall, particularly Saltash. Therefore employment prospects will continue to be influenced by the capacity and quality of the Tamar crossings.

2.5 Policies

Both Councils have adopted a number of economic, planning and transport policies that are relevant to any decisions about the future of the Tamar crossings.

Planning

2.5.1 Plymouth

Plymouth City Council adopted its Core Strategy for 2006 - 2021 in 2007 and it is supported by a number of Development Planning Documents, including Area Action Plans. The Adopted Core Strategy has a chapter which specifically considers Transport and Communications, with a number of

references to the importance of the Tamar crossings, noting 14% of Plymouth employees commute from Cornwall (Plymouth is relatively self-contained in terms of homes and employment, a position the Council wishes to maintain).

Reflecting the previous Local Transport Plan 2006 - 2016 (LTP2) the Core Strategy identifies a need for a Western Corridor park and ride site west of Tamar Bridge. The Core Strategy notes "Plymouth is also on a major strategic route to Cornwall (with rail, road and ferry links), which itself is a priority area for economic regeneration. It is therefore important to maintain these through links to a high standard."

In considering the Plymouth Sound area its Vision as set out in the Core Strategy also includes the need to "Deliver opportunities for improved water transport linkages along the waterfront".

The Area Action Plan for Derriford and Seaton, currently being consulted upon, has significance for this study because of the impact of future travel demand as the area becomes a focus for increased employment and new homes. In the future it is expected that more trips will be made between South East Cornwall and the Derriford area. Similarly the Adopted Area Action Plan for Devonport comments on the on-going role and importance of the Torpoint ferry.

2.5.2 South East Cornwall

Cornwall Council is currently developing, as part of its Planning Future Cornwall Local Development Framework, its Local Plan (formally Core Strategy) document and has consulted on its approach, including options for low, medium and high levels of housing growth and different growth patterns. In preparing an evidence base it issued 'Community Network Areas Core Strategy Area Based Discussion Papers' in 2011, including one for the 'Cornwall Gateway' CNA. This area comprise the parishes of Antony, Botus Fleming, Landrake with St Erney, Landulph, Maker-with-Rame, Millbrook, Saltash, Sheviok, St Germans, St John and Torpoint. It is the area we will use for assessing direct impacts in South East Cornwall.

The Cornwall Gateway CNA Discussion Paper identified the key issues, including the need to regenerate Torpoint and Saltash town centres, improve urban and rural public transport and recognises the influence and importance of Plymouth on the local economy. It identifies the capacity of the Tamar Bridge as a possible restraint on housing growth at Saltash. Under the nine combinations of housing numbers and growth patterns the Discussion Paper suggested that between 1,900 and 3,600 new homes could be required between 2010 and 2030 – with most of the growth focused on Saltash in each scenario.

The local consultation responses on the draft Core Strategy (now Local Plan) from the Gateway CNA however sought less housing growth than proposed and identified transport infrastructure as a restraint to future growth. The economic reliance on Plymouth was also noted. We understand that following the local consultation the new housing numbers for Saltash in particular will be reduced further, to probably no more than 750 (and 1,300 for the whole Gateway CNA) but even this lower level still requires planning for some future traffic growth on the Tamar Bridge.

A 'Town Framework Plan' is being developed for Saltash, which we anticipate will reflect the recommendations of this study in terms of future capacity of the Tamar crossings as a factor in determining levels of potential growth. The Parish Councils on the Rame peninsula are also working together to create a Neighbourhood Plan and issues of travel and access to services are central to the development of that plan.

As part of the LDF the Council commissioned in 2011 a 'Core Strategy Modelling Development Scenario Testing Report', which noted the option of a park and ride service to reduce capacity pressures on the Tamar Bridge, but did not consider in detail the level of housing that would impact on the A38.

Transport

2.5.3 Plymouth

Under 'Sub Regional Connectivity' in Plymouth City Council's Local Transport Plan (2011 – 2026) it is noted:

"The Tamar Bridge and Torpoint Ferries have undergone considerable investment in the last decade, which has increased their operating capacity and secured their effective functioning into the future. We will continue to work with Cornwall Council to make the most of this investment and manage future increased demand to maintain good links and connections between South East Cornwall and all parts of the city. Both authorities' LTPs are committed to jointly undertaking a Tamar Crossing Strategic Review. Possible measures include:

- Greater use of buses including a park and ride in Cornwall to serve the city centre and Derriford
- Connecting cycling and walking routes where necessary
- More efficient use of the local rail network
- Different toll levels at different times of the day
- More efficient use of the existing local bus network
- A 'smarter choices' programme
- Improved integration of ferries with other transport services, including smart ticketing
- Improved availability and quality of information to increase use of ferry services, such as the Cremyll foot ferry."

Clearly this study and its brief directly correspond with this objective and the actions identified in the LTP Local Implementation Plan.

The Plymouth LTP also considers the Council's position on possible park and ride provision to the west of the Tamar Bridge, noting that it would need operating subsidy and therefore three options to the east of the bridge should also be considered. It identified new High Quality Bus Transport links to Derriford and improved cycling routes linking to each of the crossings, including the Bridge, Torpoint and Cremyll ferries. On rail there is an objective which would assist cross-Tamar travel - "The development of a local 'metro' system with improved frequency of service on the local rail network from Liskeard to Newton Abbot".

2.5.4 South East Cornwall

Cornwall Council's Local Transport Plan 'Connecting Cornwall: 2030' also makes reference to the joint objectives for the Tamar Crossings and the role of this study in meeting the strategic objectives. On connectivity its Policy 8 identifies the need for this strategic review:

"We will work with the Tamar Bridge and Torpoint Ferries Joint Committee, Plymouth City Council and the Highways Agency to protect and enhance the bridge and ferry crossings of the Tamar. In order to ensure that an effective crossing is available for the long term future of the region, a strategic review is needed that considers the role of the Tamar Bridge and Torpoint Ferry for Cornwall and Plymouth in the light of future challenges. The advantages of developing this strategic view for the Tamar crossings are to:

- Create certainty for the community, investment and development.

- Enable planned investment in infrastructure and services.
- Ensure that development of the crossings is informed by, and integrated into other strategic plans.
- Ensure that investment is made in the crossing for both maintenance and improvement.
- Provide a clear process to guide the management of the crossings.

The strategic view will need to be linked to the business plan approach being developed by the Tamar Bridge and Torpoint Ferry Joint Committee to ensure consistency.”

In the LTP and supporting evidence base the Council identifies the significant journey to work flows in both directions, but also noting that commuting in Cornwall is predominantly by car. While not the most congested routes in the county the Tamar Bridge crossing is shown in the Cornwall Council LTP to be increasingly congested in the peak period.

The importance of ferries is also underlined with commitments to “Support the Cornwall maritime strategy to develop proposals to protect and enhance Cornwall’s marine transport links, including links to Plymouth for passengers and freight.”

The theme of the LTP is connectivity and the links to Plymouth get emphasised in a number of sections in the document:

“An effective transport link between South East Cornwall and Plymouth is vital in building a sustainable local community. It contributes to achieving a stronger community with better local economies and provides access to health, education and leisure services. The wider role of the crossings in the future of the communities of Cornwall and Plymouth needs to be recognised and the work necessary to secure that role identified and developed”

Economy

Both Councils recognise the need to promote economic growth through its policies, programmes and projects.

2.5.5 Plymouth

The Plymouth Local Economic Strategy (2006 – 2021, updated in 2011) recognised the need to improve economic performance through a number of key themes. “Connected communities” makes reference to sub-regional links and the need to work with strategic partners such as Cornwall Council to enhance mobility and access to employment:

“There is a clear need to maximise the role of Plymouth as a City Region, ensuring effective connectivity with neighbouring local authority areas; the City must create and embed significant levels of economic value from these relationships.”

2.5.6 South East Cornwall

Cornwall Council sets out its economic objectives in a ‘White Paper’ in 2010, “Economic Ambition”, with an overall vision of “A confident, resilient Cornwall that is a leader in innovative business and low carbon technologies”. The paper notes the role of good connectivity in economic development as well as the importance of strategic gateways. Although not directly referencing the A38 and Tamar crossings, there is clear synergy with the Council’s economic objectives and the outcomes of this strategic review.

2.6 Summary

Currently the area is characterised by its mix of population and land types, from some deprived older urban communities to relatively affluent rural areas with ageing populations. The long standing relationship between Plymouth and its travel to work area is confirmed by our analysis of demographics, employment statistics and the policy objectives the two Councils have set to ensure sub-regional accessibility supports their goals.

3 Situation Review

3.1 Introduction

In this chapter each of the existing routes across the Tamar is reviewed, with a description of current arrangements and operations, an assessment of current demand versus capacity to ascertain the level of residual capacity at present, and a discussion of the opportunities to increase capacity and the constraints that may inhibit this. The following modes are considered in turn:

- Road
 - Tamar Bridge
 - Strategic and local highways
- Water
 - Torpoint Ferry
 - Cremyll Ferry
- Public Transport
 - Rail services
 - Local bus services
- Walk and cycle

In addition the current role of travel planning and “Smarter Choices” initiatives is considered to review the current application of demand management techniques on the Tamar crossings.

3.2 Tamar Bridge and the Highway Network

3.2.1 Introduction

The study area of this report is not just constrained to the river crossing and the following elements have been identified as considerations in the strategic evaluation of the Tamar Bridge:

- The Tamar Bridge
- Highways Infrastructure
 - A38 West of Tamar Bridge
 - Saltash Tunnel
 - Carkeel Roundabout
 - A38 East of Tamar Bridge
 - St Budeaux B3413 & other strategic junctions
 - Pemros Road Roundabout

Each of these is considered separately in the following sections, with a description of current situation, demand, capacity, constraints and opportunities.

3.2.2 The Tamar Bridge

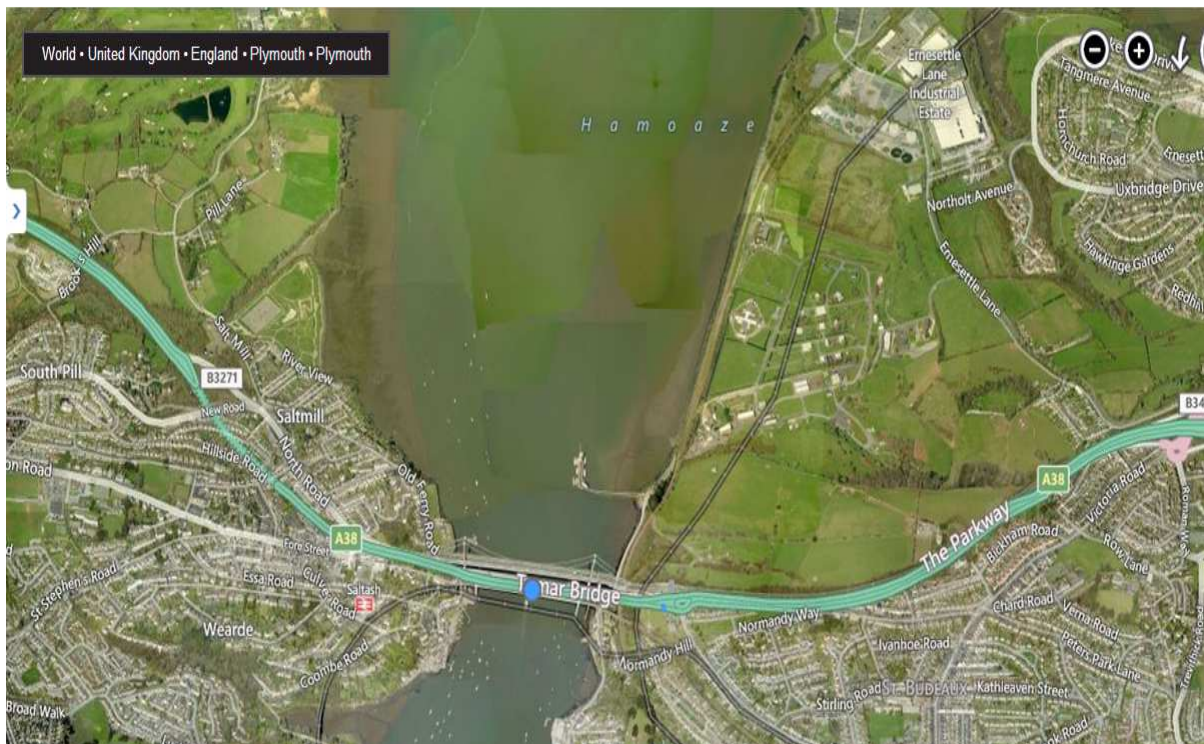


Figure 3.1: Existing Crossing and Approaches

The Tamar Bridge is operated by the Tamar Bridge and Torpoint Ferry Joint Committee, a publicly owned joint venture between Cornwall Council and Plymouth City Council. As its name implies, the organisation also operates the Torpoint Ferries and is intended to be self-funding, raising the money for the operation of the two crossings from tolls and any other revenue sources available.

It is the only road bridge crossing of the Tamar Estuary and serves both a local role, connecting Plymouth with Saltash, and a strategic role as it carries the A38 south coast route from Exeter through to Cornwall. To the east of the bridge the A38 is dual carriageway, to the west there is the A38 Saltash Tunnel and then the A38 runs on dual carriageway through to the Carkeel Roundabout, which is the main access to Saltash from the A38. Beyond the Carkeel Roundabout the A38 narrows to single carriageway. The bridge is a toll bridge and all vehicles (except motorcycles) have to pay when travelling eastbound across the bridge. There is no toll for westbound movement.

The existing bridge was constructed in 1961. It has a main span of 335m and 2 side spans of 114m each and was the longest suspension bridge in the UK when it was opened. The bridge deck was constructed using steel trusses supporting a concrete deck.

The bridge was widened from three lanes to five in 2001 by the addition of single lane cantilevers at either side of the main deck, as shown below. The southern cantilever forms a pedestrian walkway and cycleway and the northern cantilever lane takes local traffic eastbound from Saltash, connecting with the A38 eastbound traffic at the tollbooths.

Major strengthening and replacement works were also carried out on the suspended superstructure and approach spans in order to meet the European Union directives that bridges should be capable of carrying 40 tonne lorries. New stay cables were added to the suspended spans and the concrete deck was replaced. The cost of the widening and replacement work was approximately £35m.



Tamar Bridge before and after widening (courtesy of Dorman Long Technology website)

The A38 Saltash tunnel to the west has three traffic lanes and both the bridge and the tunnel operate under dynamic tidal traffic control. The bridge layout is shown in Figure 3.2 below:



Figure 3.2: Tamar Bridge Layout

The Tamar Bridge consists of five lanes, four for traffic and one for pedestrians and cyclists. On the northern side there is a dedicated eastbound lane allowing direct access for local traffic to the A38 from Saltash, with the traffic from this lane joining the A38 traffic after the toll booths. The western end of the northern cantilevered lane incorporates a section of bus lane and a signalled bus advance.

The three lanes carrying the A38 through traffic are operated under dynamic tidal traffic control which enables the central lane to be switched between eastbound and westbound traffic movements to reflect peak hour flows or respond to incidents. The central lane is generally used for eastbound traffic in the AM peak period and for westbound traffic in the PM peak period.

During the AM peak when the westbound movement is reduced to one lane, traffic merges over a relatively short distance from two lanes on the A38 to a single lane over the bridge. This merge is short due to the nature of the tidal flow design and the layout of the Pemros Road roundabout immediately to the west of the bridge which provides for limited local access and bus movements from Saltash to Plymouth.

During the PM peak when the eastbound traffic movement is restricted to one lane, plus the north cantilever lane, the traffic from Carkeel roundabout merges into a single lane on the western entrance to the Saltash Tunnel.

The Tamar Bridge is tolled in the eastbound direction with a plaza of seven lanes (with one fully automated lane and six lanes with cash booths) at the eastern end of the bridge. One of these booths is aligned to serve the north cantilever lane, four are aligned to serve the A38 approach and one can be accessed either from Saltash or from the A38 enabling more efficient use of the overall toll plaza capacity.

Buses use the most northerly automated toll booth lane, which can also be used by cars and other vehicles with tags. The toll plaza barrier system allows traffic to be released in a controlled way if required. This function is used to provide bus priority at the booths to enable the buses from Saltash to turn right across the front of the toll booths to head south into Plymouth.

The toll can be paid either via a cash payment or through the use of an automated electronic tag system. There are two tag-only lanes (one for Saltash traffic and one for the A38) with the rest being manned booths with mixed mode payment either by cash or tag payment. Auto operation of the second automated lane is an operational decision and can be used in mixed mode.

Use of tags is already high at 80% during peak periods and the take up of tags has been actively promoted by the TBTFJC with price incentives. A vehicle with a tag only pays half of the cash payment cost (75p instead of £1.50 for a car). The schedule of charges broadly matches the Torpoint Ferry rates (except for motorcycles) and is shown in Table 3.1 below.

It should be noted that tolls and ferry fares are maintained at similar levels even though the operational costs of the ferry are not fully met by fare income from passengers and therefore there is a level of on-going cross subsidy from the bridge toll income to support the ferry operation.

User	Cash Rate	Tamar Tag Rate	Cash Rate	Tamar Tag Rate
	Single Vehicle	Single Vehicle	With Trailer	With Trailer
Foot passenger	Free	Free	Free	Free
Pedal cycle	Free	Free	Free	Free
Motor cycle	Free	Free	Free	Free
Car	£1.50	£0.75	£3.00	£1.50
Goods vehicle up to 3.5 tonnes, 2 axles	£1.50	£0.75	£3.00	£1.50
Goods vehicle over 3.5 tonnes, 2 axles	£3.70	£1.85	£7.40	£3.70
Goods vehicle over 3.5 tonnes, 3 axles	£6.00	£3.00	£12.00	£6.00
Goods vehicle over 3.5 tonnes, 4 or more axles	£8.20	£4.10	£16.40	£8.20
Bus	Free	Free	Free	Free

Table 3.1: Tamar Bridge Toll Charges (2013)

3.2.3 A38 Highways Infrastructure

3.2.3.1 A38 West of Tamar Bridge

The Saltash Tunnel is three lanes wide and operates as an integral part of the Tamar Bridge tidal flow system with the central lane switching from eastbound to westbound to reflect the main traffic movements by time of day.

Carkeel Roundabout is located on the A38 to the west of the Saltash Tunnel. It provides one of the main links into Saltash from the A38 and also connects the A388 to the north. It is a standard priority roundabout. To the west of the Carkeel Roundabout the A38 has two lanes eastbound for a short distance (towards the roundabout) and a single carriageway westbound.

3.2.3.2 A38 East of Tamar Bridge

The A38 is dual carriageway to the east of the Tamar Bridge and there are five main junctions into Plymouth from the A38. These junctions are generally busy in the peak periods.

To the immediate east of the Tamar Bridge is Pemros Road Roundabout, which has been modified to accommodate the exit merge from the toll booths and the bus movement from Saltash south into Plymouth. Vehicles travelling from the A38 East have to give way to the buses. It is noted that this has a slight limiting effect on the capacity of the A38 westbound flow at this point of the network. In general the Pemros Road Roundabout has a traffic calming impact, slowing 70mph dual carriageway traffic from the A38 as it approaches the bridge with its lower speed limits.

On the westbound exit to the bridge traffic merges from two lanes to one over a relatively short distance (approximately 50m) in the AM peak, when tidal flow operation is in place. This has a further effect on the operational performance of the arrangement, in addition to the need to give way to buses turning south from the toll booths.

Current Capacity

This section considers the existing capacity of the network that affects the operation of the Tamar Bridge.

3.2.4 Tamar Bridge

In the peak direction the two lane A38 capacity of the main deck of the bridge is theoretically around 3,600 vehicles per hour (about 1,800 per lane), and with lower capacities on the A38 west of the Carkeel Roundabout (see below) the bridge does not represent a constraint on the network. These theoretical capacities are derived from the Design Manual for Roads & Bridges (1999) - Traffic Capacity of Urban Roads guidance for a highway that has been classified as a UAP1 (Urban All Purpose) type, which is described as a high standard single/dual carriageway with limited access. The DMRB guidance also notes that the actual link capacity can be up to 10% more or less than suggested.

In the off peak direction, the main deck of the bridge has a theoretical capacity of around 1,800 vehicles per hour, when operating as a single lane. DMRB suggests a two way single carriageway value of 1,590 vph, but as it operates as a lane on a dual carriageway with no junctions we have adopted a figure of 1,800 which better reflects the actual capacity. The critical constraint occurs where the two lanes merge into one lane at the entrance to the bridge (westbound) and at the entrance to the Saltash Tunnel (eastbound). Each merge has a more constrained capacity of around 1,600 vehicles per hour.

Additionally, the eastbound link from Saltash (the northern cantilevered section) has a theoretical link capacity of around 1,800 vehicles per hour. It is not anticipated that this will be a constraint within the network.

Currently there is spare capacity at the toll booths and based on the current method of operation, the TBTFJC have estimated the existing theoretical capacity (based on maximum tag utilisation) as approximately 4,200 vehicles per hour. Traffic does slow down to pass through the toll booths and this can cause some tail backs and reduce the capacity of the westbound lanes leading to the tolls. The significant constraint westbound however is the 3,600 vehicles per hour capacity of the A38 dual carriageway to the east of the bridge and the toll booths.

It has been observed that the interaction of the movement on the exit of the toll booths can cause minor delays at the toll booths due to the complexity of moves in the area. Although this is not a significant issue it could have a slight limiting effect on the overall capacity achieved at the toll booths but, as noted above, the governing constraint is the capacity of the A38 dual carriageway east of the Pemros Road roundabout.

3.2.5 A38 West of the Tamar Bridge

The capacity of the Saltash Tunnel is around the same as the main deck of the bridge with a theoretical capacity in the two lane peak direction of around 3,600 vehicles per hour and around 1,800 vehicles per hour in the off peak direction.

As with the bridge, the 2 – 1 lane merge on the eastbound approach to the tunnel in the pm peak constrains the overall capacity to below that of the 1,800 vehicles per hour single lane capacity.

In the westbound direction there is an exit slip to Saltash between the bridge and the tunnel. This in effect means that whatever the level of demand, the tunnel will have more spare capacity than the bridge as some traffic which has crossed the bridge leaves the A38 on the Saltash off-slip before the tunnel. There is no opportunity for traffic to join the A38 westbound between the bridge and the tunnel.

Currently the Carkeel roundabout has some congestion during both the AM and PM peaks. In the AM peak there is some queuing along the A388 from Callington for traffic coming southbound into the

Carkeel roundabout. Modelling of the junction for the PM peak shows that the traffic on the main A38 is liable to queue, particularly in the westbound direction. The Highways Agency has plans to improve the capacity at the Carkeel roundabout so that it is no longer a constraint on the network and an initial £1.5m scheme was approved as part of the DfT Pinch Point Fund in April 2013. While the scheme, planned to be completed by 2015, alleviates traffic pressures it is not the full resolution of the capacity issues at this location. When the full scheme is implemented it could lead to additional demand on the A38 if vehicles are currently deterred from travelling during the peak periods as a result of delays at this junction.

3.2.6 A38 East of the Tamar Bridge

The main A38 junctions into Plymouth are grade separated junctions with theoretical capacities of around 5,000 to 6,000 vehicles per hour.

The capacity of the Pemros Road Roundabout for eastbound traffic is determined by the capacity of the 7 to 2 lane merge over a short distance after the toll booths and the capacity of the dual carriageway to the east of Pemros Road roundabout of 3,600 vehicles per hour.

The capacity of the Pemros Road Roundabout for westbound traffic in the evening peak, when the tidal flow system has two lanes westbound, is estimated to be around 3,400 vehicles per hour.

The capacity of the Pemros Road Roundabout for westbound traffic in the morning peak is determined by the capacity of the 2 – 1 merge on the exit from the roundabout and onto the bridge, and the need to give way to buses travelling eastbound to the city via Pemros Road.

Current Demand

The previous section identified the capacity of the network. This section identifies the existing demand and sets this against the current capacity. It comments on both the observed demand and also on the suppressed demand caused by capacity constraints on the network. The levels of current demand have been determined by examining data from Highways Agency automatic traffic counters along the A38.

3.2.7 The Tamar Bridge

The AM peak hour eastbound flows are approximately 2,500 vehicles per hour, of which approximately 900 vehicles are from Saltash and 1,600 vehicles are through traffic on the A38. Therefore, with three lanes eastbound the Tamar Bridge is operating well within capacity. The plans by the Highways Agency to improve the Carkeel Roundabout may allow some suppressed demand to arrive at the bridge earlier. The improvement is likely to result in a maximum uplift in traffic of around 200 vehicles in the AM peak and hence the bridge will still have spare capacity eastbound.

During the AM peak there is suppressed demand wishing to travel westbound across the bridge due to the 2 to 1 merge from the Pemros Road Roundabout. The current maximum observed flow on a weekday AM peak hour is 1,675 vehicles, but the average flow is usually around 1,500 vehicles an hour (in a single lane), with 350 of these vehicles leaving via the off-slip to Saltash. If the capacity of the 2 to 1 merge could be improved this is likely to lead to an increase in the demand for vehicles to travel westbound in the AM peak hour.

In the PM peak demand eastbound is around 700 vehicles for the Saltash Link and around 1100 on the single lane A38 part of the bridge. Both of these are operating well within capacity and there is no significant suppressed demand due to congestion.

The operation of the toll booths is critical during the AM peak when the peak direction is towards Plymouth and the demand is approximately 2,500 vehicles with the Saltash link accounting for around 900 vehicles in the peak hour, with around 15 buses per hour from Saltash calling a priority and temporarily halting the traffic at the booths. The estimated capacity of the toll booths is over 4,000

vehicles an hour so even with any increase in demand following improvements at Carkeel roundabout the toll booths are not a significant constraint on the number of vehicles. However their presence does mean that vehicles slow down which can cause minor delay to vehicles compared to a completely free flow situation.

3.2.8 A38 West of the Tamar Bridge

Traffic demand through the Saltash Tunnel is lower than on the A38 over the Tamar Bridge due to the effect of the on and off slips to and from Saltash.

In the PM peak the eastbound flow at the 2 to 1 merge on the entry to the tunnel is around 1,200 vehicles per hour, which is below the capacity of around 1,600 but improvements to the Carkeel roundabout could lead to the release of suppressed demand and raise the number of eastbound vehicles closer to the capacity of this merge.

The demand for Carkeel Roundabout exceeds its current capacity on some approaches in both the AM and PM peak periods. The main queues in the AM peak period are on the A388. Junction modelling suggests that in the future delays on the A38 westbound could increase in the PM peak period. It is understood that the Highways Agency are currently looking at options to improve the capacity at the junction and have secured initial Pinch Point funding from the DfT for some works. This could release extra demand into the network. It should be noted that the amount of traffic reaching the junction is ultimately constrained as the surrounding network close to the junction consists of single lane approaches on three of the four approaches. The A38 itself is effectively a single lane in each direction for long stretches west of the Carkeel roundabout.

3.2.9 A38 East of the Tamar Bridge

The demand flows on the A38 east of the bridge are around 2,800 eastbound & 1,400 westbound during the AM peak period and around 1,800 eastbound and 2,450 westbound during the PM peak period and these are well within the dual carriageway capacity of around 3,600 vehicles per hour in each direction. Hence there is scope for traffic growth along the corridor.

The main Plymouth junctions feeding the A38 are generally at around capacity during the peak periods and there is some suppressed demand. For example the demand for Manadon Interchange is currently 5,000 vehicles an hour and it is operating at around capacity, being congested during the peak periods.

If the suppressed demand were to be released it is not anticipated that the corridor capacity along the A38 would be an issue.

The traffic demand at the Pemros Road Roundabout is around 2,800 vehicles eastbound on the A38 and 1,500 vehicles westbound on the A38 in the AM peak with around 15 buses turning across this flow. In the PM peak the traffic demand is around 2,000 vehicles eastbound on the A38 and 2,400 vehicles westbound on the A38 with around 15 buses turning across this flow.

In the AM peak the flows are well within the operational capacity of the junction, however the 2 – 1 merge on the exit towards the bridge westbound can cause queuing back through the junction.

Summary of Capacity and Demand

Figures 3.3 and 3.4 compare the capacity and demand in the current situation for the AM and PM peak periods.

Figure 3.3 shows the current situation for actual flows, i.e. it takes account of the reduction in traffic flows downstream of a capacity constraint. Figure 3.4 shows the situation for the demand flows, which looks at each section in turn and assumes that all the current demand can get to all parts of the network.

From Figures 3.3 and 3.4 the location of the main network problems can be clearly seen. In the AM peak this is the 2 to 1 merge westbound onto the Tamar Bridge. In the PM peak it is the Carkeel Roundabout.

In considering the demand flows it can be seen that if the above constraints were to be resolved, then the bridge would be operating at approaching capacity in a westbound direction, with the current flows in the AM peak, where it is operating as a single lane. In addition the 2 - 1 merge eastbound into the tunnel in the PM peak would also likely be close to capacity.

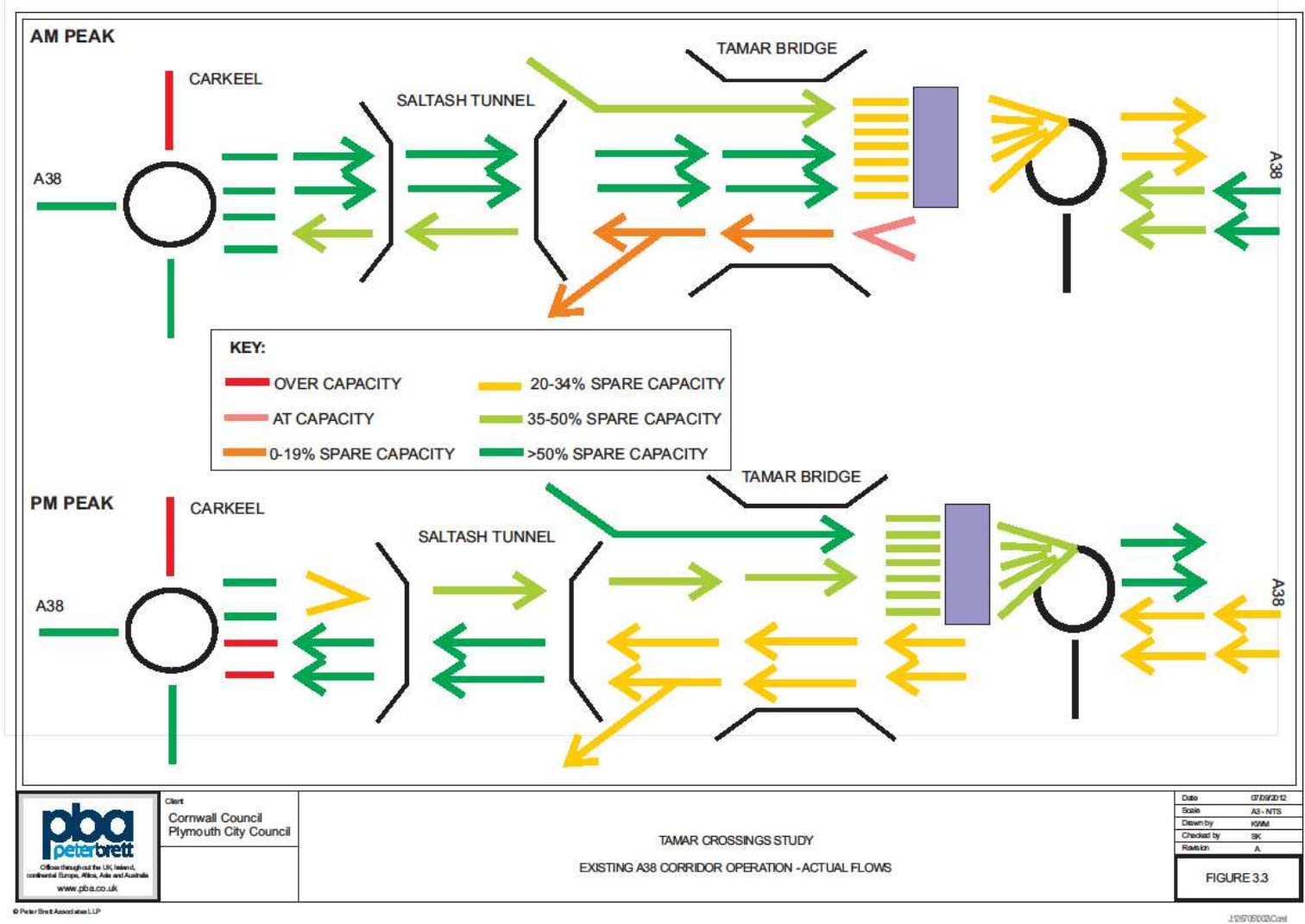


Figure 3.3 A38 Actual Flows (2012)

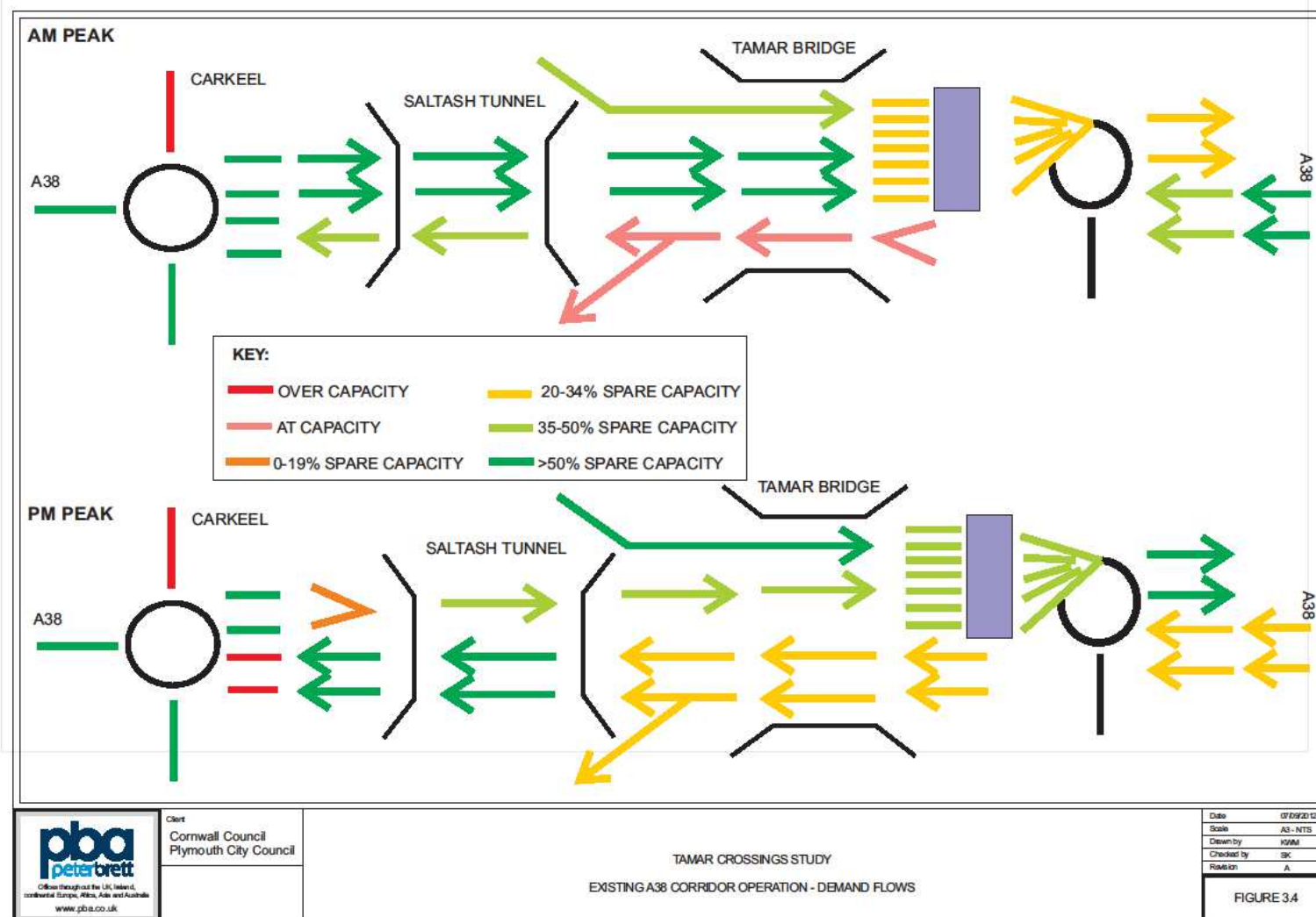
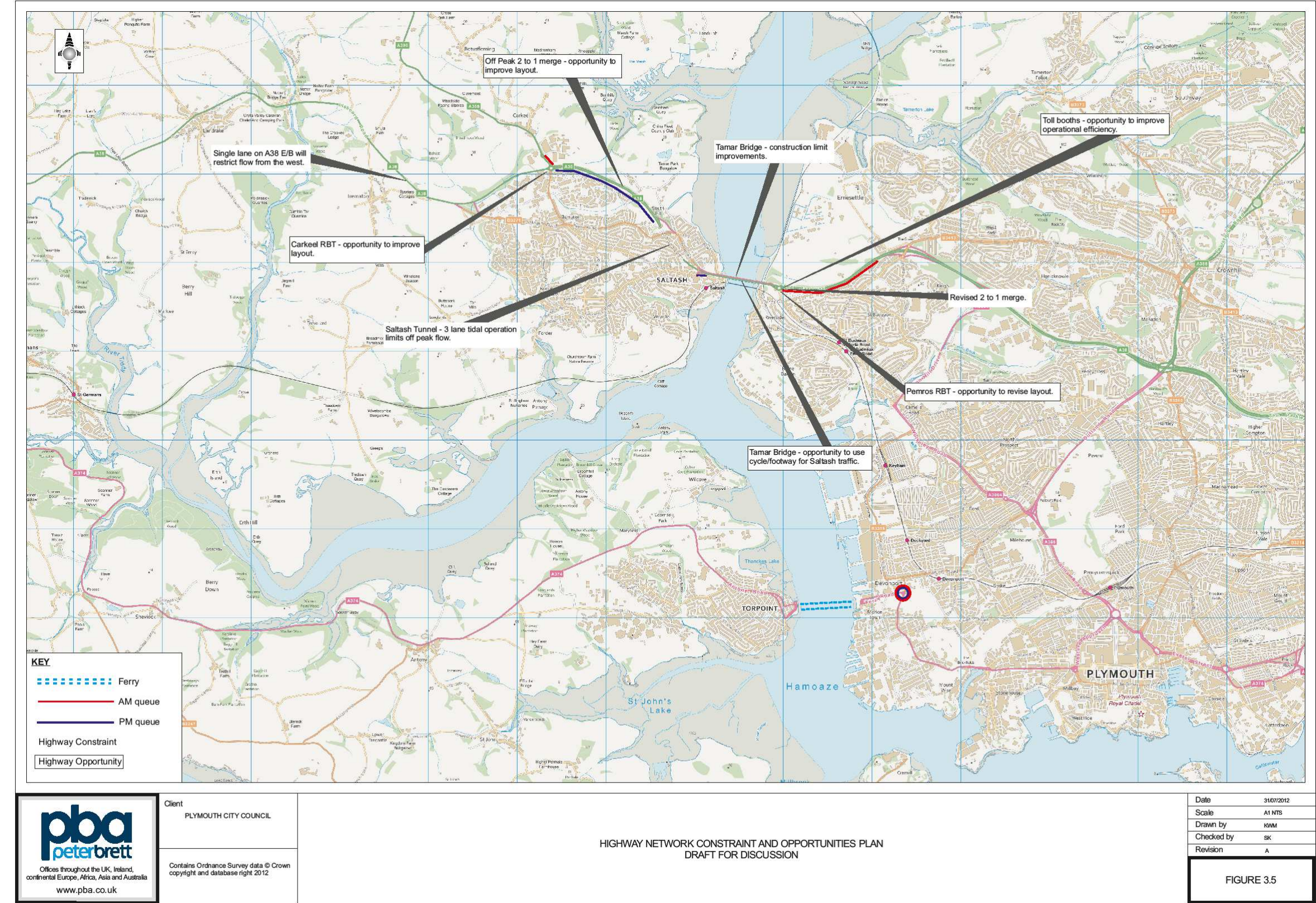


Figure 3.4 A38 Demand Flows

Constraints and Opportunities

The section gives an initial overview of the main constraints and potential opportunities to address the issues on the network. These are summarised in Figure 3.5.



© Peter Brett Associates LLP

J28765/02/02/02/02/02

Figure 3.5 Highways Issues and Opportunities (as at 2012)

3.2.10 The Tamar Bridge

The bridge structure is a key physical factor in determining traffic capacity. The Tamar Bridge has already been widened to increase the number of lanes from 3 to 4 with a dedicated foot/cycleway. It is theoretically possible to utilise the foot /cycleway as a westbound traffic lane which could then serve Saltash but there would be considerable operational issues, including meeting the TBTFJC legal duties, if the pedestrian and cyclists trips were displaced. This option would allow the removal of the 2 to 1 merge in the AM peak westbound which has been identified as a key constraint, but the overall disbenefits may outweigh the traffic flow benefits.

Therefore there are considerable practical difficulties in converting the south cantilever pedestrian and cycle lane to vehicle use. If such a scheme is rejected there is still the potential to improve the 2 to 1 merge for the westbound direction. Although the potential level of gains is likely to be minor it would help to improve the general operational issues experienced at this location for existing flows but would not accommodate any future increases in traffic growth.

Should further eastbound capacity be required at the toll booths in the long term, a physical improvement to the toll booths would be difficult to deliver due to the constrained nature of the bridge site. Even if more toll booth capacity was achieved queuing eastbound into the A38 at Pemros roundabout would probably negate any benefits achieved. Therefore on current traffic flows and levels of tag use toll plaza capacity is unlikely to be a constraint in the foreseeable future.

The toll booth operation utilises both cash and tag payments and there is an opportunity to reduce the payment time and increase capacity if required through encouraging further use of the tags above the already high 80% of transactions during the AM peak and approximately 50-60% at off peak times. In addition free flow technology could be considered, although the bus priority operation would still need to be designed in, and the current system is already fairly effective - allowing car drivers to travel through at around 10mph without stopping if they have a tag.

Bus routing at the toll booth results in all barriers being held for around seven seconds to allow the buses to turn across the exit lanes to head towards Plymouth city centre via Pemros Road which introduces some delay. Consideration could be given to re-routing the services further eastwards via the A38 and Victoria Road to remove this delay, although there would be passenger disbenefits if the services were to no longer meet the needs of passengers in Pemros Road.

3.2.11 A38 West of the Tamar Bridge

Should further capacity be required through the Saltash Tunnel a physical improvement is deemed not to be realistically viable due to the anticipated high tunnelling costs involved. There may be an opportunity to improve the 2 -1 merge eastbound into the tunnel during the PM peak, however, this is unlikely to provide significant improvements.

There are a number of safety and technology improvements that the TBTFJC have recently implemented, including an intelligent road stud system and vehicle count and classification systems, which assist capacity management and improve the user experience.

Carkeel Roundabout has been identified as a capacity constraint and Cornwall Council have ensured that sufficient land has been secured for future improvements to this junction and the Highways Agency have secured initial Pinch Point funding to improve the junction. It is anticipated that this junction could be significantly enhanced in the longer term.

The constraint for such a scheme is that the surrounding infrastructure would have a limiting effect on the number of possible trips through the junction due to the urban nature of the road and the single lane approach on most of the approaches.

3.2.12 A38 East of the Tamar Bridge

There may be the opportunity for highways infrastructure enhancements to the main A38 junctions to the east of the Bridge. However developing these options in detail is beyond the scope of this assessment.

The operation of the Pemros Road junction coupled with the 3 to 1 merge in the AM peak onto the bridge limits the efficiency of the junction operation. It is thought that there is some opportunity to improve the 3 to 1 merge with redesign of this junction, although as discussed this is likely to offer limited level of benefit. If bus movements were rerouted from the toll booth then there may be further opportunity to adjust the junction arrangement to increase the capacity.

Should the toll booth exit merge be shown to be a problem with future demand then there is an opportunity to review and potentially extend this merge.

Summary

This initial review has identified the key constraints and opportunities for the improvement in operational capacity at the Tamar Bridge and Saltash Tunnel. From this review the key challenge is to address the 2 – 1 merges on the A38 in both directions if we wish to be able to accommodate any further growth in demand. The requirement for investigating improvements beyond these will be evaluated in the context of the future demand modelling.

3.3 Torpoint Ferries

3.3.1 Introduction

There are a number of ferry operations on the river Tamar, of which two can be considered part of the public transport network, catering for work, education, shopping and personal business trips rather than mostly leisure and tourism. These are the Torpoint Ferries, also known as floating bridges, which cross the Hamoaze between Torpoint and Devonport and the Cremyll Ferry, which runs between Cremyll and Stonehouse. The Torpoint operation is reviewed in this section and the Cremyll Ferry in section 3.4.

3.3.2 Description

Introduced in 1791, the Torpoint Ferries are now the busiest inland waterway ferries in the United Kingdom, with annual movements of 2.4 million vehicles. The crossing typically takes 7 minutes and saves a twenty mile land trip via the Tamar Bridge.

The operation consists of three chain operated ferries with a nominal capacity of up to 73 cars, depending on the proportion of larger vehicles on board and up to 150 foot passengers. An 18 tonnes vehicle weight limit applies, a legacy of the specification of the previous ferries, which has been retained on the basis that large vehicles have no expectation of being able to cross, that there is little demand for them to do so, and that the difficulties of dealing with them in the marshalling area, especially should one break down, outweigh the benefits of allowing such vehicles.

The chain operation requires each vessel to have its own path across the river and a dedicated section of slipway at each terminal where vehicles are loaded and unloaded on a self-drive roll-on roll-off basis.

The current fleet, Lynher II, Plym II and Tamar II, were brought into service in 2004-06. Each vessel has three separate power units: the ferry normally completes the crossing using only one power unit. The two chain wheels are individually driven and the ferry can complete the crossing with only one chain wheel being powered.

Fares are generally collected on eastbound crossings, consistent with the Tamar Bridge, at the rates shown in Table 3.2. The only exception is that fares for motorcycles are collected on the westbound crossing, from Plymouth to Torpoint and there is no discount available.

User	Cash Rate	Tamar Tag Rate	Cash Rate	Tamar Tag Rate
	Single Vehicle	Single Vehicle	With Trailer	With Trailer
Foot passenger	Free	Free	Free	Free
Pedal cycle	Free	Free	Free	Free
Motor cycle	£0.30	N/A	£0.60	N/A
Car	£1.50	£0.75	£3.00	£1.50
Goods vehicle up to 3.5 tonnes, 2 axles	£1.50	£0.75	£3.00	£1.50
Goods vehicle over 3.5 tonnes, 2 axles	£4.20	£2.10	£8.40	£4.20
Bus	Free	Free	Free	Free

Table 3.2: Torpoint Ferries Toll Charges (2013)

The operational costs of the Torpoint Ferry are not met fully from ferry fares revenue and therefore there is cross subsidy from the Tamar Bridge toll revenues. Without this balancing of revenues between the two crossings the ferry fares would have to be higher to cover operational costs.

Vehicle access to the ferry crossing point is via the local highway network. On the Torpoint side access is via the A374. The signed routing has been designed to limit the traffic impact of the crossing on the town centre which is located close to the crossing point. There are minimal junctions along the route that affect the operational performance of the route and the ferry.

On the Plymouth side the access to the Torpoint Ferry is via the A374 or the B3396, through the Devonport town and docks area. The highway is a good standard with the signed route following major urban roads and VMS signs assist travellers in route planning for both crossings. There are a number of signalised junctions close to the access point which can accommodate the current level of trips effectively.

3.3.3 Current Capacity

Each ferry can complete a round trip in thirty minutes, thus a three ferry operation can provide a ten minute frequency service. The current timetable makes use of one, two or all three ferries at different times of day, as shown in Table 3.3, reflecting the level of demand. We have noted the nominal maximum hourly capacity based on vessels and frequencies at different times of the day.

Day	Time Period	Frequency	Hourly Capacity (each way)		Operation
		Minutes	Cars	Passengers	Ferries
Monday – Thursday	0630 – 0930	10	438	900	3
	0930 – 1400	15	292	600	2
	1400 – 1830	10	438	900	3
	1830 – 2130	15	292	600	2
	2130 – 0630	30	146	300	1
Friday	0630 – 1830	10	438	900	3
	1830 – 2130	15	292	600	2
	2130 – 0630	30	146	300	1
Saturday	0630 – 1000	15	292	600	2
	1000 – 1730	10	438	900	3
	1730 – 2130	15	292	600	2
	2130 – 0630	30	146	300	1
Sunday (Sep to May)	0630 – 2130	15	292	600	2
	2130 – 0630	30	146	300	1
Sunday (Jun to Sep)	0630 – 1100	15	292	600	2
	1100 – 1830	10	438	900	3
	1830 – 2130	15	292	600	2
	2130 – 0630	30	146	300	1

Table 3.3: Torpoint Ferries Timetable (Departures from Torpoint) (2013)

The crossing itself can be undertaken in four minutes at full speed but to ensure efficiency and economy the ferries do not usually travel at full speed, so a trip typically takes six minutes with the bulk of the remaining cycle time being taken with marshalling vehicles on and off the vessels. The ferry cycle time is effectively equally split between crossing and loading/discharge times, roughly 5/5/5 minutes.

It should be noted that the ferries have to stop for larger ships negotiating the river, such as vessels travelling to and from the Devonport naval base.

Each ferry is taken out of service once every three years for an overhaul and refit. This process takes approximately one month and results in the peak service being operated with only two ferries during this period. This constraint is worked around but can impact on flows and congestion on loading and discharging vehicles at peak times.

The current capacity of the local roads feeding the ferry has not been evaluated in detail but observations indicate that there is currently spare capacity across the peak periods. It is however recognised that offloading full ferries in the peak period can cause some localised congestion.

It is understood that the car waiting areas on either side of the crossing have sufficient capacity to deal with the current level of vehicle movements.

3.3.4 Current Demand

Figures provided by the Tamar Bridge and Torpoint Ferry Joint Committee indicate that the maximum flow in either direction is approximately 400 vehicles an hour. Anecdotal evidence suggests there is a “peak within the peak”, as although the stated peak flow is only 82% of notional capacity there are times when queuing vehicles exceed the capacity of one ferry. The maximum delay typically encountered is two crossings, as in a waiting driver might not get on the next ferry, but the one after.

Approximately 80% of vehicles making the crossing in the peak and 60% in the off peak use the Tamar Tag, broadly similar to the Tamar Bridge tag use.

With no charge made for foot passengers, these numbers are not routinely recorded, but TBTFJC occasionally surveys these passengers and so their data on volume and trends could be reviewed.

Bus services serving the Rame Peninsula from Plymouth travel on the ferry. In addition, a number of bus services within Plymouth call at the Devonport Ferry Terminal to pick up and drop off foot passengers for the ferry. This is investigated further in section 3.6.

3.3.5 Constraints and Opportunities

Pedestrians are an important group for the operators of the ferry, even though they do not pay a fare for the crossing. The ferries can potentially meet increasing travel demand by carrying more pedestrians (or bus passengers) but a significant transfer to more sustainable modes from cars will reduce income. The officers of TBTFJC however suggest this should not be an issue, as it meets the wider transport and social objectives of their operation, as well as freeing up capacity for future vehicle demand. As is discussed in later sections if the ferry were to be operated wholly commercially without public sector involvement different pricing strategies might be applied, including for walk, cycle and bus trips.

There is a potential safety risk at peak times when the number of foot passengers is highest: on disembarking, vehicles are not allowed off the ferry until foot passengers are clear of the slipway and approach ramp. At peak times this can slow the operation of the ferry. Because each ferry has its own slipway, and the chains for the ferries lie on the slipways, it is not possible to have a single access and egress route for pedestrians.

3.4 Cremyll Ferry

3.4.1 Description

The Tamar Estuary is also crossed by the Cremyll Ferry. This ferry operates from Cremyll on the Rame Peninsula to Admiral’s Hard in Stonehouse, Plymouth. The service is privately operated with financial support from both Plymouth City Council and Cornwall Council. The vessel, built in 1926, carries foot passengers and bicycles.

Scheduled minibus services are operated from Cawsand and Millbrook on Monday to Saturdays by local company A-Line Coaches with support from Cornwall Council. They meet the ferry throughout the day, from 0700 to 1925.

Unlike the Torpoint Ferries, the Cremyll Ferry charges foot passengers and cyclists with fares applied in both directions across the river. Rates are shown in Table 3.4.

User	Cash Rate
Foot passenger (single trip)	£1.20
Foot passenger (20 trips)	£12.60 (£0.63 per trip)
Pedal cycle	£0.60

Table 3.4: Cremyll Ferry Charges (2013)

The charging structure is determined independently by the operator and seeks to secure sufficient revenue to meet operating costs, albeit with on-going subsidy from the Councils.

3.4.2 Current Demand

Usage figures and spare capacity were unavailable. However the fact that no warning is given in any publicity regarding possible over-capacity demand, and the consequent risk of not getting the ferry, plus with comments received from Cornwall Council, we understand that capacity is not an issue.

3.4.3 Current Capacity

The Cremyll Ferry operates with one vessel with a passenger capacity of 157. The summer timetable is shown in Table 3.5.

Day	Time Period	Frequency	Hourly Capacity (each way)
Monday – Thursday	0645 – 0900	45 min	235
	0900 – 2030	30 min	314
Friday	0645 – 0900	45 min	235
	0900 – 2130	30 min	314
Saturday	0800 – 2130	30 min	314
Sunday	0900 – 2100	30 min	314

Table 3.5: Cremyll Ferry Timetable (Departure times from Cremyll) (2013)

The current winter timetable is as follows:

Day	Time Period	Frequency	Hourly Capacity (each way)
Monday – Thursday	0645 – 0900	45 min	235
	0900 – 1830	30 min	314
Friday	0645 – 0900	45 min	235
	0900 – 1830	30 min	314
Saturday	0800 – 1830	30 min	314
Sunday	0900 – 1800	30 min	314

Table 3.6: Cremyll Ferry Timetable (Departure times from Cremyll) (2013)

It is notable that the summer service frequency was advertised at 45 minute intervals prior to 0900, despite the ability to provide a 30 minute service with one vessel, as occurs after 0900. Cornwall Council advise us that the contracted arrangement is for 30 minute frequency, but 45 minute is accepted as the deliverable timetable is based on passenger need.

The crossing itself is stated to be 8 minutes, leaving seven minutes for passengers to alight and board. As the ferry does not carry vehicles other than bicycles this should be reliably achieved. It is understood that the current peak timetable reflects user needs, particularly in relation to the timing of onward connections.

Although offering a commuter service, much of the publicity for the ferry primarily targets the leisure and tourist markets, which are seen as the area with greatest growth potential.

3.4.4 Constraints and Opportunities

The current operation works well in addressing its existing commuter market, which is relatively limited by the low residential population in the villages near to Cremyll. Fares for commuters are modest, and there is no evidence to suggest that price is limiting demand. Opportunities for future expansion would need to be demand-led and with little growth in housing (or other economic activity) forecast for Rame, it is unlikely that any major development of the operation could be justified.

3.5 Rail Services and Infrastructure

3.5.1 Description

Rail operations in the Plymouth area are characterised by irregular headway intercity services which perform both long distance and regional functions, augmented by infrequent local stopping services. A summary schedule of services crossing the river Tamar is shown in Table 3.7 for a non high-summer weekday.

The backbone of the operation and the principal service across the Tamar is the London – Penzance route, operated under the current franchise by First Great Western using 7- or 8- coach HSTs. This provides an approximately hourly service with stops in the sub-region at Totnes, Plymouth, Liskeard and then all points in Cornwall.

A similar function is also provided by CrossCountry Trains Edinburgh – Penzance service which operates four times per day, again stopping at Totnes, Plymouth, Liskeard and all stations on the main line in Cornwall. The end-to-end journey time means that, apart from an overnight sleeper, departures from Cornwall are in the early part of the morning, including a 0820 peak arrival in Plymouth. For the same reason, journeys back to Cornwall depart Plymouth in the evening, from 1900 onwards.

Other stations on the main line in the area at Saltash and St Germans are served on an irregular one or two hourly basis by Penzance trains which originate variously in London, Bristol, Exeter or Plymouth itself, augmented by all stations peak extras to Liskeard. Menheniot and St Budeaux Ferry Road have limited services largely confined to peak periods. Menheniot, like Devonport, is only served on request.

River Tamar Crossings Study

Final Report

Rail services across Tamar Bridge (Monday to Friday)																												WESTBOUND							
PLYMOUTH	05:06	05:43	06:28	06:41	07:02	07:53	08:14	08:40	09:21	10:42	10:54	11:20	12:39	12:54	13:11	13:53	14:54	15:12	15:57	16:38	17:04	17:23	17:55	18:17	18:23	18:42	19:01	19:31	19:49	20:26	20:50	21:19	21:31	22:31	
DEVONPORT	-	-	-	06:44	07:07	-	08:17	08:43	09:24	-	10:57	-	-	12:57	-	-	14:57	-	16:00	16:41	17:07	-	-	18:20	18:26	-	-	-	-	-	-	-	21:34	-	
DOCKYARD*	-	-	-	06:45	-	-	-	08:44	-	-	10:58	-	-	12:58	-	-	14:58	-	16:01	16:42	17:08	-	-	18:21	18:27	-	-	-	-	-	-	-	21:35	-	
KEYHAM	-	-	-	06:47	-	-	-	08:46	-	-	11:00	-	-	13:00	-	-	15:00	-	16:03	16:44	17:10	-	-	18:23	18:29	-	-	-	-	-	-	-	21:37	-	
ST BUDEAUX Ferry Rd	-	-	-	-	-	-	-	-	-	10:48	-	-	-	-	-	-	-	-	16:06	-	17:13	-	-	18:26	-	-	-	-	-	-	-	-	-	-	
SALTASH	-	-	-	-	07:15	08:02	08:24	-	09:31	10:53	-	-	12:48	-	-	14:02	-	-	16:11	-	17:18	17:34	18:03	18:31	-	-	-	-	19:40	-	20:37	-	-	-	22:40
St GERMANS	-	-	-	-	07:23	08:09	08:31	-	09:38	11:00	-	-	12:55	-	-	14:09	-	-	16:18	-	17:25	17:41	-	18:38	-	-	-	-	-	20:44	-	-	-	22:47	
MENHENIOT*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16:25	-	17:32	-	-	18:45	-	-	-	-	-	-	-	-	-	-	
LISKEARD	-	06:08	06:51	-	07:36	08:21	08:43	-	09:50	11:12	-	11:44	13:07	-	13:35	14:21	-	15:36	16:31	-	17:40	17:54	18:20	18:52	-	19:07	19:23	19:57	20:12	20:56	21:13	21:44	-	22:59	
ST BUDEAUX Victoria Rd	-	-	-	06:51	-	-	-	08:50	-	-	11:04	-	-	13:04	-	-	15:04	-	-	16:48	-	-	-	-	18:33	-	-	-	-	-	-	-	-	21:41	-
BERE FERRERS	-	-	-	06:58	-	-	-	08:57	-	-	11:11	-	-	13:11	-	-	15:11	-	-	16:55	-	-	-	-	18:40	-	-	-	-	-	-	-	-	21:48	-
BERE ALSTON	-	-	-	07:07	-	-	-	09:06	-	-	11:20	-	-	13:20	-	-	15:20	-	-	17:04	-	-	-	-	18:49	-	-	-	-	-	-	-	-	21:57	-
CALSTOCK	-	-	-	07:14	-	-	-	09:13	-	-	11:27	-	-	13:27	-	-	15:27	-	-	17:11	-	-	-	-	18:56	-	-	-	-	-	-	-	-	22:04	-
GUNNISLAKE	05:50	-	-	07:27	-	-	-	09:26	-	-	11:40	-	-	13:40	-	-	15:40	-	-	17:24	-	-	-	-	19:09	-	-	-	-	-	-	-	-	22:17	-

Rail services across Tamar Bridge (Monday to Friday)																												EASTBOUND							
GUNNISLAKE	05:50	-	-	-	07:31	-	-	-	09:29	-	-	-	-	11:45	-	-	13:45	-	-	15:45	-	-	17:29	-	-	-	19:13	-	-	22:21	-	-	-	-	
CALSTOCK	06:01	-	-	-	07:42	-	-	-	09:40	-	-	-	-	11:56	-	-	13:56	-	-	15:56	-	-	17:40	-	-	-	19:24	-	-	22:32	-	-	-	-	
BERE ALSTON	06:10	-	-	-	07:51	-	-	-	09:49	-	-	-	-	12:05	-	-	14:05	-	-	16:05	-	-	17:49	-	-	-	19:33	-	-	22:41	-	-	-	-	
BERE FERRERS	06:15	-	-	-	07:56	-	-	-	09:54	-	-	-	-	12:10	-	-	14:10	-	-	16:10	-	-	17:54	-	-	-	19:38	-	-	22:46	-	-	-	-	
ST BUDEAUX Victoria Rd	06:24	-	-	-	08:05	-	-	-	10:03	-	-	-	-	12:19	-	-	14:19	-	-	16:19	-	-	18:03	-	-	-	19:47	-	-	22:55	-	-	-	-	
LISKEARD	-	06:26	07:11	07:29	-	07:53	08:20	09:16	-	09:51	10:16	11:09	11:33	-	12:16	13:09	-	14:23	15:31	-	16:17	17:34	-	17:49	18:14	19:14	-	20:45	21:53	-	23:21	23:39	-	-	
MENHENIOT*	-	-	-	07:33	-	-	-	-	-	-	-	-	-	-	-	13:13	-	-	-	-	16:21	-	-	-	-	-	-	20:49	-	-	-	-	-	-	
St GERMANS	-	-	07:22	07:41	-	-	08:31	09:27	-	-	-	-	-	-	12:27	13:22	-	14:34	-	-	16:30	-	-	18:00	18:25	-	-	20:58	22:04	-	-	-	-	-	
SALTASH	-	-	07:30	07:48	-	-	08:39	09:35	-	-	-	-	-	-	12:35	13:29	-	14:42	-	-	16:37	-	-	18:07	18:33	-	-	21:05	22:12	-	-	-	-	-	
ST BUDEAUX Ferry Rd	-	-	-	07:52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16:41	-	-	18:12	-	-	-	21:09	-	-	-	-	-	-	-	
KEYHAM	06:26	-	-	07:54	08:07	-	-	-	10:05	-	-	-	-	12:21	-	-	14:21	-	-	16:21	16:43	-	18:05	-	-	-	19:49	21:11	-	22:57	-	-	-	-	
DOCKYARD*	06:28	-	-	07:56	08:09	-	-	-	10:07	-	-	-	-	12:23	-	-	14:23	-	-	16:23	16:45	-	18:07	-	-	-	19:51	21:13	-	22:59	-	-	-	-	
DEVONPORT	06:31	-	-	07:58	08:12	-	-	-	10:09	-	-	-	-	12:25	-	-	14:25	-	-	16:25	16:47	-	18:09	-	-	-	19:53	21:15	-	23:01	-	-	-	-	
PLYMOUTH	06:36	06:51	07:41	08:04	08:17	08:20	08:49	09:46	10:14	10:18	10:41	11:39	11:58	12:30	12:45	13:39	14:30	14:51	15:56	16:30	16:52	18:00	18:14	18:19	18:42	19:39	19:58	21:20	22:25	23:06	23:45	00:04	-	-	

Table 3.7: Summary of Rail Services (2012)

The Tamar Valley branch line provides a generally two-hourly service to local stations within Plymouth at Devonport, Dockyard, Keyham, and St Budeaux Victoria Rd as well as stations on the Bere peninsula at Bere Ferrers and Bere Alston, and in Cornwall at Calstock and Gunnislake where the line terminates. While there is a 0817 arrival in Plymouth, the timetable is not well suited to commuting with return departures at 1638 and 1823. The service is provided by a 75-seat single car diesel unit.

3.5.2 Current Demand

Table 3.8 shows rail passenger flows across the Royal Albert Bridge, based on data from the Plymouth Public Transport Model. The data in the model has been provided by Network Rail and the train operating companies, to enable assessment of travel demand across all modes.

These rail passenger flows are compared with capacity later in this section.

Tamar Bridge Rail Crossing - Rail Passenger Flows St Budeaux Ferry Road – and Saltash						
Model	Cornwall to Plymouth			Plymouth to Cornwall		
	AM	Inter Peak	PM	AM	Inter Peak	PM
2009	224	68	166	76	99	294

Table 3.8 Hourly Rail Passenger Flows

Table 3.9 shows passenger use of stations within the study area, from Ivybridge in the east to Liskeard and Calstock in the west. Data has been obtained from the Delta Rail station usage reports prepared for the Office of the Rail Regulator¹ and the figures quoted are the sum of individual passenger entrances to and exits from each station and exclude interchanges.

Station	Annual Entries & Exits					Year on Year Trend				Overall Trend
	2010-11	2009-10	2008-09	2007-08	2006-07	09-10-11	08-09-10	07-08-09	06-07-08	
Ivybridge	67,104	56,494	64,154	59,920	59,108	19%	-12%	7%	1%	14%
Plymouth	2,401,082	2,278,718	2,249,849	2,026,852	1,845,958	5%	1%	11%	10%	30%
Devonport	27,006	21,674	21,528	17,450	19,655	25%	1%	23%	-11%	37%
Dockyard	5,406	5,524	5,274	4,924	5,335	-2%	5%	7%	-8%	1%
Keyham	6,330	5,016	5,600	5,055	7,976	26%	-10%	11%	-37%	-21%
St Budeaux, Victoria Road	6,942	7,026	5,666	5,193	5,264	-1%	24%	9%	-1%	32%
Bere Ferrers	14,374	12,606	11,252	10,103	10,824	14%	12%	11%	-7%	33%
Bere Alston	41,666	36,272	32,112	28,936	26,866	15%	13%	11%	8%	55%
Gunnislake	50,218	51,424	48,102	48,747	43,676	-2%	7%	-1%	12%	15%
Calstock	33,198	33,368	30,600	26,825	23,476	-1%	9%	14%	14%	41%
St Budeaux, Ferry Road	2,326	1,540	1,132	1,199	1,037	51%	36%	-6%	16%	124%
Saltash	59,240	49,578	47,244	32,062	34,266	19%	5%	47%	-6%	73%
St Germans	44,758	38,258	37,718	29,073	29,540	17%	1%	30%	-2%	52%
Menheniot	2,690	3,844	4,598	3,610	4,206	-30%	-16%	27%	-14%	-36%
Liskeard	309,162	289,276	294,638	274,090	267,864	7%	-2%	7%	2%	15%
TOTAL exc Plymouth	670,420	611,900	609,618	547,187	539,093	10%	0%	11%	2%	24%
TOTAL inc Plymouth	3,071,502	2,890,618	2,859,467	2,574,039	2,385,051	6%	1%	11%	8%	29%

Table 3.9: Annual Passenger Use of Rail Stations in the Study Area

Table 3.9 shows a general pattern of growth over the last five years, which at 29% including Plymouth, or 24% without, is slightly ahead of the UK national trend of 21%, demonstrating that rail is an increasingly its market share for travel in the area, albeit from a low base. As with the rest of the UK overcrowding on peak trains is increasingly becoming the norm on cross Tamar services.

¹ <http://www.rail-reg.gov.uk/server/show/nav.1529>, retrieved 1 May 2012

It is noteworthy, however, that the suburban stations in Plymouth at Devonport, Dockyard, Keyham and St Budeaux are lightly trafficked. This can be partly attributed to low service levels and perhaps a reflection of the low commuting population within their catchment areas but particularly it reflects the strong alternative bus services available to these communities. As these bus services are some of the most frequent and well patronised routes in the city there is the issue of how much competition infrequent rail services would provide, even if rail service levels were significantly improved.

3.5.3 Current Capacity

Table 3.10 shows current peak capacity across the Tamar based on the rail timetable shown in Table 3.7 and compares this with the demand flows shown in Table 3.8.

	Cornwall to Plymouth		Plymouth to Cornwall	
	AM	PM	AM	PM
Capacity	600 – 750	440 – 520	280	720 – 800
Demand	224	166	76	294
Surplus capacity	376 – 526	274 – 354	204	426 – 506

Table 3.10 Peak Rail capacity (2012)

Table 3.10 appears to show spare capacity on peak rail services. However, the model results are based on a “neutral” month and do not take account of localised peaking that can occur at certain times, particularly in high summer months. Notwithstanding the overall average spare capacity that does exist, there are issues with overcrowding, particularly on short formation trains, at times.

3.5.4 Constraints and Opportunities

In the medium term, Network Rail has identified in the Great Western Route Utilisation Strategy (RUS)² that the Intercity Express Programme provides an opportunity to develop a standard pattern of service throughout the day between Bristol, Exeter, Plymouth and Penzance.

While existing infrastructure copes satisfactorily with current service levels and would accommodate some increase in service provision without difficulty, there are some significant constraints to major growth in rail traffic. Foremost of these is the Royal Albert Bridge itself: the bridge is single tracked and has a permanent speed restriction of 15mph. Network Rail calculate that the theoretical maximum number of trains which could cross the bridge in an hour are five one way and four the other. This has been calculated looking at the section of track from Plymouth to St Germans³.

Current track configuration and signalling also act as constraints to the development of enhanced local services within the Plymouth travel to work area. The Saltash to Liskeard route section has two long signal sections of four miles then eight miles: provision of intermediate signals would need to be investigated if an increase in service frequency is proposed. In addition, while there is a track cross-over at Liskeard, signalling works would be required to allow trains to terminate and turnback there. To the east, there is no crossover facility at Ivybridge meaning that any trains operating beyond Plymouth would need to continue to Totnes to terminate and turnback.

While Network Rail acknowledges economic growth forecasts for Plymouth and the aspirations for improved local services and the development of a Plymouth Metro type of operation⁴, the focus at present is on train lengthening rather than major infrastructure investment. Recognising the national trend for increased rail travel, particularly for peak commuter trips, further consideration needs to be

² Great Western Route Utilisation Strategy, Network Rail, March 2010, s6.9.12

³ Email from Senior Strategic Planner, West Country, Network Rail, 24 May 2012

⁴ Great Western Route Utilisation Strategy, Network Rail, March 2010, s9.7

given to catering for realistic levels of future growth. For example parking at stations in South East Cornwall is often limited and therefore to offer effectively a rail based park & ride option at stations such as Liskeard, St Germans and Saltash may be difficult without further investment in facilities.

The opportunity exists to restore the rail line between Bere Alston and Tavistock which could have potential implications for services to Gunnislake. The current proposal is for the necessary infrastructure investment to be entirely funded from the proceeds of major residential development at Monksmead, south of Tavistock. Network Rail regard the rail proposals to be at an early stage with options still awaiting development but these could include enhancing services between Plymouth and Gunnislake to make efficient use of the additional rolling stock. This would be subject to satisfactory business case assessment.

3.6 Local Bus

3.6.1 Description

Bus services across the river Tamar are provided by First Devon & Cornwall via the Torpoint Ferry and by both First Devon & Cornwall and Plymouth Citybus via the Tamar Bridge. Table 3.11 summarises current service details.

Operator	Service	Crossing	Route	M-F Peak Frequency	Saturday Frequency	Sunday Frequency
First	1, 1A	Tamar Bridge	Plymouth and Saltash	10 minutes	10 minutes	
First	76	Tamar Bridge	Plymouth, Saltash, Callington	Hourly	Hourly	
Citybus	43A	Tamar Bridge	Plymouth and Saltash	30 minutes	30 minutes	
Citybus	152	Tamar Bridge	Derriford Hospital, Saltash, Latchbrook	30 minutes AM 60 minutes PM	No service	
First	81, 81A	Torpoint Ferry	Plymouth, Torpoint or Insworke	3 – 4 buses per hour	3 buses per hour	

Table 3.11: Summary of Bus Services Crossing River Tamar (2012)

The range of direct links across the Tamar has recently been reduced with the withdrawal of service 81C. This service commenced in 2007 using DfT Kickstart funding to provide a through service to Derriford Hospital from Cremyll and Torpoint. Demand did not meet expectations and the service was reduced in frequency in 2009 before the Derriford and Cremyll links were finally curtailed in April 2012.

3.6.2 Current Demand

Discussions have been held with managers of both bus companies, from which an understanding of current demand has been obtained.

3.6.3 Tamar Bridge Bus Services

The bus services between Saltash and Plymouth via the Tamar Bridge perform two principal functions, catering for end-to-end demand between Saltash and the city centre as well as meeting more local demand within Plymouth on the St Budeaux and Milehouse corridor. Trip purposes are principally for work and education at peak times, with a very high proportion of elderly concession card holders at off-peak times. As well as the main flows into Plymouth in the morning peak and out again in the evening, there is also a strong tidal flow movement to and from schools in Cornwall.

Indicative numbers suggest peak hour bus demand of circa 200-250 trips across the Tamar in the with-flow direction, meaning that the bus is the primary public transport mode for local trips across the river. When considering available capacity for future demand growth, however, account must also be taken of the use of these services as the buses continue into Plymouth as discussed in section 3.6.3.

Service 76 which operates from Callington via Saltash to Plymouth on an hourly frequency is not perceived by users to be part of the local transport network, despite following the same route from the Tamar Bridge into Plymouth and is instead mainly used for longer distance trips. This may be a result of its relative lack of penetration of the main residential areas of Saltash.

Both operators report strong growth in demand in recent years for links to the Derriford Hospital and Northern Corridor areas, reflecting the increase in employment that has already occurred and the continued development of this part of the city which is fast becoming a secondary hub to complement the established city centre.

3.6.4 Torpoint Ferry Bus Services

Demand across the Tamar on the bus services using the Torpoint Ferries is considerably lower than for the Tamar Bridge services. This is possibly due to a number of factors:

- Lower baseline population in Torpoint and Rame Peninsula than Saltash, Callington and Liskeard
- Cost – the graduated fare scale used by First means that a passenger boarding a bus in Torpoint pays a circa 30% higher bus fare than one boarding a bus at the ferry terminal in Devonport, when travelling on towards Plymouth. As foot passengers travel free, there is an incentive for local people in Torpoint to walk to the ferry and catch the bus once it reaches Devonport. (The reverse applies for journeys from Plymouth). This factor would not affect concession card holders who travel free on local bus services.
- Journey time – the through service from Torpoint takes a circuitous route around Stoke or Devonport Hill on its route to the city centre. Coupled with the cost factor, it makes the option of catching a direct bus from the Devonport ferry terminal an attractive option.
- Frequency – the service level is lower and irregular, with the daytime headway varying from 15 to 30 minute.

3.6.5 Current Capacity

On the basis of currently used vehicle types, the peak hour capacity provided across the Tamar is summarised in Table 3.12. Capacity has been calculated as the total number of seats provided on current scheduled services, recognising the difficulty of achieving the authorised standing allowance in practice, the unattractiveness to users of standing for journeys of over 20 minutes and therefore the undesirability of planning to achieve maximum occupancy. Demand estimates are derived from bus loading data provided by Plymouth Citybus and First.

We have also included an estimate of 'local demand', which is the passenger demand on the section within Plymouth from the bridge or ferry, to reflect the whole route demand and therefore capacity required.

Corridor	Capacity	Estimated Demand	Spare Capacity	Estimated Local Demand Within Plymouth	Net Spare Capacity
Tamar Bridge – Plymouth	320	220	100	100	0
Tamar Bridge – Derriford	40	40	0	0	0
Torpoint – Plymouth	160	80	80	20	80

Table 3.12: Peak Hour Capacity and Utilisation (2012)

3.6.6 Constraints and Opportunities

Both operators have expressed interest in enhancing services to meet future demand growth, either through increased frequencies on existing routes or, where the demand quantum is sufficient, adding new services to the network. While Plymouth city centre is the main demand destination at present, there is recognition of the growing importance of developments on the Northern Corridor and of the increasing significance of the public transport hub at Derriford Hospital.

Operators cite the importance of bus priority in their ability to deliver reliable and attractive services. The arrangements at the Tamar Bridge toll plaza and bus priority on the St Budeaux corridor are examples of effective priority measures that have given the bus a distinct advantage over general traffic.

If bus services are to contribute to the transport solutions for new developments, it is critical that the principles of public transport orientated development are followed, particularly for residential schemes. There is a need to ensure that the highway specification and internal road network afford access to full sized buses to allow effective penetration of developments and minimise walk distances to bus services.

A summary of public transport constraints and opportunities is shown in Figure 3.6.

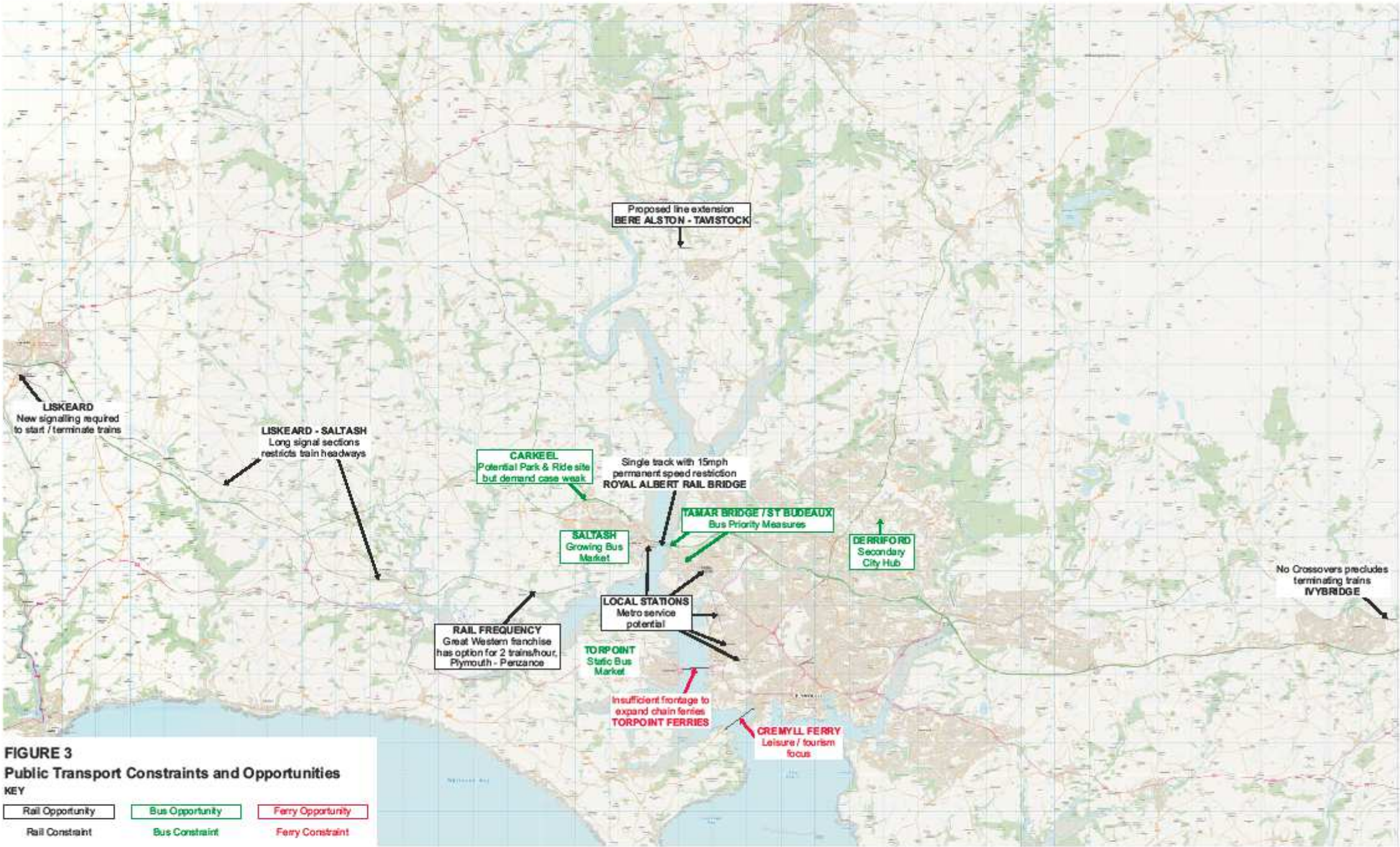


Figure 3.6 Public Transport Issues and Opportunities (2012)

3.7 Walk and Cycle

3.7.1 Introduction

The pedestrian and cycling choices open to residents and visitors are determined by the physical links of the Tamar Bridge and the ferries, Torpoint and Cremyll. The attractiveness of walking and cycling as an alternative to the car or public transport is dependent on a number of factors, including the route (is it direct or circuitous, flat or hilly), cost, perceived safety, lighting and signing. Clearly the Tamar is a barrier for all trips, as the most direct routes invariably involve some additional distance and time. However because of the savings in cost (parking, fuel, fares) and potential time savings in congested streets when cycling, for example, walking and cycling should be encouraged through policy, information and investment.

Tamar Bridge

3.7.2 Description

On the Tamar Bridge there is a segregated shared foot/ cycle lane on the southern cantilevered section of the bridge. The link ties in with the urban highway network on either side of the crossing. To the east of the bridge the cycle footway links into the PCC signed on street cycle route which travels either south along Pemros Rd or continues east along Normandy Way. Both cycle routes are along quiet 30mph residential streets. The pedestrian route links into the current pedestrian facilities which provide footway on either side of the residential street. There is an informal crossing at the point that the cycle footway ends on the eastern side of the bridge which allows cyclists and pedestrians to get to the most appropriate side of the highway.

To the west of the crossing the cycle footway links into Fore Street. There are no formal cycle facilities within close proximity to where the bridge ends. The cycle footway does link into a footway which travels toward Saltash town centre. There are no crossing points for pedestrians at the end point of the cycle footway, although Fore Street appears to be lightly trafficked at this point. TBTFJC advise us that the pedestrian facilities are also regularly used by a number of mobility scooters.

Plymouth City Council has cycle counters on the Tamar Bridge which in 2012 identified daily averages of over 400 cycles per day in the peak summer period, with some days having over 600 cycles detected.

3.7.3 Constraints and Opportunities

There are opportunities to review the foot / cycle provision in combination with the development of schemes for increasing the bridge capacity. Should the southern cantilevered section on the bridge be required for vehicle traffic in the future then this could substantially change the role of this foot/cycleway crossing of the river and its offer of alternative connections into Saltash and Plymouth. However the legal constraints, the practical difficulties of converting the lane to vehicle use and the need to provide alternative arrangements for significant levels of pedestrians and cyclists may eliminate it from further consideration or scheme development.

Torpoint Ferry

3.7.4 Description

The Torpoint Ferry includes cycling and walking facilities within the infrastructure provision. At the Torpoint side of the ferry crossing there is footway provided to gain access which links into the footways along the adjoining streets. Cyclists are required to use the highway. The main signed vehicle route has no cycle specific facilities, although the overall width of the highway is good with no on-street parking and the speed limit is 30mph. This route is a designated cycle route outlined in the Plymouth Cycle Map. There is an off road leisure route to the west of Torpoint.

On the Plymouth side the ferry terminal is connected to the rest of the city via good standard footways and there are pedestrian facilities at all the junctions. The cyclists have a signed on-street route directly from the terminal. Where the route connects with Park Avenue, which heads toward the city centre, there are some on-street cycle lanes, although these are limited to relatively short lengths heading to and from the city centre. The Council and Sustrans funded 'Connect-West' project is significantly improving east west routes between the ferry terminal, Devonport, Stoke, Stonehouse and the city centre, increasing off road sections as well as linking with existing routes.

At the Torpoint ferry terminal there are cycle lanes that allow cyclists to bypass waiting vehicles in the holding area. On both sides of the crossing the cyclists load onto the ferry last, shortly before departure for safety reasons. For pedestrians there are routes around the terminal although it is understood that there is some conflict between the different modes in the terminal areas due to cyclists and pedestrians not obeying instructions.

3.7.5 Constraint and Opportunities

A key constraint is the limited total width of the highway and associated footways leading up to the ferry terminal. This is especially the case on the Plymouth side along Ferry Road which has quite a gradient change towards the city.

There is an opportunity through safety audits to better define the pedestrian route at the ferry terminal to improve safety and control of the departure area.

3.8 Travel Planning and Smarter Choices Initiatives

Travel planning is a well-established method for influencing behaviour and is generally led by local councils working with communities, schools and businesses. Normally the local authority will take the lead, either directly supporting local businesses or schools, or be indirectly involved in new development sites as part of a planning permission. Increasingly both Cornwall Council and Plymouth City Council have sought to utilise the wider 'Smarter Choices' approach, including introducing 'softer measures' and personalised travel planning (PTP) programmes. In the absence of public funding for introducing additional transport capacity, either highways or public transport, Councils are turning to influencing approaches to better manage demand when the supply is constrained.

Both Cornwall Council and Plymouth City Council have in house travel planning expertise to call on, but this is limited and is not resourced to deal with every request for support. In both authorities it is policy that all schools should have school travel plans and in Cornwall, for example, 99% of all schools have travel plans in place. Similarly good progress has been made with workplace travel plans, but as the programme is voluntary it needs considerable promotion and staff time to encourage participation, through 'Business Travel Forums' and area wide support.

When new developments are granted planning permission it is the policy of both Councils that travel plans are a requirement and they have to be monitored and enforced. Cornwall Council, for example, has its own guidance for developers - 'Travel Plans – Advice for Developers in Cornwall'. Monitoring of travel plan impacts and particularly mode shift is limited by staff resources at both councils, but future development will need to demonstrate compliance with local policies and increasingly challenging targets.

Large scale travel behaviour programmes, as part of the Plymotion campaign (<http://www.plymouth.gov.uk/plymotion>), for example, have been funded by external sources such as the Local Sustainable Transport Fund, and these will fund Plymouth City Council to work with both households and businesses over a 3 year period. The lessons learnt from this project will be invaluable in future programmes to support development and manage growth.

If behaviour change techniques are to be used more to offset planned development growth on the Tamar Crossings, whether arising from general travel growth or specific developments, then additional staff resources will be required. However because of the high value for money of travel planning and

other 'Smarter Choices' initiatives it should be integrated fully into the options developed on how best to meet future demands.

4 Demand Forecasts

4.1 Introduction

How current demand on the Tamar crossings will change over time with development growth is a key question of this study. We have therefore examined the levels and location of future development planned to take place within the Plymouth area and South East Cornwall as a basis for establishing low and high future growth scenarios.

The principal types of development likely to impact upon transport movements include residential, employment and retail developments. Major community and leisure developments can also impact on patterns of movement.

4.2 Development Prospects

4.2.1 Methodology and Assumptions

A development schedule has been constructed taking account of levels of growth identified by Plymouth City Council, Cornwall Council and adjoining authorities, where appropriate. The schedule includes the levels of proposed development, the locations where this is planned to occur and, where known, the likely timescales for delivery and completion.

For the Plymouth City Council area, a number of statutory local plans have been produced which set out the levels and types of development proposed within the city. These include:

- Core Strategy (adopted)
- Central Park Area Action Plan (AAP) (adopted)
- City Centre and University AAP (adopted)
- Derriford and Seaton AAP (pre-submission)
- Devonport AAP (adopted)
- Millbay & Stonehouse AAP (adopted)
- North Plymstock AAP (adopted)

Whilst much of the future development within the city is anticipated to take place on sites allocated within these local plans, there is likely to be a significant level of development on other sites. We have therefore included within the schedule current large planning permissions and other large sites identified in the latest Strategic Housing Land Availability Assessment (SHLAA) as being potentially suitable, available and achievable.

Another potential source of future development comes from “windfall” sites, that is, previously developed sites that have unexpectedly become available. The City Council has identified a potential future windfall rate for taking account of residential development on these types of sites.

Within the Plymouth urban fringe area, but outside the City Council boundaries, development is proposed within the South Hams District Council area. This is set out within the following adopted local plans:

- Core Strategy (adopted)

■ Sherford (AAP) (adopted)

Within Cornwall, the study has focussed on development proposed within South East Cornwall, particularly at Saltash and Torpoint. However, the study has also had regard to the overall levels of development proposed for the rest of Cornwall.

In January 2012, Cornwall Council published its preferred approach for a Core Strategy (now called the Local Plan) for the 20 year period from 2010 to 2030 and a series of discussion papers showing how the growth and distribution options presented in the preferred approach relate to Cornwall's 19 community network areas (CNAs). These growth options related primarily to future levels of residential development. For example the Cornwall Gateway CNA Discussion Paper identified key issues for Torpoint and Saltash town centres. It identified 9 combinations of housing numbers and growth patterns, suggesting that between 1,900 and 3,600 new homes could be required between 2010 and 2030 – with most of the growth focused on Saltash in each scenario.

Following the Core Strategy consultation in January - March 2012 and further review the Council adopted in February 2013 the "Local Plan: Strategic Policies Pre Submission Version". This plan, which includes reduced housing numbers, is now subject to a further consultation period (11th March to 22nd April 2013) and the Council will consider the outcome of this consultation after the May elections. Originally 48,500 new homes across Cornwall were identified by officers in the draft plan, but the Council adopted a lower total of 42,500.

While the revised development numbers may be challenged (either way – there is local opposition to even the reduced number) we have adopted the new lower figures as appropriate in assessing future demand, recognising that at the national level the Coalition government is seeking higher levels of housing growth than many Councils are willing to accept currently.

In the Cornwall Gateway CNA for example the new housing levels will be as follows;

Cornwall Gateway	Target Provision 2010-2030	Completions since 2010 and Commitments	Remaining Requirement
Saltash	750	163	587
Torpoint	300	13	287
Remainder of CAN	250	98	152
Total	1300	274	1026

These numbers clearly do not include earlier potential allocations of up to 3,400 new homes at the Broadmoor Farm site, for example.

We have included the new identified levels of development and potential sites within this development schedule. These documents included alternative options for some areas which have informed the development of low and high growth scenarios.

To supplement this information and to extend this information to include likely levels of employment and retail growth, we have had regard to Cornwall Council's Annual Monitoring Reports and evidence base reports. In particular, we have built into the development schedule assumptions regarding the amount of employment and retail floor space needed to meet future demands.

From the Council's Retail Study (2010) we have included net retail floor space provision requirements to meet demands by 2031. A trend based approach and an alternative higher population and household growth approach have informed our low and high growth scenarios.

From the Council's Employment Land Review (2010), we have included net land requirements for offices and industry for the period to 2026, which take account of forecasts of employment growth, past take up rates and an allowance for a choice of sites for developers.

4.2.2 Development Schedule

Tables 4.1 to 4.3 below set out the development schedules identified in 2012 for the period to 2026, for the study area, and some of the major schemes are also shown geographically in Figure 4.1. Clearly development in Plymouth and East Cornwall, shown in Tables 4.1 and 4.2, will have the greatest impact on cross-Tamar demand but the development prospects for the rest of Cornwall have also been considered to ascertain whether any significant development further west would have an impact on movements across the river. Table 4.3 shows the situation in the rest of Cornwall.

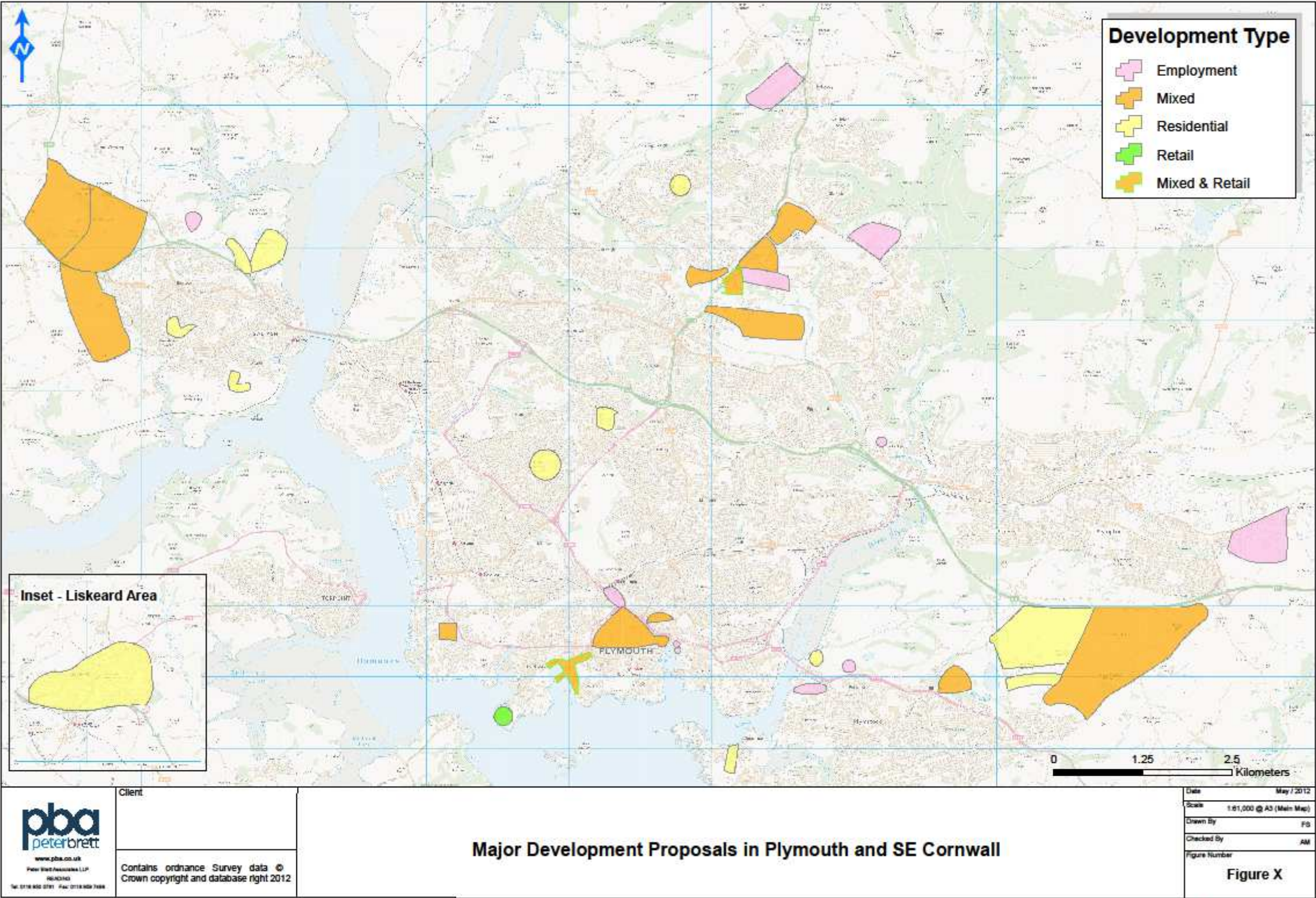


Figure 4.1. Major Development Proposals in Plymouth and South East Cornwall (2012)

River Tamar Crossings Study

Final Report

AAP or Area	Policy Ref	Site Location / Development Name	Type of Development (Land-Use)	Floor Space (m2)			Status
				Dwellings	Commercial	Retail	
North Plymstock	NP01	Plymstock Quarry	Residential / Mixed	1,684	21,000	2,000	Outline permission
	NP02	Pomphlett Ind. Estate	Mixed Use	75	3,850		Project Dev
	NP16	Land North of Hazledene Quarry	Residential	1,000			Emerging proposal
Millbay & Stonehouse	MS01	Royal William Yard	Mixed Use		3,000	7,500	Construction
	MS03	East Quay/Clyde Quay	Residential / Office	1,300	40,000		Pre-application
	MS04	Bath Street	Residential	550			Pre-application
	MS07	Millbay Marina	Residential	90			Pre-construction
Devonport	DP01	South Yard Enclave	Mixed Use	150	3,500	1,860	Construction
	DP06	Mount Wise	Residential	450	7,500		Construction
Sutton Harbour	SH02	Bretonside Bus Station	Mixed Use	310	22,000	5,400	Project Dev / Construction
	SH04	47-57 Exeter Street	Mixed Use	240	26,200	3,300	Project Dev
	SH05	Friary Park	Mixed Use	530	21,100	5,250	Project Dev
	SH07	Sutton Road	Mixed Use	720	17,800	7,800	Project Dev
	SH08	Coxside Car Park	Mixed Use	118	3,800	1,000	Project Dev
Central Park	CP01	The Life Centre (Sports)	Sports / Mixed Use		5,380		Construction
	CP02	Home Park Stadium Improvements	Mixed Use		4,200	1,300	Pre-application
City Centre & University	CC08	Colin Campbell Court	Mixed Use	265		9,750	Adopted AAP
	CC11	Cornwall Street	Mixed Use	700		86,000	Adopted AAP
	CC14	North Cross and Railway Station	Office		100,000		Adopted AAP
	CC15	The Northern Triangle	Mixed Use	444	7,000		Adopted AAP
Derriford & Seaton	DS06	Plymouth Int. Medical & Tech Park	Health	50	50,000		Pre-submission AAP
	DS07	Tamar Science Park	Office	50	25,000		Pre-submission AAP
	DS09	Derriford Hospital	Children's Hospital	200	20,000		Pre-submission AAP
	DS10	University College St Mark and St John	Student Accommodation	500			Pre-submission AAP
	DS11	Christian Mill	Office		1,400		Pre-submission AAP
	DS12	Glacis Park	Residential / Office	700	15,000		Pre-submission AAP
	DS13	Seaton Neighbourhood	Mixed Use	770		2,000	Pre-submission AAP
	DS14	North West Quadrant	Mixed Use	580	5,000	820	Pre-submission AAP
	DS17	New District Centre	Mixed Use	320	25,000	30,000	Pre-submission AAP
		Plymouth Airport (401K)	Residential	300	3,000		Outline permission
Outside AAP areas		The Lozenge	Residential	123			Outline permission
		North Prospect Phase 1A & 1B	Residential	405			Outline permission
		Southway Phase 1C	Residential	450			Pre-application
		Tesco Transit Way	Retail			15,000	Planning consent
Completions & Constructions (2009-2011)		Princess Yachts (South Yard)	Commercial		31,935		Planning consent
	MS01	Mills Bakery, Royal William Yard	Residential	79			Complete
	SH07	Salt Quay House	Employment		4,800		Complete
		Unit J 91 St Modwen Road	Employment		2,226		Under construction
		1 Belliver Way	Employment		2,786		Under construction
	SH07	East Quays Boat Yard, Sutton Road	Employment		3,100		Under construction
		Sisna Park, Estover	Employment		4,045		Under construction
Plymouth Urban Fringe		Yacht Haven Quay, Breakwater Road	Employment		6,775		Under construction
	SNC1	Sherford (Sherford AAP adopted)	New community	5,180	67,000	16,840	Outline permission
		Langage	Energy Park		140,000		Proposal in PUF DPD

Table 4.1: Development Schedule for Plymouth 2011

River Tamar Crossings Study

Final Report

AAP or Area	Policy Ref	Site Location / Development Name	Type of Development (Land-Use)	Floor Space (m2)			Status
				Dwellings	Commercial	Retail	
East 1 North Cornwall	PP10	Wadebridge and Padstow - Wadebridge	Residential	800			Preferred option in CS
	PP10	Wadebridge and Padstow - Rest	Residential	700			Preferred option in CS
	PP11	Bodmin	Residential	1,000			Preferred option in CS
	PP11	Bodmin-Rest	Residential	250			
	PP11	Bodmin - ALTERNATIVE	Residential	5,000			Preferred option in CS
	PP12	Camelford	Residential	800			Preferred option in CS
	PP13	Bude	Residential	900			Preferred option in CS
	PP13	Bude - Rest	Residential	350			Preferred option in CS
	PP14	Launceston	Residential	1,500			Preferred option in CS
	PP14	Launceston - Rest	Residential	400			Preferred option in CS
		Wadebridge TTWA	Employment		54000		Net employment space needed
		Launceston TTWA	Employment		84000		
		Bude TTWA	Employment		36000		
		Wadebridge	Retail			6705	Net retail forecast provision needed (trend based growth)
		Wadebridge	Retail			5659	
		Bodmin	Retail			6259	
		Bodmin	Retail			7982	
		Bude	Retail			4127	
		Bude	Retail			4578	
		Launceston	Retail			8777	
		Launceston	Retail			12395	
Rest of East Area 2 Caradon	PP15	Liskeard and Looe - Liskeard	Residential	1,250			Preferred option in CS
	PP15	Liskeard and Looe - Looe	Residential	700			Preferred option in CS
	PP16	Caradon	Residential	800			Preferred option in CS
		Liskeard	Retail			9602	Net retail forecast provision needed
		Liskeard	Retail			11092	
Saltash - Torpoint	PP17	Cornwall Gateway - Rest	Residential	450			Preferred option in CS
	PP17	Cornwall Gateway - Saltash	Residential	1,000.0			Preferred option in CS
	PP17	Cornwall Gateway - Saltash	Residential	3,500			Preferred option in CS
		Possible site: A1 Broadmoor Farm	Mixed Use	3400			
		Possible site: A2 Broadmoor Farm	Mixed Use	1600			
		Possible site: A4 Pill Lane	Residential	200			
		Possible site: A5 Land adj. Salt Mill	Residential	150			
		Possible site: A6 Land adj. Wearde Road	Residential	200			
		Possible site: A7 Latchbrook	Residential	1600			
		Saltash / Torpoint	Residential	112			Planning permissions
		Saltash, Church Road (SA2)	Residential	40			Planning permissions
		Small sites	Residential	47			Planning permissions
		Saltash & Torpoint TTWA	Employment		86000		Net employment needed
		Possible site: A3 Tamar View	Employment		110000		
		Saltash	Retail			1362	Net retail forecast provision needed (trend
		Saltash	Retail			1525	

Table4.2: Development Schedule for East Cornwall from "Our Preferred Approach for a Core Strategy" 2011

River Tamar Crossings Study

Final Report

AAP or Area	Policy Ref	Site Location / Development Name	Type of Development (Land-Use)	Floor Space (m2)			Status
				Dwellings	Commercial	Retail	
West 1 Penwith	PP1	West Penwith - Penzance	Residential	2,150			Preferred option in CS
	PP1	West Penwith - Rest of area	Residential	1,100			Preferred option in CS
	PP2	Hayle & St Ives - Haye	Residential	2,000			Preferred option in CS
	PP2	Haye & St Ives - St Ives	Residential	700			Preferred option in CS
	PP2	Hayle & St Ives - Rest of area	Residential	200			Preferred option in CS
		Former Penwith	Residential	2,644			These figures are requirements for the period 2009-2026 rather than actual permissions or allocations
		Penzance TTWA	Employment		140000		
		Penzance - Newlyn	Retail			15512	
		Penzance - Newlyn	Retail			15920	
		Hayle	Retail			2612	
		Hayle	Retail			2757	
West 2 Kerrier	PP3	Helston and The Lizard - Helston	Residential	1,100			Preferred option in CS
	PP3	Helston and The Lizard - Rest	Residential	900			Preferred option in CS
	PP4	Cambourne, Pool and Redruth	Residential	6,500			Preferred option in CS
	PP4	Cambourne, Pool and Redruth - Rest	Residential	500			Preferred option in CS
	PP5	Falmouth & Penryn	Residential	3,500			Preferred option in CS
	PP5	Falmouth & Penryn - Rest	Residential	500			Preferred option in CS
		Falmouth-Helston TTWA	Employment		56000		These figures are requirements for the period 2009-2026 rather than actual permissions or allocations
		Truro, Redruth & Camborne TTWA	Employment		420000		
		Helston	Retail			2540	
		Helston	Retail			4545	
		Camborne-Pool-Redruth	Retail			15554	
		Camborne-Pool-Redruth	Retail			21955	
		Falmouth-Penryn	Retail			10392	
		Falmouth-Penryn	Retail			17370	
Central 1 Carrick	PP6	Truro and Roseland - Truro	Residential	4,500			Preferred option in CS
	PP6	Truro and Roseland - Rest	Residential	700			Preferred option in CS
	PP7	St Agnes and Perranporth	Residential	1,100			Preferred option in CS
		Truro	Retail			63983	Trend based growth
		Truro	Retail			78103	Trend based growth
Central 2 Restormel	PP8	Newquay and St Columb - Newquay	Residential	3,000			Preferred option in CS
	PP8	Newquay and St Columb - Rest	Residential	300			Preferred option in CS
	PP9	St Austell	Residential	1,500			Preferred option in CS
	PP9	St Austell - Rest	Residential	250			Preferred option in CS
	PP9	China Clay	Residential	800			Preferred option in CS
	PP9	St Blazey, Fowey and Lostwithiel	Residential	800			Preferred option in CS
	PP9	St Blazey, Fowey and Lostwithiel -Rest	Residential	5,000			Preferred option in CS
		St. Austell TTWA	Employment		408000		These figures are requirements for the period 2009-2026 rather than actual permissions or allocations
		Newquay	Retail			4446	
		Newquay	Retail			4089	
		St Austell	Retail			21528	
		St Austell	Retail			24692	

Table 4.3: Development Schedule for Cornwall (excluding East Cornwall) from "Our Preferred Approach for a Core Strategy" 2011

The following table 4.4 is drawn from the "Local Plan: Strategic Policies Pre Submission Version", published in February 2013, which sets out the reduced housing numbers proposed after the consultation in 2012. These residential figures have been used for the transport modelling to establish growth arising from development. The revised employment and retail figures from the Local Plan, which changed less than housing, have also been utilised in the transport modelling.

River Tamar Crossings Study
Final Report

Community Network Area	Target Provision 2010-2030	Completions since 2010 and Commitments	Remaining Requirement
West Penwith:			
Penzance/Newlyn	1,400	481	919
Remainder of CNA	1,100	469	631
Hayle and St Ives:			
Hayle	1,300	997	303
St Ives-Carbis Bay	750	555	195
Remainder of CNA	350	192	158
Helston and the Lizard:			
Helston	900	456	444
Remainder of CNA	900	518	382
Camborne, Pool and Redruth:			
Camborne, Pool, Illogan and Redruth	4,000	2,723	1,277
Remainder of CNA	500	366	134
Falmouth and Penryn:			
Falmouth – Penryn	3,200	809	2,391
Remainder of CNA	800	302	498

Community Network Area	Target Provision 2010-2030	Completions since 2010 and Commitments	Remaining Requirement
Truro and Roseland			
Truro – Threemilestone	2,200	626	1,574
- Shortlanesend			
Remainder of CNA	800	403	397
St Agnes and Perranporth CNA	1,100	290	810
Newquay and St Columb			
Newquay	3,000	2,008	992
Remainder of CNA	600	198	402
St Austell, St Blazey, Fowey and Lostwithiel, China Clay Area			
Eco-community	2,300	0	2,300
St Austell	1,700	1,554	146
Remainder of CNA	300	134	166
St Blazey, Fowey and Lostwithiel CNA	800	394	406
China Clay CNA	1,400	910*	490
Wadebridge and Padstow:			
Wadebridge	800	253	547
Remainder of CNA	900	522	378

River Tamar Crossings Study
Final Report

Community Network Area	Target Provision 2010-2030	Completions since 2010 and Commitments	Remaining Requirement
Bodmin:			
Bodmin	3,000	536	2,464
Remainder of CNA	200	43	157
Camelford CNA	900	386	514
Bude			
Bude – Stratton – Poughill	800	567	233
Remainder of CNA	450	151	299
Launceston			
Launceston	1,100	744	356
Remainder of CNA	400	238	162
Liskeard and Looe			
Liskeard	1,000	320	680
Remainder of CNA	1,000	649	351
Caradon CNA	1,000	466	534
Cornwall Gateway			
Saltash	750	163	587
Torpoint	300	13	287
Remainder of CNA	250	98	152
Total	42,250	19,534	22,716

Table 4.4: Development Schedule for Cornwall – revised housing numbers from the "Local Plan: Strategic Policies Pre Submission Version" 2013.

Any estimate of levels of future development for a period up to 20 years is, by definition, subject to some degrees of uncertainty. The options in the tables above are discrete and not cumulative, so further variation in total numbers will have to be assessed as planning policy evolves.

In this case, whilst the policy framework for Plymouth City Council and South Hams District Council is well established, with adopted plans subjected to testing and examination, the situation is less certain within Cornwall and final levels of proposed development may change following current consultation.

However, plans are constantly under review, often open to legal challenge and both Councils will have to review their planning policies, having regard to new economic growth forecasts, needs assessments and market conditions when setting new policy targets for future development.

Development will continue to come forward from sites not identified within plans and the types and levels of such new development are not always predictable. The sudden loss or gain of a major employer to an area can lead to development or redevelopment not foreseen in plans. As an example, the recent closure of Plymouth Airport was not foreseen when the City Council was adopting its Core Strategy in 2007 and reacting to such changes therefore requires plans to be kept under review.

Changing economic circumstances and market conditions can alter development rates and affect the timing of proposals already in the pipeline. Significant fluctuations can affect the deliverability of overall levels of development. Whilst regular reassessments of market based information (e.g. annual updates of SHLAAs) can assist in predicting change and militating against uncertainty, delivery rates are always likely to vary from planned projections. As an example, the Sherford new community was

originally planned to start delivering homes in 2009. Due to the current economic climate, completions are now not scheduled before 2014.

4.3 Future Demand

4.3.1 Outline Methodology

To establish the demand on the Tamar Crossings in the future the Plymouth City Council Saturn highways model and EMME2 public transport model have been utilised. Both of these comprehensive models cover the wider Plymouth travel to work area and are therefore suitable for assessing and testing the demand for travel at key crossing points between South East Cornwall and Plymouth.

The level of demand for highway trips across the Tamar Bridge has been modelled using Plymouth's Saturn model. The 2009 level of demand is shown in Figures 4.1 and 4.2 for the am and pm peaks respectively. 2009 is the base year for the modelling and the data in the model was built from a series of roadside interview data collected in the preceding years, amongst other sources. Traffic flows across the bridge were surveyed in 2007. The demand flows taken from the 2009 model show the number of passenger car units (pcu) that would like to cross the bridge. This includes vehicles that are in reality held up in queues elsewhere on the highway network.

The future year, 2026, demand, is derived by increasing the 2009 level of demand to reflect the additional trip generation associated with new developments and the increase in car travel from the existing population and other land uses in the area. This has been derived from an existing model originally created for the assessment of schemes along Plymouth's northern corridor. Significantly large developments were explicitly modelled in the trip matrices, whilst other developments and the increase in car travel from existing land uses were modelled using the Department for Transport's forecast growth rates from the National Trip End Model (NTEM), provided via the Temprow programme. Temprow is the software provided by the DfT to output traffic growth rates using the NTEM results. The NTEM growth rates are based on an assumed level of development in the area which does not match exactly more locally informed views on the likely roll out of development in the area. The growth rates used were therefore modified using the alternative planning assumptions tools available in Temprow.

2026 was chosen as a forecast year because it is not so far in the future that predictions become too unreliable, but far enough to allow for the completed build out of a number of major developments to be included in the forecast.

The trip matrices from this model were modified to allow for the increased development above the planning assumptions within NTEM 6.2 for Cornwall and South Hams, and then assigned to the forecast network to create the revised model. This provides the forecast level of demand for vehicles to use the Tamar Bridge.

4.3.2 Alternative Planning Assumptions

The increase in households due to development in Cornwall and South Hams was supplied as an overall figure for 2010-2030. The model forecast is for 2026, and the model has a base year of 2009. Therefore, to compare the household development with NTEM data for changes between 2009 and 2026, the 2010-2030 household increases were pro-rata to provide data for 2009-2026.

Table 4.5 shows the alternative planning assumptions used in Temprow for Cornwall and South Hams and compares them to the standard planning assumptions used in NTEM version 6.2.

River Tamar Crossings Study

Final Report

NTEM zone	Description	NTEM 6.2 jobs 2009-2026*	NTEM 6.2 HHs 2009-2026*	Dev jobs 2009- 2026	Dev HHs 2009- 2026*	Jobs alternative assumption increases	HHs alternative planning assumption increases
18UG00	rural (South Hams)	0	853	457	0	457	0
18UG2	Ivybridge	1917	480	4667	361	4667	361
15UB0	rural (Caradon)	1536	2643	255	1063	255	1063
15UB1	Saltash	409	1058	234	638	234	638
15UB2	Torpoint	390	354	234	255	234	255
15UB3	Liskeard	554	680	425	850	425	850
15UB4	Looe	232	449	425	850	425	850
15UB5	Callington	268	320	0	0	0	0
Authority	North Cornwall	5415	7083	1913	6885	1913	6885
Study Area		951	14047	10413	12070	10413	12070

Table 4.5: Tempro Input Alternative Planning Assumptions

By applying these assumptions in Tempro alternative rates of demand growth by trip purpose and time period were extracted.

Table 4.6 gives a summary of the growth from 2009-2026 in AM peak commuting trip ends, showing the original NTEM 6.2 growth, the growth derived when using alternative planning assumptions, and the proportional difference between the two. The peak hour used in this modelling summary is 0800-0900 AM.

		AM peak alternative planning assumptions						AM peak proportional change	
Area Description		AM peak original		AM peak original		AM peak alternative planning assumptions		AM peak proportional change	
Level	Name	Commute Origin	Commute Destination	Commute Origin	Commute Destination	Commute Origin	Commute Destination	Commute Origin	Commute Destination
18UG00	rural (South Har	1.0053	1.0192	0.9676	1.0493	0.962499	1.029533		
18UG2	Ivybridge	1.1738	1.1515	0.9453	2.0897	0.805333	1.814763		
15UB0	rural (Caradon)	1.0039	1.1133	0.9284	1.0316	0.924793	0.926615		
15UB1	Saltash	1.0124	1.1194	0.956	1.0703	0.944291	0.956137		
15UB2	Torpoint	0.9635	1.0998	0.9392	1.0656	0.974779	0.968903		
15UB3	Liskeard	1.0288	1.1304	1.06	1.1074	1.030327	0.979653		
15UB4	Looe	1.05	1.1263	1.1808	1.2219	1.124571	1.08488		
15UB5	Callington	1.0242	1.1226	0.8837	1.0172	0.86282	0.906111		
Authority	North Cornwall	1.0826	1.1333	1.0733	1.0619	0.99141	0.936998		
Study Area	951	1.1087	1.0981	1.0105	1.073	0.911428	0.977142		

Table 4.6: Comparison of Tempro and Alternative Demand Growth Assumptions

The table shows for example, that for Saltash, the original AM peak commuting origin growth from 2009 to 2026 was 1.0124. With the alternative planning assumptions, (which assumes an increase of 638 households instead of 1,058 in NTEM 6.2), the growth is 0.956137.

Within Plymouth, the Council has prepared a detailed development schedule of expected growth in the area as shown in table 4.1. Within the Plymouth area it was particularly important to have regard to the precise location of growth, especially with respect to its relation to the crossing points of the river Tamar. In Plymouth the actual numbers of vehicle trips associated with each development and the distribution of those trips was calculated based on standard observed trip rates and locally observed travel patterns. The total number of vehicle trips starting or finishing in the Plymouth area was controlled to the total numbers, by journey purpose and time of day from the NTEM model. However, NTEM version 6.2 has a very low forecast of employment growth in Plymouth so for the Plymouth area the number of trips was controlled to the forecast totals in the previous version of NTEM, version 5.4.

4.3.3 Modelled Flows – Tamar Bridge and Torpoint Ferry

Figures 4.1 to 4.4 show the current and forecast AM and PM peak pcu demand flows across the Tamar, based on the alternative planning assumptions identified above. During the study development a number of different levels of planned development were tested and the most recent planning assumptions are now used to determine likely traffic growth.

While we expected more change due to the most recent Cornwall Council Local Plan decisions on reduced housing numbers the alternative demand flows represent a reasonable growth scenario with known variables. The 740 pcu growth in eastbound AM trips, for example, from 3134 to 3874 from 2009 to 2026 represents an annual increase of 1.26% (previous growth under the earlier Cornwall Council Core Strategy development levels was 1180 pcu, an annual increase of 1.89%).

As we discuss later the modelled flows, based on 2009, will also not reflect the reduced growth that has occurred during the last three years of recession and so testing against the recent observed growth, using Highways Agency and TBTFJC data, needs to be undertaken. It is possible that the predicted outcomes, where demand exceeds capacity, will now be significantly later than in our earlier assessment based on the higher levels of development in south east Cornwall and will be further tempered by the recent recession.

It would be reasonable to push back the expected year where demand exceeds capacity by approximately 5 years, but this needs to be tested with a detailed review of demand patterns from the Ferry and Bridge for the last four years - it is of course possible that demand has been suppressed and that it will grow back at a quicker rate than straight line growth modelling might normally assume.

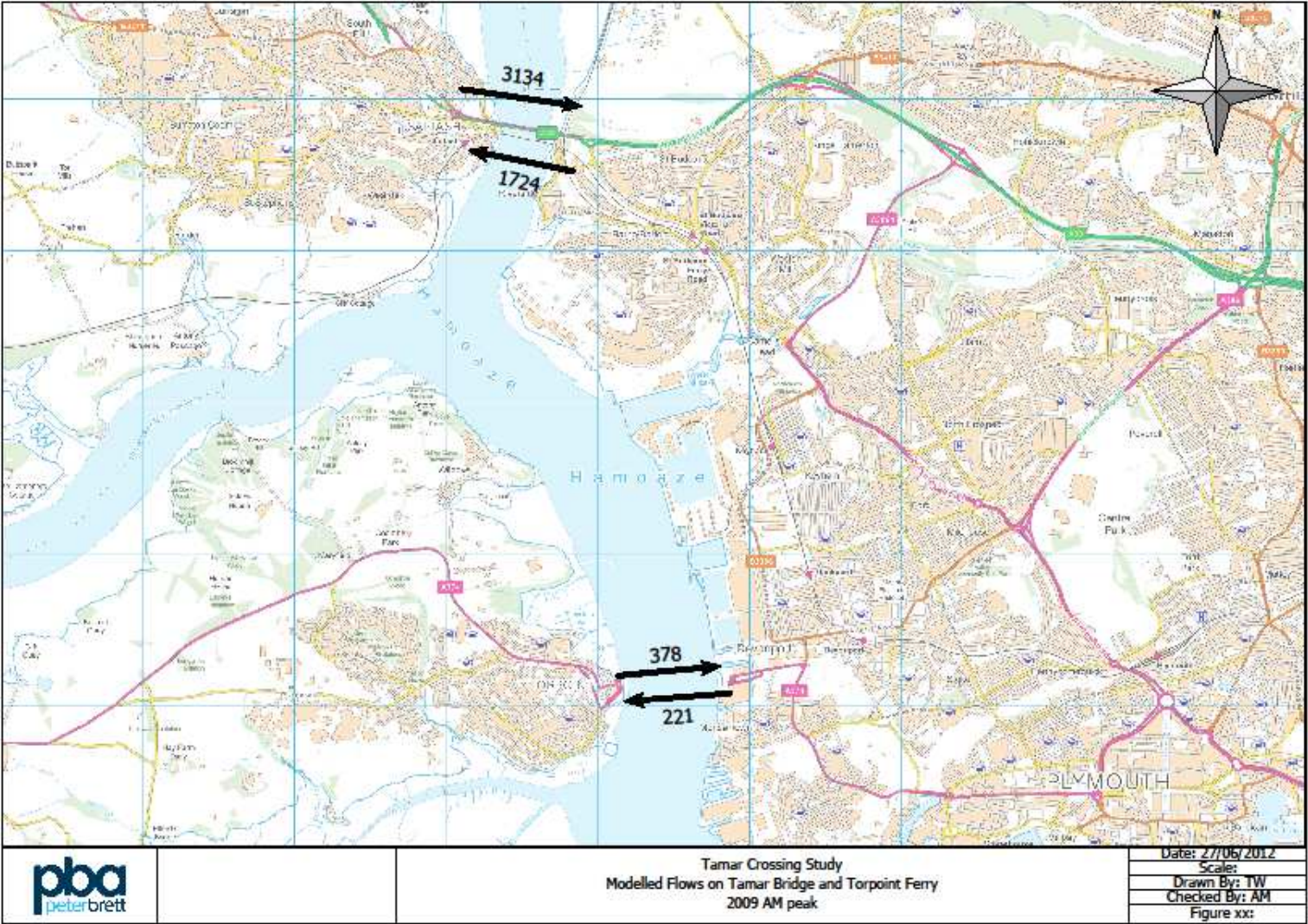


Figure 4.1 Modelled Flows 2009 AM Peak

River Tamar Crossings Study
Final Report

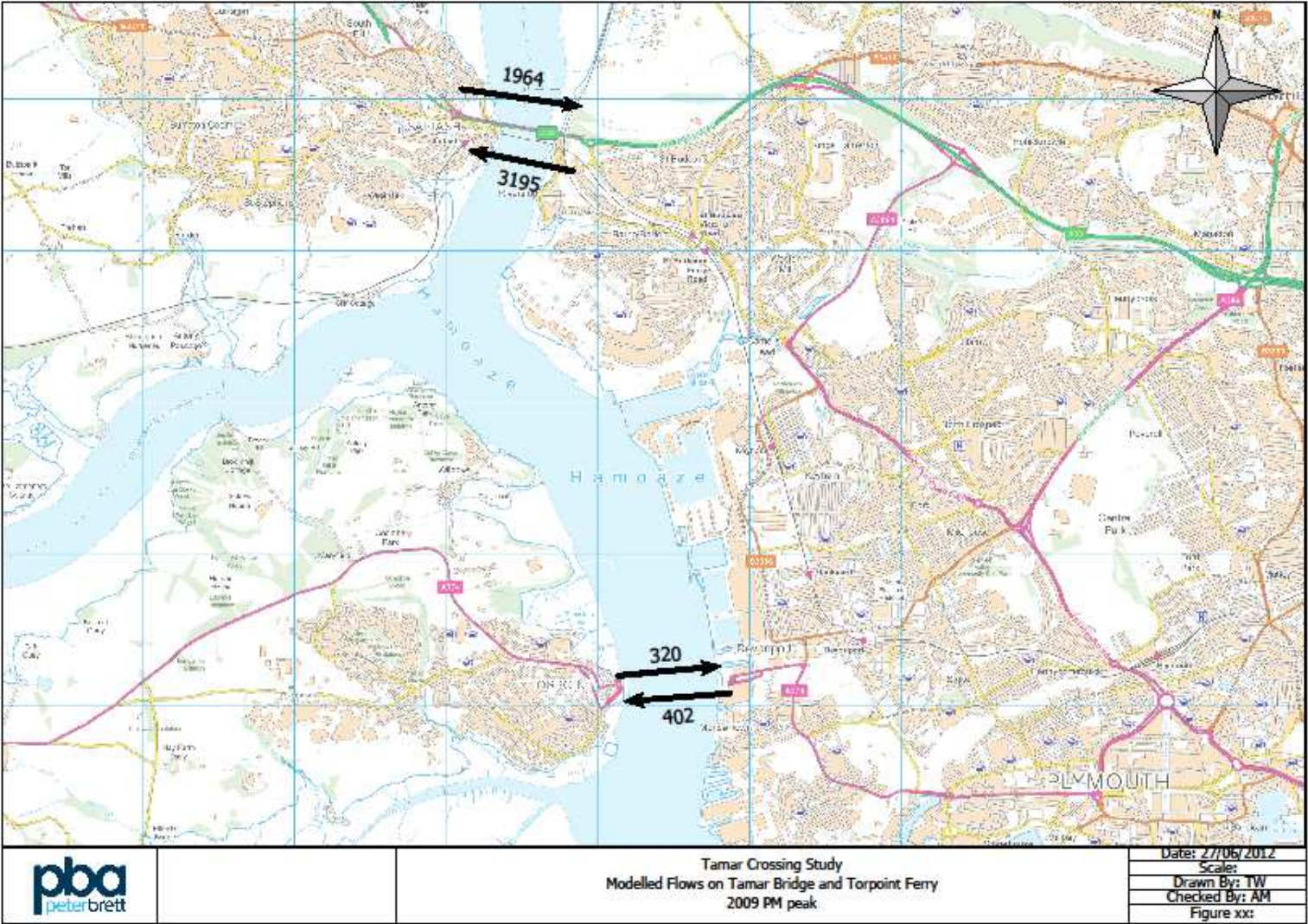


Figure 4.2 Modelled Flows 2009 PM Peak

River Tamar Crossings Study
Final Report

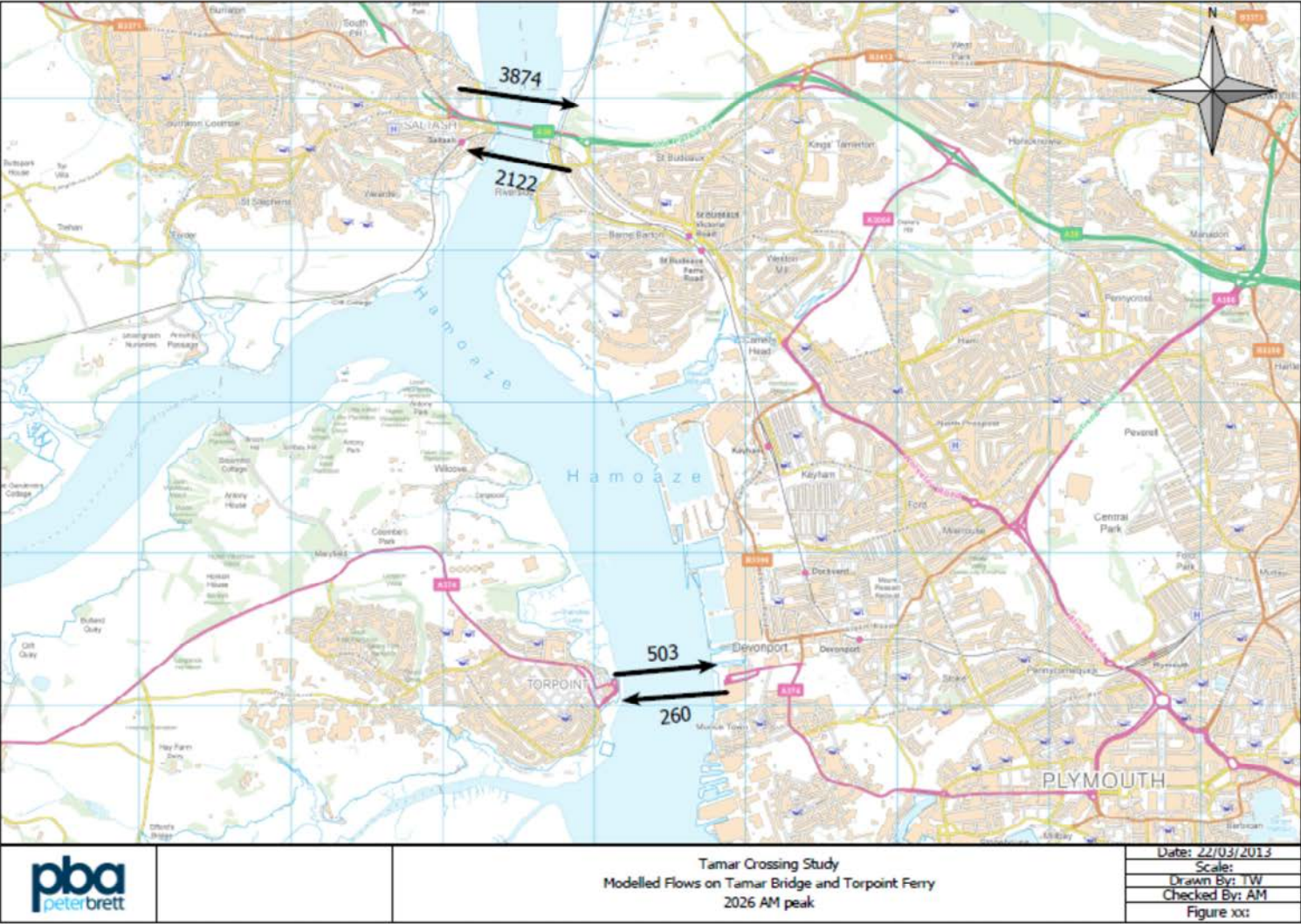


Figure 4.3 Modelled Flows 2026 AM Peak

River Tamar Crossings Study

Final Report

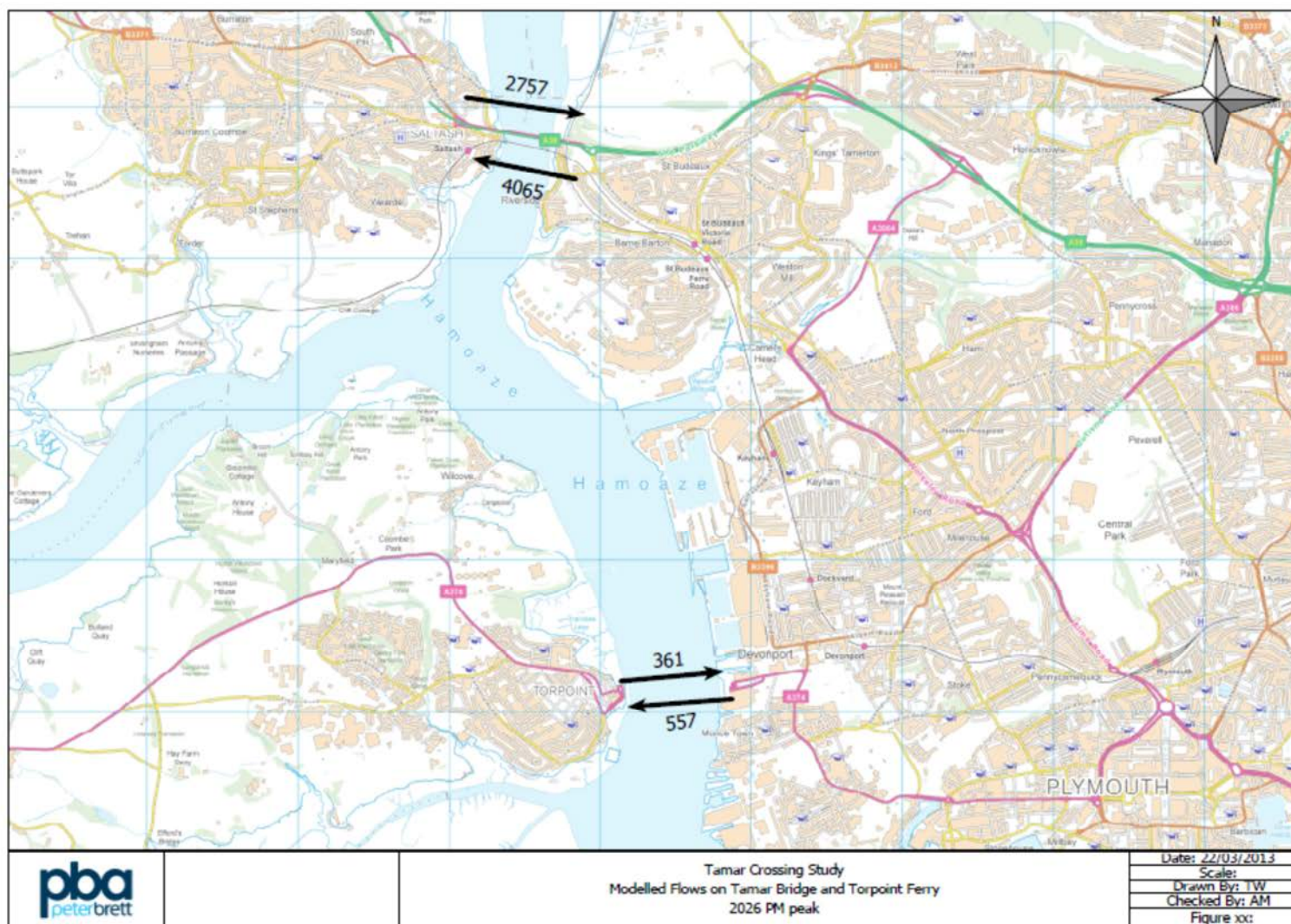


Figure 4.4 Modelled Flows 2026 PM Peak

4.3.4 Model Results

With regard to the A38 / Tamar Bridge route, Figures 4.5 to 4.8 below give a comparison of forecast demand flows and capacity over the next 30 years. The figures show east and westbound flows separately for the AM and PM peak periods, highlighting the critical points at which capacity is reached in the absence of mitigation measures. Note that the capacity is variable dependent on traffic direction, because of configuration and tidal flow operation and this is reflected on Figures 4.5 – 4.8:

- Eastbound AM capacity constraint is 3,400, as identified for Pemros Roundabout, not the two lane 3,600 identified for the A38 main deck or the 4,200 identified for the toll booths
- Westbound PM capacity is the two lane A38 main deck capacity of 3,600
- Eastbound PM capacity is again the Pemros Roundabout level of 3,400, although we have also shown the impact on the single merged lane at the Saltash Tunnel entrance at 1,600
- Westbound AM capacity is the single main deck running lane under tidal flow working, with a level of 1,600

Our modelled demand analysis therefore identifies the following outcomes, shown in Figures 4.5 - 4-8 below:

- On the principal demand flows, i.e. AM peak eastbound towards Plymouth and PM peak westbound from Plymouth, demand only reaches capacity after 2040.
- Because of the single traffic lane operated as part of some of the TBTFJC traffic plans on the Tamar Bridge and in the Saltash Tunnel, capacity becomes critical much sooner for the tidal flow movements, from Plymouth to Cornwall in the morning and returning in afternoon peak period. The first critical point is the westbound AM movement over the bridge: demand is already in excess of 90% of capacity today and is forecast to exceed capacity by 2018.
- The next critical points relate to the eastbound PM flow. Demand reaches 90% of capacity for the Saltash Tunnel in 2023 and 100% in 2027. Flows on the A38 east of Pemros Road Roundabout reach 90% of capacity in 2032 and 100% in 2036.
- Because observed flows suggest the recession has slowed traffic growth significantly the critical points may be reached 3 - 5 years later, but still need consideration unless alternative travel patterns – greater use of sustainable modes, etc. – can be achieved through demand management intervention by the two Councils.

On the Torpoint Ferry the modelled flows also show potential capacity issues in the future, as shown on Figures 4.9 – 4.12 below:

- Capacity in the weekday peak hour, with a 3 vessel operation and 10 minute frequency, is a maximum of 438 vehicles per hour.
- On the 2009 modelled flows there is a small amount of spare capacity on both AM and PM peak, in both directions - AM to Plymouth 378 (60 spare), PM to Torpoint 402 (36 spare). This reflects broadly the observed peak flows in 2012:

Torpoint Ferry – Modelled Flows				
	2009		2026	
	AM	PM	AM	PM
Westbound	221	402	260	557
Eastbound	379	320	503	361

- On the 2026 modelled flows 537 cars are shown on the AM flow to Plymouth and therefore the ferries would be over capacity by 101 vehicles.
- Similarly on the 2026 modelled flows for the PM peak hour the flow of 594 would be an excess demand of 156 vehicles.
- As noted above the ability to increase the number of vessels or improve frequencies is constrained by the nature of the chain ferry operation and therefore there will either be peak spreading, a shift to sustainable modes or longer distance trips may reroute where feasible to the Tamar Bridge.

Options to address these demand growth scenarios and infrastructure constraints are developed in the next chapter.

4.3.5 Modelled vs. Actual Flows

While we have utilised the traffic model to understand demand over a long period of time, testing various levels of development (residential, employment, etc.) and taking into account the general growth predictions for current traffic we must also reflect observed current flows. This is particularly important as the model is built from 2009 observed data and the economic recession and other factors have had an impact in the intervening period 2009 - 2012.

The TBTFJC data shows that traffic has not grown during this period and that there has been some overall reduction in numbers since the recession started in 2008. Therefore we would suggest that subject to more detailed testing the modelled estimates of when demand exceeds capacity, on both Tamar Bridge and Torpoint Ferry, should be adjusted by a period of up to 5 years. While our recommendations will establish the risk of excess demand on the identified modelled dates, we will encourage flexibility in assessing when actions may be required in future years to address capacity shortfalls.

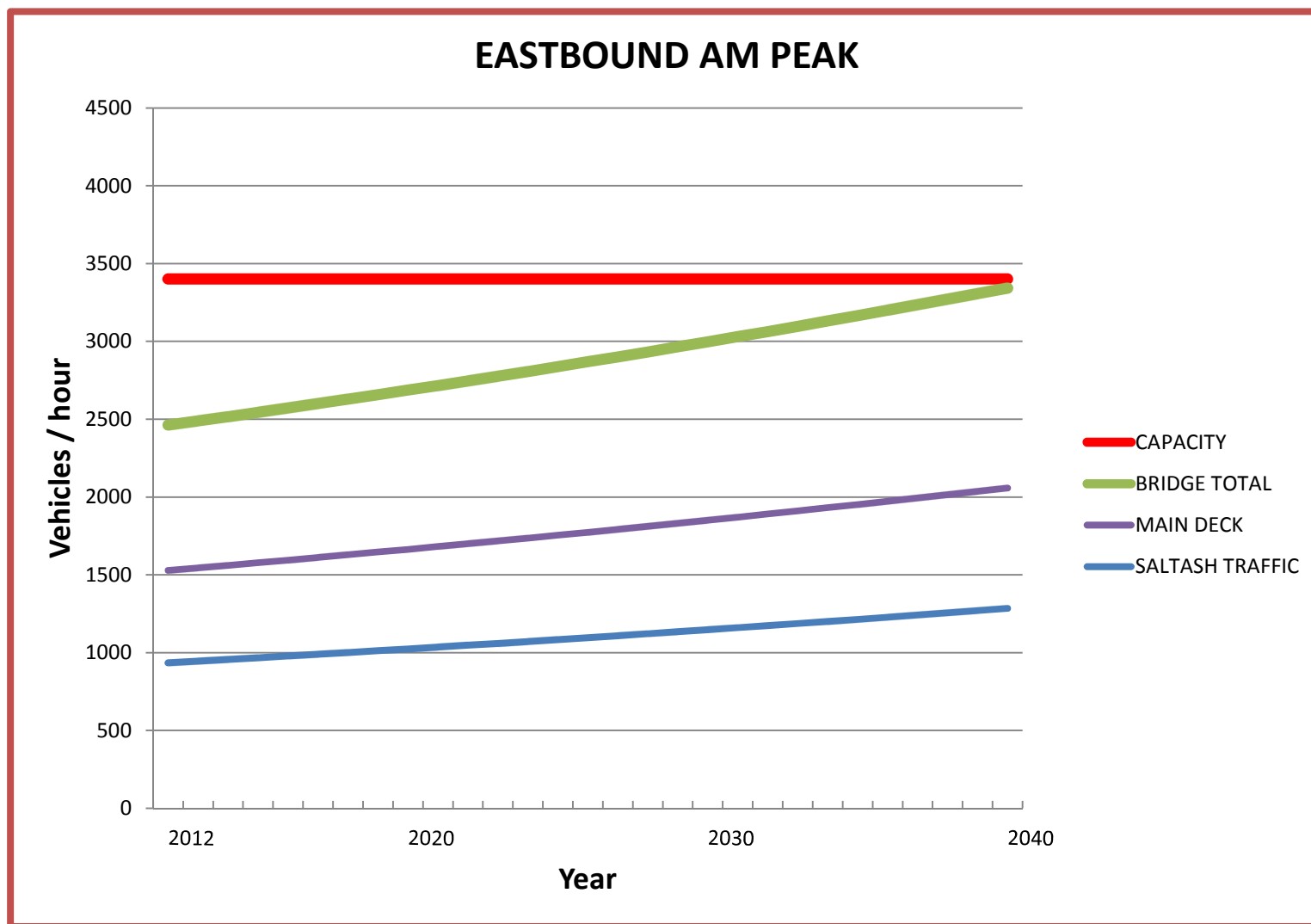


Figure 4.5 A38 / Tamar Bridge Corridor Demand v Capacity, Eastbound AM Peak

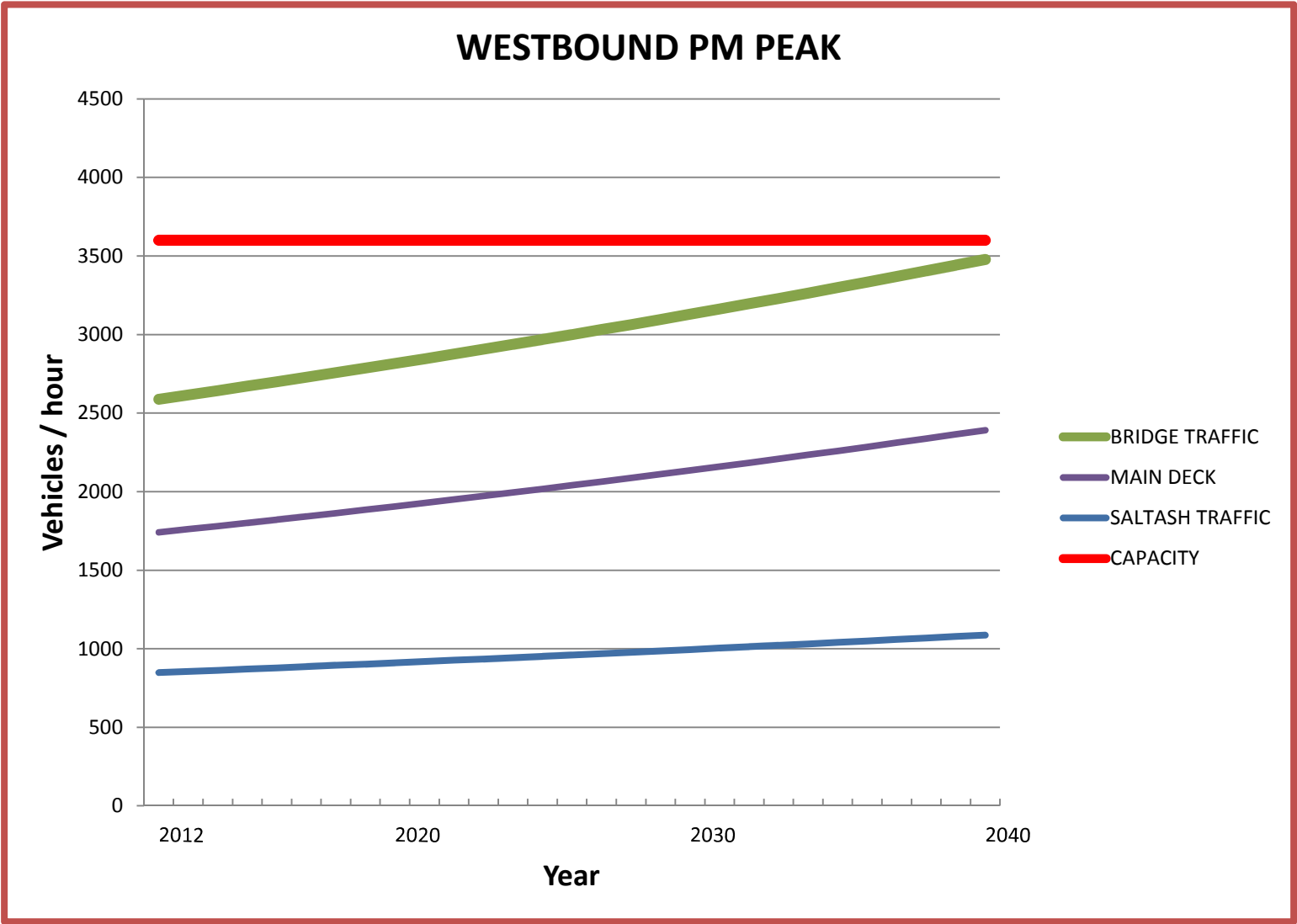


Figure 4.6 A38 / Tamar Bridge Corridor Demand v Capacity, Westbound PM Peak

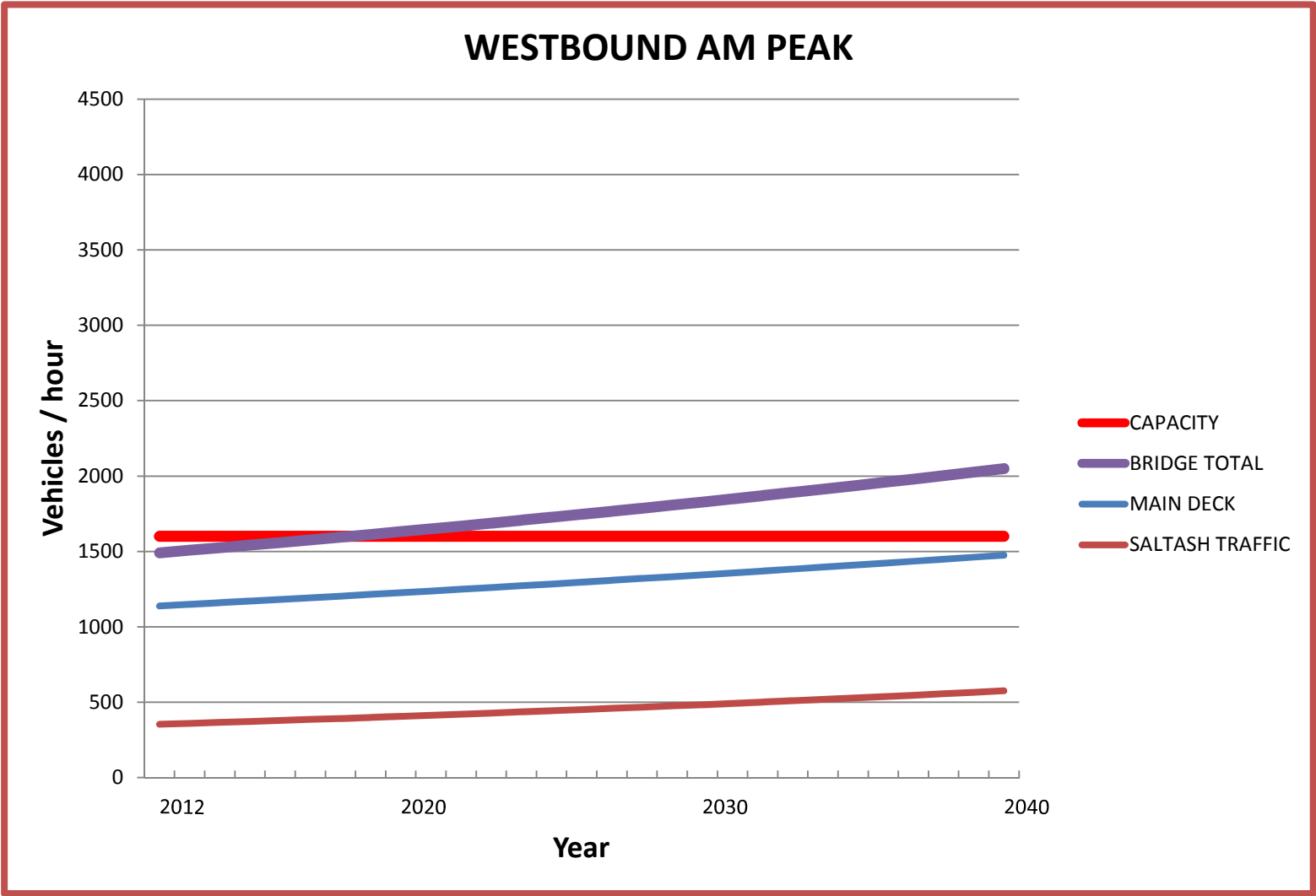


Figure 4.7 A38 / Tamar Bridge Corridor Demand v Capacity, Westbound AM Peak

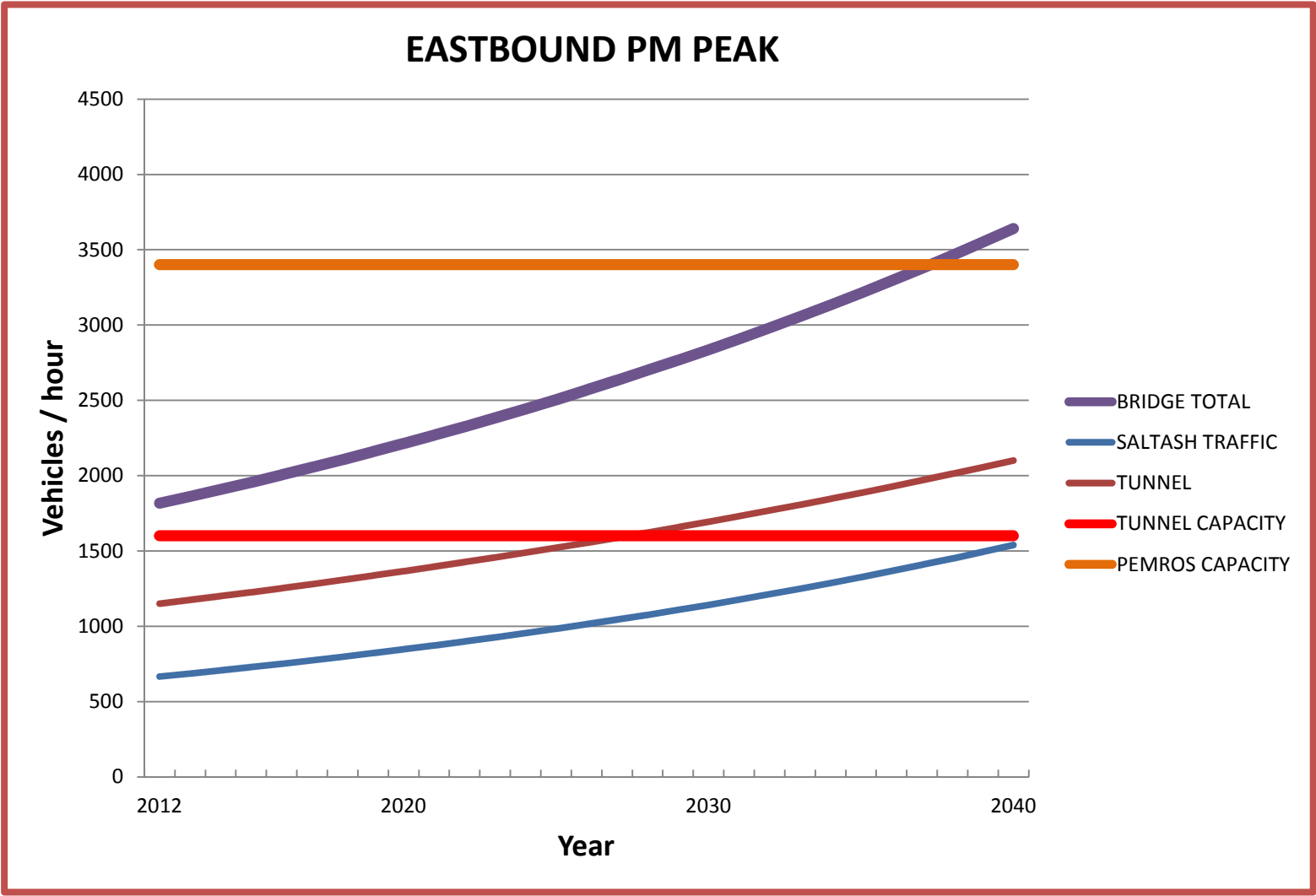


Figure 4.8 A38 / Tamar Bridge Corridor Demand v Capacity, Eastbound PM Peak

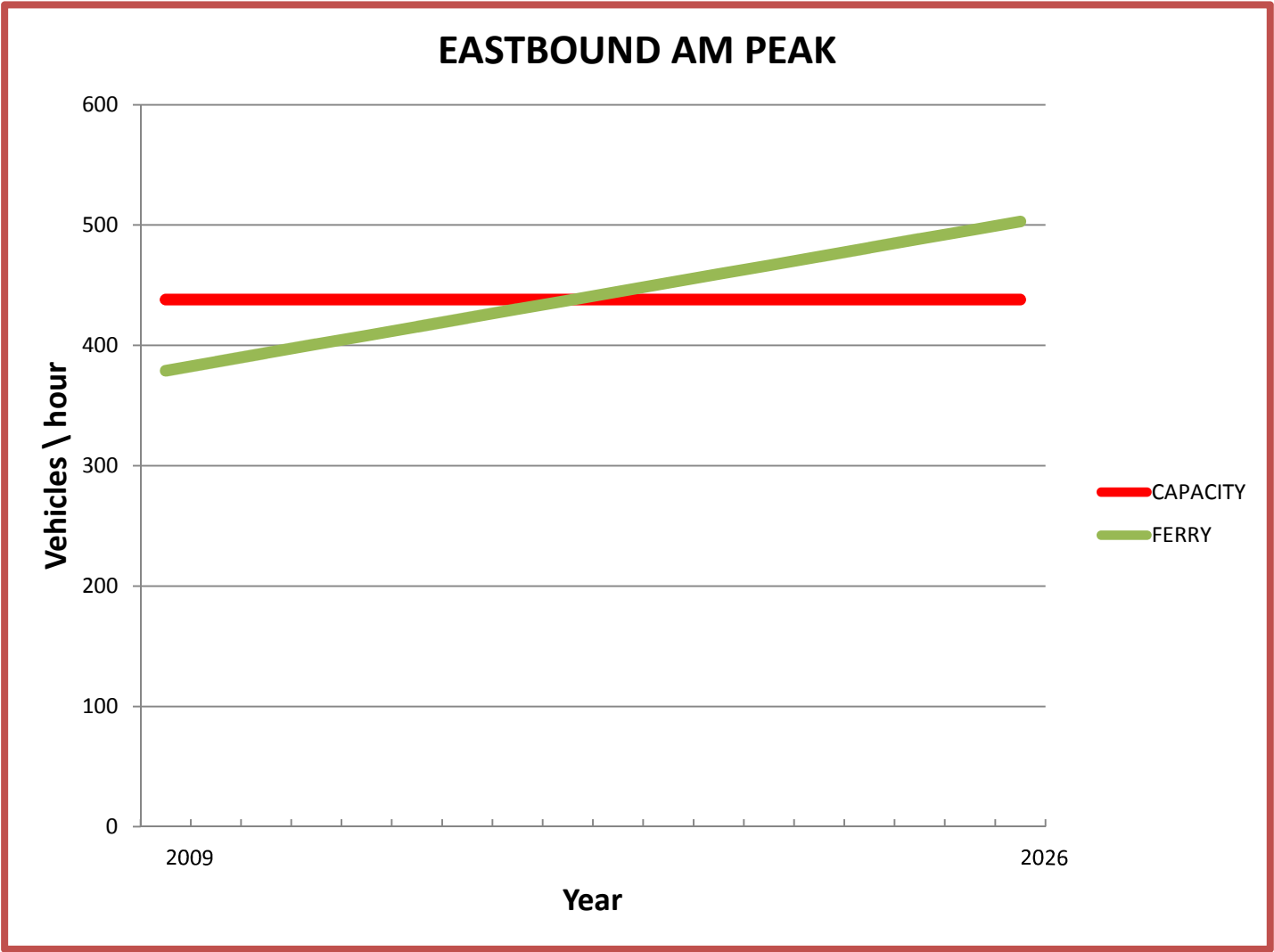


Figure 4.9 Torpoint Ferry Demand v Capacity Eastbound AM

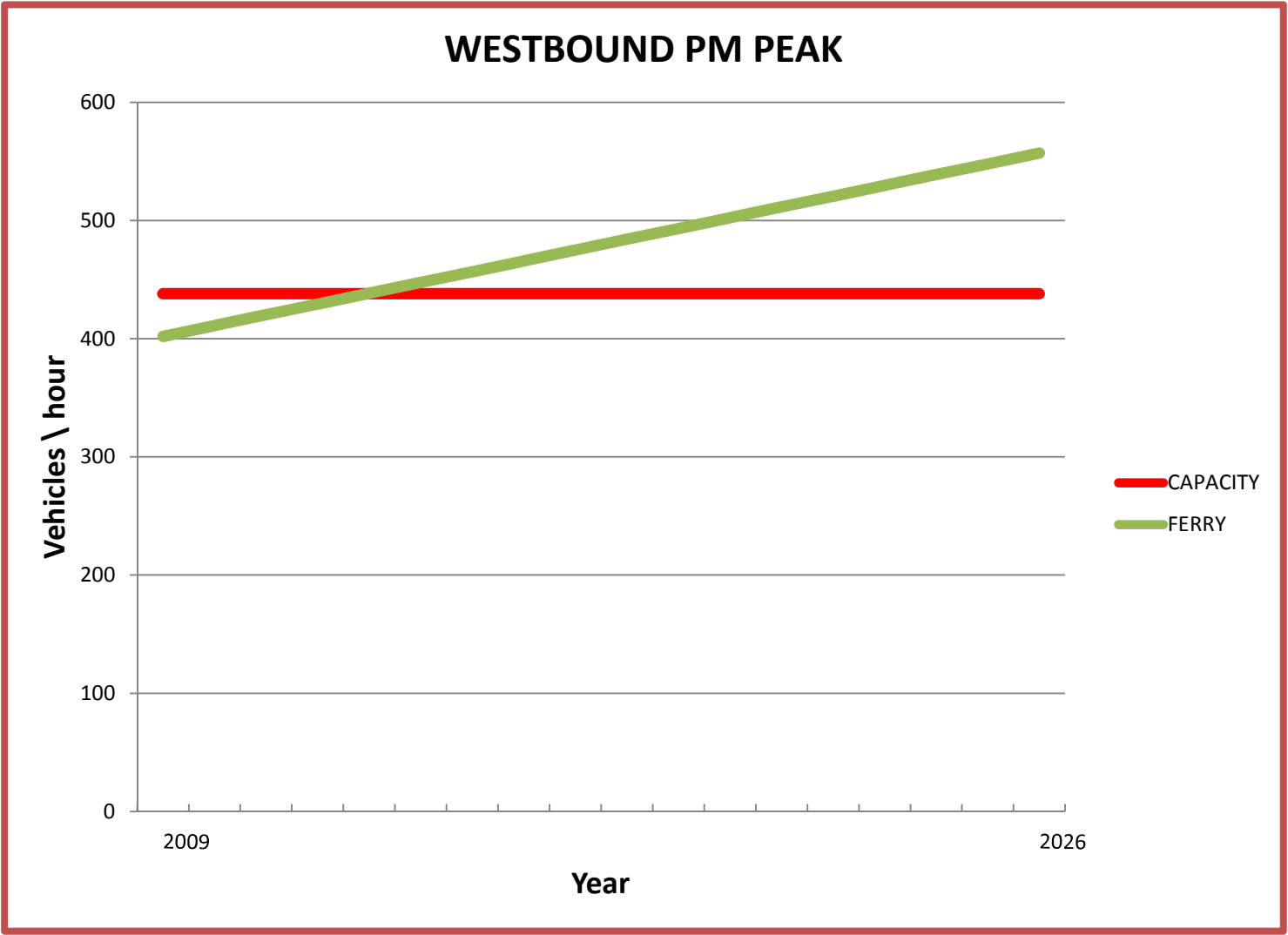


Figure 4.10 Torpoint Ferry Demand v Capacity Westbound PM

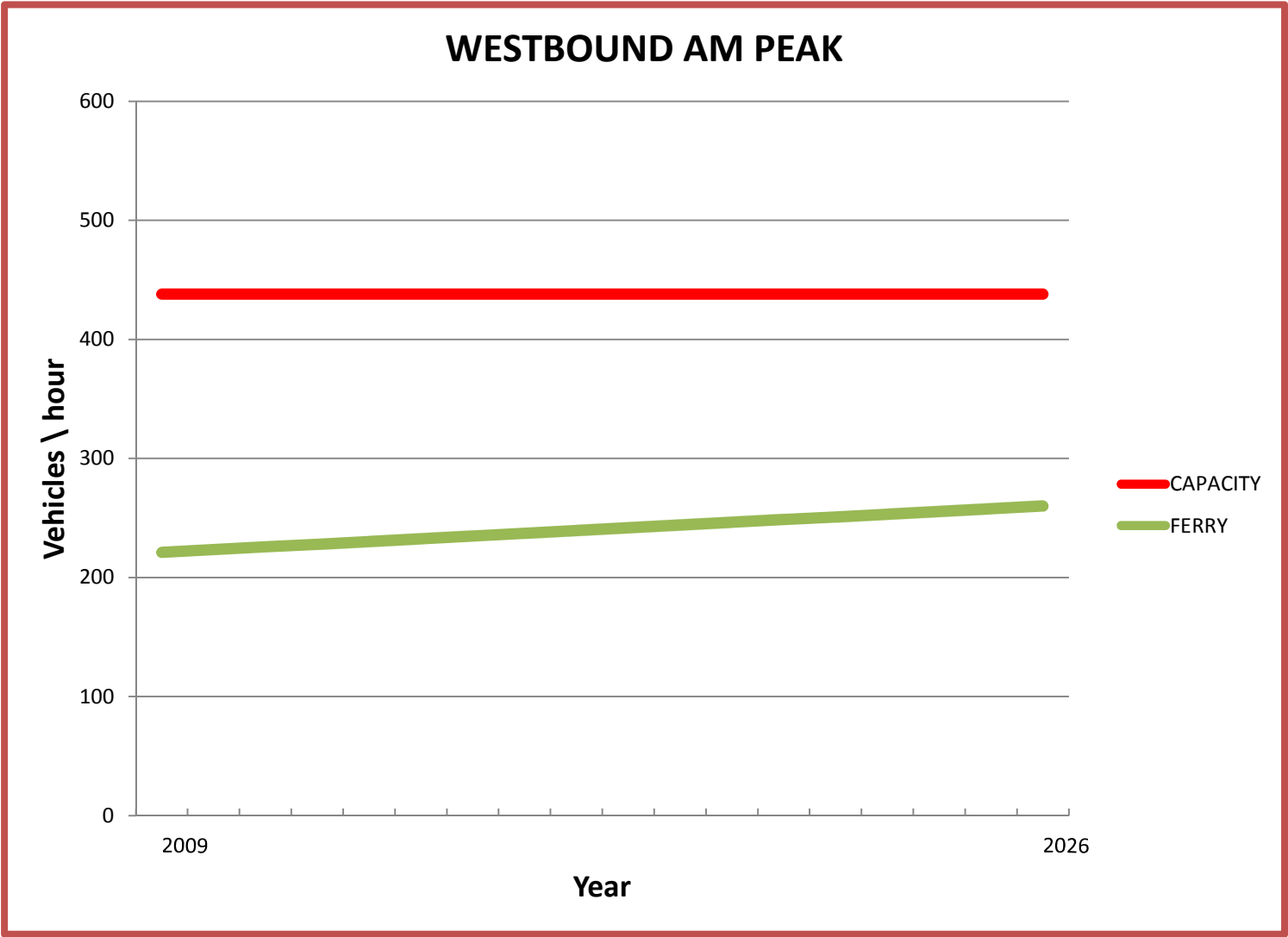


Figure 4.11 Torpoint Ferry Demand v Capacity Westbound AM

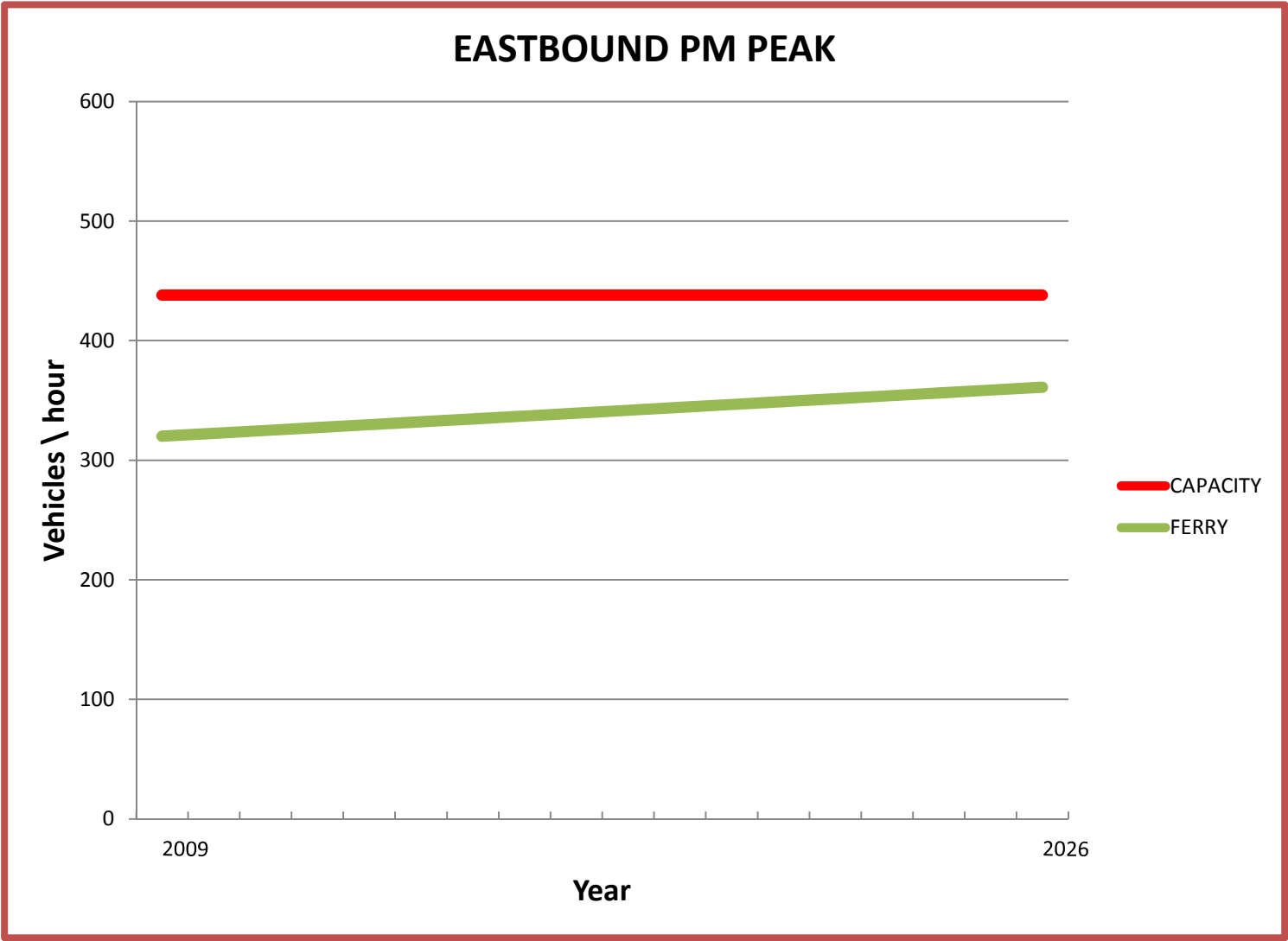


Figure 4.12 Torpoint Ferry Demand v Capacity Eastbound PM

5 Option Development

5.1 Introduction

Following analysis of data, consultation with stakeholders, workshops and brainstorming, a number of options have been developed to meet the anticipated growth in demand for travel between South East Cornwall and Plymouth. These range both in the scale of impact on capacity and in the timescale of delivery, providing a range of solutions as demand grows, from “quick wins” through to major infrastructure investment. They are discussed below by mode, with possible schemes (**Projects 1 – 16**) summarised in Table 5.1 at the end of the chapter.

We have developed a number of scenarios (discussed in detail in the next chapter 6) which combine demand management options with minor and major infrastructure improvements. Recognising resources and timescales for delivery in this chapter, as well as both Councils commitment to promoting sustainable mode alternatives, we assess each of the options individually, with Smarter Choices Projects considered initially through pricing interventions to highways and bridge investment.

5.2 Travel Planning and Smarter Choices Initiatives

5.2.1 Personalised Travel Planning

The first proposed option (**Project 1**) is to utilise Smarter Choices (and innovative Behaviour Change interventions generally) to influence peak and off peak trips from South East Cornwall to Plymouth, to encourage the greater use of sustainable travel modes. We therefore propose investigating further the option of implementing a household based Personalised Travel Planning programme for both Saltash & Torpoint, with a possible extension to Liskeard if funds allow. Based on the unit costs derived from the current ‘Plymotion’ project in Plymouth we would expect the cost per household would be in the order of £25.

On current household numbers of 6,147 for Saltash, 3,327 for Torpoint and 3,788 for Liskeard an urban PTP scheme would involve approximately 13,262 households. This equates to £331,550 on current 2012 cost profiles. This size of PTP intervention could be delivered over a 12 – 24 month period and on anticipated mode shift rates from the Plymouth project could conservatively lead to a reduction of between 2% and 5% of all car trips.

If one person in every household in the PTP area was commuting to Plymouth a 2-5% reduction in peak flows on the Tamar Bridge and the Torpoint Ferry would be equal to 265 to 665 trips and would make a significant contribution to reducing future congestion. However census data suggests 14% of Plymouth employees are from south east Cornwall and this should be factored in – clearly not all of the working population in Saltash, Torpoint and Liskeard is travelling to Plymouth by car via the Tamar Bridge or Torpoint Ferry each day. While it is therefore difficult to be certain about the direct impact of PTP on commuting trips via the Tamar Bridge or Torpoint Ferry it is possible that perhaps 20% of the 265 to 665 participants who switch modes are commuters to Plymouth – this would equate to approximately 52 to 133 trips in the peak hour.

It is recognised that PTP perhaps represents limited value for money but still relatively cost effective compared to the capital cost of major new infrastructure. In practical terms it is still significant funding to secure through a Local Transport Plan and such a project has only limited direct traffic reduction impact on the Tamar crossings. While we believe PTP in south east Cornwall has real value in encouraging peak and off peak travel generally to switch to sustainable modes, our modelling suggests it cannot be utilised to achieve significant reductions in peak hour traffic flow on the Tamar Bridge or Torpoint Ferry.

If a PTP intervention was implemented later in the study period, it is calculated that up to 1,300 new dwellings may be built up to 2030 (table 4.4 above) and these could be subject to developer funded PTP campaigns (and perhaps offer refresher campaigns in the main urban areas). Without significant levels of developer funding we could not however fully recommend PTP to specifically reduce car traffic on the Tamar Bridge or Torpoint Ferries.

There may be potential for a rural community based PTP trial as well, but we believe that the use of PTP has generally been constrained in rural locations because of the limited availability of alternative modes to the private car. Therefore if third party funding can be secured as part of a wider package of transport measures for South East Cornwall this could be considered but we do not believe it should be a priority. It certainly would be unlikely to achieve significant mode shift on the Tamar Bridge or transfer to sustainable modes utilising the Torpoint Ferry, for example.

Better information is required on the current travel patterns of Tamar Bridge and Torpoint Ferry users, particularly on the detailed origin and destination data, which suggests new data collection, perhaps utilising tag data and Bluetooth technology, could supplement modelled demand predictions. This would enable future Smarter Choices measures to be better directed to achieve higher levels of participation and mode shift. While both Councils, TBTFJC and many other agencies undertake regular data collection there is benefit in undertaking a more comprehensive analysis of travel across the Tamar, which could be a project undertaken in the short term to inform all future option testing (**Project 2**)

5.2.2 Travel Planning

We recommend that greater impact may be achieved with the two Councils working with existing and new Plymouth 'Northern Corridor' employers to offer advice on travel options for workers resident in and/or moving to Saltash & Torpoint. This could be part of the core business travel planning programmes of the two Councils and need not require significant funding, but reinforces any local PTP campaign in South East Cornwall. Similarly programmes which address travel to South East Cornwall, by linking with employers in Saltash and Torpoint, could bring some shift to sustainable travel modes. We propose this option, **Project 3**, is given early priority and funding secured to introduce intensive travel planning interventions, over and above that which would normally be implemented.

5.2.3 Car Sharing

One specific Smarter Choices intervention which may have better than average impact on trips to and from South East Cornwall is the promotion of car sharing (**Project 4**). Recognising for many residents the relative convenience of travelling by car via the Tamar Bridge and the Torpoint Ferry a focussed campaign on the cost benefits of regular car sharing could slow the growth of single occupancy car trips on both of the Tamar crossings. If linked with the introduction of High Occupancy Vehicle lanes and priorities this relatively inexpensive intervention may reduce overall trips and offset underlying growth trends. While not recommending introducing HOV lanes on the Tamar Bridge, because of the impact on the variable lane control working (unless the southern cantilevered deck is converted for pedestrian and cyclist use), there should be further investigation into whether such provision could be made on the corridors into Plymouth city centre and to the Derriford employment areas. It may be possible to give HOVs priority lanes in queuing for the Torpoint Ferry, although this requires further consideration of the space available at both landing stages. An innovative marketing campaign to promote existing car share schemes such as Liftshare should be relatively inexpensive, perhaps £10,000 over a five year period but will be more than cost effective if say 50 peak hour trips were regularly transferred to multiple occupancy vehicles.

*The use of personalised travel planning (as proposed for **Project 1**) to influence behaviour and encourage mode shift is a recognised tool for local authority transport planners. While not making the claims of high mode shift as achieved in the comprehensive programmes implemented in the Sustainable Travel Towns projects there is an opportunity in the medium term to offset potential general growth in demand from South East Cornwall through a PTP campaign, perhaps initially focussed on Saltash. With housing development less than previously proposed there is also still an*

*opportunity to secure funding for proactive travel planning which again will lessen development impacts on the Tamar Bridge corridor. Better data is required to inform demand management initiatives (**Project 2**). Employer focused travel planning with an emphasis on influencing travel demand on the Tamar crossing, introduced for businesses on both sides of the Tamar, should also be considered as a priority (**Project 3**). Car sharing offers considerable benefits to users and traffic reduction and the relatively inexpensive **Project 4** marketing campaign should therefore be considered as a component of general travel planning in the region.*

5.3 Intelligent Transport Systems

Intelligent transport systems (ITS) can be used to improve the efficiency of the transport network, through using technologies to maximise the highway capacity, provide priority for sustainable modes, and through providing pre journey and on journey traveller information to enable travellers to make informed choices of how and when to travel.

In the context of the Tamar Bridge and Saltash Tunnel ITS has been extensively implemented to maximise vehicle capacity through the tidal flow and tag based tolling systems and therefore there is limited scope here to further maximise capacity with the introduction of new technology. The Torpoint Ferries are limited by the physical number of ferries able to operate and therefore ITS will also not provide a significant capacity increase here. With limited capacity to cross the Tamar, and no spare capacity on alternative routes in the event of any incidents, a key role of ITS is therefore to manage vehicle demand through information in advance of travel and through encouraging alternative modes. The role of information and more general network management techniques are set out below.

5.3.1 Informed Traveller

Timely, accurate and reliable travel information can help travellers make informed decisions of how and when to travel and hence influence travel demand. The Tamar Bridge and Torpoint Ferry Joint Committee have a website (www.tamarcrossings.org.uk) which provides live travel information. This includes a simple text summary (i.e. Light Traffic) of the traffic conditions for each direction across the Tamar Bridge and at the Saltash Tunnel. In addition there are static webcam images for the bridge and ferry which are updated every minute. The ferry images show the traffic waiting at each side of the crossing with supporting text indicating approximately how many lanes of traffic will fit on the next ferry. The bridge cameras are located on the top of the bridge towers looking east and west and provide a general view of the traffic. These give good coverage of the existing traffic on the bridges but do not provide clear coverage of the merge approach to the bridge from the east and have no coverage of the merge into the tunnel from the west which are the main constrictions on the network.

There is the opportunity to improve the live travel information in terms of data collection, collecting journey times through the network, and in terms of updating the website, providing applications specifically designed for mobile phones and providing SMS alerts for those without smart phones. There is also the opportunity to introduce multimodal information on the alternative ways to cross the Tamar either directly on the website or through much better links to Plymotion. The TBTFJC already uses social media channels, such as Twitter and Facebook, to keep users informed.

Therefore it is an option to deliver a traveller information package (**Project 5**) which could include:

- Providing multimodal information on how to cross the Tamar integrated into the website, and / or with links to Plymotion for multimodal journey planning.
- Implementation of a journey time measurement system to cover the tunnel, bridge and both approaches to record any queuing into the merges. This could be cost effectively implemented using Bluetooth technology or Tamar Tag detectors to measure journey times at key timing points.
- Consider implementing additional traffic management cameras at the tunnel entrance and to better view the entrance from the east if not already covered and presenting images to the website.

- Upgrade of the website to include journey time information, both typical by time of day and live. Upgrade the image management system to enable video clips or live feeds to be posted from the cameras which gives a much better impression of the actual traffic conditions.
- Development of a mobile app for the key mobile platforms, Android, Apple IOS, Windows.
- Implement an SMS alerts system for delays or any issues.
- Develop desktop apps or widgets

Whilst the above enhancements will provide the opportunity for travellers to make more informed choices of when to travel it is difficult to quantify the benefits in terms of an increase in capacity through more effective distribution of trips over the day. However with the increasing independent development of 'apps' for travel information and the likelihood that congestion will increase there will be increasing expectation from travellers that this information will be more widely available. Therefore a key consideration is how the increasing amounts of data collected by the Councils, Highways Agency and the TBTFJC can be offered to software developers through Open Data channels to encourage new innovative information channels to be provided independently (and commercially).

5.3.2 Network Management

The TBTFJC team work well with their colleagues at the Highways Agency and the two Councils to ensure the smooth operation of the network on a daily basis, utilising information and signing.

The tidal flow system has been optimised to maximise the effective capacity of the bridge and further updates in technology are not expected to provide any significant capacity changes. Additional intelligent road studs have been installed to support the tidal lane operation on the bridge, which matches that in the tunnel and will improve the clarity of the system for motorists.

The road side variable message signs (VMS) is in place on the Cornwall side of the bridge with other signs located across Plymouth at key route decision points, with some owned and operated by the Highways Agency. These can provide information in the event of an incident or significant delays on the Tamar crossings and it is assumed, although not confirmed, that they are used for this purpose. As drivers are already on the network when they see the signs they have limited choices to re-route to avoid delays.

Our analysis therefore suggests there are no quick wins in network management proposals specifically requiring investment in ITS, but there should be recognition that as technology improves rapidly that sufficient funding (drawn from toll income) should be set aside to integrate existing systems with emerging technologies (for example in car information systems).

5.4 Pricing and Smart Ticketing

While current pricing is covered within each mode option analysis there is a need for the user cost of crossing the River Tamar by car, ferry, bus or train to be reviewed regularly. In particular if there is increasing car congestion on the Tamar Bridge the Councils should consider whether trips can be diverted to either the off peak, to different routes or to alternative modes by introducing differential pricing.

5.4.1 Differential Pricing – Peak/Off-peak

With a low cost for regular users with the Tamar Tag (£0.75 per crossing) research is needed to understand the price sensitivity of Tamar Bridge users in the peak period – typically such trips are seen as relatively price inelastic, such that quite large increases do not deter travel in the short run, although the long run elasticity will increase which will ultimately encourage transfer to alternatives.

Therefore higher peak costs are unlikely to reduce bridge congestion significantly, as peak commuter trips will still need to be made and there may be only limited switch to off peak travel, other routes or other modes, but it will increase income significantly. It is our view that on this corridor a significant rise in peak fares may lead to increased car sharing before a switch to public transport or cycling occurs, but further detailed price sensitivity modelling would be required to determine if this outcome would arise in real life.

One positive outcome is that any additional income could be used to cross subsidise fares on alternative modes, for example. However as with all of the pricing proposals in this section care will be required to demonstrate that the change is consistent with the statutory requirements placed on the Tamar Bridge and Torpoint Ferry Joint Committee by the Tamar Bridge Acts of 1957 and 1998. This restraint on introducing all types of differential fares and tolls is considered in more detail below.

5.4.2 Differential Pricing – Routes

In setting a pricing strategy the TBTFJC may also wish to consider whether Ferry fares and Bridge tolls need to be the same or differential pricing by route might be introduced. Because of the high level of use of Tamar Tag on the bridge electronic payments and billing would need to be redesigned to reflect different price strategies, but this has been achieved elsewhere.

However the increase of tolls on the Tamar Bridge to support lower Torpoint Ferry fares could be argued as inequitable, as the users have less opportunity to switch modes because of the different catchment area of each mode. In fact it is recognised that there is a level of cross subsidy at the moment and making it more transparent perhaps serves little purpose.

5.4.3 Differential Pricing – Vehicle Occupancy

It would also be useful to encourage car sharing and reduce the number of single occupancy vehicles on the bridge in the peak period and pricing might have a role. If the bridge had tolls at a similar level to the Humber, Severn or Dartford crossings we might see a higher level of informal park & ride and voluntary car sharing in Saltash, for example. However with the tolls, particularly on Tamar Tag, at a very low level there is very little incentive for co-workers or neighbours to transfer to one vehicle. While savings in city centre parking charges is recognised as a benefit that currently may influence some trip decisions, if there were other benefits such as HOV lanes combined with higher peak tolls we may see some shift to car sharing.

However we believe the real risk of being challenged under the statutory Toll Orders process and Tamar Bridge Act provisions if excess 'profit' is taken would deter the TBTFJC from advocating such an approach. As discussed below income should be sufficient to cover operational costs and future investment and the opportunity to use high price regimes is particularly limited in the context of the wider social role the TBTFJC identify in their Business Plan 2011-2015.

5.4.4 Differential Pricing – Vehicle Type

The current tolls and fares do differentiate between vehicle types, and particularly in the case of HGV traffic specifically weight and axles. When prices are regularly reviewed the TBTFJC can take into account the proportions of each type of vehicle and assess whether differential rates can further influence the market.

Clearly with HGVs already paying much higher tolls detailed modelling would be required to see if more than inflation increases, for example, might discourage the use of this route for longer distance trips which could alternatively use the A30 corridor. We understand that such long distance traffic is generally already routed to the north and so any higher toll increases would directly impact on local businesses and the deliveries they need for their economic activity. As such we believe any higher than inflation increases would be challenged by the local business community, be politically unpopular and may have limited impact on congestion, as HGV traffic is a small proportion of all peak hour traffic.

5.4.5 Differential Pricing - Constraints

The main constraint on using price as a tool for demand management is the statutory basis on which the bridge and ferry are operated. The Tamar Bridge Acts require the Joint Committee manage the facilities so as to be self-supporting and while they should not draw on funds from either Council (i.e. from Council Tax) they also cannot contribute excess income to either Council – all income has to be reinvested in the facilities.

There is an option to “reimburse transport initiatives that benefit either crossing” and that could be interpreted to fund bus services, highways links, cycle paths or landing facilities, for example. However raising significantly higher income streams to fund off site investment or specifically to influence demand would require legal opinion to determine compliance or otherwise with the Act. We have not sought that legal opinion, as it is out of the scope of our study, but we feel it is important to resolve the position as it rules in or out demand management by price.

5.4.6 Tolls & Fares Reviews

Once a pricing strategy is established, which may or not allow greater differential pricing, the key stakeholders can more proactively influence demand. The Councils clearly need to consider the long term level of tolls and fares, working with the Tamar Bridge and Torpoint Ferry Joint Committee.

Historically toll increases have been limited and relatively small, as the core objective (and statutory requirement) has been to secure sufficient income to operate and maintain the facilities. The current Business Plan 2011-2015 estimates on current income expectations and investment requirements that TBTFJC will need to review and increase tolls again in 2014.

The TBTFJC is proposing that tolls are reviewed more regularly in future, recognising that this will entail taking any increases through the Toll Order process where an application has to be made to the Secretary of State for Transport. This allows a new maximum toll level to be set, for each class of vehicle, based on a review of the business case submitted by the TBTFJC. Clearly this is a time consuming and costly process, so a balance has to be struck between regular reviews, potential increased income benefits and efficiency.

The wider transport policy objectives of the two Councils to influence travel demand are distinct from the TBTFJC focus on securing inflation increases sufficient to ensure that the operator is meeting their operational and investment needs. The question is whether this orientation of the organisation should be maintained, based as it is on statutory requirements, as it keeps tolls low and so could be said to encourage car travel or should the TBTFJC objectives increasingly support the Council transport policies with a different approach to pricing? Indeed if there were a more commercial approach to pricing would that have an impact of better matching supply to demand, both on existing and future levels of traffic?

This is a fundamental discussion and cannot be resolved by this study, but in the longer term a low toll cost model which does not allow the Councils to use price to manage demand may result in unintended consequences. For example if continued low toll costs do not suppress demand and long term growth exceeds bridge and ferry capacity will the Councils seek major funding for a new bridge or grasp the challenge of using significant price increases to keep within the existing facilities capacity? Which is the deliverable option, the efficient option, the sustainable option and the publicly acceptable option? The theoretical response should be to use pricing to encourage mode shift and offset capacity shortfalls for as long as possible, but we recognise the difficulty of securing support for such an approach.

***Project 6** is a proposal to introduce differential tolling between peak and off peak and to progressively increase road tolls specifically to encourage switch to sustainable modes and increase car sharing. While the impact will not be significant in the short run, due to peak price inelasticity, it will influence long term travel choices. It is recognised that above inflation fare increases, for example, would be unpopular with the community (and difficult politically) and therefore needs to be incremental over*

time, explained to users as better managing the scarce resource of bridge capacity. There may be disbenefits however in its impact on development decisions in SE Cornwall – sites may be seen as less attractive if access to markets and residents is affected by higher tolls.

Importantly this proposal cannot be implemented until the statutory basis for the bridge and ferry operation is reconsidered at a fundamental level and legal opinion is received as to how much demand management by pricing can be achieved with the current Tamar Bridge Act provisions.

5.4.7 Smart Ticketing

Smart ticketing has a number of potential applications associated with the operation of the Tamar Bridge and the Torpoint Crossing.

Vehicle Tags – there is no need to update the current tag system at present and the TBTFJC is focusing on the expansion of the use of tags which will improve the efficiency of operation of the tolls. It may be useful to set a target for increased tag use but with the current high 80% tag use in the peak periods, 65% off peak, it is unclear if there is much more regular demand that can be switched to tags. A 5% increase equates to an estimated future toll booth capacity of increase of 200 vph and is therefore a target to aim for, but additional testing is required to see if it is achievable. There is no specific marketing cost associated with this as it relates to the on-going promotion of the tags, but clearly has an impact on daily revenues – 200 vehicles paying £0.75 daily rather than £1.50 equates to up to £39,000 per annum loss on Monday to Friday revenues alone. Therefore the potential loss in revenue needs to be assessed against the savings possible from avoiding the need for new infrastructure to secure similar capacity gains.

The vehicle tags can also be used on the ferries to give half price travel although here there is no capacity benefit to be achieved from using the tags over cash payment and hence no capacity reason to increase tag use. Payments are taken whilst the vehicles are on the ferry and therefore the payment does not affect loading / unloading times.

Bus Smartcards – A regional smartcard system is being implemented across the Plymouth Region, led by Plymouth University with £2.9m LSTF funding. These smartcards will help to encourage the use of buses through simplifying payment and could offer wider benefits, being a platform for incentives or being multiuse smartcards. No specific allowance has been made for the roll out of this technology in terms of the bus use.

5.5 Walk and Cycle

Both walking & cycling are already high priorities for both Councils, in terms of policy support and investment, whether through Local Transport Plans or with partners, such as Sustrans. The ease of use, promotion and signing, whether at the ferry crossings at Torpoint and Cremyll or at the Tamar Bridge itself, will be key factors in encouraging greater use of healthy travel modes.

Current investment in the modes should therefore be maintained if at all possible and particularly the opportunities to reinforce the walking and cycling option through community based travel planning should be sought. Similarly any new developments requiring crossings of the Tamar should not just look at their motorised travel needs, but also offer healthy travel options for residents and employees, funded where appropriate through S106 planning contributions.

The opportunities for physical infrastructure and localised investment are identified in current Local Transport Plans – for example the Plymouth Strategic Cycle Network and Connect West projects linking Torpoint to the city centre, with plans for better links to the Tamar Bridge is programmed for development in the plan period. National Cycle Network route 2 utilises the Cremyll ferry and offers a well-marked east west route. Further consideration of enhancing cycling links to Derriford from South East Cornwall should be part of the wider development plans for northern Plymouth. **Project 7** is therefore an indication of the possible introduction of improved east west cycle links specifically to the Northern Corridor growth area in Plymouth.

In the medium to longer term the need to enhance walk and cycle links may be required and this may be achieved as part of a change in role for Tamar Bridge south side cantilever deck, if that is to be converted to an additional east – west running lane for local Saltash traffic, buses and possibly HOVS. In such circumstances the costing for an additional high level structure, over the existing bridge, might be developed or alternative provision such as new foot and cycle ferries from Lower Fore Street, Saltash to Wolseley Road, St Budeaux. Such a ferry crossing would need public subsidy to offer free or reduced cost travel and operating costs may be in the order of £200,000 to £2m pa. However this cost may be justified if it allows additional highway capacity to be secured at a much lower cost than new bridge or car ferry provision. It is proposed that further detailed costing is undertaken to assess this as an option, recognising that a transfer to another mode would be less attractive to users.

It should be noted that some cyclists choose to use the main deck A38 route, rather than the cantilevered section, but this should not be seen as lessening need for a traffic free route. We understand the TBTFJC are discussed how to improve cycle access with local groups and the Councils.

*While strategic pedestrian or cycle initiatives, apart from new routes to Derriford (**Project 7**), are not generally suggested as specific projects to deliver new alternative capacity for the bridge or ferry, it is anticipated that the changing pattern of residential and employment growth in the two Council areas will place new demands on existing provision and a case for developer funded investment in infrastructure (and promotion) in the medium to long term can be made.*

5.6 Local Bus

Local bus services offer a relatively inexpensive and flexible means of meeting future growth in demand. Commercial operators can be expected to continue to respond to changes in the market place; in particular by developing the already successful corridor from Saltash to Plymouth city centre via St Budeaux.

With growing demand due to some additional residential development in Saltash and the potential impact of Smarter Choices measures, the case for operating the existing services more as “express” buses running limited stop within Plymouth may become stronger (**Project 8**). Although the existing running time is already fairly attractive and the route benefits from bus priority measures, there is an opportunity to reduce the journey time by potentially 4-5 minutes. As well as the direct time saving, the perception of this more direct type of service to new users may be attractive.

However opportunities for such new service initiatives primarily arise from the anticipated future spatial pattern of development in Plymouth with growth focused on the Derriford area and the Northern Corridor and, later, Sherford. The Derriford Hospital bus interchange already acts as a secondary transport hub for the city; further economic growth in the area will not only create demand for additional services but has the potential to create the critical mass of operations that leads to Derriford becoming an alternative to the city centre for users interchanging between services.

Taking both the growth in direct demand to Derriford and the Northern Corridor and the potential displacement of interchange trips from the city centre, the case for direct services from Cornwall to Derriford becomes strong (**Project 9**). A Saltash to Derriford service of sufficient frequency would offer a potentially attractive alternative to the car, making use of bus priority at the Tamar Bridge and then operating direct via the A38. This may be a stronger option than increasing the frequency of the existing service 152 which operates hourly on Monday to Friday only between Saltash, St Budeaux and Derriford, although this potentially provides a baseline service for an initial expansion to meet demand. It is expected that if demand is sufficient such a direct service (either an expanded existing service or new service) would be provided commercially, albeit with possibly some s106 developer contribution funding initially.

As discussed previously in section 5.4, smart ticketing would bring considerable benefits to bus users:

- Multi-operator capacity – enabling users to travel on buses of any of the city’s three main operators
- Multi-mode capability – opportunity to integrate ticketing with local rail and ferry services and, potentially, other non-public transport activities
- Bespoke tickets and pricing – ability of operators to offer products tailored to individual users requirements, including occasional and infrequent users as well as regular travellers.

*Two Projects are proposed for buses –express buses to supplement current service levels between Plymouth and Saltash (**Project 8**) and direct buses connecting Saltash and South East Cornwall with the Derriford growth area (**Project 9**). However both proposals need to be kick-started with development funding or council revenue support, and ultimately need to be provided commercially by local bus operators.*

5.7 Rail Services

Enhancement of rail services is most effectively achieved between Liskeard/Saltash and Plymouth. There are no local stations east of Plymouth until Ivybridge some 12 miles away; as previously discussed, there is no infrastructure at Ivybridge that would permit trains to be turned there, so any service would need to continue to Totnes which is a further 12 miles away. It would therefore be more appropriate to focus on the route west of Plymouth where there are a number of local stations and the concept of a “metro” type operation would be more feasible. Again, infrastructure limitations mean that services would need to continue to Liskeard.

As discussed in chapter 3, the demand base for significantly enhanced local rail services is not evident and with a network of frequent direct bus services that penetrate the city centre more effectively than rail, the case for a high frequency Plymouth “metro” type service cannot be made at this stage. Effectively there is not the critical mass of existing or future development to support a mass transit solution.

A comparison of journey times from Saltash, for example, shows a potential walk within Saltash of, say, five minutes, a rail journey time of 10 minutes to Plymouth rail station then a walk time to, say, Armada Way of circa 10 minutes compared to an end to end bus journey time of 23 minutes. For residents of Saltash housing estates, who could use the bus then train, an interchange penalty would be added at Saltash station so the attractiveness of the rail option remains limited.

The Invitation to Tender for the renewal of the Great Western franchise, issued by DfT in July 2012, does include options to increase rail services west of Plymouth with a proposal for two trains per hour between Plymouth and Penzance between 0700 and 1900. This option has a putative start date of December 2017 and would address many of the issues identified with the current pattern of rail service. The current ‘pause’ in franchise decisions, following the West Coast Main Line difficulties, means that these improvements may be delayed further.

The infrastructure of stations and line capacity is in place to allow the consideration of the development of cross Tamar metro services serving local stations in South East Cornwall and suburban stations in Plymouth. However without an increase in demand from new homes in Saltash or new employment our modelling suggests there is insufficient demand to justify what would be significant investment in rolling stock and improved frequencies, when buses, for example, present a more flexible and viable alternative.

5.8 Torpoint Ferries

The modelling of demand for year 2026 has confirmed that the Torpoint Ferries will be reaching full peak hour capacity before the individual vessels are replaced in 2025 – 2030. Options to increase peak capacity in the short, medium and long term on the Torpoint Ferries have therefore been

considered in discussion with the TBTFJC staff, but there are considerable difficulties to be addressed.

The current ferries have a notional capacity of 73 vehicles and 150 passengers each, the vehicle capacity being dependent on the average size of vehicles. It is possible to operate larger ferries in the future but this has the potential to increase cycle times as loading and unloading times increase, meaning that the additional capacity benefit of introducing larger vessels may be limited. Therefore the balance between vessel capacity and loading times must be a key consideration in the vessel replacement strategy.

An option that we have considered is the provision of one or more additional vessels. As chain-operated ferries, each vessel requires its own path across the river and its own berthing points. There is no room to add a fourth ferry to the existing slipways, and constraints on either side of the slipways make extension difficult but not impossible. These include the presence of tidal water in an environmentally sensitive area, and the need for rearrangement of the landside access to the ferries. Further technical review of the options of extending the landing stage and operating a fourth vessel should be a priority for the TBTFJC. In consideration of all options the possibility of a fixed link might also be considered as a long term solution, although not without considerable difficulties of practical delivery and funding.

We have considered whether peak spreading will reduce the capacity issues on the Torpoint Ferry. As all three ferries are in use until 0930 and from 1400 (on weekdays), it is unlikely that variable pricing could be used to justify the operation of the third vessel for a greater part of the day. It may however assist in reducing demand at the absolute peak and shifting it to peak shoulders. This could mean a differential pricing structure compared to the Tamar Bridge, which would be a departure from the current policy of equity between the two modes; the economic case for the current policy is, however, less clear.

The most sustainable forms of transport, foot passengers, cyclists and bus passengers, do not pay a fare on the ferries which presents a paradox, as action to increase use by these categories has no financial benefit to the operator. Charging a token fare for pedestrians and cyclists would create a new revenue stream but would create administration charges, may prove politically difficult and be counter-productive by discouraging sustainable travel. Therefore it is not recommended to introduce charging for pedestrians or cyclists.

In our analysis of the current Torpoint Ferry operations we also reviewed opportunities for new ferry routes on the wider Torpoint – Devonport corridor. The key issue is securing appropriate landing stages either north or south of the current Devonport landing, because of existing MOD and dock uses, and similarly on the Torpoint peninsula with residential, employment and marina uses at risk. While there is no easy option to locate a fourth chain ferry route at this location without significant cost and extensive Compulsory Purchase procedures, because of the passenger growth pressure on the Torpoint – Devonport corridor this option cannot be fully ruled out.

Overall, demand forecasts for 2026 show a significant need for investment in capacity on the Torpoint Ferries, yet the options are potentially quite limited. Larger vessels have operational issues and additional ferries may not have the landing stage space to be accommodated.

This capacity shortfall from 2026 is based on the relatively low levels of growth in housing or employment currently envisaged in Torpoint and if these were to change with greater growth than currently planned, then capacity issues will arise even earlier. To some extent, this is a circular situation in that the ferry capacity acts as a constraint on growth in Torpoint and the lack of forecast growth militates against significant investment in the transport operation.

*We maintain however that technical solutions (**Project 10**) to increase physical capacity on the Torpoint Ferry route by 2025 need to be developed by TBTFJC and in advance options using pricing and the promotion of alternative modes should be developed for short term management of*

increasingly scarce capacity. A detailed study to develop options for the medium and longer term needs to be brought forward as part of the TBTFJC business planning.

5.9 Cremyll Ferry

As has already been stated, whilst this 150 passenger ferry offers a limited commuter service, at present it is marketed as, and perhaps better equipped for, a leisure and tourism offer. However it currently has an important role in meeting commuter demand specifically from the Rame peninsula and opportunities to improve the offer to make it more attractive should be considered.

To create a more viable commuter service, it would be necessary to:

- Improve the overall quality of the landing areas on either side of the crossing to provide additional accommodation/shelter and assist in improving load/unload times
- Provide a greater frequency in the peak hours
- Encourage through ticketing from the ferry to buses serving onward destinations on both sides of the Tamar
- Provide a vessel (or vessels) for passengers that is better adapted to rapid loading and unloading times

We have consulted with local parishes and have reluctantly come to the view that there is no evidence of a strong enough demand base to justify these service or infrastructure enhancements, apart from consideration of through ticketing. There is very little housing growth envisaged for the Rame peninsula and limited employment, which are the usual drivers of passenger demand, so emphasis should be on preserving existing services (including bus links) and enhancing them incrementally over time.

5.10 New Ferry Services

The provision of new ferry services is often seen as an attractive alternative to increasing capacity (ferry or otherwise), as rivers are generally underused as transport corridors. The limiting factor for any commuter orientated ferry service is the need for reliability and daily provision, regardless of tide or weather. From this perspective the Tamar could be used at least as far upstream as Saltash and probably beyond, with some options for using the Lynher but not the Plym.

At most locations on the Tamar a channel to the shore would have to be dredged or a pier built to secure the vessel at low water, as even where the channel is navigable the profile of the river makes approach to the bank difficult or impossible without these actions. The plans for Rendel Park (the ex-gasworks site, owned by TBTFJC) in Torpoint could include provision for small scale ferry and water taxi operation from a new landing stage, but this requires further investigation and funding (a minimum of £275,000 would be required for a landing stage according to recent studies).

The boarding points also need landward access: on the east bank for much of the distance the Naval Facilities at Devonport render this impractical, unless there is a change to civilian use. This is clearly possible in the medium to long term as the MOD reduces its facilities in Plymouth and so should remain as an option to be further investigated.

Other new ferry options have been considered, particularly in relationship to a possible change in pedestrian and cycle access to the Tamar Bridge. The provision of new ferries with bespoke access arrangements for pedestrians and cyclists between Saltash and St Budeaux would remove the need for pedestrians and cyclists to use the bridge. Whilst this is additional infrastructure investment beyond that currently provided by the bridge if it releases useable capacity on the bridge then this should be costed as part of increased capacity options. Care must be taken to ensure this doesn't discourage pedestrian and cycle crossings at this point – the need to undertake journeys within a fixed timetable

would not be as attractive as the ease of use of the existing pedestrian and cycle bridge without time restrictions. Currently up to 600 cyclists (and 400 on average) use the Tamar Bridge each day in the peak summer season, so any change to arrangements needs to take into account peak cycle demands.

The route between Saltash and St. Budeaux is the only reasonable point for a short crossing between two existing roadways, as other options would involve the creation of a new access to the water's edge (possibly associated with development) or longer river crossings such as Saltash to the Hoe. Although previous studies have suggested there may be a market for such services we do not see a viable year round service being developed to meet the limited existing or future demand. Journey times would be comparable to the bus alternative and the Hoe, for example, is less convenient destination than city centre bus stops for many commuter trips.

It is therefore not proposed that a new pedestrian and cycle ferry service is developed unless directly related to the transfer of the Tamar Bridge pedestrian and cycle lane to motorised traffic. Even with greater promotion of sustainable travel modes there is unlikely to be sufficient walk and cycle commuter demand to justify significant levels of new provision, which would require considerable on-going subsidy, even if fares were collected. Developing new ferry provision for cars is an even more complex option, as the road access and landing stages requirements, significant capital investment and lengthy planning process probably militate against such an option being secured.

5.11 Tamar Bridge and Highway Network

It is clear from the modelling described in chapter 4 that the “tidal flow” peak movement may be critical sooner than the main peak direction and attention is therefore required to address this capacity issue first.

A number of ideas were considered in terms of new infrastructure on the Tamar Bridge and the highway access either side of the bridge. Achieving significant increases in road capacity on a highly constrained road corridor and on a fixed bridge structure with 4 lanes and a dedicated footbridge is unsurprisingly quite difficult.

For example it is possible to convert the current pedestrian and cycle lane which is cantilevered from the main bridge and use this either for an additional general westbound traffic lane (**Project 11**) or restrict its use to buses and High Occupancy Vehicles (**Project 12**). If used for general traffic, the improvement would increase the theoretical capacity by 1,600, although in practice the improvement would be limited to the number of Saltash-bound vehicles that could be displaced from the main running lane. This figure is circa 400 vehicles per hour and so represents considerable disruption for limited capacity benefit.

Converting the pedestrian bridge presents a number of separate issues, which may be resolved if the need for capacity is sufficient, but will need to be addressed. In particular the Tamar Bridge and Torpoint Ferry Joint Committee managers have noted that The Tamar Bridge Act 1998, which enabled the construction of the cantilevered south and north lanes, had specific conditions which would require an amendment to the Act for any change in use. As such it would require formal consultation and probably a lengthy legal process, with no guarantee of success.

The option to convert the pedestrian and cycling lane, even if legal obstacles were resolved, would require an alternative pedestrian link to be provided, for which there are a number of options:

- New bridge – a new pedestrian and cycle bridge, potentially built alongside, over or under the existing road bridge, which would require cantilever suspension due to the height above the river. Indicative costs are in the order of £25-35m.
- New pedestrian and cycle ferry – a small vessel operating between Saltash and St Budeaux, perhaps similar to the Cremyll Ferry. Indicative annual operating cost of £200,000 to £1m, dependent on service frequency and operational hours. This option would require reinstatement of

landing stages and other infrastructure at Saltash and St. Budeaux, which requires one off capital funding and maintenance.

- Bus service – operation of a shuttle bus service using vehicles adapted to carry bicycles. However because of variation in flows at different times of day, week and season the number of vehicles may also need to be flexible or this will act as a constraint at peak times. The indicative annual operating gross cost for a basic service is approximately £120,000.
- Cable car – a high profile option which would have tourism benefits as well as acting as a transport link. The indicative cost is £30-40m, plus annual operating costs of £1-2m would be required, but potentially costs to be offset by passenger income.

The level of pedestrian and cycle demand is a key determinant of the most effective option and a relatively low cost solution such as a bus shuttle may well be most appropriate if demand is low. However cycling flows rise up to 600 trips and average 400 per day in the peak summer period, according to Plymouth City Council statistics. As pedestrian flows were not available new surveys will be required to inform any decision to provide an alternative crossing facility. Clearly the change in mode will create an interchange penalty which pedestrian and cyclists don't currently face using the existing south side bridge. It is also difficult to introduce charges for the crossing as the existing pedestrian and cycle bridge is free to users, therefore the build and operating costs would probably need to be met by the Councils.

A further unintended consequence is that as the additional capacity on the bridge westbound increasingly makes the Saltash Tunnel the key constraint regular drivers would consider rat-running via the Saltash exit lane and via North Road and the B3271 to the A38 westbound. Dependent on the success of Pinch Point funded measures to smooth traffic flow through the Carkeel Roundabout this routing may be more or less attractive, but it highlights the issues with the corridor generally. Any independent action, whether improving Carkeel Roundabout, Pemros Road Roundabout or the movement of vehicles across the bridge itself, can be said to only be moving delays to a new location, not reducing them overall. The Saltash tunnel, with its fixed capacity and no opportunity for widening, for example, is particularly key to ensuring a smooth traffic flow on the whole corridor. The level of the most efficient throughput of the tunnel in both directions always becomes the default flow for the A38 corridor between the Pemros Road and Carkeel Roundabouts and this needs to be recognised. Small scale incremental improvements need to be addressed to defer major investment as much as possible but fundamental infrastructure investment will be needed if future demand is not managed by investment in alternative modes and implementing higher pricing strategies. The opportunity for major new infrastructure to address future congestion is considered further in section 5.14 below.

A further traffic management option (**Project 13**) would address the westbound 2 to 1 merge on the Tamar Bridge in the AM peak. The current 2 to 1 merge has a capacity of around 1,600 and represents the key constraint in the off-peak AM westbound direction. Reconfiguration of the arrangement could allow 100 more vehicles through, although the benefit would only allow an improvement during the AM peak.

Project 14 is the converse of **Project 13**, being the eastbound 2 to 1 merge at Saltash Tunnel in the PM peak. The current 2 to 1 merge has a capacity of around 1600 and represents the key constraint in the off-peak PM eastbound direction. Reconfiguration of the arrangement could allow 100 more vehicles through, although the benefit would only allow an improvement during the PM peak.

As a non-highway infrastructure option (**Project 15**) we recognise that Tamar Tag use is already very high, at 80%, but an increase to 85% achieved through focussed marketing, etc. could reduce journey time delays for existing users. Further consumer testing of reasons for not utilising the TAG would be useful to understand whether such uplift is possible, but it represents an inexpensive option for increasing throughput in advance of other technologies. A 100% Tag use objective is clearly unachievable with longer distance non local trips being made, and in terms of revenue loss may be

commercially difficult, but market research will confirm optimal levels of electronic ticketing to balance user convenience, operational efficiency and income.

Currently buses travelling from Saltash to Plymouth have to travel across the front of the toll booths and trigger a seven second hold function at all other booths. With current bus operations this is not a constraint on capacity but the impact of significantly increased bus frequencies and consequently added delays to general traffic could be a consideration in the future. As a longer term option (**Project 15**) further detailed traffic studies and bus routing option testing may identify marginal benefits that can offset more expensive infrastructure investment for longer.

In practice the constraints on road access via the Tamar Bridge as development led demand increases will not be the bridge itself, but the access either side on the A38 and in particular the Saltash Tunnel. In the absence of significant investment in alternative modes and using price to influence demand the flows on the Tamar Bridge will reach saturation first on the tidal flow (westbound AM, eastbound PM) and later on the main peak flow to and from Plymouth.

*In the short to medium term **Projects 11 – 16** should be developed further as options, with a particular need to assess in detail the highways impacts and potential change in demand for both car travel and sustainable modes.*

5.12 Park & Ride via Tamar Bridge

There have been a number of proposals for Park & Ride provision to the west of Tamar Bridge, often linked with residential developments. Focused on the Carkeel area and specifically the Broadmoor Farm site, funding has not been secured to date to deliver the project. A Park & Ride Strategy study, produced for Plymouth City Council in 2008, suggested that the Broadmoor Farm site would be viable, but with caveats:

*“The Broadmoor Farm site has limited patronage potential based on existing demand despite the increased attractiveness of the service due to the cost penalty for motorists in the form of the Tamar toll. Patronage potential could be enhanced by including a pick-up in Saltash. **The viability of the service will depend upon the scale and nature of the development at Broadmoor Farm.**”*

The viability is clearly linked to what at the time was seen as a significant level of housing development in Saltash. Earlier estimates suggested between 2,800 and 5,500 new homes could be delivered in Saltash, as part of the Cornwall Gateway Strategy, and specifically 1,600 to 3,400 on the Broadmoor Farm sites A1 and A2. With the Broadmoor Farm proposals now effectively stalled because of the recession the prospect of land being made available for a large car park site and revenue funding provided for bus links to meet increased travel demand is very limited.

The case for a western approaches site is not sufficiently robust with current development proposals or the general population growth levels in South East Cornwall. There needs to be a trigger point where switching to Park & Ride services gains a real time (or cost) advantage for users. This is in our view only when the bridge is at capacity and a Park & Ride bus has more than marginal time and/or cost advantage – the transfer penalty is otherwise too high. In the 2008 study the level of demand without the Broadmoor Farm Development was identified as 4428 weekly trips. We believe this is a generous reading of the level of intercept that may occur, as the level of congestion or pricing is not currently sufficient to deter drivers using the Tamar Bridge. For long distance drivers from further west in Cornwall the site is too remote from Plymouth city centre to act as an attractive interchange to bus, and the location to the north west of Saltash means it will be unattractive to the majority of Saltash-based drivers who would need to head away from their destination to access it. With high frequency, direct bus services already operating from the main residential areas in the town, it is difficult to see Park & Ride offering a competitive alternative.

Therefore while the supply side of the equation is established by previous studies identifying potential sites on a corridor which could intercept trips heading to Plymouth, we do not believe that the demand case is sufficiently well made in the previous studies. With the likelihood of much lower levels of

residential development in Saltash and south east Cornwall generally the original estimates of potential demand are further weakened.

Plymouth City Council also identified the benefits of other sites to the east of the bridge in the previous studies, and these have greater chance of being viable in terms of intercept and reduced journey times, once users have crossed the Tamar Bridge. They do not reduce traffic levels on the bridge as the suggested sites are further east and could even increase traffic if there is significant transfer from public transport to car and Park & Ride.

We therefore do not propose any further development of Park & Ride proposals for sites in Saltash on the basis of the limited demand identified previously and current limited development growth. We also think it is unlikely that schemes to immediate east of the Tamar Bridge will have sufficient impact to be developed.

5.13 Other Bridge Crossings

In seeking additional capacity for road travel we have reviewed opportunities for new bridge provision in the next section of this report, but also have considered whether other existing bridges can provide additional capacity.

The Gunnislake New Bridge, built in 1520, is unlikely to take any more than standard traffic growth. It was until the Tamar Bridge was opened in 1961 the furthest downstream crossing of the Tamar. The A390 from Liskeard to Tavistock uses the bridge to cross the Tamar.

Our investigations suggest that physical improvement is not an option because of the age and historical nature of the granite bridge, as well as limited opportunities to improve access on either side. The single carriageway bridge is 13ft wide and operates with priority working from the west, but with no traffic signals.

Generally our site visits and technical review confirms that developing new bridge capacity above the Tamar Bridge at Gunnislake is not feasible for access and environmental impact issues, especially in the Tamar Valley Area of Outstanding Natural Beauty, but this is explored further in the next section.

5.14 New Bridge Crossing

A new crossing would be a major infrastructure project: at the time of the renewal of the Tamar Bridge decks and addition of the cantilevered platforms, the cost of construction of a replacement bridge was estimated at £300m.

In terms of location for a new bridge, the impact on the Tamar Valley Area of Outstanding Natural Beauty is a major consideration. Adjacent to the south of the existing Tamar Bridge is the Grade I listed Royal Albert Railway Bridge while locations further south are more remote from the A38 with consequential cost, land use and environmental implications of major road construction. The need to maintain shipping access on the river also precludes such sites.

To the north, the defence munitions centre at Ernesettle provides a notable impediment but it would appear possible to align a new bridge immediately north of the A38 with an angled crossing of the river, as shown in Figure 5.4.

River Tamar Crossings Study

Final Report

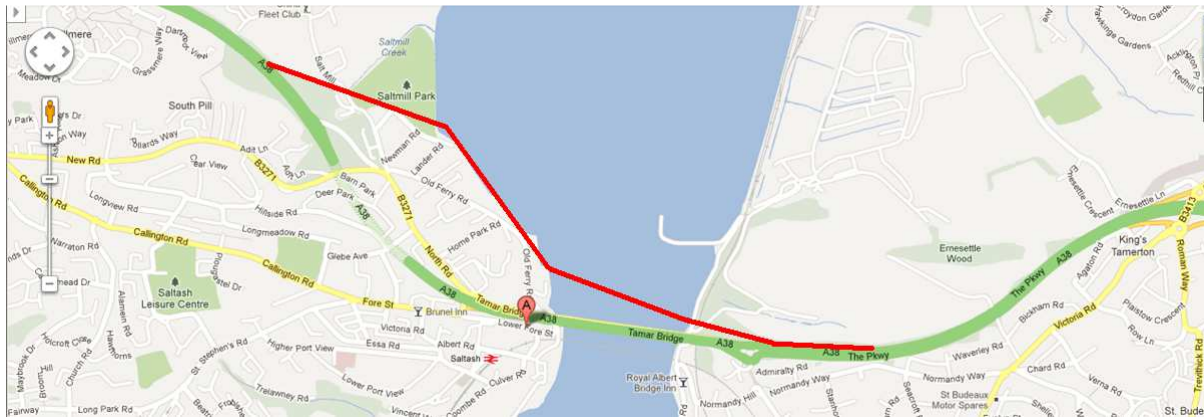


Figure 5.4 Potential New Bridge Alignment

The potential cost is estimated to be £380m - £510m, based on a comparison of the construction costs of the Second Severn Crossing. The Second Severn Crossing is 5km long and the main bridge span is 483m. The total cost in 1996 was £428m. Using an index of 2.2 (i.e. assuming a 5% annual increase in cost from 1996 to 2012), the 2012 cost of the Severn Crossing would be $£428m \times 2.2 = £942m$.

Assuming the new Tamar crossing is 2km and applying a pro-rata of the Second Severn Crossing figures, the indicative estimate for the Tamar new crossing = $2/5 \times £942m = £377m$. The Severn Crossing involved much longer approach structures in water so it would cost more to construct.

This order of cost is largely corroborated by an upgrading of the previous £300m figure using David Langdon Indices, which gives a figure of circa £510m.

As identified in earlier chapters of the report the option of delivering a new bridge would remove the current constraint of the Saltash tunnel, but impacts on the flow of A38 traffic from Manadon in the east to Trerulefoot in the west needs further assessment if plans for a new bridge were taken forward.

We have therefore not recommended the development of a new bridge as a Project to be taken forward at this stage because the level of demand will not increase sufficiently in the next 30 years to justify the major investment. The level of development in South East Cornwall, if reduced to less than 1,300 new homes in the plan period, for example, suggests that demand led infrastructure funding will not be needed for some time. It would be prudent however to return at regular intervals to test the model assumptions and growth patterns, to commence planning for a new bridge in the longer term (Project 17).

5.15 Summary

Table 5.1 contains a summary of options to increase capacity across the Tamar. Each scheme has been allocated a Project number, described, costed and where possible specific capacity benefits identified.

Project	Title	Mode	Location	Description	Estimated Benefit	Indicative Total Cost
1.	Smarter Choices initiatives	All	All routes	Full household PTP campaign for Saltash, Torpoint and Liskeard, 2 years to deliver, plus rural PTP campaigns as appropriate	Potential 2-5% mode shift from car, up to 130 peak hour trips on bridge and ferry	£331,000
2.	Data collection	All	All routes	Undertake new data collection and surveys to understand in detail current travel patterns, including origin and destination, mode choice, journey purpose and potentially using tag and Bluetooth technology to track vehicle movements.	This will enable the future planning of investment in infrastructure and demand management to be better informed, as well as allowing variable pricing regimes to be trialled.	£20,000
3.	Travel planning	All	All routes	Intensive travel planning focused on new travel to Derriford and South East Cornwall employment growth areas, spread over 5 year period	Establishes sustainable travel as default mode for new employment trips, slows growth of peak hour car trips on bridge and ferry, possible reduction of 25 – 50 trips	£30,000
4.	Car sharing	Car	All routes	Innovative marketing campaign to encourage greater use of existing car sharing schemes, linked to possible introduction of HOV lanes and priority systems	Reduce single occupancy trips on Bridge and Ferry, up to 50 peak hour trips	£10,000
5.	Travel information	All	All routes	Upgrade existing travel information system to enable more informed travel choices, including making data available on Open Data servers to enable independent data utilisation in apps	Reduction in congestion as informed passengers revise their travel plans, although difficult to estimate direct impact	£50,000
6.	Differential tolls and pricing strategies	General Traffic, Bus and Ferries	All routes	Amending charging structure to incentivise peak spreading and switch to sustainable modes and or more car sharing. Study of impacts required, including demand modelling and review of capacity of sustainable modes, especially buses, to meet increased passenger demand.	Likely revenue increase due to inelastic peak demand plus some capacity release as peak trips transfer to sustainable modes	Cost neutral as increased peak revenue offsets administration costs, statutory Toll Orders process and advertising the new charges
7.	Saltash to Derriford Cycle Route	Cycle	Saltash – Derriford	Routes to be developed, with mix of on and off highway sections, new signing and promotion. Linked with Project 2 – travel planning for new employees.	Increase in cycling across both bridge and ferry, although impact on capacity difficult to assess as may be transfer from other sustainable modes/routes	£10,000 to £50,000, dependent on route and new infrastructure required
8.	Express buses	Bus	Saltash – Plymouth	Supplementary express bus service between Saltash and Plymouth city centre	Access between new housing and employment, in both directions. Reduces growth of peak hour car trips arising from development, although difficult to estimate direct capacity impact on bridge and ferry	£600,000 kick-start support assuming 3 years to viability, funded by developers
9.	Express buses	Bus	Saltash – Derriford	Direct bus service between Saltash and Derriford Hospital / Northern Corridor	Access between new housing and employment, in both directions. Reduces growth of peak hour car trips arising from development, although difficult to estimate direct capacity impact on bridge and ferry	£450,000 kick-start support assuming 3 years to viability, funded by developers
10.	Torpoint Ferry capacity improvements	Ferry	Torpoint – Devonport	Develop plans for additional ferry capacity to meet pressing capacity shortfall identified in modelling demand. Options include larger capacity ferries when current vessels are replaced from 2025 or fourth chain ferry if landing stages can be secured	Without additional Torpoint Ferry capacity development in Torpoint specifically and South East Cornwall more widely may be constrained	Previous ferry costs were £4.9m per 73 vehicle capacity vessel (2006 prices). Larger vessels or additional vessel, plus costs of new slipways would therefore be significant and probably more than can be met from TBTFJC reserves and annual income

						(based on 2011-2015 Business Plan). Detailed option and cost studies therefore need to be undertaken. Study costs estimate £100,000
11.	New westbound traffic lane	General Traffic	Tamar Bridge	Conversion of the existing cantilevered deck from pedestrian/cycle use to create an additional westbound lane for general traffic. Would require alternative pedestrian and cycle facilities and would require changes to Tamar Bridge Act, which constrains such a measure.	Theoretical capacity increase of 1,600 but actual equates to Saltash traffic of 400 vehicles plus scope for growth in Saltash traffic	£250,000 + cost of alternative pedestrian access
12.	New westbound HOV lane	Bus/HOV	Tamar Bridge	Conversion of the existing cantilevered deck from pedestrian/cycle use to create an additional westbound lane for buses and high occupancy vehicles. Would require alternative pedestrian and cycle facilities and would require changes to Tamar Bridge Act, which constrains such a measure.	Limited capacity benefits	£250,000 + cost of alternative pedestrian access
13.	Westbound 2 to 1 merge	General Traffic	Tamar Bridge	Reconfiguration of current 2 to 1 merge on eastern (westbound) approach to bridge to increase AM capacity	100 extra vehicles westbound AM	£50,000 -100,000
14.	Eastbound 2 to 1 merge	General Traffic	Saltash Tunnel	Reconfiguration of current 2 to 1 merge on western (eastbound) approach to tunnel to increase PM capacity	100 extra vehicles eastbound PM	£50,000 -100,000
15.	Increased Tamar Tag use	General Traffic	Bridge Toll Plaza	Targeted marketing to increase Tamar Tag use from 80% to 85%	Reduced journey time delay, therefore higher throughput of vehicle and nominal capacity increase but also reduces income	£39,000 pa loss of income, plus promotional costs of £5,000 to encourage increased use
16.	Reroute buses to avoid crossing other traffic lanes	General Traffic	Bridge Toll Plaza	Buses trigger a 7 second hold function at other toll booths when crossing from left to right after the bridge. Re-routing would release this time to general traffic.	Reduced journey time delay, therefore higher throughput of vehicle and nominal capacity increase	£20,000
17.	Develop plans for new Tamar Bridge	General Traffic	Tamar Bridge	Develop plans for long term capacity increase through additional bridge north of existing alignment. Engineering, planning, environmental and viability studies required to prepare business case for government investment.	If built provides significant extra car and HGV capacity, avoids Saltash tunnel bottleneck, existing bridge could switch to local and HOV role	Study costs £2m plus, new bridge cost £377 - 510m plus on 2012 cost base

Table 5.1 Summary of Projects

6 Option Appraisal

6.1 Introduction

It is relatively simple to identify and develop a wide range of possible actions to improve transport infrastructure and increase capacity, particularly at a strategic level, but each option has to be tested against range of factors to determine appropriateness, effectiveness and deliverability. It is the interplay between the options, their relative values and the ability to programme delivery to achieve specific goals that we have sought to test.

It is expected that this initial assessment will require greater technical assessment and modelling of options (and indeed may lead to the rejection of options deemed unacceptable for non-technical reasons). In this chapter we start to explore the key issues to be addressed in determining the optimal way forward to meet future travel demand for the communities either side of the Tamar.

6.2 Key Issues

The prioritisation that has been applied has sought to reflect the project objectives:

- To evaluate the existing Tamar Crossings to determine residual capacity
- To evaluate the impacts of development in Saltash and Plymouth will have on the residual capacity of the crossings on the basis of the existing travel patterns / mode split
- To investigate and evaluate options to increase the residual useful life of the existing crossings by increasing capacity, managing demand or other initiatives
- To determine and test a preferred package of projects to optimize the capacity of the existing infrastructure
- To evaluate the potential to construct a new bridge and compare in economic and transport terms this option to the preferred package of projects

In assessing the Tamar Crossings against these objectives we have identified the following key issues:

- We have seen that the two main high volume crossings, the Tamar Bridge and the Torpoint Ferry, have physical capacity constraints which can be partially mitigated by efficiency measures and small scale infrastructure enhancements but ultimately present a finite limit on meeting future demand.
- Development in south east Cornwall, particularly new residential sites, is now likely to be less than originally planned for in the draft Core Strategy but will still place some additional pressure on the existing crossings. The proposed development growth in Plymouth and in particular in the Northern Corridor however may encourage greater numbers of employment trips from the existing population of south east Cornwall and these may require new sustainable transport links if private car growth is to be discouraged.
- Achieving a balance between demand management and increasing capacity through investment in infrastructure is at the heart of the prioritisation of options. Each option developed has a potential role in meeting future demand, recognising that the level of future demand is dependent on a range of external variables. Short term demand management and infrastructure optimisation solutions may defer major investment in new crossing capacity - on current trends the capacity constraints will not be reached within 20 years on the bridge but as early as 10 years from now on

the ferry (although these may also be up to 5 years later when more recent observed flows reflecting the current recession can be used to update the model outcomes).

- A package of projects needs to be developed which not only has a technical rationale but also meets commercial, planning, political, and importantly community objectives. In this study we have identified options that are technically feasible, such as the conversion of the southern cantilevered lane to vehicle use, but which may raise potentially insurmountable non-technical objections.
- Therefore it is appropriate that both Councils continue to plan for additional road vehicle crossings in the longer term, possibly within 20 - 40 years, but with a flexible and resilient approach which can be shaped to reflect external factors – the economy, technology, politics, attitudes, etc. of the time.

6.3 Technical Appraisal

The options identified above have been prioritised in basic terms of meeting demand at key stages of local development and growth, but further work will be required to refine this prioritisation. In particular if schemes are to be submitted to the Local Transport Boards for funding as major schemes the Councils will need to prepare a business case that will reflect the criteria for funding being established by those bodies. In recent years the Department of Transport have developed their previous WEBTAG guidance for appraising projects, but it is uncertain whether these or other assessment tools will be utilised by the new LTBs.

The Early Assessment and Sifting Tool, known as EAST, was developed by the Department of Transport to facilitate the summarising of evidence on different options for achieving a transport objective. It is designed to 'provide decision makers with relevant, high level, information to help them form an early view of how options perform and compare' (DfT, 2012).

EAST could therefore be useful to the two Councils to refine the prioritisation offered in this report and we recommend that officers should consider the use of EAST to supplement any assessment they make of the options before submitting them to the LTB for funding.

7 Conclusions

This report has confirmed the importance of the existing Tamar crossings to the communities on both sides of the river and has underlined the need to consider the future demands on these strategic links. At the outset of this study we expected to focus primarily on the peak hour commuter flows to Plymouth on the Tamar Bridge but perhaps against the perceived view we have found that tidal flow movements and the capacity of the Torpoint Ferry actually present the most immediate challenges.

The analysis undertaken has not identified a pressing need for major investment in bridge capacity. However there are some minor schemes which could be implemented to increase (particularly) non-tidal flow capacity. More importantly, projects to reduce demand and encourage more sustainable modes will need to be fully explored and supported. However on the Torpoint Ferry we believe there is a need to address growing demand and potential capacity shortfalls within 10 years.

In essence there is sufficient capacity on the Tamar Bridge to meet peak travel demand for many years, especially as South East Cornwall developments will not be generating sufficient additional trips that require investment in new infrastructure. Planned levels of employment and residential development can be accommodated by implementing focussed demand management programmes, specifically through travel planning and pricing strategies. The capacity of the Tamar Bridge is not, we believe, a constraint on growth and development in South East Cornwall.

We understand that locally there is a perceived congestion problem, but generally the Bridge has sufficient eastbound AM peak and westbound PM capacity for up to 20 years at least on base line growth. Our analysis confirms that the key highways peak hour constraint is not the bridge, but the Carkeel Roundabout and the Saltash Tunnel. Therefore enhancing either will improve the free flow of traffic on the A38 corridor.

Following the Cornwall Council local consultations on the approach and options for the draft Cornwall Local Plan (formally Core Strategy) it appears that the number of new households to be built in South East Cornwall and particularly in Saltash is now likely to be significantly less than previously identified. Therefore with a reduced number of new homes being built (and on current trends only a percentage, say 20%, of the new residents will work in Plymouth), this reinforces our assessment that there is not an urgent need to build more physical capacity on the bridge.

If a case were to be made for a new Tamar Bridge for the medium to long term it would have to be justified on levels of development that are not being proposed by the Council, are supported by the community or being sought by the market at the current time. We estimate that approximately 15,000 new homes and/or 5,000 jobs would be the minimum development levels to support a credible business case for a new bridge.

Our analysis suggests that if significantly more jobs were to be created in South East Cornwall in the next ten years the peak tidal flow will become a problem fairly soon. This impact may be managed in highways terms with better 2-1 merges, etc. and prioritising workplace travel planning, etc. Again only a percentage of new employees will be travelling from Plymouth and so the impact arising from a large increase in jobs should not be overstated.

Capacity on the Torpoint Ferry, particularly at peak times, could potentially become a key constraint on growth in Torpoint and to a lesser extent on the Rame peninsula. While development pressures are limited, with relatively low level of housing and employment growth envisaged for Torpoint, the fixed capacity of the Ferry link needs to be addressed.

Our initial view was that there is little additional capacity that can easily be provided, because of physical constraints of vessel size, landing slipway capacities and chain ferry operation. However further analysis suggests that with the expected replacement of the current fleet from 2025 onwards an opportunity arises to review whether the current 73 vehicle capacity vessels can be replaced by

larger vessels without loading and unloading disbenefits. It is also reasonable to review whether a fourth chain ferry could be introduced on this route, recognising the potential difficulties of securing landing stage space at the Devonport side of the Tamar and the potential conflict with redevelopment plans for Rendel Park on the Torpoint side.

In the short term to offset capacity pressures on the Torpoint Ferry the Councils should focus on Smarter Choices measures, including promoting car sharing and personalised travel planning, as well as developing enhanced bus services on this corridor.

Our review of existing bus and rail services, plus options for their growth in the future, indicated that there are limited opportunities for new bus services, metro rail or new ferry routes on the current development quantum. Rail stations are poorly located in many cases and so a true suburban rail network offer is likely to need considerable investment without attracting sufficient additional patronage. Existing bus operations on the Tamar Bridge and Torpoint Ferry have sufficient capacity for organic growth in the short and medium term and are sufficiently flexible that they can be increased quickly to meet new demands as they arise, hopefully as a fully commercial offer. Previous studies have made the case for new passenger ferries serving new routes but our analysis cannot identify sufficient unmet demand to justify the investment required to implement such services.

The one exception in delivering new sustainable travel modes is the creation of new cycle routes and better bus links to Derriford, which could be supported as Plymouth's Northern Corridor becomes a prime location for jobs, healthcare and other services.

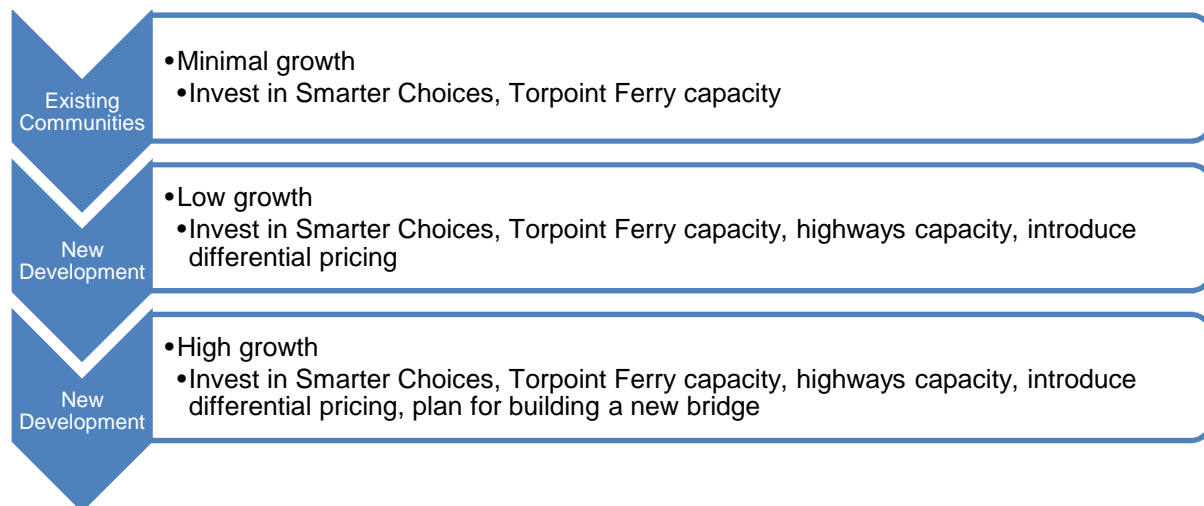
We have considered in some detail the use of pricing to manage demand. In classic economic theory it is reasonable where supply is constrained to ration scarce resources through increasing prices, notwithstanding social issues that might arise. Increasing the tolls and fares for the bridge and ferry to discourage single occupancy car use, for example, may switch users to mass transit modes, car sharing or walking or cycling. Of course it may also limit travel choices and access to jobs, health care and education, a potentially severe social outcome. Therefore a simple price increase strategy is unlikely to win support, politically or within the community, even if it raises income for investment in new capacity and reduces existing congestion.

It is also difficult because of the Tamar Bridge Act 1957 and the statutory Toll Orders process, which sets clear requirements on the TBTFJC to secure sufficient toll income to meet operational, maintenance and investment costs, but effectively not to make profits. A legal opinion is therefore required on how a different approach to toll setting and the use of cash reserves can be tested within the current legislative framework. The TBTFJC has accepted that a better response to inflation and future proofing is required, with plans for more frequent toll reviews identified in the Business Plan 2011-2015. Our analysis suggests further consideration of differential pricing, by time, route, vehicle type, etc., as well as a fuller understanding of people's travel patterns will be needed to inform the way forward.

In summary there are established and well managed crossings of the Tamar that meet current demand and with limited development growth can meet future demand, with careful interventions on pricing and offering attractive sustainable travel alternatives. There are effectively three growth scenarios to be planned for:

- Minimal growth –Meeting the needs of the baseline existing population, with no more than organic growth and no significant local government or central government intervention in promoting development.
- Low growth - With limited residential and employment development, particularly as proposed by the Cornwall Local Plan: Strategic Policies (2013) for example. This is more likely to occur if the current recessionary trend continues for the medium term and central government promotion of growth is unsuccessful.

- High growth – With significant levels of residential and employment development, as proposed by Plymouth City Council Core Strategy (2007) and the previous draft Cornwall Core Strategy (2011). This is more likely to occur with an improved economy and/or central government incentives for planning.



A project plan for delivering appropriate improvements to respond to these demand scenarios is recommended in the next chapter.

8 Recommendations and Project Plan

Based on the appraisal of the Projects developed in chapter 5, the following actions are recommended. Costs are provided as a high level guide, with significant caveats but note they are a mix of revenue and capital costs, with some funded externally by developers and operators, others needing council funding. Timing is based on the critical capacity thresholds identified in Figures 4.5 to 4.8 and in the conclusions chapter.

2013 - 2017

Project 2 – Data collection - Undertake new data collection and surveys to understand in detail current travel patterns, including origin and destination, mode choice, journey purpose and potentially using tag and Bluetooth technology to track vehicle movements. This will enable the future planning of investment in infrastructure and demand management to be better informed, as well as allowing variable pricing regimes to be developed.

£20,000

Project 4 - Car sharing - Innovative marketing campaign to encourage greater use of existing car sharing schemes, linked to possible introduction of HOV lanes and priority systems. Reduce single occupancy trips on Bridge and Ferry, up to 50 peak hour trips.

£10,000

Project 5 - Travel information - Upgrade existing travel information system to enable more informed travel choices, including making data available on Open Data servers to enable independent data utilisation in apps. Reduction in congestion as informed passengers revise their travel plans, although difficult to estimate direct impact.

£50,000

Project 6 - Differential tolls and pricing strategies - Amending the charging structure to incentivise peak spreading and switch to sustainable modes. Likely revenue increase due to inelastic peak demand plus some capacity release as peak trips transfer to sustainable modes. Cost potentially neutral as increased peak revenue offsets administration costs, statutory Toll Orders process and advertising the new charges. However there is benefit in identifying a budget for a pricing strategy feasibility study, as the costs of review may not be recouped if changes are not ultimately implemented. This study would make use of data collected in Project 2 above.

£20,000

Project 13 - Tamar Bridge new westbound 2 to 1 merge - Reconfiguration of current 2 to 1 merge on eastern (westbound) approach to bridge to increase AM capacity. Delivers 100 extra vehicles capacity westbound AM.

£50,000 - 100,000

Project 14 - Eastbound 2 to 1 merge - Reconfiguration of current 2 to 1 merge on western (eastbound) approach to tunnel to increase PM capacity. Delivers 100 extra vehicles capacity eastbound PM.

£50,000 - 100,000

Project 15 - Increased Tamar Tag use - Targeted marketing to increase Tamar Tag use from 80% to 85%. Reduced journey time delay, therefore higher throughput of vehicle and nominal capacity increase but also reduces income. This option should be considered initially as part of the pricing strategy feasibility study identified in Project 6, which may or may not recommend further

encouragement to transfer to Tamar Tag use. If implemented there is an on-going reduction in total toll revenue.

£39,000 pa loss of income,

plus promotional costs of £5,000

Project 16 – Tamar Bridge Toll Plaza - Reroute buses to avoid crossing other traffic lanes - Buses trigger a 7 second hold function at other toll booths when crossing from left to right after the bridge. Re-routing would release this time to general traffic. Reduced journey time delay, therefore higher throughput of vehicle and nominal capacity increase.

£20,000

2018 - 2023

Project 1 – Smarter Choices initiatives – Based on the intelligence gained from Project 2, implement a full household PTP campaign for Saltash, Torpoint and Liskeard as appropriate. 2 years to deliver, plus rural PTP campaigns, also, as appropriate. Potential 2-5% mode shift from car, up to 130 peak hour trips on bridge and ferry. Maximum costs identified, may be offset by developer contributions.

£331,000

Project 3 - Travel planning - Intensive travel planning focused on new travel to Derriford and South East Cornwall employment growth areas, spread over 5 year period. Establishes sustainable travel as default mode for new employment trips, slows growth of peak hour car trips on bridge and ferry, possible reduction of 25 – 50 trips.

£80,000

Project 7 - Saltash to Derriford Cycle Route – Routes to be developed, with mix of on and off highway sections, new signing and promotion. Linked with Project 2 – travel planning for new employees. Increase in cycling across both bridge and ferry, although impact on capacity difficult to assess as may be transfer from other sustainable modes/routes.

£10,000 to £50,000

Project 8 - Express buses (Saltash – Plymouth) - Supplementary express bus service between Saltash and Plymouth city centre. Access between new housing and employment, in both directions. Reduces growth of peak hour car trips arising from development, although difficult to estimate direct capacity impact on bridge and ferry. Utilises “Kickstart” type funding approach on the basis of achieving commercial operation after initial local authority supported period.

£600,000

Project 9 - Express buses (Saltash – Derriford) - Direct bus service between Saltash and Derriford Hospital / Northern Corridor. Access between new housing and employment, in both directions. Reduces growth of peak hour car trips arising from development, although difficult to estimate direct capacity impact on bridge and ferry. Utilises “Kickstart” type funding approach on the basis of achieving commercial operation after initial local authority supported period.

£450,000

Project 10 - Torpoint Ferry capacity improvements - Develop plans for additional ferry capacity to meet pressing capacity shortfall identified in modelling demand. Options include larger capacity ferries when current vessels are replaced from 2025 or fourth chain ferry if landing stages can be secured. Without

additional Torpoint Ferry capacity development in Torpoint specifically and South East Cornwall more widely may be constrained. Previous ferry costs were £4.9m per 73 vehicle capacity vessel (2006 prices). Larger vessels or additional vessel, plus costs of new slipways would therefore be significant and probably more than can be met from TBTFJC reserves and annual income (based on the 2011-2015 Business Plan). Detailed option and cost studies therefore need to be undertaken, for medium and long term solutions.

Study costs £100,000

2024 - 2034

Project 11 – Tamar Bridge new westbound traffic lane - Conversion of the existing cantilevered deck from pedestrian/cycle use to create an additional westbound lane for general traffic. Would require alternative pedestrian and cycle facilities and would require changes to Tamar Bridge Act, which constrains such a measure. Theoretical capacity increase of 1,600 but actual equates to Saltash traffic of 400 vehicles plus scope for growth in Saltash traffic.

£250,000 + cost of alternative pedestrian access

Or

Project 12- Tamar Bridge new westbound HOV lane - Conversion of the existing cantilevered deck from pedestrian/cycle use to create an additional westbound lane for buses and high occupancy vehicles. Would require alternative pedestrian and cycle facilities and would require changes to Tamar Bridge Act, which constrains such a measure. Limited capacity benefits.

£250,000 + cost of alternative pedestrian access – potentially £20m

Or

Project 17 – New Tamar Bridge - Develop plans for long term capacity increase through additional bridge north of existing alignment. Engineering, planning, environmental and viability studies required to prepare business case for government investment. If built provides significant extra car and HGV capacity, avoids Saltash tunnel bottleneck, existing bridge could switch to local and HOV role.

Study costs £2m +

New bridge cost £377 - £510m + (on 2012 cost base)