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TimberLINK Environmental and Economic Evaluation

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Evaluation Report

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Collingwood Environmental Planning

Project title:	**TimberLINK Environmental and Economic Evaluation**	
Contracting organisation:	**Forestry Commission Scotland (FCS)**	
Contractor:	**Collingwood Environmental Planning Limited (CEP)**	
Contact details:	***Head office:***	
	Address:	1E The Chandlery, 50 Westminster Bridge Road, London, SE1 7QY, UK
	Contact:	Ric Eales
	Tel.	020 7407 8700
	Fax.	020 7928 6950
	Email:	r.eales@cep.co.uk
	Website:	www.cep.co.uk
	Scottish office:	
	Address:	c/o Department of Civil and Environmental Engineering, University of Strathclyde, Level 5, James Weir Building, 75 Montrose Street, Glasgow, G1 1XJ
	Contact:	Dr Peter Phillips
	Tel:	0141 416 8700
	Email:	p.phillips@cep.co.uk
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	Authors:	Peter Phillips, Tom Matthew, Liza Papadopoulou, William Sheate and Neil Ferguson

Executive summary

Forestry Commission Scotland (FCS) commissioned Collingwood Environmental Planning Limited in association with Reference Economic Consultants and the University of Strathclyde to undertake the **TimberLINK Environmental and Economic Evaluation** project. The evaluation was undertaken between August and November 2016.

What is TimberLINK?

Forest cover in Argyll is almost double that of the Scottish average and the area produces around 15% of Scotland's timber. Limited local processing capacity, however, means that much of this timber leaves Argyll to be processed in central Scotland and Ayrshire. There is therefore high demand for timber transport. This is in a context of the Argyll area's complex geography which means that road transportation involves a circuitous route on a road that is not ideal for HGV traffic.

TimberLINK is a public service contract, funded by the Scottish Government through FCS, to support short-sea coastal shipping of roundwood from Argyll to Ayrshire. This currently operates from three ports in Argyll (Ardrishaig, Campbeltown and Sandbank) to Troon and Ayr in Ayrshire.

The service was envisioned principally as an environmental initiative. Subsidy payments cover the **additional costs** associated with transporting timber by sea rather than road, the main objective being to reduce the environmental and community impact of Argyll-Ayrshire timber transport. The alternative to sea transport is a long road haul (up to 190 miles) on the A83, A82, M8 and various trunk roads in Ayrshire.

Objectives and scope of the evaluation

The overall aim of the evaluation project was to establish an understanding of the direct and indirect impacts of the TimberLINK service. Specific objectives related to: the assessment of environmental and economic impacts; using appropriate methods to quantify and (where possible) monetise impacts; assessing the impacts of the service on key policy objectives; and exploring potential improvements and alternatives to TimberLINK through stakeholder input.

The impacts that were considered are set out in Table A below.

Table A: Impacts considered in the evaluation

Environmental impacts	Economic impacts
Societal level impacts • Fuel usage • Carbon emissions	*Quantified economic impacts:* • Full Time Equivalent (FTE) jobs • Gross Value Added (GVA)
Regional level impacts • Damage to roads • Road maintenance costs	*Non-quantified economic impacts:* • Supply chain investment • Haulier capacity and operational feasibility • End-user benefits / dis-benefits • Wider impacts – tourism • Wider impacts – community reaction
Combined regional and local level impacts • Traffic flow and congestion • Accident risk • Driver frustration	
Local level impacts • Amenity and community severance • Visual impact • Regeneration • Noise • Air pollution	

Other reasonable timber transport scenarios were considered in the evaluation to provide a comparison for the impacts of the TimberLINK service. The three scenarios assessed were:

1. **TimberLINK "Business as Usual" (BAU):** the extant TimberLINK service, based on the assumption that funding and operations remain unchanged;
2. **Expanded TimberLINK service:** assumes that the volume of timber moving through the TimberLINK supply chain increases to 120,000 tonnes (for comparison, the actual volume transported in 2015/16 was c76,000 tonnes); and
3. **Non-TimberLINK scenario:** reflects what might happen in the absence of the TimberLINK service. The most reasonable alternative to TimberLINK was considered to be road transportation of timber via the A83, A82, M8 and various trunk roads in Ayrshire.

Results of the evaluation

The quantifiable results of the evaluation, per scenario, are outlined in Table B. An overall summary is then provided that considers the balance of quantifiable costs and benefits across the TimberLINK BAU and non-TimberLINK (road based alternative) scenarios, relative to the level of subsidy paid. Summaries are based on TimberLINK operational data and subsidy payments for 2015/16. Due to methodological constraints, it was not possible to quantify and monetise all impacts.

Table B: Key quantifiable results of the evaluation per scenario

Scenario	Total Gross Value Added (GVA) impact at the Scotland level	Total employment impact at the Scotland level	Total cost of quantifiable environmental impacts
1. TimberLINK BAU	**£1,561,000**	**26.8 FTE**	**£115,578**
2. TimberLINK expanded service	**£2,342,000**	**40.2 FTE**	**£181,323**
3. Non-TimberLINK (road based)	**£1,108,000**	**26.2 FTE**	**£283,238**

It is important to bear in mind at this point the nature of timber transport via the TimberLINK service. As with all forms of freight haulage, regardless of mode, timber transport will always have environmental impacts. The objective of TimberLINK is to reduce these impacts by shifting a portion of Argyll's timber lorry miles to short-sea coastal shipping.

Therefore, whilst TimberLINK still causes environmental impacts (and associated costs), these are less than the road based alternative. In effect, this reduction in environmental costs is the environmental benefit of the service. This is why there is an environmental cost line shown in Table B for the TimberLINK BAU and expanded service scenarios. It is clear, however, that the environmental cost of TimberLINK is lower than the non-TimberLINK (road based) scenario.

Quantifiable costs and benefits for the TimberLINK BAU and non-TimberLINK scenarios[1] in Table B show clearly how the environmental costs of the former are substantially lower than the latter (only 41%). Also, Scotland level GVA impact of the TimberLINK BAU scenario is higher than that of the non-TimberLINK scenario. Therefore, **TimberLINK results in less environmental costs and more economic benefits** than the non-TimberLINK (road based alternative) scenario.

Environmental costs and economic benefits have been integrated across the TimberLINK BAU and non-TimberLINK (road based alternative) scenarios to calculate the **net benefit of TimberLINK**. That was defined as: *net reduction in environmental costs + additional Scotland level GVA impact*.

By this logic, the net benefit of the TimberLINK service in 2015/16 was **c£621,000**. This is roughly equal to the level of subsidy required by TimberLINK in 2015/16 (£665,000); it is short by **£45,000** or **6.7%**. We would expect this shortfall to be made up (and potentially exceeded) by full consideration of the non-quantifiable environmental and economic impacts (e.g. traffic flow and congestion, visual

[1] The quantifiable costs and benefits of the TimberLINK expanded service scenario are not directly comparable with the non-TimberLINK (road based alternative) scenario and have therefore not been covered here. To directly compare these two scenarios, the non-TimberLINK scenario costs and benefits would need to be increased pro rata in line with the expanded service scenario, necessitating some further (relatively complex) calculations. This was not a requirement of the evaluation brief.

impact, end-user benefits) and / or by using a carbon price that better reflects the wider societal benefits of climate change mitigation. Related to this, it is noteworthy that TimberLINK consistently reduces timber lorry movements by over 1,000,000km per year.

Overall conclusions from the evaluation

TimberLINK was conceived principally as an environmental initiative aimed at reducing the environmental impacts of timber transport between Argyll and Ayrshire. The nature of timber transport, however, is such that there will always be an environmental impact, hence TimberLINK's focus on *reducing* environmental impacts (i.e. avoiding the impacts entirely is impossible).

The evaluation work undertaken in this project has demonstrated how **key quantifiable environmental impacts are lower in magnitude when timber is transported by TimberLINK than by the road-only alternative** (via the A83, A82 etc). This is true for fuel usage, carbon emissions and road damage related impacts, amongst others. This reduction in impacts is achieved by drastically reducing timber lorry movements (by over 1,000,000km per year).

It has also been possible to monetise several key environmental impacts. The value of the environmental costs *avoided* through sea transportation of timber (via TimberLINK) instead of road-only was **£167,660**. When the economic benefits (in terms of GVA) are incorporated, TimberLINK produces a net benefit of **£620,660**. This net benefit is similar to the TimberLINK subsidy rate paid (it is **6.7%** less). **We conclude therefore that the TimberLINK subsidy payments are commensurate with the realised environmental and economic benefits of the service**[2].

In addition to the overall benefit, there are also **several key local environmental impacts of TimberLINK experienced in and around the three ports used by the service**. These include: impacts on local traffic flows and congestion; driver frustration and accident risk; visual impacts; impacts on local regeneration objectives; and noise and air pollution impacts. On balance, **none of these impacts are particularly significant** as the magnitude of the impact causing activities (TimberLINK delivery days and related timber lorry movements) is relatively low.

However, **several local environmental impacts are likely to be much more significant in Sandbank**. In particular, traffic flow and congestion, driver frustration and accident risk, visual impact and noise. This is principally due to the pier's location close to the centre of the village, poor access to the pier and an ongoing grievance between a substantial portion of the community and the pier operator.

It is also important to note that **TimberLINK is only a subset of overall Argyll timber transport by sea**. As such, stakeholders (including affected communities) may perceive TimberLINK's impacts to be greater than they necessarily are.

The evaluation quantified some of the supply chain economic impacts of TimberLINK within the economies of Argyll, Ayrshire and Scotland. The **magnitude of employment and GVA impacts is very slight in the context of the overall size of each of the three economies**. However, the economic evaluation showed that the **TimberLINK BAU scenario has a positive GVA to subsidy ratio**; i.e. greater than 1 (2.35). It should be appreciated that TimberLINK does not have economic impact as a scheme objective (it is principally an environmental initiative).

Finally, it is important to note that the **economic impact of a non-TimberLINK scenario on growers and end-users is highly uncertain**. TimberLINK is a proven service that is valued by growers and end-users for various reasons. In the absence of TimberLINK, it remains unclear as to how far the road haulage sector would be able to fully "take up the slack". This uncertainty is compounded by the fact that there was no consensus among stakeholders on the likely scale / nature / location of changes in timber sourcing and timber sales under a non-TimberLINK scenario.

[2] All figures are for financial year 2015/16.

Contents

1. Introduction to TimberLINK and the evaluation

Forestry Commission Scotland (FCS) commissioned Collingwood Environmental Planning Limited (CEP) in association with Reference Economic Consultants and the University of Strathclyde to undertake the **TimberLINK Environmental and Economic Evaluation** project. The evaluation was undertaken between August and November 2016. This document is the final Evaluation Report.

TimberLINK is a public service contract, funded by the Scottish Government through FCS, to support short-sea coastal shipping of roundwood from Argyll to Ayrshire. The service was envisioned as an environmental initiative designed to reduce the impact on communities and the environment of timber transport via the A83 (and other roads) from Argyll to Ayrshire.

1.1 Objectives of the evaluation

The overall aim of the TimberLINK evaluation project was to establish an understanding of the direct and indirect benefits arising from the TimberLINK service. Specific objectives relating to different aspects of the evaluation (environmental, economic etc) are outlined in Box 1.1 below.

In order to compare the impacts of the TimberLINK service with other reasonable timber transport scenarios, the following three alternatives were considered:

1. TimberLINK "Business as Usual" (BAU);
2. Expanded TimberLINK service; and
3. Non-TimberLINK (road based alternative).

The three scenarios are introduced further in Chapter 2 below.

Box 1.1: Objectives of the TimberLINK evaluation

Environmental and economic evaluations shared objectives

1. Where possible, use appropriate methods to quantify and value the individual and aggregated impacts; and
2. Detail how the quantity and value of the impacts would differ in alternative scenarios.

Environmental and economic evaluations topic specific objectives

3. Identify the local, regional and societal environmental impacts of TimberLINK; and
4. Identify the range of economic impacts that result from TimberLINK through consideration of different sectors and scales.

Policy impact evaluation objectives

5. Identify the Scottish Government policies related to TimberLINK's activities and impacts;
6. Describe how and to what extent TimberLINK supports or undermines the relevant policies and associated targets; and
7. Detail how and to what extent this supporting or undermining would differ in the alternative scenarios.

Objectives for exploring alternative timber transport approaches

8. Explore potential improvements and alternatives to TimberLINK through stakeholder input; and
9. Consider how the above would influence the impacts and value of the TimberLINK service.

1.2 Purpose and contents of this Evaluation Report

This report is intended to provide a comprehensive view of the evaluation project's main findings as well as details of the methodological approach adopted. It is structured as follows:

- **Chapter 1 – Introduction to the evaluation:** Outlines the aims and objectives of the evaluation project and sets the context for the evaluation, especially in terms of key Scottish Government policies that influence timber transport and sustainable transport / haulage more generally. The introduction also provides a brief overview of the TimberLINK service.
- **Chapter 2 – Methodology:** Describes the methodology adopted in the evaluation project including details of the specific approach used in each aspect of the evaluation (environmental, economic etc), datasets used, stakeholder consultation etc.
- **Chapter 3 – Findings of the environmental evaluation:** Details the results of the environmental evaluation including an introduction to the findings, an overview of the TimberLINK operational data used in the assessment and a summary of the results for each environmental impact considered. Where relevant, results per impact are provided for each timber transport scenario and for the *ex-post* evaluation and *ex-ante* assessment aspects.
- **Chapter 4 – Findings of the economic evaluation:** Details the results of the economic aspects of the evaluation. Economic impacts are described as part of an *ex-post* evaluation (2010/11 – 2015/16) of the TimberLINK business as usual (BAU) scenario and an *ex-ante* assessment for all three scenarios.
- **Chapter 5 – Evaluation synthesis:** This chapter brings together the environmental and economic aspects of the evaluation in synthesis. Results from the assessment of each individual scenario are synthesised then the environmental costs and economic benefits of the TimberLINK BAU and non-TimberLINK scenarios are integrated to calculate the overall costs and benefits of the TimberLINK service. The findings of the policy impact assessment are also described.
- **Chapter 6 – Conclusions:** Sets out the main findings of the evaluation and overall conclusions. This chapter includes a review of key methodological limitations and makes some recommendations for how these could be addressed in future evaluations. It also sets out some suggestions for how the ongoing delivery of TimberLINK might be improved.

1.3 Background and policy context for the TimberLINK service

The TimberLINK service is the product of various factors and opportunities that came together in the late 1990s and early 2000s[3]. Specifically, a large windblow event in Argyll in the late 1990s produced a large volume of timber that then needed to be transported in a relatively short time.

The Argyll Timber Transport Group[4] (ATTG) was already established (it was formed in 1997). It aims to promote dialogue between timber producers and the local authority over the use of public roads by timber traffic. The ATTG had already been considering the options and benefits of mode shift for timber transport. Therefore, the combined effect of these factors in Argyll in the late 90s / early 00s meant that there was a very specific context that promoted and warranted the development of subsidised coastal shipping of timber between Argyll and Ayrshire.

In addition, there are numerous Scottish and UK Government policies that influence the delivery of the TimberLINK service and *vice versa*. These policies cover a range of economic, environmental, safety, planning and social issues. For example, climate change, sustainable transport, economic strategy, rural development, tourism development, forestry development, road safety, air quality and noise. The key policies, plans and strategies that establish the overall policy framework for TimberLINK are set out in Table 1.1 below. As part of the evaluation, the policy impacts of TimberLINK have been assessed by considering the extent to which TimberLINK supports or undermines key objectives and targets from this policy framework.

[3] These issues were identified and discussed by participants at the TimberLINK Stakeholder Seminar undertaken as part of this evaluation project and held in Inveraray on 25th October 2016.
[4] http://timbertransportforum.org.uk/groups/argyll

Table 1.1: Key policies of relevance to the operation of the TimberLINK service

Title of policy	Policy owner / year of publication	Lifespan
1. National Performance Framework	Scottish Government (2016 refresh)	Refreshed every 4 years
2. National Transport Strategy	Transport Scotland (2016)	To 2026
3. Scotland's Economic Strategy	Scottish Government (2015)	Reviewed every 4 years
4. Ambition / Opportunity / Place – Scotland's Third National Planning Framework (NPF3)	Scottish Government (2014a)	Long term vision to ~2035
5. Scottish Planning Policy (SPP)	Scottish Government (2014b)	Reviewed every 5 years
6. Transportation Noise Action Plan	Scottish Government / Transport Scotland (2014)	Outlines actions to be undertaken 2013-18
7. Low Carbon Scotland: Meeting our Emissions Reduction Targets 2013-2027 (RPP2)	Scottish Government (2013a)	2013-2027
8. Scotland's Road Safety Framework to 2020: Go safe on Scotland's Roads it's everyone's responsibility	Scottish Government (2009)	To 2020
9. Climate Change Programme	Forestry Commission Scotland (2013)	N/A
10. Scottish Forestry Strategy	Forestry Commission Scotland (2006)	To 2016 (currently under review)
11. Tourism Development Framework for Scotland	Visit Scotland (2013)	To 2020
12. UK National Air Quality Strategy	Defra (2011)	N/A
13. Strategic Transport Projects Review	Transport Scotland (2008)	To 2032

1.4 Overview of the TimberLINK service

Argyll has around 30% forest cover (Argyll and Bute Council, 2011) which is substantially higher than the current Scottish average of 18% (FC, 2015). The region produces around 15% of Scotland's timber. However, as there is limited local processing capacity, most of this leaves Argyll to be processed in central Scotland and Ayrshire (FCS, undated) e.g. Egger at Auchinleck, Caledonian Paper and Mairs Sawmill in Irvine and Land Energy in Girvan. Furthermore, a not insignificant portion of this timber is sent to Ireland including exports to Eire.

The road transport option involves a long journey (up to 190 miles) on the A83, A82, M8 and various other trunk roads in Ayrshire. Although a trunk road, the A83 is not ideal for heavy goods vehicles (such as timber lorries) due to frequent changes in gradient and sharp corners. The road also passes through the centre of numerous settlements including Lochgilphead, Inveraray and Arrochar. In contrast, transport across the Firth of Clyde, via TimberLINK or other (commercially operated) coastal shipping services, involves a sea journey of around 50 miles (see Figure 1.1 below).

Coastal shipping of timber via TimberLINK is, therefore, designed principally as an environmental initiative, providing a sustainable alternative to road haulage. The environmental benefits of the

service include reductions in fuel usage and carbon emissions, reduced traffic congestion on the trunk roads and associated impacts on air quality, noise and visual amenity along the route.

Figure 1.1: TimberLINK coastal shipping routes between Argyll and Ayrshire (Source: FCS, undated)
Note: Portavadie was used by TimberLINK until it was closed for use after winter 2012/13.

It is important to stress that the Argyll harbours used for TimberLINK also ship timber via coastal shipping services other than TimberLINK (i.e. commercially operated services). In 2015/16 for example, the TimberLINK service accounted for only 30% of the timber moving through the ports at Ardrishaig, Campbeltown and Sandbank and the MV Ayress (the vessel used for TimberLINK's coastal shipping leg) transported almost as much timber as part of other contracts as it did for TimberLINK[5][6]. Clearly this has implications in terms of how stakeholders and communities differentiate between the local environmental impacts of TimberLINK vs. the impacts of other coastal timber shipping services, especially as the MV Ayress is very visibly branded with the TimberLINK logo and name. There is also fluctuation in the amount of timber shipped by TimberLINK year-on-year due to market demand. In 2015/16 for example, TimberLINK shipped 76,489 tonnes of timber whereas in 2010/11, 102,735 tonnes was shipped. Clearly, therefore, the exact impact attributable to TimberLINK will fluctuate accordingly.

The TimberLINK service commenced in Spring 2000 and is currently operated by Associated British Ports Limited[7] (ABP) with a subsidy of up to £1 million per annum from the Scottish Government. This covers the additional cost of transporting timber by sea rather than road; as road transport is less costly, the subsidy makes up the difference (i.e. it covers the cost of delivering the environmental benefits / reducing the environmental impact of timber transport).

In TimberLINK's current guise, ABP manages the service and is responsible for ensuring successful delivery of the complete end-to-end operation which covers:

[5] Operational data provided by ABP.
[6] These figures do not include any tonnage taken out of Sandbank by parties other than ABP and JST (i.e. the proportion of timber shipped through Sandbank attributable to TimberLINK will be <30%).
[7] http://www.abports.co.uk/

- Collection of timber at forest roadside;
- Off-loading the timber lorries at pier-sides;
- Loading the vessel (MV Ayress currently) prior to sailing;
- Sailing the routes; and
- Discharging at Troon and onward delivery to the receiving processors.

The current funding phase for TimberLINK is coming to an end on 31st March 2017. Policy-makers are now tasked with deciding on the future of the service and this Evaluation Report will provide a key piece of evidence informing these deliberations. It is anticipated that a re-tendering process for TimberLINK will commence shortly.

2. Evaluation methodology

2.1 Overview of the evaluation methodology

In contrast to the previous two TimberLINK studies (TTR and EKOS, 2007; TTR, 2010), this current evaluation considers TimberLINK's environmental and economic impacts at the same time. These two aspects were undertaken in parallel by different experts: CEP undertook the environmental evaluation; and Reference Economic Consultants the economic. The key benefit of evaluating both sets of impacts in the same study is the opportunity to compare, contrast and integrate the impacts simultaneously to help draw overall conclusions.

A further key aspect of the methodology adopted in this evaluation is the use of scenarios to compare the impacts of TimberLINK "Business as Usual" (BAU) alongside other reasonable alternatives for timber transport between Argyll and Ayrshire. Consideration of scenarios in this regard facilitates a more forward looking *ex-ante* assessment by identifying what might happen with and without the TimberLINK service. Three scenarios including TimberLINK BAU were provided in the brief and assessed in the evaluation. These are outlined in Box 2.1 below.

Box 2.1: Timber transport scenarios assessed in the evaluation

1. ***TimberLINK Business as Usual (BAU) scenario:*** *based on the assumption that funding and operations will remain essentially unchanged. Assessment of this scenario drew heavily on empirical TimberLINK operational data available from ABP to reflect the current (BAU) situation;*
2. ***Expanded TimberLINK service scenario:*** *this scenario assumes that the volume of timber moving through the TimberLINK supply chain increases to 120,000 tonnes (by way of contrast the service shipped ~76,400 tonnes in 2015/16). This scenario reflects the possibility that harvesting in Argyll forests could increase though the consequences for TimberLINK and associated impacts are uncertain (e.g. increased harvested volumes could be transported by road or TimberLINK). A key assumption within this scenario is that volumes per port would increase in proportion to their current usage (i.e. under the TimberLINK BAU scenario); and*
3. ***Non-TimberLINK scenario:*** *this scenario reflects what might happen in the absence of funding and hence the current TimberLINK service. Under this scenario, end-users in Ayrshire would need to obtain their raw materials by alternative pathways such as road haulage, rail or non-subsidised coastal shipping. For the purposes of the evaluation, the non-TimberLINK scenario was assumed to be road haulage via the A83, A82, M8 and various trunk roads in Ayrshire. Most stakeholders consulted as part of the evaluation highlighted this as the most reasonable option in the absence of TimberLINK. The tonnages and distances travelled by timber lorries assessed under the non-TimberLINK scenario are based on data from the TimberLINK BAU scenario.*

2.2 Approach taken to the environmental evaluation

This section describes the scope and approach adopted in the environmental aspects of the TimberLINK evaluation.

2.2.1 Scope of the environmental evaluation

The specification for the TimberLINK evaluation is very clear in terms of the environmental impacts to be considered. Three categories of environmental impact are defined, with each linked closely to scale issues:

- **Local impacts:** impacts affecting specific communities; "port communities" under the TimberLINK BAU and expanded service scenarios (Ardrishaig; Campbeltown; Sandbank) and "road communities" under the non-TimberLINK (road based alternative) scenario (principally Lochgilphead, Inveraray and Arrochar);

- **Regional impacts:** impacts that transcend individual communities including damage to local and trunk roads, traffic congestion and the indirect impacts of traffic congestion and associated driver frustration on tourism; and
- **Societal impacts:** these are impacts associated with increased / decreased fuel usage and carbon emissions under the different timber transport scenarios. Climate change is a global issue that transcends administrative boundaries (including states) hence the emissions reductions facilitated by TimberLINK are seen as benefitting society as a whole.

Table and Figure 2.1 summarise the impacts considered in the environmental evaluation including various information: scale of impact; whether the assessment methodology is quantitative or mixed (see section 2.2.3); whether the assessment has been undertaken *ex-post*, *ex-ante* or both (see section 2.2.2) and which timber transport scenarios have been assessed for each impact. A more detailed version of this table is included at Annex 1 (including further detail on the scope of each assessment as well as where / how qualitative data from stakeholder interviews has been used).

Table 2.1: Summary of individual assessments undertaken in the environmental evaluation

Impact being assessed	Scale of impact			Assessment approach		Ex-post or ex-ante		Timber transport scenarios assessed		
	Local	Regional	Societal	Quantitative	Mixed	Ex-post	Ex-ante	BAU	Non-TimberLINK	Expanded service
Fuel usage & carbon emissions	✘	✘	✓	✓	✘	✓	✓	✓	✓	✓
Damage to roads & maintenance costs	✘	✓	✘	✓	✘	✓	✓	✓	✓	✓
Congestion	✓	✓	✘	✘	✓	✓	✓	✓	✓	✓
Noise	✓	✘	✘	✘	✓	✓	✓	✓	✓	✓
Air	✓	✘	✘	✘	✓	✓	✓	✓	✓	✓
Driver frustration	✓	✓	✘	✘	✓	✘	✓	✓	✓	✓
Accident risk	✓	✓	✘	✘	✓	✓	✓	✓	✓	✓
Visual impact	✓	✘	✘	✘	✓	✘	✓	✓	✘	✘
Amenity & community severance	✓	✘	✘	✘	✓	✘	✓	✘	✓	✘
Regeneration	✓	✘	✘	✘	✓	✘	✓	✓	✘	✘

2.2.2 The difference between *ex-post* evaluation and *ex-ante* assessment

Ex-ante assessment aims to predict the likely impacts of an intervention before the event. *Ex-post* evaluation identifies and describes an intervention's impacts after the event. The former is theoretical based on models, the inherent logic behind the intervention and assumptions. The latter is empirical and based on observations of what actually happened.

More often than not, the findings of *ex-post* evaluations only become available after the *ex-ante* assessment of the new policy or programme has been undertaken. This means that the learning gained by evaluating the previous initiative is not available to inform the scope and objectives of the

next. This is frequently the case with *ex-post* evaluations and *ex-ante* assessments of EU Structural and Investment funds, such as Rural Development Programmes funded through the EAFRD[8].

The TimberLINK evaluation project raises a relatively unique opportunity in impact assessment practice as it is being undertaken at a juncture where historic data is available to evaluate the impacts of the service *ex-post* yet, at the same time, there is also an opportunity to assess *ex-ante* the potential future impacts of the service, along with the impacts of alternative scenarios for timber transport between Argyll and Ayrshire.

In practical terms, evaluating impacts both *ex-post* and *ex-ante* means that deliberations about the future of the TimberLINK service can be informed by a clear understanding of the service's impacts to date as well as the possible future impacts of the service "as is" (i.e. the TimberLINK BAU scenario) and other reasonable alternatives for timber transport between Argyll and Ayrshire.

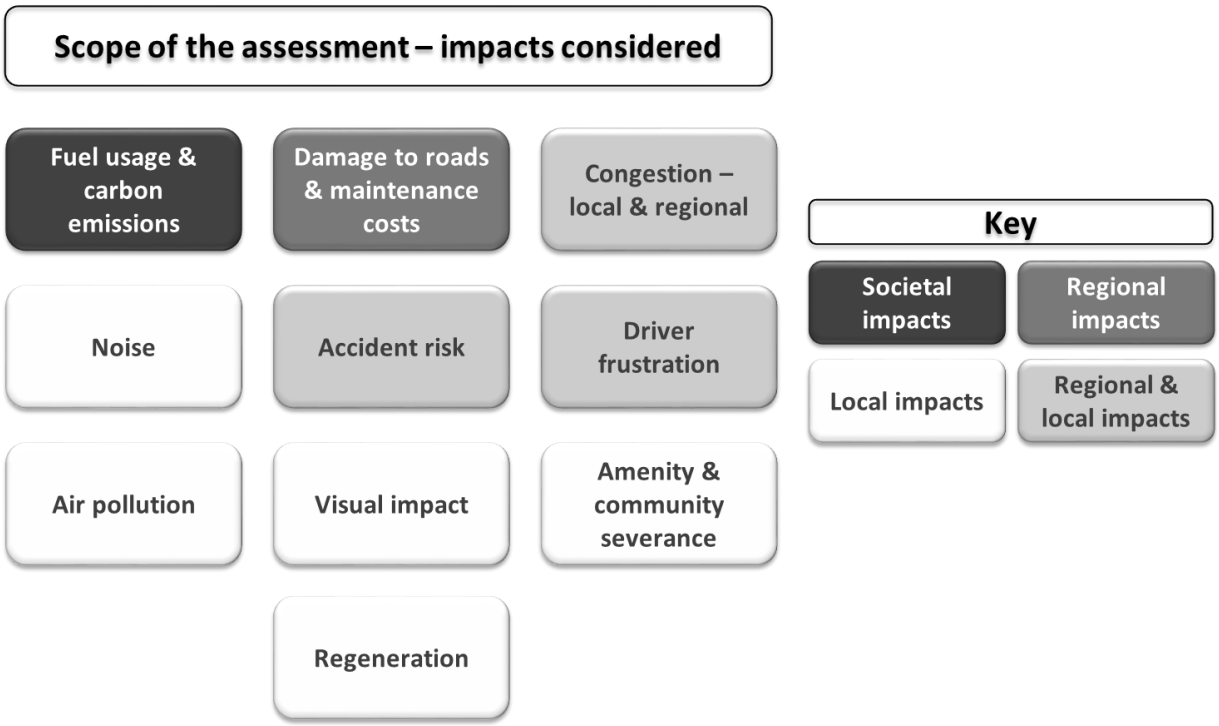

Figure 2.1: Scope of the assessment – impacts considered

The *ex-post* evaluation has been undertaken primarily for the TimberLINK BAU scenario drawing on empirical data relating to the actual operation of the TimberLINK service. The impacts considered have been assessed for all ensuing years following the 2010 environmental evaluation (2010/11; 2011/12; 2012/13; 2013/14; 2014/15; and 2015/16) using historic operational and other data. The objective of the *ex-post* evaluation therefore is not to produce comparable data between all three timber transport scenarios considered, rather it provides an "internal" comparison of the BAU scenario *ex-post* i.e. assessing the efficiency of the TimberLINK service in terms of the magnitude of key impacts relative to the volume of timber shipped (e.g. carbon emissions per tonne of timber shipped, road damage costs per tonne of timber shipped).

Conversely, the *ex-ante* assessment has been undertaken for all three timber transport scenarios. The impacts considered have been assessed for an ex-ante "baseline" year taken to be 2015/16. The assessment of the TimberLINK BAU scenario uses operational data from this year of operation. The assessment of the non-TimberLINK (road based alternative) and expanded TimberLINK service scenarios are based on extrapolations of TimberLINK BAU scenario operational data for 2015/16 (e.g. the distance travelled and therefore the number of timber lorry trips, fuel usage etc required to transport the volume of timber shipped by TimberLINK in that year under a road based alternative).

[8] http://ec.europa.eu/agriculture/rural-development-2014-2020/index_en.htm

Where appropriate, therefore, these "calculated data"[9] are provided for earlier years (2010/11 to 2014/15) to provide comparators for the other two scenarios; i.e. what might have happened in a given year if there had been no TimberLINK service or if more timber had been transported.

As part of the *ex-ante* assessment it had been hoped that further projections into the future could have been undertaken e.g. to predict what the impacts of the different scenarios might have been for the duration of the next TimberLINK contract (i.e. up to March 2022). Following discussion with FCS however this anticipated aspect of the assessment was not taken further as it was deemed impossible or spurious to predict end-user demand for timber and therefore harvesting rates and associated demand for timber transport as these factors are all dependent on market variability.

2.2.3 The difference between quantitative and mixed methods assessments

As shown on Table 2.1, a further methodological distinction in the assessment of TimberLINK's environmental impacts is between impacts that were assessed purely quantitatively and those that were assessed using a mixed methods approach (i.e. combining quantitative and qualitative data).

Impacts were assessed using quantitative techniques only where the data permitted such an assessment and where the nature of the impacts is such that there is little room for qualitative interpretation of the results (i.e. where stakeholder perception does not influence the overall significance of the impact). Purely quantitative assessments were undertaken for: 1) fuel usage and carbon emissions; and 2) damage to roads and maintenance costs. The assessments were based on TimberLINK operational data (tonnages, number of timber lorry trips etc) and various conversion factors and multipliers to quantify the impacts in monetary and non-monetary terms. Further detail on data and the specific methods used is provided in sections 2.2.4 and 2.2.5 respectively.

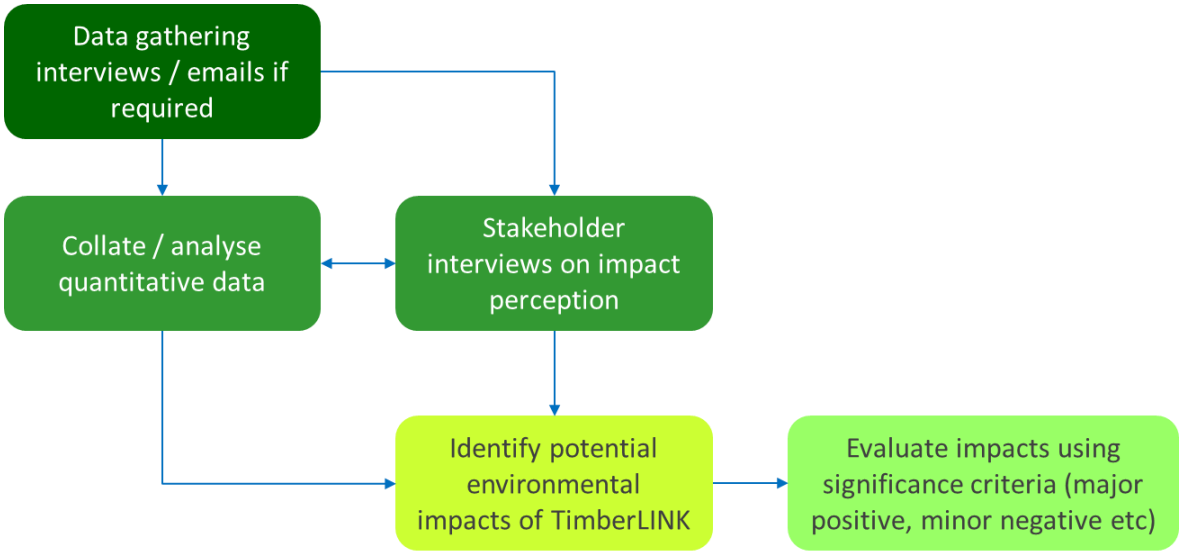

Figure 2.2: Schematic representation of mixed methods assessment process

The opposite is true of the mixed methods assessments undertaken in the evaluation. These were used where there was an absence of suitable data to predict impacts purely quantitatively and / or where a degree of qualitative interpretation was required. For example, the direction (positive; negative; mixed) and overall significance of visual impact will be determined by stakeholder perceptions of what constitutes a visual intrusion (or beneficial / visually pleasing activity for that matter). Mixed methods assessments were undertaken for all impacts other than fuel usage / carbon and damage to roads and maintenance costs (see Table 2.1 and Figure 2.1).

For several of these impacts it was possible to calculate a monetised impact using the Department for Transport's (DfT) Mode Shift Benefit (MSB) values methodology (DfT, 2009; DfT, 2014). However, it

[9] As opposed to empirical operational data.

was felt that all these impacts warranted qualitative interpretation as well so the monetised impacts were used as one piece of assessment evidence only.

Altogether therefore, the mixed assessments were based on the following: 1) TimberLINK operational data; 2) findings from the quantitative assessments; 3) qualitative evidence from stakeholder interviews; and 4) significance criteria. Significance criteria taken from the Environmental Assessment (Scotland) Act[10] were used to evaluate all the evidence and draw conclusions as to the likely significance of the identified impacts. A schematic depiction of the mixed methods assessment process is shown at Figure 2.2. Further detail on data, the specific methods used and the significance criteria is provided in sections 2.2.4, 2.2.5 and 2.2.6 respectively.

2.2.4 Data used in the assessment

The various data, conversion factors and multipliers used in the environmental evaluation of TimberLINK are listed in Table 2.2 below. The detail of *how* the data have been used in individual assessments is explained in section 2.2.5 (where relevant).

Table 2.2: Data and conversion factors / multipliers used in the environmental evaluation

Dataset / conversion factor / multiplier	Source	Use in impact assessments
Datasets		
Argyll forest exit points shapefile (see Figure 2.3)	FCS	Determining distance travelled by timber lorries on the "Argyll leg" as an input to fuel usage and carbon emissions assessment.
"Argyll leg" routes from forest exit points to corresponding TimberLINK port shapefile (see Figure 2.3)	FCS	Determining the proportion of the "Argyll leg" road network comprised of "A" roads and "other" roads as an input to all Mode Shift Benefit (MSB) value calculations.
Volumes of timber shipped by TimberLINK per port / month / year (see Table 3.1)	ABP	General context. Calculating the fuel and carbon efficiency of the TimberLINK service (litres fuel used per tonne; $kgCO_2e$ emitted per tonne). Determining the number of timber lorry journeys that would be required to transport the same volume of timber on the road based alternative (non-TimberLINK scenario).
Number of "Argyll leg" timber lorry trips made per zone / month / year	ABP	Determining distance travelled by timber lorries on the "Argyll leg" as an input to fuel usage and carbon emissions assessment.
Timber lorry miles avoided on the road based alternative by port / month / year	ABP	Calculating the fuel usage and carbon emissions avoided through operation of the TimberLINK service (i.e. the impacts that would have occurred under the non-TimberLINK scenario).
Nautical miles travelled by the MV Ayress during TimberLINK operations	ABP	Calculating the fuel usage and carbon emissions from the "shipping leg" aspect of the TimberLINK service.
Traffic flow metrics from A83 traffic counters	Transport Scotland	Assessing the potential magnitude of the additional timber lorry movements required under the non-TimberLINK scenario on A83 traffic flows and congestion.
Air quality monitoring data	Argyll & Bute Council	As part of the evidence base to help determine the overall significance of air quality impacts that may be caused by the three scenarios.

[10] http://www.legislation.gov.uk/asp/2005/15/contents

Dataset / conversion factor / multiplier	Source	Use in impact assessments
Qualitative data from semi-structured interviews with key stakeholders	Interviews	As part of the evidence base to help determine the overall significance of all impacts assessed using a mixed methods approach.
Conversion factors and multipliers		
Average fuel consumption of timber lorries operating the TimberLINK service	Hauliers (via ABP)	Calculating fuel usage on the "Argyll leg" and "Ayrshire leg" of the TimberLINK road transport operation as an input to the carbon emissions assessment.
Average fuel consumption of the MV Ayress[11]	ABP	Calculating fuel usage on the "shipping leg" of the TimberLINK operation as an input to the carbon emissions assessment.
Average fuel consumption of the loading / unloading equipment used in TimberLINK ports	ABP	Calculating fuel usage from port loading / unloading activities within the TimberLINK operation as an input to the carbon emissions assessment.
Loading rates (tonnes/hr) of the loading / unloading equipment used in TimberLINK ports	ABP	Calculating fuel usage from port loading / unloading activities within the TimberLINK operation as an input to the carbon emissions assessment.
Type of fuel used by timber lorries	Hauliers (via ABP)	Calculating carbon emissions associated with transport of timber by lorry.
Type of fuel used by port loading / unloading equipment	ABP	Calculating carbon emissions associated with loading and unloading of timber at TimberLINK ports.
Type of fuel used by the MV Ayress	ABP	Calculating carbon emissions associated with sea transport of timber.
Greenhouse gas (GHG) conversion factors for different fuels	DECC	Calculating carbon emissions ($kgCO_2e$) associated with the consumption of different fuels as part of the TimberLINK service and other timber transport options.
Short-term traded carbon values for policy appraisal	DECC	Calculating the cost (£) of carbon emissions from the operation of the TimberLINK service and other timber transport options.
Pence per lorry mile values from DfT's Mode Shift Benefit (MSB) values method	DfT	Calculating the cost (£) of various environmental impacts caused by the operation of the TimberLINK service and other timber transport scenarios: greenhouse gas emissions; road damage; accident risk; noise; and air pollution.

2.2.5 Approach taken to the assessment of specific impacts and key limitations

This section describes the approach taken to the assessment of specific impacts in the environmental evaluation. Methods have only been described where the assessment approach warrants specific explanation (e.g. where there are key limitations or assumptions to consider). Several of the mixed methods assessments are not described in detail. Readers should refer to the generic description of these assessments (section 2.2.3) and explanation of the significance criteria (section 2.2.6).

[11] The Ayress is the vessel currently operating the shipping leg of the TimberLINK service.

Approach taken to the assessment of fuel usage and carbon emissions

UK Government guidance on measuring and reporting greenhouse gas (GHG) emissions from freight transport operations identifies a range of possible methodological options (DfT *et al.*, 2013). The most accurate option relies on data showing the amount of fuel used. Other less accurate options include: using data on the overall cost of fuel used; and data on distance travelled combined with vehicle fuel efficiency (miles per gallon or litres/km).

Unfortunately, none of these options were fully available as part of the TimberLINK evaluation; fuel used and / or distance travelled attributable to TimberLINK is not routinely collected as part of TimberLINK related timber lorry movements[12]. Similarly, fuel usage attributable to TimberLINK activities is not routinely collected as part of the operation of port loading / unloading equipment or the MV Ayress[13]. However, data on the distance travelled by the Ayress during TimberLINK operations *is* collected.

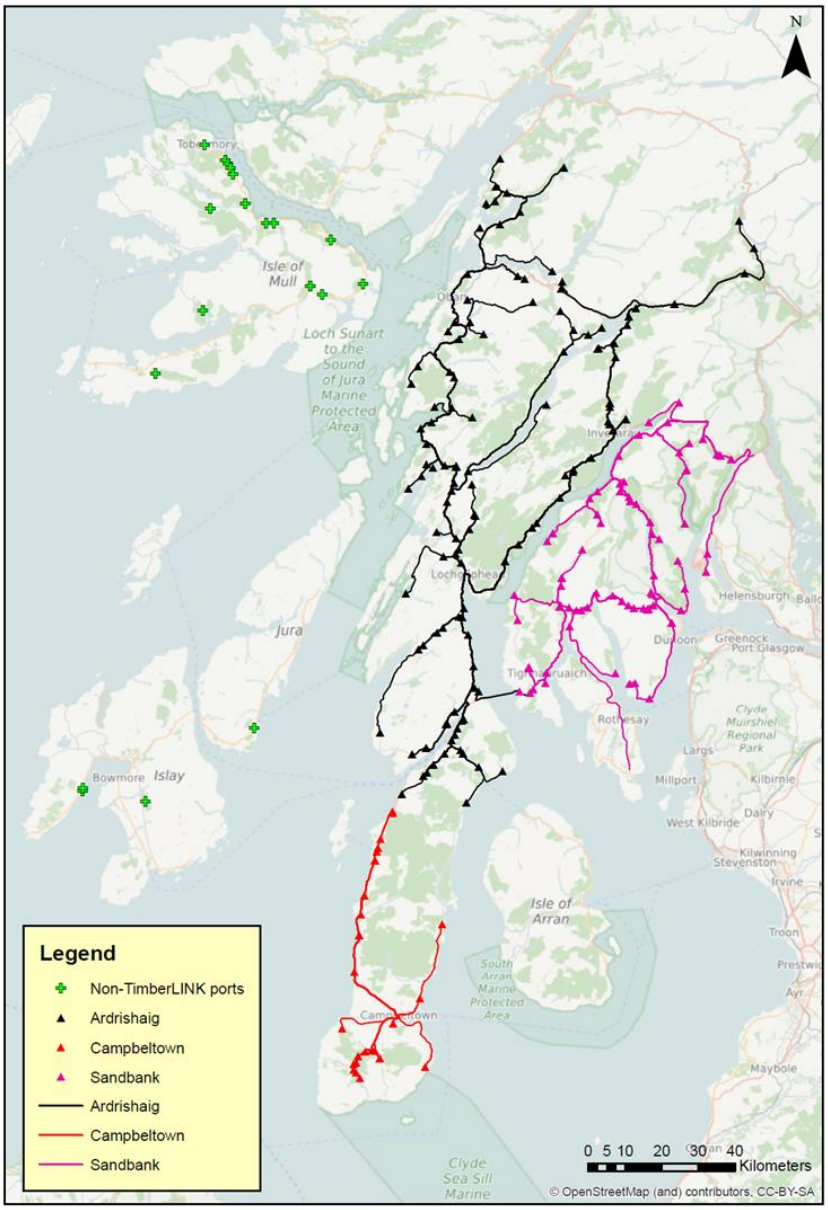

Figure 2.3: Forest exit points and "Argyll leg" routes used in TimberLINK road transport operations

Note: All points on the map above (triangles and crosses) indicate the forest exit points where harvested timber is collected by timber lorries for road transport to the corresponding port (indicated by colour coding). The

[12] Its collection is not contractually required.

[13] Ibid

coloured lines indicate the road network used by timber lorries on the "Argyll leg" of TimberLINK road transport operations.

Given the limitations outlined above, the best option available for assessing fuel usage and carbon emissions, in line with DfT *et al.* (2013), was to calculate estimates of: 1) the distance travelled by timber lorries; and 2) the hours of operation of port loading / unloading equipment, during TimberLINK related operations. This was not required for fuel usage and carbon emissions from the shipping leg as distance travelled by the MV Ayress is recorded accurately (see above). The approach taken to each of these estimates is described in further detail in Boxes 2.2 and 2.3 below.

Box 2.2: Method used to estimate distance travelled by timber lorries during TimberLINK usage

Background information: *as part of the operation and management of the TimberLINK service, FCS maintain spatial data for Argyll forest exit points and the routes used by timber lorries transporting harvested timber from these points to the corresponding TimberLINK port (Figure 2.3). Each forest exit points falls within a pre-determined "zone". These zones are used to calculate subsidy rates as part of the TimberLINK contract (in its current configuration as managed by ABP). The zones relate to distance thresholds from forest exit point to corresponding TimberLINK port and processors in Ayrshire, hence their use in subsidy calculations. FCS have analysed this data to calculate the distance between each forest exit point (the coloured triangles on Figure 2.3) and its corresponding TimberLINK port. ABP record the number of timber lorry trips made from each zone, per TimberLINK delivery (i.e. per sailing of the MV Ayress). This data is recorded annually and monthly.*

- ***Step (1) – calculate the average distance from forest exit point to corresponding TimberLINK port per zone:*** *using the FCS data outlined above, the average distance (mean) from all forest exit points in a given zone to the zone's corresponding TimberLINK port was calculated. Some zones have many forest exit points and the distance between exit points and port can vary to quite a large extent. By way of example, Ardrishaig Zone 2 has 68 forest exit points with exit point-port distances ranging from c.18km to c.50km. The mean average exit point-port distance for this zone was calculated as 31.09km.*
- ***Step (2) – estimate the distance travelled by timber lorries per zone:*** *as explained above, ABP record the number of timber lorry trips made per zone for each TimberLINK related sailing of the MV Ayress. Using this data combined with the average forest exit point-port distance metric from Step (1), an estimate of the distance travelled by timber lorries per zone was calculated (i.e. number of trips per zone x average forest exit point-port distance for that zone).*
- ***Step (3) – sum "feeder miles" and distance travelled per zone:*** *ABP maintain a record of "feeder miles" which relates to the distance travelled by timber lorries transporting discharged timber at Troon harbour onwards to the various Ayrshire timber processors. Summing this value with the output of Step (2) provides an overall estimate for distance travelled by timber lorries during TimberLINK operations.*

Box 2.3: Method used to estimate hours of operation of port loading / unloading equipment during TimberLINK usage

Background information and methodology: *as part of the operation of the TimberLINK service, timber is loaded from the pier side to the MV Ayress at Argyll ports. After the shipping leg, it is then unloaded at Troon harbour ready for collection by timber lorries and an onward journey to various processors in Ayrshire. Fuel usage and / or the duration of operation of port loading and unloading equipment attributable to TimberLINK is not routinely recorded. It was therefore necessary to estimate this. The metric for average fuel consumption by port equipment is in litres of fuel per hour (litres/hr). ABP provided "slow" and "quick" loading rates for the port equipment: slow loading equates to 150 tonnes/hr; and fast 200 tonnes/hr. The loading time duration in hours was calculated for each month of data by dividing the volume of timber shipped that month by slow and quick loading rates. Multiplying the loading time (hours) by port equipment average fuel consumption (Table 2.3) then provided a fuel consumption estimate for this aspect of the TimberLINK supply chain.*

Once distance travelled by timber lorries and hours of operation of port equipment had been calculated using the methods described in Boxes 2.2 and 2.3, fuel usage in litres was obtained by multiplying values for distance travelled / hours of operation by the relevant average fuel consumption conversion factor (see Table 2.3). Carbon emissions associated with this fuel usage (litres) were then calculated using the relevant GHG conversion factor[14], for each fuel, to give comparable values of unit weight carbon dioxide equivalent ($kgCO_2e$) emitted. For each of the *ex-post* years (see section 2.2.2), GHG conversion factors from the corresponding year were used to give as accurate a measure as possible for $kgCO_2e$. In relation to the diesel fuel used by timber lorries for example, the biofuel content fluctuates year on year, affecting the amount of carbon emitted ($kgCO_2e$) per unit volume of fuel used.

Finally, the cost of carbon emissions was calculated by multiplying the amount of carbon emitted by different unit cost values for tonnes of carbon emitted (£/tCO_2e). Two values of £/tCO_2e were used from DECC's short-term traded carbon values for public policy appraisal (DECC, 2015). A further value concerning the cost of GHG emissions per lorry mile (pence/mile) was also used, taken from the DfT MSB values methodology (DfT, 2009; DfT, 2014). In recognition of ongoing debates concerning the use of traded and non-traded carbon values (Valatin, 2011), the intention of using multiple carbon cost values in this regard was to provide a partial sensitivity analysis of the impact of this multiplier on the overall costs and benefits of TimberLINK. Carbon valuation issues are discussed further in the *fuel usage and carbon emissions* assessment (see section 3.3). The carbon cost values used in the assessment are included at Table 2.3 below.

Table 2.3: Multipliers and conversion factors used in fuel usage / carbon emissions assessments

Conversion factor or multiplier	Unit	Value
Average fuel consumption		
Average fuel consumption of timber lorries operating Argyll and Ayrshire "road legs"	Litres/km	0.6
Average fuel consumption of the MV Ayress	Litres/nautical mile	18.18
Average fuel consumption of port loading / unloading equipment	Litres/hour	30
Cost of carbon emissions		
DECC short-term traded sector carbon values for policy appraisal – central value (2016)	£/tCO_2e	5.91
DECC short-term traded sector carbon values for policy appraisal – high value (2016)	£/tCO_2e	23.40
DfT MSB values method cost of GHG emissions from road haulage	Pence/lorry mile "A" roads	6.40
	Pence/lorry mile "other" roads	6.50

Approach taken to the assessment of road damage and other key quantified MSB impacts

The DfT's MSB values methodology provides a framework for predicting and monetising various impacts of moving freight by road (DfT, 2009; DfT, 2014). The methodology was originally developed to estimate the benefits (in pounds and pence) of modal shift from road based freight transportation to other modes (rail; water). In the TimberLINK evaluation however, the methodology provides a useful means of estimating and monetising the impacts of different levels of road based timber transportation across the three different scenarios considered recognising, of course, that each scenario involves an element of road based transport (see Box 2.1).

[14] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2016

The MSB values refresh (DfT, 2014) is particularly useful in this regard as it provides pence per lorry mile values for a range of impacts of relevance to the environmental aspects of the TimberLINK evaluation. These values are shown in Table 2.4 above along with the corresponding TimberLINK environmental impacts that they have been used to assess (see Figure 2.1 and Table 2.1).

Table 2.4: MSB values used in the TimberLINK environmental evaluation (Source: DfT, 2014)

Impacts from MSB guidance	Corresponding impacts assessed in TimberLINK evaluation (Table 2.1)	Cost of impact (pence per lorry mile)	
		"A" roads	"Other" roads
Accidents	Accident risk	5.7	5.7
Noise	Noise	3.4	4.3
Pollution	Air pollution	0.1	0.1
Greenhouse gases	Fuel usage & carbon emissions	6.4	6.5
Infrastructure	Damage to roads & maintenance costs	22.3	171.2

In using the MSB values to calculate impacts, the value for each impact has simply been multiplied by the number of timber lorry miles undertaken in each scenario, recognising that for the TimberLINK expanded service and non-TimberLINK (road based alternative) scenarios the number of timber lorry miles are modelled estimates based on:

1. Estimates of the actual timber lorry miles undertaken during TimberLINK operations (Box 2.2) – these are used to calculate pro rata the amount of timber lorry miles that would be required to transport 120,000 tonnes of timber in the TimberLINK expanded service scenario; and
2. The source of harvested timber (zone / forest exit point – see Box 2.2). This information is used by ABP to estimate the amount of timber lorry miles that would be required to transport the harvested timber, by road, from its source to the Ayrshire processors. ABP's calculations therefore were used to estimate the timber lorry miles that would be required under the non-TimberLINK (road based alternative) scenario.

Approach taken to the assessment of traffic flow and congestion

For the purposes of the evaluation, the impacts of the non-TimberLINK (road based alternative) scenario on *regional* traffic flow and congestion were defined, principally, as impacts on the A83 caused by increased timber lorry traffic. These impacts were assessed by:

1. Calculating the number of additional return timber lorry trips (i.e. there and back) on the road based alternative (which includes the A83) between Argyll forests and Ayrshire processors. This was calculated by dividing the volume of timber transported by TimberLINK in each year considered by the capacity of the timber lorries that would be used for the road haul. Information provided from Argyll hauliers (via ABP) suggests that a 27.5 tonne flatbed lorry would be used for this purpose.
2. Assessing the magnitude of the impact of increased timber lorry movements from Step (1) on A83 traffic flows. This was undertaken with reference to Transport Scotland traffic flow data from A83 traffic counters. Data permitting, impact magnitude was assessed in relation to: i) overall traffic flows; and ii) the proportion of traffic flows comprised of HGVs; and
3. As a mixed methods assessment (see Table 2.1, Figure 2.2 and section 2.2.3), the quantitative data above were considered alongside qualitative data on congestion hotspots (and other issues) obtained via interviews and email correspondence with community stakeholders in "road communities" (Lochgilphead; Inveraray; Arrochar) and Transport Scotland. All quantitative and qualitative evidence was assessed and evaluated using the significance criteria (see section 2.2.6) to form a view of the likely overall significance of the non-TimberLINK scenario's regional traffic flow and congestion impacts.

Approach taken to the assessment of local impacts

Various local impacts of the TimberLINK BAU and expanded service scenarios were assessed (see Table 2.1 and Figure 2.1). All local impacts were assessed using a mixed methods approach. For all these assessments, quantitative data on the number of timber lorry movements per TimberLINK port per year were used as a basic proxy of the impact causing activities in line with the logic underpinning the assessment (see Figure 3.2). These data were used as a prompt / discussion point in the stakeholder interviews to help tease out an understanding of the likely magnitude and significance of the local impacts. All quantitative and qualitative evidence used in the assessment of local impacts was assessed and evaluated against the significance criteria (see section 2.2.6) as was the case in all of the mixed methods assessments undertaken (see Figure 2.2 above).

2.2.6 The use of significance criteria in mixed methods assessments

For the mixed methods assessments, significance criteria were used to evaluate all evidence produced through the assessment, both quantitative and qualitative, and form an evidence based view as to the likely overall significance of the impact (see Figure 2.2). Impacts were then described using qualitative scoring (e.g. minor negative, major negative – see Table 2.5) as opposed to absolute numeric or monetary values, as was the case with the purely quantitative assessments.

This type of qualitative assessment approach is common in impact assessment practice, especially Strategic Environmental Assessment (SEA) in line with the European Union (EU) SEA Directive[15]. The significance criteria used were taken from the Environmental Assessment (Scotland) Act 2005 which is the implementing legislation for the EU SEA Directive in Scotland. Specifically, the criteria from Schedule 2 were used[16]. The criteria relate to the nature of the impacts whereby certain impacts are likely to be more significant than others; e.g. a high magnitude, permanent impact affecting a valuable receptor would potentially be more significant than a small, temporary impact affecting a lower value receptor.

The key to scoring used in the mixed methods assessment, a description of each potential effect and the significance criteria used are provided in Table 2.5 below.

Table 2.5: Qualitative scoring and significance criteria used in mixed methods assessments

Major negative	Moderate negative	Minor negative	Neutral	Minor positive	Moderate positive	Major positive
Major adverse impacts in time, space and / or duration on important or multiple receptors (regional / national)	**Moderate adverse impacts in time, space and / or duration on important or multiple receptors** (local / regional)	**Minor adverse impacts in time, space and / or duration on specific receptors** (local)	No significant impact	**Minor positive impacts in time, space and / or duration on specific receptors** (local)	**Moderate positive impacts in time, space and / or duration on important or multiple receptors** (local / regional)	**Major positive impacts in time, space and / or duration on important or multiple receptors** (regional / national)
In determining the likely significance of TimberLINK, the following characteristics* of the effects and of the area likely to be affected have been considered:						

[15] Directive 2001/42/EC: http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:32001L0042
[16] http://www.legislation.gov.uk/asp/2005/15/schedule/2

a) the probability, duration, frequency and reversibility of the effects;

b) the cumulative nature of the effects;

c) the transboundary nature of the effects;

d) the risks to human health or the environment (for example, due to accidents);

e) the magnitude and spatial extent of the effects (geographical area and size of the population likely to be affected);

f) the value and vulnerability of the area likely to be affected due to—

i. special natural characteristics or cultural heritage;

ii. exceeded environmental quality standards or limit values; or

iii. intensive land-use; and

g) the effects on areas or landscapes which have a recognised national, Community or international protection status.

*[*these criteria are taken from the Environmental Assessment (Scotland) Act 2005 Schedule 2 paragraph 2: http://www.legislation.gov.uk/asp/2005/15/schedule/2]*

2.2.7 Interviews with stakeholders

Interviews with key stakeholders were undertaken to collect qualitative data that was used alongside quantitative data in mixed methods assessments to help reach a view on the likely overall significance of the impact (see Figure 2.2 and Table 2.5). The interviews were carried out by phone and a written (non-audio) record of the conversation made. An example interview schedule used in the interviews is included at Annex 2 (categories of questions were modified according to stakeholder interests). Interviewees were identified using a convenience sampling approach drawing on a stakeholder list provided by FCS. Community stakeholder interviewees were all Community Councillors. Interviews were undertaken with following stakeholder categories:

- Community stakeholders in "port communities" (x3: Ardrishaig; Campbeltown; Sandbank);
- Community stakeholders in "road communities" (x3: Lochgilphead; Inveraray; Arrochar);
- Local authority economic development and regeneration expert (x1); and
- Local authority environmental health expert (x1).

2.3 Approach taken to the economic evaluation

The economic evaluation covers quantifiable and non-quantifiable economic impacts.

The quantified economic impacts are for most elements of the supply chain from timber growers in Argyll through to the end users in Ayrshire. They were calculated at three geographical levels:

- Argyll;
- Ayrshire; and
- Scotland.

The measures used were: employment (expressed in FTE-Full-Time Equivalent jobs); and Gross Value Added (GVA). Put simply, GVA is the sum of a company's labour costs and gross profits.

The total impacts comprise three parts:

- Direct – e.g. employment of drivers by Argyll hauliers to transport timber from the forest to the piers;

- Indirect – the purchase of goods and services required by the direct activity (e.g. purchases of fuel for lorries); and
- Induced – these arise from the expenditure of the wages of those directly and indirectly employed-in shops, restaurants, etc.

The data sources used for the estimates of quantified impacts were as follows.

Firstly, information on TimberLINK activity, provided by ABP.

Secondly, economic statistics were used to:

- Estimate direct GVA impacts, using data from the latest available Scottish Annual Business Survey (2014); and
- Inform the calculation of indirect and induced impacts (for both employment and GVA). Relevant multipliers were taken from the latest available Scottish Input-Output Tables (2013).

Thirdly, telephone consultations collected information from the TimberLINK supply chain which was used in the impact calculations, with our own assumptions applied where data were not provided. The consultations were also used to collect qualitative impact information. The consultees are listed in Table 2.6 below.

Table 2.6: Consultees for the economic aspects of the evaluation

Category	Consultee
1. TimberLINK management	ABP
2. Mills / end-users	Adam Wilson & Sons / Glennons
	Egger UK Ltd
	Land Energy Girvan Ltd
	BSW Timber (Director of Public Affairs; Group Logistics and Coproducts Manager; Timber Buyer, Kilmallie)
	Norbord Ltd
	Northern Energy Developments Limited
	Ridings Sawmills
3. Hauliers and timber loaders	Coille Haulage
	JST Services
	McFadyens Transport
	Peter McKerral & Co
	Coast Line Shipping
	Ferguson Transport
	Great Glen Shipping
	Troon Tug Company
4. Piers and harbours	Argyll and Bute Council-Campbeltown Harbour
	Holy Loch Marina / Sandbank pier
	Scottish Canals – Ardrishaig pier
5. Forestry sector	Forest Enterprise (Area Operations Manager, West Argyll Forest District; Forest District Manager, West Argyll Forest District; Marketing and Sales Officer)
	Tilhill Forestry (Contracts Supervisor; Wood Energy Development Manager)
6. Roads	Argyll and Bute Council Roads (Traffic and Development Manager; Head of Economic Development & Strategic Transportation)
	Argyll Timber Transport Group (Chair; Project Officer)
7. Tourism	Visit Scotland Regional Director (Oban)
8. Miscellaneous	Oliver Chapman Architects

3. Findings of the environmental evaluation

3.1 Introduction to the findings of the environmental evaluation

Timber transport, as with all transportation of goods, causes a range of environmental impacts. As explained in Chapter 1, TimberLINK was originally conceived as an environmental initiative, prompted by the unique geography of Argyll and its existing road infrastructure (i.e. the circuitous route taken by the A83 and A82 between Argyll and the main urban centres and onward road connections in Central Scotland).

The key rationale behind TimberLINK therefore is to *reduce* the environmental impact of timber transport between Argyll and timber processors in Ayrshire by shifting a portion of Argyll's timber transport related lorry miles to short-sea coastal shipping between ports in Argyll (Ardrishaig, Campbeltown and Sandbank) and ports in Ayrshire (including Troon, South Ayrshire) (see Figure 1.1).

As such, TimberLINK still causes many of the same environmental impacts as conventional road based timber transport, the key benefit of the service however is that many of these impacts are greatly reduced. In some cases, the service is also seen as having novel positive environmental impacts; the spectacle of the port operations on TimberLINK delivery days (i.e. a "visual" impact) is considered, by some, to benefit tourism in the area.

Figure 3.2 below provides an overall causal model of the environmental impacts caused by TimberLINK. The model links timber transport activities on the left of the diagram to impacts in the centre and then the impacted receptors (aspects of the environment) on the right. The development of this model has been informed by the previous TimberLINK environmental evaluation (TTR, 2010), other relevant literature (DfT, 2009; DfT, 2014; Kinnear *et al*, 2015) and expert input from Dr Neil Ferguson (University of Strathclyde). Although specific to TimberLINK, many of the activities and impacts identified on the model are also common to road based timber transport (except for those impacts related to short-sea coastal shipping of timber). As such, the model has provided the overall structure for the environmental evaluation, helping to identify indicators and data for the assessment of each individual impact.

The remainder of this Chapter summarises the key findings of the environmental evaluation across a range of different impacts. The impact assessment differentiates between the three timber transport scenarios considered (see Box 2.1) where differences in impact can be evidenced quantitatively (the magnitude of the impact) and / or qualitatively (the likely overall significance of the impact drawing on various quantitative and qualitative evidence). Readers should refer to section 2.2 for a full description of the methodology used in the environmental evaluation.

3.2 Overview of TimberLINK operational data used in the evaluation

Various data relating to the operation of the TimberLINK service, between financial years 2010/11 and 2015/16, have been obtained from ABP. However, the indicators and datasets maintained by ABP, as part of their monitoring of TimberLINK, required some further processing before calculations could be made as part of several quantitative assessments in the environmental evaluation. The outputs of these calculations also underpinned the mixed methods assessments undertaken in the environmental evaluation (see section 2.2.3).

For example, it was not possible to obtain TimberLINK operational data from ABP (or operators within the service) on: distance travelled by timber lorries on the Argyll road leg; or fuel consumption by timber lorries, the MV Ayress or the loading / unloading equipment used in the TimberLINK ports. Proxies for these indicators have therefore been calculated using data that *was* available, as explained in the methodology (see section 2.2.5 and Boxes 2.2 and 2.3). An overview of the operational data that have been used in the evaluation is provided at Table 3.1 below.

Figure 3.1 below illustrates a sample of the operational data. The yellow line shows the volume of timber transported by the TimberLINK service in each year. The blue coloured bars indicate the total

TimberLINK service related lorry trips made in each year (km) for the Argyll and Ayrshire legs combined (i.e. the TimberLINK BAU scenario). The orange bars indicate the total lorry trips avoided (km) on the road haulage alternative that would have otherwise been made to transport the same volume of timber from the forest to the receiving processor in Ayrshire (i.e. the non-TimberLINK scenario). Finally, the green bar shows net lorry trips avoided (km) on the road haulage alternative due to the operation of the TimberLINK service.

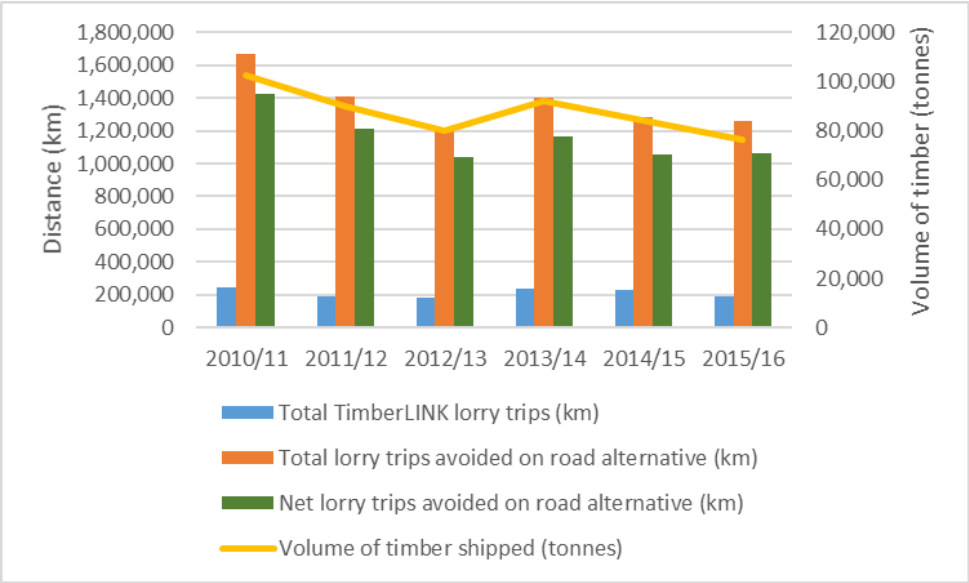

Figure 3.1: TimberLINK road haulage distances travelled / avoided and timber volumes shipped

Figure 3.1 clearly shows that TimberLINK removes many lorry kilometres that would otherwise be made on the trunk roads under a non-TimberLINK (road based alternative) scenario (e.g. A83, A82, M8, A737 etc). For example, the distance travelled as part of TimberLINK related lorry trips are equivalent to between 13.7% (2011-12) and 17.7% (2014-15) of the trips that would be made using the road haulage alternative (non-TimberLINK scenario). This saving in lorry kilometres is illustrated clearly in Figure 3.1 by way of the green bar (net lorry trips avoided on the road haulage alternative). The Figure also shows how road haulage distances (both travelled and avoided) fluctuate from year to year linked to the volume of timber being shipped by TimberLINK (tonnes). The timber volumes shipped have varied over the past six years from a peak in 2010/11 of 102,735 tonnes to a low point in the last financial year (2015/16) of 76,489 tonnes.

3.2.1 Review of operational data – summary of main findings

Key findings from the review of TimberLINK operational data 2010/11 – 2015/16 include:

1. **Reduction in timber lorry trips:** the TimberLINK service removes a substantial number of lorry kilometres that would otherwise need to be made on a road haulage only alternative (the non-TimberLINK scenario).
2. **Timber volumes by year:** the volume of timber shipped by the TimberLINK service fluctuates year on year. The highest volume was shipped in 2010/11 (102,735 tonnes) and the lowest in 2015/16 (76,489 tonnes). The mean average volume of timber shipped during the period assessed was 86,571 tonnes.
3. **Timber volumes by port:** the amount of timber shipped per TimberLINK port varies year on year. Across the period assessed however, substantially more timber was shipped via Ardrishaig than either Campbeltown or Sandbank. Campbeltown and Sandbank shipped similar volumes of timber though Ardrishaig consistently shipped more.
4. **Timber lorry trips vary year on year:** unsurprisingly, the distance travelled by lorries as part of the TimberLINK service (and distance avoided on the road haulage alternative) fluctuates from year to year, depending on the volume of timber shipped by the service.

Table 3.1: Overview of TimberLINK operational data used in the evaluation

Year	Volume of timber shipped (tonnes)	Argyll leg timber lorry trips undertaken (number per port)			Argyll leg timber lorry trips average distance[1] (km)			Total TimberLINK related timber lorry trips (km)	Total timber lorry trips avoided on road haulage alternative[2] (km)	Net timber lorry trips avoided on road haulage alternative (km)	Total TimberLINK related trips undertaken by MV Ayress (nautical miles)	Operation of port equipment[3] (hours)	
		Ardrishaig	Campbeltown	Sandbank	Ardrishaig	Campbeltown	Sandbank					Quick estimate (200 tonnes/hour)	Slow estimate (150 tonnes/hour)
2010/11	102,735	3,411	927	601	36.16	19.36	21.98	243,667	1,668,419	1,424,752	7,156	514	685
2011/12	90,032	2,698	728	488				192,648	1,408,375	1,215,727	6,496	450	600
2012/13	79,902	2,240	485	749				181,137	1,218,844	1,037,707	5,196	400	533
2013/14	91,954	2,923	603	473				237,738	1,399,721	1,161,982	6,088	458	613
2014/15	84,256	2,321	640	703				227,233	1,284,246	1,057,013	5,312	421	562
2015/16	76,489	1,836	864	622				189,685	1,255,939	1,066,254	4,668	382	510

Notes:

[1] The distance travelled by timber lorries on the "Argyll leg" as part of TimberLINK operations is a key metric underpinning many calculations in the environmental evaluation (fuel use, carbon emissions, road damage etc). However, this data is not routinely collected by ABP or the hauliers operating the Argyll legs. ABP do collect data on which "zone" the timber has been transported from and the number of timber lorry trips per zone; the catchment area for each TimberLINK port is made up of a number of zones that are used for calculating TimberLINK subsidy rates. For each zone, the mean distance from all forest exit points (the location on a public road where harvested timber can be collected) to the corresponding TimberLINK port was calculated using FCS spatial data. This was then multiplied by the number of timber lorry trips made from that zone to estimate distance travelled. The table above shows average distances for each port rather than each zone. This aspect of the methodology is explained further at section 2.2.5 and Box 2.2.

[2] ABP calculate this metric as part of their monitoring. It is based on the distance between the Argyll forest where the timber is harvested and the receiving processor in Ayrshire. The distance is multiplied by the number of lorry trips that would be required to deliver the volume of timber received by the processor using a standardised lorry capacity (27.5 tonnes). This is then doubled to provide a final figure that includes the return (empty) journey.

[3] ABP and the pier / harbour operators do not routinely collect data on the amount of fuel used by port loading / unloading equipment or the amount of time the equipment is working during TimberLINK operations. ABP provided upper and lower loading rate (tonnes/hour) estimates for the equipment. These have been used to calculate low and high estimate for "hours of operation" based on tonnages shipped by TimberLINK. This aspect of the methodology is explained further at section 2.2.5 and Box 2.3.

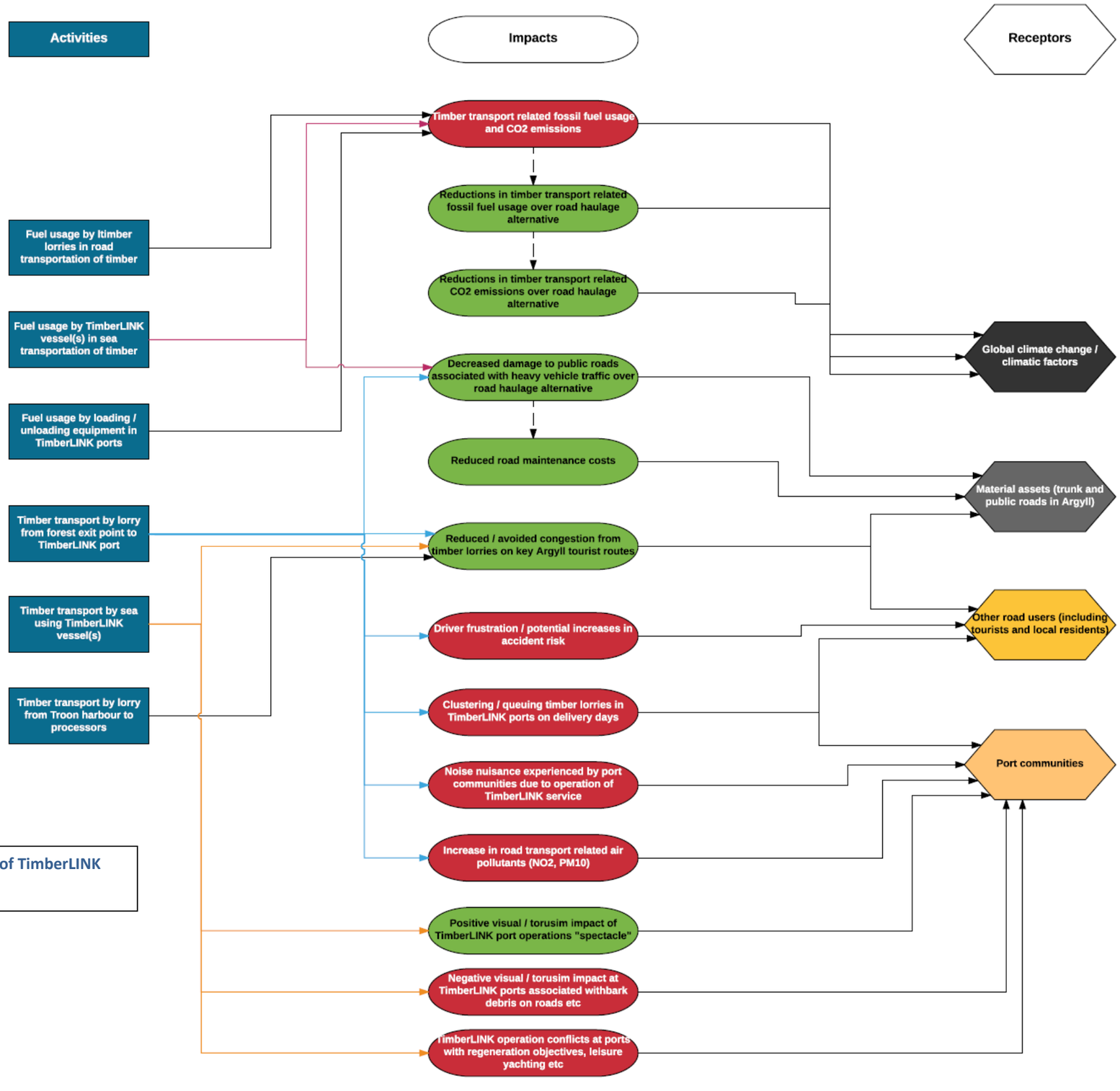

Figure 3.2: Overall causal model of TimberLINK environmental impacts

3.3 Fuel usage and carbon emissions

Timber transport causes carbon emissions from the combustion of fossil fuels in motorised transport and loading / unloading operations. In the case of TimberLINK, fossil fuels are combusted thus:

- **Road leg 1 – Argyll:** road transportation of timber by lorry in Argyll from forest exit point (the location on a public road where harvested timber can be collected) to the corresponding TimberLINK port. Timber lorries used in this operation are generally 24.5 tonne capacity crane lorries which use diesel fuel (average biofuel blend).
- **Loading by crane:** timber is loaded from the pier at Ardrishaig, Campbeltown and Sandbank onto the MV Ayress ready for short-sea coastal shipping to Troon. The crane equipment uses gas oil and can load at a rate of between 150 and 200 tonnes/hour.
- **Shipping leg:** timber is shipped by sea from the Argyll ports to Troon on the MV Ayress. The Ayress has a capacity of 1,400 tonnes and uses gas oil.
- **Unloading by crane:** timber is unloaded from the MV Ayress onto the pier. Crane equipment as per the above.
- **Road leg 2 – Ayrshire:** onward road transportation of timber by lorry from Troon to the receiving timber processor in Ayrshire. Timber lorries as per the above.

ABP do not routinely collect all the data required to assess fuel usage and carbon emissions for all of the activities above; e.g. data on fuel usage and / or distance travelled on Road leg 1 (the "Argyll leg") is not collected (see Box 2.2 and Table 3.1).

In some instances, therefore, certain key metrics have been estimated using data that *are* available. For example, fuel usage as part of the "Argyll leg" has been calculated using data on the distance between Argyll forest zones and corresponding ports, the number of lorry trips per zone and the average fuel consumption of the timber lorries making the trips. The method used for calculating proxies is explained in full in Chapter 2 above (see Boxes 2.2 and 2.3 in particular).

3.3.1 Fuel usage assessment

Recognising the limitations above, Table 3.2 below sets out fuel usage proxies for the three scenarios between 2010/11 and 2015/16. For the two TimberLINK scenarios (BAU and expanded service) separate figures are presented for the different types of fuel used in the operation of the service (diesel and gas oil) and for slow and quick loading rates at the ports (see Table 3.1, Box 2.3 and Chapter 2 for further explanation). This distinction is not applicable for the non-TimberLINK scenario which has only one fuel using activity (road transportation using diesel fuel). The carbon emissions assessment below aggregates this fuel consumption data through common metrics (tonnes CO_2e and £/tonnes CO_2e).

Table 3.2: Fuel usage (**Note:** greyed-out numbers represent the two alternative scenarios had they been in place)

Scenario / aspect of scenario	Fuel used (litres)					
	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
TimberLINK BAU and expanded service scenarios						
TimberLINK BAU: Total fuel consumption – diesel	146,134	115,589	108,682	142,643	136,340	113,811
TimberLINK expanded service[17]: Total fuel consumption – diesel	170,693	154,062	163,222	186,148	194,179	178,555

[17] Calculated on pro rata basis.

Scenario / aspect of scenario	Fuel used (litres)					
	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
TimberLINK BAU: Total fuel consumption – gas oil (slow[18] loading)	171,190	154,110	126,424	147,461	130,275	115,459
TimberLINK expanded service[19]: Total fuel consumption – gas oil (slow loading)	199,960	205,405	189,868	192,436	185,541	181,141
TimberLINK BAU: Total fuel consumption – gas oil (quick loading)	160,916	145,107	118,434	138,266	121,849	107,811
TimberLINK expanded service[20]: Total fuel consumption – gas oil (quick loading)	187,960	193,405	177,868	180,436	173,541	169,141
Non-TimberLINK scenario (road haulage only)						
Total fuel consumption – diesel	1,001,051	845,025	731,306	839,833	770,548	753,564

Figure 3.3 plots fuel consumption data (diesel) for all three timber transport scenarios against a fuel efficiency proxy (litres of fuel used per tonne of timber transported). Diesel is used as a comparator here although the BAU and expanded service scenarios also use gas oil fuel in the operation of the MV Ayress and port loading / unloading equipment (see Table 3.2). The green coloured bars on Figure 3.3 clearly show that the amount of diesel fuel used is much higher in the non-TimberLINK scenario owing to the much higher road distances travelled transporting timber on the road haulage alternative (see Figure 3.1 and Table 3.1).

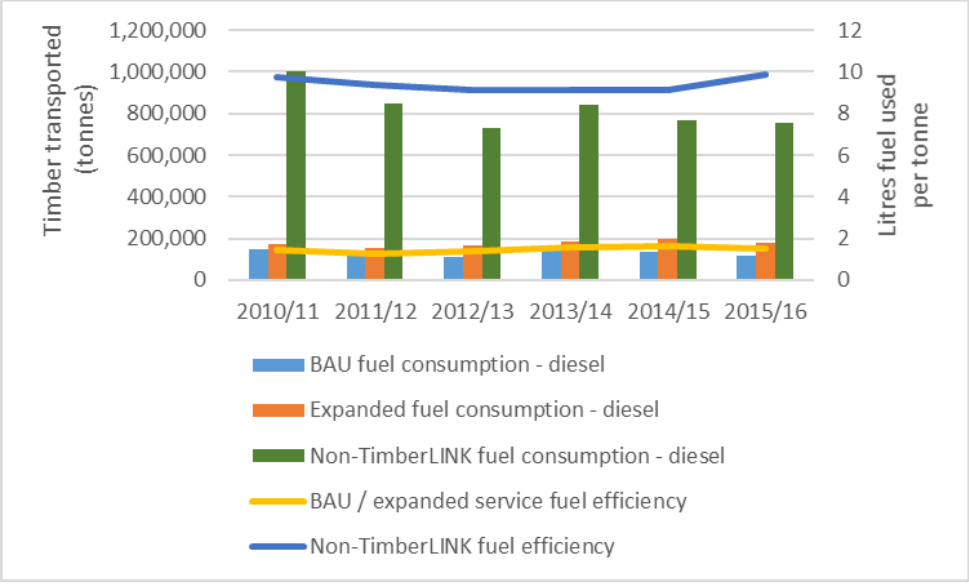

Figure 3.3: Diesel fuel usage and fuel efficiency across all three timber transport scenarios

The two lines on Figure 3.3 indicate fuel efficiency in the operation of the different timber transport scenarios; i.e. the amount of fuel used to transport a tonne of timber (litres/tonne). The lines show a degree of fluctuation in fuel efficiency from year to year. This is most likely to be dependent on the source of the timber (port catchment; specific forest zones within the catchments) and therefore the

[18] See Box 2.3 and Table 3.1 for a full explanation of what is meant by "slow" and "fast" loading and its relevance to the assessment.
[19] Calculated on pro rata basis.
[20] Ibid.

distance travelled on each of the TimberLINK road and shipping legs (see above) as well as the corresponding distance that *would* be travelled on the road haulage alternative. However, there is no clear trend between fuel efficiency in a given year and either the volume of timber shipped or the source of the timber (in terms of specific TimberLINK ports). This is most likely due to the relatively large variation in the "Argyll leg" distances for each forest zone considered in the assessment; e.g. for Ardrishaig, the average "Argyll leg" distances, per zone, vary from 9.34km to 54.85km (see Box 2.2 for a full explanation of the approach taken to estimating Road leg 1 distances). Clearly the zone from which the harvested timber is sourced and the amount of timber per zone will have a large impact on the "Argyll leg" distance travelled.

3.3.2 Carbon emissions assessment

The fuel usage proxy data presented above have been used to assess carbon emissions and the cost of these emissions for each timber transport scenario considered. The carbon emissions assessment is based on the use of conversion factors which translate litres of fuel consumed into tonnes of CO_2 equivalent (tCO_2e) emitted. For the assessments of carbon emissions from *historical* fuel usage, historical conversion factors have been used to ensure that the assessment is as accurate as possible (see section 2.2.5 for further details). Carbon emissions per scenario are detailed at Table 3.3 below.

The carbon cost assessment translates the emissions data into a monetary value using traded carbon values (£/tCO_2e). Given ongoing debates concerning the use of traded and non-traded carbon values (Valatin, 2011), the carbon cost assessment has been undertaken using several carbon values to analyse the sensitivity of the overall environmental costs and benefits of TimberLINK (and its alternatives) to carbon price. Specific values for the greenhouse gas component from the DfT's mode shift benefit (MSB) values calculation methodology (DfT, 2009; DfT, 2014) have also been included as an additional comparator. The approach adopted in the carbon cost assessment is described in full at section 2.2.5 above. Carbon costs per scenario are detailed at Table 3.4 below.

Table 3.3: Carbon emissions (**Note:** greyed-out numbers represent the two alternative scenarios had they been in place)

Scenario	Carbon emissions (tonnes CO_2e)					
	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
TimberLINK BAU (slow[21] loading)	895	764	654	803	731	640
TimberLINK BAU (quick loading)	864	737	630	776	707	617
TimberLINK expanded service scenario (slow loading)	1,045	1,019	982	1,047	1,041	1,004
TimberLINK expanded service scenario (quick loading)	1,009	982	946	1,012	1,007	968
Non-TimberLINK scenario	2,586	2,183	1,902	2,186	1,991	1,968

Figure 3.4 below plots carbon emissions data (tCO_2e) for all three timber transport scenarios against a carbon efficiency proxy ($kgCO_2e$ emitted per tonne of timber transported). The use of tCO_2e allows for direct comparison between the scenarios as it aggregates emissions from all sources within the TimberLINK service (road haulage; shipping; port loading / unloading equipment). The carbon efficiency metric ($kgCO_2e$ per tonne) provides a useful measure of the service's carbon intensity. For example, the carbon emissions released to ship a given volume of timber may be higher or lower depending on where within Argyll the harvested timber is sourced from (i.e. in terms of the source "forest exit point" – see Figure 2.3 and Box 2.2). Equally, carbon efficiency might vary because of more

[21] See Box 2.3 and Table 3.1 for a full explanation of what is meant by "slow" and "fast" loading and its relevance to the assessment..

/ less efficient logistics (timber lorry route planning). The carbon efficiency metric therefore provides a useful indicator of these underlying operational factors within the TimberLINK service.

Figure 3.4 clearly shows how carbon emissions attributable to TimberLINK (both the BAU and expanded service scenarios) are substantially lower than the non-TimberLINK road haulage alterative; e.g. even in the expanded service scenario, emissions are almost always less than half of those from the road haulage alternative (the exception being 2014/15 when the carbon efficiency of TimberLINK had its third lowest year). The carbon efficiency of the non-TimberLINK scenario is poorest in 2010/11 and 2015/16 (25.17 and 25.73 $kgCO_2e$ per tonne of timber respectively) due to the high volumes of timber shipped from Campbeltown in these years. Forests in the Campbeltown area have the longest road haul due to their position at the southern tip of the Kintyre peninsula (meaning that the fuel and carbon emissions from this haul will be higher than if the same volume of timber was transported from forests in Ardrishaig or Sandbank zones, which are further north).

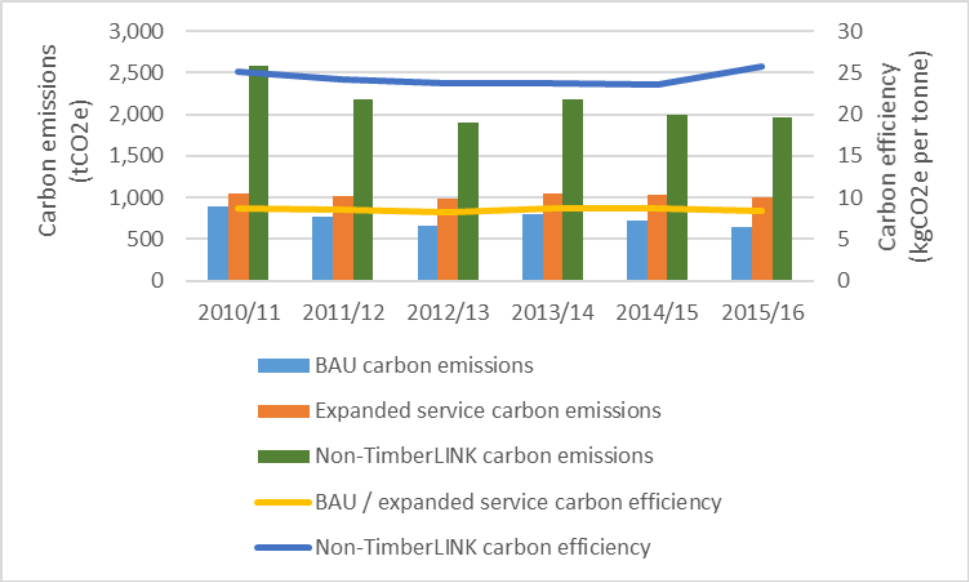

Figure 3.4: Carbon emissions and carbon efficiency across all three timber transport scenarios

Table 3.4 below sets out the cost (£) of carbon emissions associated with each of the timber transport scenarios and on the basis of the different carbon values / methods used. The year with the highest emissions was 2010/11 which was therefore also the costliest year. The non-TimberLINK scenario is the costliest in terms of carbon emissions due to the greater distance travelled, higher fuel consumption and higher levels of emissions (see above).

Despite the obvious carbon cost differential between the scenarios, what is also apparent in Table 3.4 is the seemingly modest price attached to the cost of carbon emissions (on the basis of the values and methods used) relative to TimberLINK subsidy levels. The DECC values used in the assessment are traded carbon values from the EU emissions trading scheme (ETS). It is acknowledged that traded carbon values are not a good proxy for the societal benefits of reducing emissions *"due to low emission reduction targets being set by governments in establishing cap-and-trade schemes and shortcomings in the design and operation of such markets"* (Valatin, 2011). As such, the figures in Table 3.4 should be read with this in mind; i.e. there will most likely be key societal benefits of emissions reductions that are not accounted for in the assessment.

3.3.3 Fuel usage and carbon emissions assessment – summary of main findings

Key findings from the assessment of fuel usage and carbon emissions include:

1. **The TimberLINK BAU scenario is beneficial in terms of fuel usage and carbon:** the TimberLINK BAU scenario is 3-5 times as efficient in terms of fuel usage, carbon emissions and carbon cost compared to the non-TimberLINK scenario (road haulage alternative).

2. **Carbon cost savings in absolute terms are relatively modest:** this is due in large part to using a traded price of carbon (which is low) for a project which is essentially local / regional in its impact. Carbon is also only one indicator of sustainability and not necessarily the most important one at the local / regional scale.

Table 3.4: Cost of carbon emissions (**Note:** greyed-out numbers represent the two alternative scenarios had they been in place)

Scenario / aspect of scenario	Carbon cost (£)					
	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
DECC short term traded carbon values 2016 high estimate (£23.40/tCO_2e)						
TimberLINK BAU (slow[22] loading)	20,937	17883,	15,295	18,782	17,111	14,968
TimberLINK BAU (quick loading)	20,211	17,247	14,746	18,153	16,537	14,437
TimberLINK expanded service scenario (slow loading)	24,456	23,835	22,970	24,510	24,370	23,483
TimberLINK expanded service scenario (quick loading)	23,608	22,987	22,146	23,689	23,553	22,650
Non-TimberLINK scenario	60,517	51,085	44,506	51,143	46,590	46,052
DECC short term traded carbon values 2016 central estimate (£5.91/tCO_2e)						
TimberLINK BAU (slow loading)	5,288	4,517	3,863	4,744	4,322	3,780
TimberLINK BAU (quick loading)	5,105	4,356	3,724	4,585	4,177	3,646
TimberLINK expanded service scenario (slow loading)	6,177	6,020	5,801	6,190	6,155	5,931
TimberLINK expanded service scenario (quick loading)	5,962	5,806	5,593	5,983	5,949	5,721
Non-TimberLINK scenario	15,285	12,902	11,241	12,917	11,767	11,631
DfT 2014 refresh Mode Shift Benefit (MSB) values method (6.4p and 6.5p per lorry mile on "A" roads and "other" roads respectively)						
TimberLINK BAU	9,802	7,753	7,290	9,568	9,145	7,634
TimberLINK expanded service	11,449	10,334	10,948	12,486	13,024	11,976
Non-TimberLINK scenario	66,737	56,335	48,754	55,989	51,370	50,238

3.4 Damage to roads and maintenance costs

Heavy Goods Vehicles (HGVs), such as timber lorries, cause damage to road infrastructure (see Figure 3.1). The extent of the damage caused is dependent on: vehicle type (including vehicle weight and tyre configuration / pressure); road type; driving conditions; and the frequency of road usage by HGVs (DfT, 2009). Additional damage to roads caused by HGVs will increase the frequency with which roads maintenance is required, resulting in costs to local authorities (e.g. Argyll and Bute Council) and to Transport Scotland in relation to trunk road network damages.

A key benefit of TimberLINK therefore is the reduction in road damage the service affords by removing a number of timber transport related lorry miles from the road network. The DfT's Mode Shift Benefit (MSB) Values guidance provides a methodology for estimating the cost saving associated with road

[22] Ibid.

damage / maintenance avoided. The method (and therefore our calculations here) assumes an "average" HGV which does not account for the road damage impacts specific to timber lorries (e.g. which typically always run loaded at the maximum 44 tonnes).

Table 3.5 sets out the distances travelled by timber lorries under each timber transport scenario considered. The road damage costs associated with these journeys are then shown on Table 3.6. This data is combined on Figure 3.5.

Table 3.5: Distance travelled by timber lorries (**Note:** greyed-out numbers are the two alternative scenarios had they been in place)

Scenario	Distance travelled by timber lorries (km)					
	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
TimberLINK BAU scenario	243,556	192,648	181,137	237,739	227,233	189,685
TimberLINK expanded service scenario	284,488	256,770	272,037	310,247	323,632	297,592
Non-TimberLINK scenario	1,668,419	1,408,375	1,218,844	1,399,721	1,284,247	1,255,940

Table 3.6: Cost of road damage caused by timber lorries (**Note:** greyed-out numbers represent the two alternative scenarios had they been in place)

Scenario	Road damage cost (£)					
	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
TimberLINK BAU scenario	122,569	96,950	91,157	119,642	114,355	95,459
TimberLINK expanded service scenario	143,168	129,219	136,902	156,131	162,868	149,763
Non-TimberLINK scenario	232,536	196,292	169,876	195,086	178,992	175,047

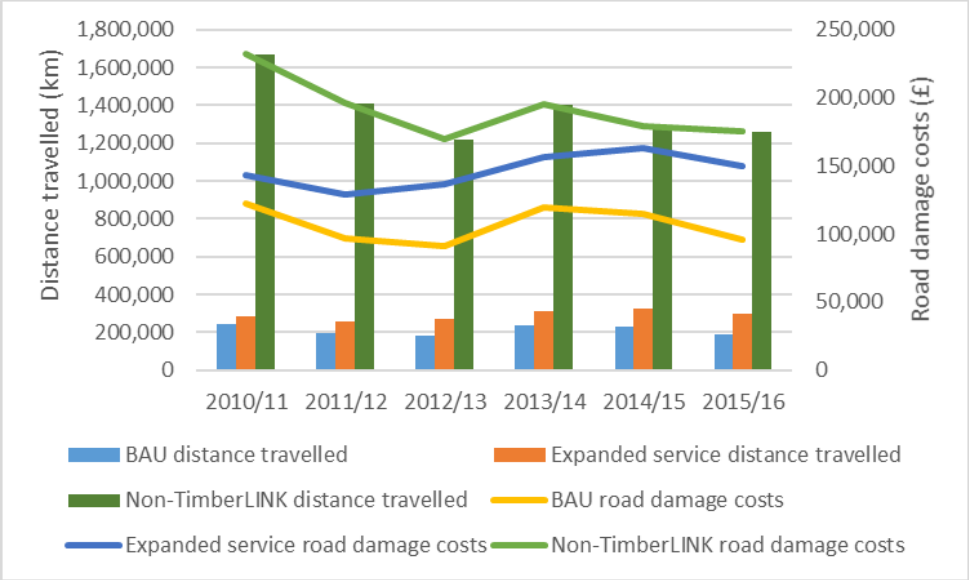

Figure 3.5: Distance travelled and road damage costs across all three timber transport scenarios

A feature of the DfT (2009; 2014) MSB methodology for road damage assessment is that damage to "other" roads (B, C and unclassified roads) is costed much higher than damage to "A" roads[23], the rationale being that "A" roads are better designed to accommodate road haulage by HGVs (see section 2.2.5 and Table 2.4). Based on data provided by FCS (see Figure 2.3), approximately 40% of the "Argyll leg" routes used by timber lorries operating within the TimberLINK service are on "other" roads. This

[23] This is 171.2 and 22.3 pence per lorry mile respectively (DfT, 2014)

is unsurprising given the remote rural nature of much of this territory. Conversely, we have assumed for the purposes of assessment that the non-TimberLINK scenario (road haulage alternative) is undertaken exclusively on "A" roads, hence the proportionally lower road damage costs for this scenario (relative to the much higher number of lorry miles).

Figure 3.5 clearly shows how the distance travelled by timber lorries varies from year to year (in line with volumes of timber shipped – see Table 3.1) and how the distance travelled in the non-TimberLINK scenario (road haulage alternative) would have been much greater than in the two TimberLINK scenarios (BAU and expanded service). Figure 3.5 also shows that whilst road damage costs are certainly higher under the non-TimberLINK scenario (as much as £232,536 in 2010/11), the costs are not too dissimilar to the two TimberLINK scenarios in some years (especially 2014/15). This is most likely due to a higher number of TimberLINK lorry miles being driven in those years (i.e. due to greater distances between the zones where harvested timber was collected and the corresponding port) combined with higher road damage costs under the two TimberLINK scenarios due to lorry travel on "other" roads (B, C and unclassified roads).

3.4.1 Road damage assessment – summary of main findings

Key findings from the assessment of road damage impacts include:

1. **HGVs (such as timber lorries) cause much greater levels of damage to "other" roads:** due to their design and intended use, "other" roads (B, C and unclassified roads) are much more susceptible to damage by HGVs. This means that road damage impacts are much more costly on these roads. Argyll is a predominantly remote rural area so unsurprisingly a high proportion (40%) of the "Argyll leg" routes used by timber lorries operating within the TimberLINK service are on "other" roads.
2. **The non-TimberLINK scenario causes greater levels of road damage:** due to the much higher distances that would need to be travelled by timber lorries under the non-TimberLINK scenario (road based alternative), the associated costs of road damage are higher than the two TimberLINK scenarios. However, the costs are not hugely dissimilar given that a high proportion of TimberLINK related lorry trips are on "other" roads, where the costs of road damage are much higher.

3.5 Traffic flow and congestion

The assessment of impacts on traffic flow and congestion has considered both regional and local level impacts.

The regional assessment considers the traffic flow and congestion impacts of additional timber lorry trips on the A83 that would be required under the non-TimberLINK scenario (road haulage alternative). The assessment focuses on impacts in and around the main "road community" settlements along the A83 (Lochgilphead; Inveraray; Arrochar) and has been undertaken for the *ex-ante* baseline year only (2015/16).

The local assessment considers the traffic flow and congestion impact of timber lorry trips on TimberLINK delivery days in and around the three TimberLINK "port communities" (Ardrishaig; Campbeltown; Sandbank). The local assessment has been undertaken for the TimberLINK BAU and expanded service scenarios. The TimberLINK BAU scenario has been assessed for all the *ex-post* years (2010/11 – 2015/16). The TimberLINK expanded service scenario has been assessed for the *ex-ante* baseline year only (2015/16).

3.5.1 Regional traffic flow and congestion impacts

The regional traffic congestion impact assessment is relevant to the non-TimberLINK (road haulage alternative) scenario. A sample of A83 traffic flow data is provided at Table 3.7 below. A map showing the location of Transport Scotland traffic counters on the A83 is provided at Figure 3.6.

Table 3.7: Sample of A83 traffic flow data

Note: the "ATC" numbers in the table below are site references for Transport Scotland traffic counters. The locations of these traffic counters are shown on Figure 3.6 below. The traffic flows data presented in the table is for all vehicles, combined flows (both lanes). Traffic flows data disaggregated by vehicle class (e.g. HGVs) were not available consistently across all traffic counter sites and have therefore not been presented below.

Traffic flow[24] indicator	Traffic counter site reference and data year[25]				
	ATC00082 (2015)	ATC08058 (2016)	ATC08055 (2014)	ATC08063 (2012)	ATC08067 (2012)
Average daily flow January (7 day)	2,731	1,675	2,121	2,261	2,065
Average daily flow June (7 day)	2,899	2,545	3,372	4,016	3,181
Average daily flow August (7 day)	2,956	2,801	3,708	4,126	3,276

Figure 3.6: Transport Scotland traffic counter sites on the A83

For the *ex-ante* baseline year (2015/16), the TimberLINK service shipped 76,488 tonnes of timber (see Table 3.1). This avoided the need for 1,255,939km worth of return timber lorry journeys on the road haulage alternative. Given the volume of timber shipped in 2015/16, the non-TimberLINK scenario would have necessitated 5,562 return timber lorry journeys (using 27.5 tonne flatbed lorries) on the road haulage alternative route, which includes the A83.

[24] The data included shows combined flows from both lanes of the A83.

[25] Data has been included for the most recent year when data is available against all traffic flow indicators considered. Traffic flows are fairly consistent year on year (annual fluctuation is minimal).

Timber harvesting in Argyll and subsequent timber transport is driven primarily by market demand for timber. Accordingly, it is not possible to predict annual or sub-annual variation of timber transport demand (as this fluctuates with the market). Advice from Confor however suggests that timber transport in Argyll is a six-day (Monday – Saturday) operation equivalent to 313 working days in a year. Averaging out the 5,562 additional return timber lorry trips required for the non-TimberLINK scenario in 2015/16 across the year therefore equates to an additional 18 return timber lorry trips per day. In reality, these timber lorry trips would not be spread evenly across the working year meaning that there would be more / less additional lorries on the road for any given day.

Considering the additional timber lorry movements that would be required under a non-TimberLINK scenario in light of existing traffic flows on the A83 (see Table 3.7), the magnitude of the anticipated increase in timber lorry traffic on overall traffic flows is only small (less than 1% across all traffic counter sites considered).

Traffic flow data disaggregated by vehicle class (HGVs) are available for one traffic counter site on the A83 (JTC08339 at Ardrishaig – see Figure 3.6). At this site, HGVs accounted for 18% of average daily flows (7-day yearly average 2013) (Transport Scotland, 2014). Given that overall average daily flow for this indicator was 2,629, 18% is equivalent to 473 HGVs. Adding the additional 18 daily return timber lorry journeys[26] that would be required under the non-TimberLINK scenario therefore increases the HGV component of traffic flow to 491 vehicles or 19% (rounded from 18.68%). So, similar to the impact of increased timber lorry traffic on overall traffic flows (see above), the impact on HGV flows is also small in magnitude (especially as a relatively high proportion of A83 traffic flows is already made up of HGVs)[27].

Interviews undertaken with community stakeholders from the three "road communities" however suggest that these additional lorry movements could cause significant traffic flow and congestion impacts. This is not due to the magnitude of the impact *per se*, rather there is an issue with the capacity of the A83 and a number of pinch-points along the route where HGVs can impede traffic flow whilst also contributing to accident risk (see specific assessment of accident risk at section 3.6). In relation to impacts in Arrochar for example, the community stakeholder commented:

> *"Through our area there are 5-6 pinch-points; where a wood lorry and another lorry meet, one or other has to give way or climb the pavement which is causing damage to the side of the streets and the pavement. The lorries are so big…"* (Community Stakeholder, Arrochar)

The issues raised by community stakeholders above were also highlighted in email correspondence with Transport Scotland (North Branch Trunk Road and Bus Operations). In particular, a 2013 report to Transport Scotland by Jacobs UK Ltd was cited including the following identified problems with the A83: *"the overall geometric standard of the route including restricted road width, poor horizontal and vertical alignment, the availability and standard of laybys and pinch points"*. In addition, the report identified the following specific pinch points on the A83 though none of these are considered to cause congestion:

1. **Strone Point:** has a poor accident record, will be re-aligned financial year 2016/17;
2. **Dunderave:** a series of schemes are being progressed through this area to improve the condition of the route;
3. **Erines:** a narrow carriageway causes issues for HGV traffic, this is a future improvement scheme as yet unfunded; and
4. **Barmore Road, Tarbert:** narrow carriageway, priority control in place.

Heavy traffic and congestion was felt to be a particular issue in the tourist season (July and August – see Table 3.7 also) so additional timber lorry movements during this time would be a particular

[26] For a 6-day working week.

[27] Given the available data on disaggregated vehicle flows, the assessment here is not completely accurate. In particular, data published by Transport Scotland on HGV disaggregated average daily flows is only available for 5-day and 7-day averages whereas the Argyll timber hauliers operate a 6-day working week.

problem. This issue was also highlighted through email correspondence with a tourism stakeholder (VisitScotland): *"[this level of increased timber lorry traffic] on the A83 will have a significantly detrimental effect on other road-users"*. However, there was also a feeling that the A83 is perhaps no worse than any other road in Scotland and that timber transport is accepted due to the region's reliance on the forestry sector for employment (though this perhaps simply raises questions regarding the quality of the road network overall).

In light of the quantitative and qualitative evidence above, the overall impact of the **non-TimberLINK scenario on regional traffic flow and congestion** is assessed as **minor negative**; 1) the *magnitude* of the impact as a proportion of overall traffic flow is small and *infrequent*; 2) there is a risk to *human health* as a result of increased driver frustration and accident risk (see section 3.6) though again, this is likely to be low due to the *relatively small and infrequent* nature of the impacts; and 3) the road communities and other road users have some existing *vulnerability* to these impacts as there are several congestion pinch-points along the A83.

3.5.2 Local traffic flow and congestion impacts

The basic proxy used to assess the local congestion impacts caused by the two TimberLINK scenarios is the number of timber lorry trips made, per port, to service the volume of timber shipped by TimberLINK in any given year (see Table 3.8). The nature of the TimberLINK service and the port infrastructure used is such that multiple timber lorries arrive in quick succession on a delivery day as there is limited capacity to store timber at the ports. As shown on Figure 3.1, this "clustering" of timber lorries can cause traffic congestion in and around the TimberLINK ports on delivery days.

The local traffic congestion impact assessment is relevant to the two TimberLINK scenarios: BAU; and expanded service. Each scenario is assessed in turn below.

Table 3.8: Number of timber lorry trips to TimberLINK ports – BAU and expanded service scenarios

TimberLINK port	Number of TimberLINK delivery days[28] and timber lorry trips made											
	2010/11		2011/12		2012/13		2013/14		2014/15		2015/16	
TimberLINK BAU scenario												
Ardrishaig	61	3,410	48	2,698	40	2,240	52	2,923	41	2,321	33	1,836
Campbeltown	17	926	13	728	9	485	11	603	11	640	15	864
Sandbank	11	601	9	488	13	749	8	473	13	703	11	622
Total	**88**	**4,939**	**70**	**3,914**	**63**	**3,474**	**71**	**3,998**	**65**	**3,663**	**59**	**3,322**
TimberLINK expanded service scenario												
Ardrishaig												2,881
Campbeltown												1,356
Sandbank												976
Total												**5,212**

Local traffic flow and congestion impacts – TimberLINK BAU scenario

The BAU assessment has considered local traffic congestion impacts for each of the *ex-post* years (2010/11 – 2015/16). The number of timber lorry trips made per year to each TimberLINK port is listed at Table 3.7 above. The table shows fluctuation year on year linked to the amount of timber shipped by TimberLINK (there is more or less a direct correlation between these two factors as the timber lorries tend to operate at or close to capacity). The table also shows how Ardrishaig is the busiest port every year, shipping at least three times as much timber as the other two ports except for 2015/16 when Ardrishaig tonnages were low and Campbeltown's relatively high.

[28] Note: the capacity of the vessel is 1,400 tonnes and each full vessel would require 56 lorry trips, though the average load is in the order of 1,100 – 1,200 tonnes.

The basic operational data above provide a proxy for local traffic congestion issues in each of the ports. There are no quantitative data available on traffic flows or other congestion indicators that can be analysed with these proxy data to provide an overall quantitative assessment of local congestion. However, the interviews undertaken with community stakeholders in each of the "port communities" provides a crucial insight into some of the issues.

Sandbank was the only port community where local traffic congestion impacts were felt to be a particular problem. Similarly to Arrochar in the regional congestion impacts assessment this is potentially due to a pinch-point / capacity issue:

> *"it's a very tight space to go down there…they [the lorries] have to take all of the road which causes problems if there is anything else coming down"* (Community Stakeholder, Sandbank)

Another issue in Sandbank is the baseline traffic flow level which has seemingly increased in recent years due to closure of car ferry services (though no data is available to support this claim). Community stakeholders from both Ardrishaig and Campbeltown did not identify any particular traffic congestion issues attributable to timber lorry movements. This is noteworthy given the much higher level of timber traffic in Ardrishaig than the other two ports, although the interviewee did highlight that these impacts could change if there are other activities in the future.

When asked to consider *actual* data on timber lorry movements (Table 3.7), the community stakeholder from Ardrishaig commented that numbers of this magnitude were to be expected. Conversely, the Sandbank stakeholder had expected the numbers to be higher: *"I thought it would be more to be honest"* (Community Stakeholder, Sandbank). This highlights an important perception issue whereby TimberLINK accounts for only a relatively small percentage of the overall timber moving through the three ports used by the service (circa 30% in 2015/16).

In light of the quantitative and qualitative evidence above, we suggest that the overall impact of the **TimberLINK BAU scenario on local traffic flow and congestion** would be **minor negative**: 1) the impacts are quite *frequent* given the number of TimberLINK delivery days and associated lorry trips required to service the tonnages delivered; 2) there is potentially a risk to *human health* as a result of accident risk (see separate assessment below) though this is likely to be low / was not identified as a particular issue in the interviews; and 3) in terms of the *spatial extent* of the impacts, only one of the three ports identified local traffic congestion as an important issue (Sandbank). Were this to have been the case across all three ports, this impact could arguably be considered as more significant (**major negative**).

Local traffic flow and congestion impacts – TimberLINK expanded service scenario

For the baseline year (2015/16), the assessment of local traffic congestion impacts that may be caused by the TimberLINK expanded service scenario has considered: 1) the potential increase in timber lorry trips (per port) required to ship 120,000 tonnes of timber; and 2) evidence from interviews with community stakeholders where participants were asked to consider the potential local traffic congestion impacts of a specific quantified increase in timber lorry movements.

Table 3.7 shows the likely pro rata increase in timber lorry trips required to deliver 120,000 tonnes of timber in the baseline year (based on the actual rate of timber transport which was 0.04 timber lorries per tonne of timber transported). Given the sources of timber in 2015/16, the expanded service scenario would see the number of delivery days and timber lorry trips in Campbeltown and Sandbank increase beyond levels seen in any of the preceding years. Although it has not been possible to quantify the potential increase in congestion, qualitative data from the interviews with "port community" stakeholders suggest that increases in timber traffic of this magnitude are not likely to be an issue in Campbeltown though it could cause a problem in Sandbank:

> *"Good on them – more work for the locals and the drivers. I am up for them running as much as possible if I am honest"* (Community Stakeholder, Campbeltown)

> *"As far as the village is concerned it would be a disaster"* (Community Stakeholder, Sandbank)

"The amount of increase would be noticeable but not burdensome" (Community Stakeholder, Ardrishaig)

In light of the evidence above, we suggest that the overall impact of the **TimberLINK expanded service scenario on local traffic flow and congestion** would be **minor negative** for similar reasons to the BAU scenario. The key issue would be the need to manage impacts in and around Sandbank.

3.5.3 Traffic flow and congestion assessment – summary of main findings

Key findings from the assessment of traffic flow and congestion impacts include:

1. **The impact of additional timber lorry movements on A83 traffic flows under the non-TimberLINK scenario would be small in magnitude but may be significant overall:** a non-TimberLINK scenario (road based alternative) would result in an additional 18 return timber lorry trips per day on the A83 (assuming the Argyll hauliers work a 6-day week). The magnitude of this impact on existing A83 traffic flows is small for: all traffic (<1%); and HGVs only (the proportion of traffic comprised of HGVs would increase by <1%). The overall significance of the impact however has been assessed as minor negative due to road capacity, design and pinch-point issues identified in stakeholder interviews.
2. **The location and design of port infrastructure contributes to local congestion impacts:** there is limited capacity to store timber at the three ports used by TimberLINK meaning that timber lorries arrive in quick succession on delivery days. This "clustering" of timber lorries can cause local congestion issues. This is acute in Sandbank due to the location of the port close to the centre of the village.
3. **Ardrishaig is the busiest port though local congestion impacts were not identified:** Ardrishaig is the busiest port in terms of TimberLINK volumes shipped (by as much as a factor of 4) though interviews with Ardrishaig community stakeholders did not highlight any traffic congestion issues.

3.6 Driver frustration and accident risk

The driver frustration and accident risk assessments have considered regional and local level impacts (see Table 2.1 and Figure 2.1). The regional assessment considers the impacts of additional timber lorry trips on the A83 that would be required under the non-TimberLINK (road based alternative) scenario. The local assessment considers the impacts caused by timber lorry movements in and around the port communities under the TimberLINK BAU and expanded service scenarios.

The regional assessment thus focuses on impacts on the main "road communities" along the A83 (Lochgilphead; Inveraray; Arrochar) and the local assessment on the impacts in and around the port communities in Ardrishaig, Campbeltown and Sandbank.

The assessment of driver frustration has been undertaken for the *ex-ante* baseline year only (2015/16). However, data available from MSB accident cost calculations (see Table 2.4), acting as a proxy for accident risk, have facilitated a comparison of the potential impacts of all three timber transport scenarios for all the *ex-post* years (2010/11 to 2015/16).

3.6.1 Regional driver frustration and accident risk impacts

Regional driver frustration – Non-TimberLINK scenario

The regional driver frustration impact assessment is relevant to the non-TimberLINK (road based alternative) scenario only. It is closely related to the assessment of regional traffic flow and congestion impacts discussed above; the non-TimberLINK scenario would increase traffic flow on the A83 <1% across all traffic counter sites where data is available (see Table 3.7 and Figure 3.6). Using this as a proxy of magnitude for the impact on driver frustration, that does not appear to be significant. However, as emphasised in earlier assessments, assumptions have been made of an even distribution of these impacts across the working year.

The qualitative assessment, informed by traffic flow data, further explored regional driver frustration and accident risk impacts with community stakeholders from the A83 "road communities".

Presented with data on the magnitude of additional timber lorry movements on the A83, stakeholder interviewees considered the impact on driver frustration to be relatively small, similarly to perceptions of regional congestion. Driver frustration impacts were not necessarily linked to the magnitude of additional traffic, though several references were made to the quality of the road and the existence (or not) of opportunities for drivers to overtake timber lorries, with the latter significantly impacting the assessment on driver frustration.

Among community stakeholders there was a similar perception around the impact of timber lorry traffic on driver frustration which did not seem to be affected noticeably by a <1% increase of this type of traffic. One community stakeholder interviewee noted that there is a "*common perception*" amongst residents, supported by the interviewee's personal experience, that timber lorries tend to travel in convoys:

> "*sometimes you get two or three* [timber lorries]" (Community Stakeholder, Lochgilphead)

This was thought to "*add some frustration down the A83*", although the main issue of poor road design / condition emerged again. Increased A83 timber lorry traffic under the non-TimberLINK scenario did not have an impact on this interviewee's perceptions of driver frustration.

The interview with the community stakeholder from Arrochar highlighted the importance of local knowledge for driver frustration. It was suggested that residents of the local area are accustomed to this type of traffic and the likely increase in timber lorry traffic identified did not appear to have any considerable impact on current perceptions of driver frustration:

> "*Obviously, I can't speak for other drivers – there are always people who might be in a hurry and get frustrated. As a local in this area all my life it is not a problem…it is part of my life there is many other HGVs on the road – not just timber*" (Community Stakeholder, Arrochar)

A community stakeholder from Inveraray appeared slightly more concerned about the impact of increased timber lorry traffic on the A83. He emphasised that under such a scenario, sharing of information with impacted communities would be important to allow residents to plan their journeys and, if possible, choose alternative routes (Community Stakeholder, Inveraray).

Regional accident risk – Non-TimberLINK scenario

Table 3.9 below sets out the potential cost (£) of accident risk as a result of timber lorry movements for all three scenarios considered, between 2010/11 and 2015/16. These values have been calculated using the accident component from the DfT's MSB values methodology (see section 2.2.5 and Table 2.4). In the *ex-ante* baseline year (2015/16), the cost of regional accident risk on the A83 under the non-TimberLINK (road based alternative) scenario is calculated at £44,743.

Table 3.9: Cost of accident risk caused by timber lorries (Note: greyed-out numbers are the two alternative scenarios)

Scenario	Accident risk cost (£)					
	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
TimberLINK BAU scenario	8,677	6,863	6,453	8,469	8,095	6,758
TimberLINK expanded service scenario	10,135	9,147	9,691	11,053	11,529	10,602
Non-TimberLINK scenario	59,437	50,173	43,421	49,865	45,751	44,743

Accident risk, across interviewees, was mentioned in relation to the road being particularly winding and narrow. However, some interviewees noted that most roads in rural Scotland share this characteristic. Other risks, such as natural hazards and in particular landslides, appeared to be more prominent in participant's minds when considering the risk of accidents, while any recollection of

recent accidents were not linked to the TimberLINK service. Road communities overall appeared slightly more concerned about the impact of increased traffic on accident risk than driver frustration.

When asked to consider the impact of reinstating the number of timber lorry trips on the A83 that TimberLINK currently removes, one road community respondent suggested it would be for the worse with "*…a possibility for more accidents and people being frustrated and arguing*" (Community Stakeholder, Arrochar). The same interviewee identified two potential pinch points / black-spots on the road between Arrochar and Tarbet where timber lorries increase the risk of accidents. One of these relates to a location where a recently opened forest exit provides access to a new harvesting site to / from the A83. A concern was also expressed for pedestrian-related accidents linking back to the issue of roads and pavements being particularly narrow and not fit for purpose. This interviewee further highlighted that it has been by "*luck*" that no accidents have yet occurred and that a solution should be discussed prior to any scenario that would result in increased traffic:

> *"The police and council look at that* [accidents] *but do we have to wait for them to happen?"* (Community Stakeholder, Arrochar)

Another accident black spot was identified at Strone Point near Inveraray, with another interviewee cautioning that there have been a number of fatalities over the years. However, it is understood that funding for a £1.3 million scheme is already in place aiming to improve alignment of the carriageway and increase the forward visibility to vehicles travelling ahead on the bend[29].

It is interesting to note one interviewee's comments on a "*common [but mistaken] perception*" that timber lorries are heavier than same tonnage lorries used to transport other type of goods, which was found to have a negative effect on perceptions around the risk of accident. However, according to the same interviewee, community concerns expressed in the past have settled down as most lorries are now equipped with weight recording devices to ensure they are not overweight. In this case as well, increased A83 timber lorry traffic under the non-TimberLINK scenario was not considered to have a considerable impact on accident risk.

In light of the quantitative and qualitative evidence above, the overall impact of the **non-TimberLINK scenario on regional driver frustration and accident risk** is assessed as **minor negative**; 1) the *magnitude* of the impact as a proportion of overall traffic flow is small and *infrequent*; 2) the risk to *human health* as a result of increased driver frustration and accident risk is likely to be low due to the relatively small and infrequent nature of the impacts; and 3) the road communities and other road users have some existing *vulnerability* to these impacts as there are several congestion pinch-points along the A83.

3.6.2 Local driver frustration and accident risk impacts

The local assessment considers the driver frustration and accident risk impact of timber lorry trips on TimberLINK delivery days in and around the three TimberLINK "port communities" (Ardrishaig; Campbeltown; Sandbank) and has been undertaken for the TimberLINK BAU and expanded service scenarios.

Local driver frustration and accident risk impacts – TimberLINK BAU scenario

The BAU assessment has considered local driver frustration and accident risk impacts for the baseline year (2015/16). Operational data revealing the number of timber lorry trips made in each of the three ports are used as a proxy for the impact causing activities (e.g. increased HGV flows, traffic congestion) that can lead to local driver frustration and accident risk. This data, presented in Table 3.10, show that in 2015/16 Ardrishaig saw a considerably larger number of timber lorry trips compared to the other two ports. It is worth noting that there have been no TimberLINK-related accidents reported in 2015/16 in any of the port communities.

[29] Transport Scotland: A83 Minor Improvement Schemes http://www.transport.gov.scot/project/a83-rest-and-be-thankful/a83-minor-improvement-schemes

Table 3.10: Number of timber lorry trips to TimberLINK ports in 2015/16 – baseline data

Scenario	Number of timber lorry trips made (or predicted)		
	Ardrishaig	Campbeltown	Sandbank
TimberLINK BAU scenario	1,836	864	622
TimberLINK expanded service scenario	2,881	1,356	976

The results of the qualitative analysis, however, reveal that factors other than the magnitude of the impact can have a considerable effect on peoples' personal assessments of driver frustration impacts. The assessment of local residents were to a great extent linked to the existence of benefits that could be identified (or not) for their local community. Those benefits referred predominately to the maintenance of industrial activity (i.e. forestry and its ancillary services) in the area translating as employment for the local community. The existence of such benefits, when those were perceived to be a direct result of the TimberLINK service, were found to have an impact on drivers' tolerance and indeed offset some of the negative impacts of timber lorry traffic on driver frustration:

> *"I drive and live on the relevant road and I can say that we drivers and local residents accept that timber lorries are part of our local industry so we might get stuck behind one but we can work with it – to some extent it is a welcome fact because it implies industrial activity in the area"* (Community Stakeholder, Ardrishaig)

The same interviewee offered some indication of the perceived relative magnitude of the impact expressed as a portion of the overall frustration caused by traffic.

> "*TimberLINK – on delivery days – contributes approximately a fifth or less*."

Community stakeholders interviewed across the "port communities" also referred to the timber lorry drivers, mentioning how they are very cooperative and, where possible, often "let you pass" (Community stakeholder, Campbeltown).

Two of the three "port communities" did not find TimberLINK to have a considerable impact on accident risk in the community.

However, the assessment of impacts on driver frustration and accident risk, were considerably different in the assessment of the community stakeholder interviewed from Sandbank who noted a significant negative impact. A range of reasons appear to have contributed to this including:

1. The location of the port close to the centre of the village exacerbating the impact on driver frustration and accident risk as timber lorries arrive from both directions:

   > *"When they (TimberLINK) are in full production we have logging trucks full coming from both directions to the village. It's a nightmare – sometimes you are waiting for hours"* (Community stakeholder, Sandbank)[30]

2. The lack of any perceived benefits for the local community to offset the impacts experienced:

   > *"It has been nothing but disruption – by [the pier owner's] own admission the village get no benefits – the people that work there don't live in the village there are not benefits to the village. We have to put up with a lot without any benefit"* (Community stakeholder, Sandbank)

3. The roads and pavements in the village being narrow raising concerns for pedestrian safety:

   > *"…you have to pull your elbows in, they are intimidating you can feel the suction"* (Community stakeholder, Sandbank)

[30] This same interviewee highlighted that the number of timber lorry trips in Sandbank (Table 3.10) under the TimberLINK BAU and expanded service scenarios was lower figure than they had expected, on the basis of their experience.

The latter concern was exacerbated by an increase in the number of people walking and driving, caused by a decrease in public transport and the cancellation of a car ferry service to Sandbank, resulting in more interactions / conflicts in the use of roads in the area. It should be noted, however, that TimberLINK only makes-up a portion of timber lorry movements at Sandbank (see section 1.4) therefore there may be a perception issue regarding the magnitude and significance of impacts attributable to TimberLINK.

In light of the quantitative and qualitative evidence above, the overall impact of the **TimberLINK BAU scenario on local driver frustration and accident risk** is assessed as localised – **negligible to minor negative** for Ardrishaig and Campbeltown, and **moderate negative** for Sandbank.

Local driver frustration and accident risk impacts – TimberLINK expanded service scenario

An increase in the operations of the TimberLINK service to enable the shipping of 120,000 tonnes of timber per year would result in 1,045 additional lorry trips to Ardrishaig, 492 to Campbeltown and 354 in Sandbank, when compared to the TimberLINK BAU scenario in the *ex-ante* baseline year (2015/16) (see Table 3.10 above).

Exploring the perception of community stakeholders in the "port communities" on the impact of such an increase, two out of the three stakeholders expected no negative impact on driver frustration or accident risk, highlighting the important "counterbalancing" effect of community benefits from the Argyll forestry sector and residents' familiarity with the timber lorry traffic.

One of the "port community" interviewees noted that among the various impacts discussed in relation to the TimberLINK increased service scenario (see Table 2.1), driver frustration and accident risk would be the "key concerns", however that was directly linked with an expected increase in employment for local residents and was for that reason welcomed:

> *"I am up for them running as much as possible if I am honest"* (Community Stakeholder, Ardrishaig).

A similar stance was held by a community stakeholder interviewee from one of the "road communities" located near Ardrishaig, noting no impact on either driver frustration or accident risk:

> *"I honestly don't think it would [affect driver frustration or risk of accident], because of the way they are linked there are speed limits anyway so I don't see extra lorries being an issue there at all and again people accept that these keep employment in the area"* (Community Stakeholder, Lochgilphead)

In light of the quantitative and qualitative evidence above, the overall impact of the **TimberLINK expanded service scenario on local driver frustration and accident risk** would remain **minor negative** for Ardrishaig and Campbeltown as: 1) the *magnitude* of the impact as a proportion of overall traffic flow is small and *infrequent*; 2) the risk to *human health* as a result of increased driver frustration and accident risk is likely to be low due to the relatively small and infrequent nature of the impacts; and 3) the road communities and other road users have some existing *vulnerability* to these impacts as there are several congestion pinch-points along the A83. However, for Sandbank, where there appear to be existing concerns over accident risks and driver frustration, an increase of 57% on current TimberLINK related[31] lorry movements would likely exacerbate these concerns considerably. For Sandbank therefore these impacts are assessed as **moderate to major negative**.

3.6.3 Driver frustration and accident risk assessment – summary of main findings

Key findings from the assessment of driver frustration and accident risk include:

[31] Clearly there are also other timber lorry movements in Sandbank as part of other (commercial) short-sea coastal timber shipping operations. Any increase in TimberLINK related timber lorry movements should be considered alongside these existing movements.

1. **Regional driver frustration and accident risk impacts on the A83 are influenced by road design:** the design and nature of the A83 (the "overall geometric standard of the route") is such that there are limited overtaking opportunities. This can influence driver frustration and, subsequently, accidents where drivers perform risky overtaking manoeuvres.
2. **The non-TimberLINK scenario may contribute to minor negative driver frustration and accident risk impacts on the A83:** although the overall magnitude of increased timber lorry movements on A83 traffic flows under the non-TimberLINK (road based alternative) scenario is small (<1%), issues with the geometric standard of the route (see above) may contribute to an overall significant minor negative effect, primarily due to limited overtaking opportunities and subsequent driver frustration.
3. **The cost of accident risk is highest under the non-TimberLINK scenario:** estimates of accident risk costs (£) using the DfT MSB values methodology suggest that costs are highest under the non-TimberLINK (road based alternative) scenario by at least a factor of 4. This is due, primarily, to the much larger distances travelled under this scenario.
4. **Local driver frustration and accident risk impacts differ between ports:** local impacts in the three TimberLINK ports are not consistent. Whilst Ardrishaig was substantially busier in terms of TimberLINK related timber lorry movements than Campbeltown or Sandbank (by at least a factor of 2), community stakeholders did not identify any significant driver frustration or accident risk impacts. This was also the case in Campbeltown. Conversely, significant impacts were identified in Sandbank for various reasons (e.g. the location of the port close to the centre of the village).

3.7 Amenity and community severance

The amenity and community severance assessment has considered local level impacts to "road communities" under the non-TimberLINK (road based alternative) scenario (see Table 2.1).

This assessment explored the impact of increased timber lorry traffic on "road communities" along the A83 and how that might cause a hazard, affecting the amenity of the place, disrupting the movement of pedestrians and other road users and generally affecting the wellbeing of local communities and other people who use and visit the area.

This assessment is underpinned by quantitative data from the regional traffic flow and congestion assessment (see section 3.5.1). Table 3.7 provides an overview of traffic flow data on the A83 across five traffic counter sites (see Figure 3.6). Despite the small magnitude of the additional timber lorry traffic (<1% across all traffic counter sites assessed) interviews with community stakeholders from the "road communities" suggest that there may be significant impacts on traffic flows and congestion. The interviews further explored stakeholders' perceptions of these impacts on amenity and community severance overall as well as at identified pinch points.

In two of the three road communities, stakeholders referred to rest stops on the A83 used by car drivers, buses and lorries alike. One interviewee suggested that lorries parked in bus stops interfered with bus movement *"forcing the bus to stop in the carriage way"* which can *"cause some issues"* (Community stakeholder, Inveraray). Similarly, a community interviewee from Arrochar referred to a pinch point located at a rest stop that is popular amongst drivers. However, neither of the interviewees considered this to be a significant impact in terms of community severance while the latter also highlighted that the community is aware of these issues and willing to put up with it as it brings business to the local stores:

> *"At least they [lorry drivers] are using the local stores – already two other shops closed in the village recently..."* (Community stakeholder, Arrochar)

In light of the quantitative and qualitative evidence above, the overall impact of the **non-TimberLINK (road based alternative) scenario on amenity and community severance** is assessed as **minor negative**.

3.7.1 Amenity and community severance assessment – summary of main findings

Key findings from the assessment of driver frustration and accident risk include:

1. **The non-TimberLINK scenario has potential to cause minor negative effects on amenity and community severance:** although the magnitude of increase timber lorry traffic on the A83 under the non-TimberLINK (road based alternative) scenario is small, specific local issues in two of the "road communities" mean that this increase has the potential to cause minor negative effects on community severance.

3.8 Visual impact

The assessment of visual impact has considered local level impacts to "port communities" under the TimberLINK BAU scenario (see Table 2.1).

The scope of this assessment was such that we explored both positive and negative impacts to the views, setting and character of the ports and the surrounding area that may be caused by TimberLINK related activities, such as the loading / unloading of timber at the port, the arrival and departure of the TimberLINK vessel, the movement of timber lorries etc.

As a proxy for the magnitude of impact causing activities (see above), Table 3.11 presents operational data on the number of TimberLINK delivery days, number of timber lorry trips and timber volume (in tonnes), for each port, in the *ex-ante* baseline year 2015/16[32].

Table 3.11: Number of timber delivery days, lorry trips and volume to TimberLINK ports in 2015/16

Port	Number of TimberLINK delivery days	Number of timber lorry trips made	Timber volume shipped (tonnes)
Ardrishaig	33	1,836	45,900
Campbeltown	15	864	21,600
Sandbank	11	622	15,550

Interviews with community stakeholders in the three ports above revealed a range of perceptions, both positive and negative, concerning the visual impact of TimberLINK activities.

Three out of four of the community interviewees made positive comments referring to the arrival and loading of the TimberLINK vessel as an interesting activity at the port. Yet, it is worth noting that one of these participants is located in Lochgilphead – a community in close proximity to Ardrishaig – while the other only has a view of the port but is not in close proximity.

> *"We have a huge pile (of wood at the port) – [Do you find that unattractive?] Not at all. It's actually quite nice to watch the loading and offloading"* (Community stakeholder, Campbeltown)

> *"…communities welcome the piers and a lot go and watch the shipping's loading – especially in Ardrishaig"* (Community stakeholder, Lochgilphead)

One of the interviewees in Ardrishaig pointed out that the lack of residential properties in close proximity to the port minimises potential conflicts and negative visual impacts. This interviewee further made a distinction between: "very, very quiet days" where there are no deliveries; the arrival of the vessel, which was characterised as an interesting activity; and the loading / unloading operations for which the interviewee mentioned "there is toleration" by the majority of the local community:

> *"As a resident that has a good view, I like to see the vessel coming and going and at night you see it there and it is of interest but that is from a distance. At this time there are no particular*

[32] Note: the number of TimberLINK delivery days is calculated according to the volume of timber shipped in each port and assuming that the MV Ayress was loaded each time to its maximum capacity of 1,400 tonnes. This figure provides an estimate only of the delivery days (and associated timber lorry trips) as the average load of the Ayress is lower than maximum capacity (in the order of 1,100 – 1,200 tonnes).

residents that live close enough to the operation to be disturbed by any of the activity" (Community stakeholder, Ardrishaig)

The visual impacts associated with the operation of the TimberLINK service at Sandbank appeared to be more severe, though also complicated by other developments at the port (see section 3.9). It is also important to note that TimberLINK operations only account for one aspect of timber shipping from Argyll ports; therefore, the perceived impact of timber operations at Sandbank are likely to be less than the actual impacts caused by the TimberLINK service. Notwithstanding these factors, the visual impacts experienced in Sandbank relate to claims that:

1. The highly visible location of the port close to the centre of the village and main road where it is overlooked by several residential properties: *"*[the port is] *a huge scar on our landscape. Nobody who lives in front of the marina can see the water"* (Community stakeholder, Sandbank); and
2. Timber lorries exiting the pier result in debris and bark being transferred in the village's streets.

In light of the quantitative and qualitative evidence above, the overall impact of the **TimberLINK BAU scenario on visual impact** is assessed as **localised and neutral** at Ardrishaig and Campbeltown, but **minor to moderate negative** at Sandbank. This is likely to be exacerbated under a TimberLINK expanded service scenario.

3.8.1 Visual impact assessment – summary of main findings

Key findings from the assessment of visual impacts include:

1. **The visual impacts of TimberLINK operations are acceptable in Ardrishaig and Campbeltown:** visual impacts in these two ports have been assessed as "neutral" overall. The arrival and loading of the MV Ayress is seen as an interesting activity that provides an interesting spectacle for local people and tourists.
2. **The visual impact of TimberLINK operations in Sandbank is negative overall:** several factors combine at Sandbank to create an overall minor to moderate negative visual impact. Key issues are the port's location in relation to the village and poor relations between the port operator and the community (see section 3.9 also).

3.9 Regeneration

The assessment of impacts on regeneration has considered local level impacts in "port communities" under the TimberLINK BAU scenario (see Table 2.1).

By regeneration impact we refer to the impact – positive or negative – of the TimberLINK service on economic development and regeneration objectives associated with the ports and their surrounding areas including impacts on, for example, tourism, fishing, leisure sailing, recreation, marina development etc.

The various aspects of regeneration impacts were explored qualitatively at a local level via interviews with community stakeholders in the "port communities". TimberLINK operational data provides a quantitative proxy for the magnitude of impact causing activities; e.g. data on timber lorry movements and delivery days (see Table 3.11). The focus has been on understanding how TimberLINK operations interact (conflict / support) with regeneration activities.

Marina development

Several stakeholders noted that in the years that TimberLINK has been operational it has become a *"part of everyday life now"* and *"local communities have gotten used to it and the benefit of it as well"*. This interviewee (who was from a "road community") discussed what they saw as the positive impacts of TimberLINK on regeneration in the port of Ardrishaig which is close to Lochgilphead. The

interviewee referred specifically to improvements in the piers supporting efforts to regenerate the marina areas.

> *"Especially Ardrishaig and Campbeltown there have been improvements in the piers – all these are benefits to the communities as well"* (Community stakeholder, Lochgilphead)

The community stakeholder from Ardrishaig noted that, if TimberLINK operations were to be expanded (e.g. as per the expanded service scenario), it would be crucial to ensure that the area of operations is confined, so as to avoid interactions between timber lorries and pedestrians and other visitors to the marina. The interviewee further noted that *"the [port] area also constitutes the centre of touristic attractions – not very much but all we got"* (Community stakeholder, Ardrishaig). Suggestions to reconcile the two activities (timber transport and tourism) in the limited space available included using a notice board to provide information on the TimberLINK service, vessel and timings so that interested locals or visitors can be more involved and better informed.

Tourism

Most of the interviewees identified a neutral impact of TimberLINK on tourism, noting it neither attracted nor deterred tourists from visiting the area. For those that would happen to visit the port it was seen – if anything – as an additional interest. One of the interviewees also identified an indirect positive impact of TimberLINK in removing additional traffic from the local roads. This issue was also identified specifically, by a representative from VisitScotland, in relation to increased timber lorry traffic under the non-TimberLINK scenario (see traffic flow and congestion assessment at section 3.5 also). For three out of four interviewees, the balance of opinions indicated a neutral or minor positive impact. The perception of these impacts differed in Sandbank however, where the TimberLINK service was considered to *"put off visitors"* (Community stakeholder, Sandbank).

Recreational activities

Recreational activities close to ports that could potentially be affected by the TimberLINK service included recreational fishing, sailing and pedestrians walking along the shoreline / marina. While the majority of interviewees had the impression that TimberLINK did not have any considerable impact on these activities, the community stakeholder interviewee from Sandbank identified some negative impacts, though it is important to note that these appeared to relate to what was identified as poor maintenance of the pier and management / disposal of by-products of the operation, rather than the operation of TimberLINK:

> *"…in close proximity there are some boats but the amount of resin that comes off the bark[33] covers the boats … they have to clean that 3-4 times a years instead of once – it has halted the development of the marina – it's a dead deal, the marina is never going to be developed." (Community stakeholder, Sandbank)*

> *"It [Sandbank] is supposed to be a recreational space to live and work and it's not." (Community stakeholder, Sandbank)*

There would seem to be an ongoing dispute between some members of the local community and the port's owner at Sandbank as well as concerns about activities at the port. In 2011, 79 letters and emails of objection to a planning application for retention of a concrete batching plant at the port were received from the local community, while another letter was received from Sandbank Community Council which included a petition with 23 signatures[34]. More recently, in 2015, in relation to the latest planning application by the port's owner for expansion (increasing the height of the infilled area), a total of 88 emails and letters of representation were received comprising 32 objectors

[33] Interviewee had earlier made a point about the inappropriate disposal of bark which ends up in the water.

[34] https://www.argyll-bute.gov.uk/moderngov/documents/s56445/00158_concrete%20batching%20plant%20Holy%20Loch%20Marina.pdf

and 55 supporters[35]. Clearly these planning applications are not directly related to TimberLINK and therefore the objections stated are not against TimberLINK (or timber transport more generally). They do, however, highlight the ongoing dispute between some members of the local community and the port owner in Sandbank. This dispute may well influence peoples' perception of TimberLINK, as per the comments above.

As a general suggestion to help mitigate the impact of TimberLINK on regeneration objectives in and around the ports, two interviewees suggested that improved information sharing between the operators of the TimberLINK service and local communities could help to avoid conflicts. An example provided was the case of community events taking place in the village, where access to the site would be important and could potentially conflict with use of the roads by timber lorries.

In light of the quantitative and qualitative evidence above, the overall impact of the **TimberLINK BAU scenario on regeneration** is assessed as **minor positive** for Ardrishaig and Campbeltown, and **minor negative** for Sandbank.

3.9.1 Regeneration assessment – summary of main findings

Key findings from the assessment of regeneration impacts include:

1. **TimberLINK operations have the potential to cause mixed impacts on regeneration objectives:** overall, the assessment suggests that the TimberLINK BAU scenario is likely to cause minor positive effects of regeneration in Ardrishaig and Campbeltown and minor negative effects in Sandbank.
2. **TimberLINK is seen to have had a positive impact on marina / pier improvements:** in Ardrishaig and Campbeltown there is a perception that TimberLINK has had a positive impact on port development including marinas and piers. Presumably this has also been influenced by other (commercial) timber shipping operations and indeed the other sectors / activities that use the ports (e.g. renewables).
3. **TimberLINK is seen to have a negative impact on all aspects of regeneration in Sandbank:** in line with other impacts assessed, TimberLINK is considered to negatively impact tourism and recreational activities in Sandbank. Various reasons for these have been cited and we understand that a substantial portion of the community in Sandbank have raised ongoing complaints and objections concerning the timber shipping activities taking place. It is important to note that TimberLINK only constitutes a relatively small portion of timber shipping operations in Sandbank (20.2% in 2015/16).

3.10 Noise and air pollution

The assessment of noise and air pollution impacts has considered local level impacts to port and road communities under all three timber transport scenarios (see Box 2.1). The TimberLINK BAU scenario has been assessed for all the *ex-post* years (2010/11 – 2015/16). The assessment of the TimberLINK expanded service and the non-TimberLINK (road based alternative) scenarios has focussed mainly on the *ex-ante* baseline year (2015/16) although quantitative data from the MSB methodology has been calculated for all *ex-post* years as well.

The assessment of noise and air pollution impacts is underpinned by key TimberLINK operational data (distance travelled by timber lorries) as a proxy for the magnitude of the impact causing activities (i.e. timber transport) experienced by the port and road communities. These data have been presented earlier in Table 3.1. An additional proxy emerges from the DfT MSB calculations for the components of noise (see Table 3.12) and air pollution (see Table 3.13). These tables detail the costs of noise and air pollution impacts, as per the MSB method, under all three scenarios.

[35] https://www.argyll-bute.gov.uk/moderngov/documents/s111928/02969_RoHa%20Holy%20Loch%20Marina%20PPSL003.pdf

Table 3.12: Cost of noise impact caused by timber lorries (Note: greyed-out numbers are the two alternative scenarios)

Scenario	Noise impact cost (£)					
	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
TimberLINK BAU scenario	5,711	4,517	4,248	5,575	5,328	4,448
TimberLINK expanded service scenario	6,671	6,021	6,379	7,275	7,589	6,978
Non-TimberLINK scenario	35,454	29,928	25,900	29,744	27,290	26,689

3.10.1 Noise – TimberLINK BAU scenario

Looking across the scenarios at the estimated cost of noise impacts, Table 3.12 identifies a six-fold increase in impact between the TimberLINK BAU scenario and the non-TimberLINK (road based alternative) scenario for 2015/16. As per the MSB methodology (see Table 2.4), these figures are based on the noise impact of timber lorry traffic, hence the increase in magnitude under the non-TimberLINK scenario (as distance travelled is greater). Figure 3.7 below plots the distance travelled by timber lorries (km) for all three timber transport scenarios against the noise impact costs (£) associated with this.

Figure 3.7: Cost of noise impact across all three timber transport scenarios

TimberLINK related noise issues were discussed with community stakeholders from "port communities" to explore the impact of timber loading / unloading and related timber lorry movements at the port. The qualitative assessment drawing on the interview data revealed that although there were noticeable differences in impact between days or times of the day (i.e. "activity" days vs. "quiet" days), the impact was considered tolerable.

> *"It goes from very quiet to very noisy but as I say generally speaking people perceive it as evidence of something happening – we accept that it is noisy. And it's tolerated well."* (Community stakeholder, Ardrishaig)

Similarly to various other impacts (see above), the noise impacts of TimberLINK were less tolerated by community stakeholders in Sandbank. Reasons quoted previously, such as the location of the port in close proximity to residential properties, were mentioned.

> *"Because its water it echoes – people across can hear the noise, it sounds like gunfire when they are loading the boat – we live in a tranquil area it is the only industry we have. There are supposed to be limitations. The trucks are noisy as well…"* (Community Stakeholder, Sandbank)

However, the noise impact of TimberLINK operations was also discussed with an environmental health expert from Argyll and Bute Council who characterised the impact as "negligible".

3.10.2 Air pollution – TimberLINK BAU scenario

Table 3.13 presents cost estimates for the air pollution impacts of the three scenarios, using the MSB methodology (see Table 2.4), for each of the *ex-post* years (2010/11 – 2015/16). Figure 3.8 then plots the distance travelled by timber lorries (km) for all three timber transport scenarios against these cost data (£).

It is important to note that air pollution cost proxies, as per the DfT's MSB methodology, do not account for greenhouse gas emissions which are assessed separately to avoid double counting (see Table 2.4 and section 3.3 on fuel usage and carbon emissions). This explains why the cost impacts of air pollution are much lower than the equivalent noise impact costs. Nevertheless, looking at the difference between the TimberLINK BAU and non-TimberLINK (road based alternative) scenarios, the same magnitude increase in cost is observed (i.e. more than six-fold).

During the interviews, community stakeholders in "road communities" did not consider the air pollution impacts of TimberLINK to be of any particular concern. Indeed a couple of the interviewees spontaneously compared this scenario to the potential impacts of the non-TimberLINK (road haulage alternative) scenario which was considered far worse.

Table 3.13: Cost of air pollution caused by timber lorries (Note: greyed-out numbers are the two alternative scenarios)

Scenario	Air pollution cost (£)					
	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
TimberLINK BAU scenario	152	120	113	149	142	119
TimberLINK expanded service scenario	178	160	170	194	202	186
Non-TimberLINK scenario	1,043	880	762	875	803	785

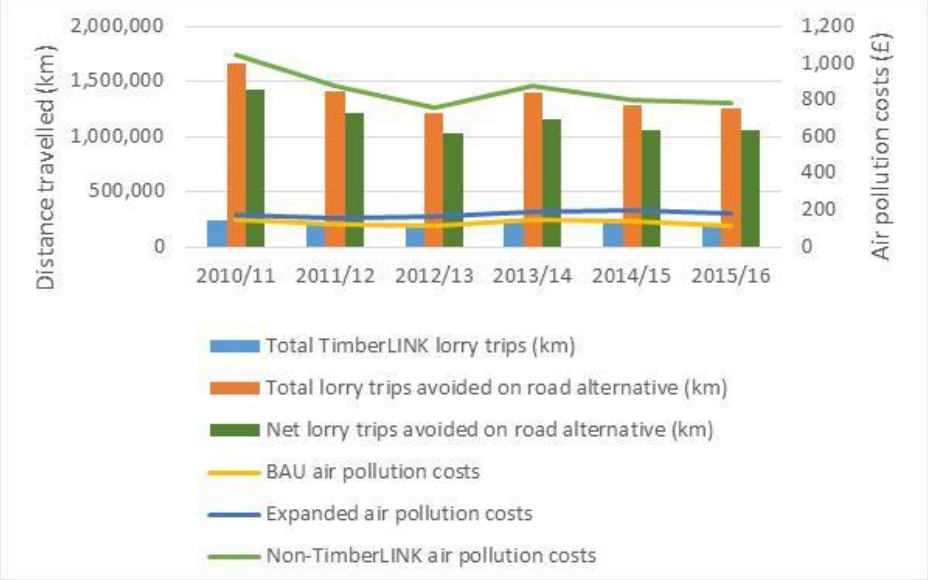

Figure 3.8: Cost of air pollution across all three timber transport scenarios

Although air pollution impacts were not explored specifically with community stakeholders in "port communities", the environmental health expert from Argyll and Bute Council noted that due to the ports being *"wide open"* and considering the number of timber lorry trips, as well as the fact that they arrive at infrequent intervals, the air pollution impact would be *"negligible"*. Nonetheless, he did emphasise that air pollution measurements, specific to the port communities, are not available to validate this.

In light of the quantitative and qualitative evidence above, the overall impact of the **TimberLINK BAU scenario on noise and air pollution** is assessed as **negligible / neutral**.

3.10.3 Noise and air pollution – TimberLINK expanded service scenario

Tables 3.12 and 3.13 identify a relatively small increase in the cost of noise and air pollution for the expanded service scenario. Discussions with stakeholders, similarly, discern no impact of the corresponding increase in timber lorry trips on interviewees' original perceptions of the noise and air pollution impacts.

> *"I think that is manageable. I guess there would be peaks of activity and peaks of impact. All acceptable"* (Community stakeholder, Ardrishaig)

One of the wider stakeholders, however, warned that increased levels of noise could impact other activities in the port area relevant to its enjoyment by community members and visitors alike.

In a similar vein to the assessment of other impacts above, the community stakeholder interviewee from Sandbank described the expanded service scenario as being a *"disaster"* for the village.

In light of the quantitative and qualitative evidence above, the overall impact of the **TimberLINK expanded service scenario on noise and air pollution** is assessed as **minor negative**.

3.10.4 Noise and air pollution – non-TimberLINK scenario

Tables 3.12 and 3.13 identify a considerable increase in the cost of both noise and air pollution under the non-TimberLINK (road based alternative) scenario.

Qualitative data from interviews seem to reflect the quantitative assessment, with community stakeholders from "road communities" expressing concern about the impacts of a non-TimberLINK scenario on communities along the A83. One "road community" stakeholder presented with the estimated number of timber lorries that would be reinstated in the absence of TimberLINK expressed a concern about the *"ongoing impact on air pollution"* (Community stakeholder, Lochgilphead).

The environmental health expert from Argyll and Bute Council further noted that noise and air pollution impacts under the non-TimberLINK scenario may be quite profound in road communities near Arrochar, assuming that each timber lorry would eventually feed into the A82 road and head towards Glasgow. Air quality could then become a concern for Arrochar and Tarbet but also communities further south on the A82. Despite that, considering overall traffic flows, any additional timber lorries under a non-TimberLINK scenario would still likely remain a *"small component of the wider total mix"* (see section 3.5 on traffic flow and congestion impacts).

In light of the quantitative and qualitative evidence above, the overall impact of the **non-TimberLINK (road based alternative) scenario on noise and air pollution** is assessed as **minor negative**.

3.10.5 Noise and air pollution assessment – summary of main findings

Key findings from the assessment of noise and air pollution impacts include:

1. **Air pollution and noise impacts are minimal across all three scenarios:** due to the scale of the timber transport operations under all three scenarios and the remote rural nature of Argyll, air pollution and noise impacts range from neutral / negligible (TimberLINK BAU) to minor negative (TimberLINK expanded service and non-TimberLINK scenarios). Issues are likely to be more pronounced in Sandbank though no specific air quality or noise impacts were identified by community stakeholders in Ardrishaig or Campbeltown.
2. **The estimated costs of air pollution and noise impacts are substantially higher under the non-TimberLINK scenario:** notwithstanding the above, the MSB method estimated costs for noise and air pollution impacts are six times higher under the non-TimberLINK scenario when compared with the TimberLINK BAU scenario.

4. Findings of the economic evaluation

4.1 Ex-post evaluation of the TimberLINK business as usual scenario

This section sets out the economic evaluation of the TimberLINK business as usual scenario. It is based on tonnages of 80,000 per annum being moved on the service. This is close to the actual level (76,489) moved in 2015-16. The employment and Gross Value Added (GVA) estimates shown are ones that would recur each year if 80,000 tonnes of timber were moved via TimberLINK.

It covers:

- Quantified economic impacts through the supply chain. Financial costs to government (e.g. additional road maintenance costs under some scenarios) are covered in the environmental evaluation;
- Non-quantifiable impacts, including those for timber growers in Argyll and the end users in Ayrshire;
- Wider impacts-tourism and community reaction;
- Potential changes to TimberLINK operation; and
- Summary of findings.

4.1.1 Quantified economic impacts – employment

The approach to the quantified economic impacts is set out at Chapter 2. Please note that in some tables column or row data do not sum exactly to the totals show. This is due to rounding.

Table 4.1 shows the direct employment impacts in the supply chain in Argyll, expressed as Full-Time Equivalents (FTE) jobs.

Table 4.1: Argyll – direct FTE employment

Supply Chain	FTE
Haulage-forest to quay	3.9
Pier	0.4
Vessel loading	0.7
Total	**5.0**

The impacts include both the initial activity (e.g. driving timber lorries from the forest to the pier) and an allowance for supporting activity within the relevant company (e.g. maintenance of lorries by other members of the workforce, administration etc).

The total direct impact is 5 FTE within the companies providing the haulage, the three Argyll piers and the work required to load timber onto the vessel. Most of the impact is from the haulage.

Table 4.2 shows total employment impacts (direct, indirect and induced) in Argyll.

Table 4.2: Argyll – total FTE employment

Supply Chain	FTE			
	Direct	Indirect	Induced	Total
Vessel operation (MV Ayress)	0.0	0.1	0.0	**0.1**
Haulage-forest to quay	**3.9**	0.1	0.4	**4.4**
Pier activity	**0.4**	0.1	0.1	**0.6**
Vessel loading	**0.7**	0.1	0.1	**0.9**
Total	**5.0**	**0.4**	**0.6**	**6.0**

The inclusion of indirect and induced impacts increases the total employment impact to 6.0 FTE. The indirect element is very slight, reflecting consultees' views / assumptions on the limited extent of

purchases from suppliers in Argyll. It also includes spend by the MV Ayress on goods and services within Argyll, while she is in at one of the three TimberLINK ports (the direct employment on the vessel itself is included within Scottish level impacts, as shown later). Table 4.3 shows estimated direct employment impacts in Ayrshire.

Table 4.3: Ayrshire – direct FTE employment

Supply Chain	FTE
Shipping fuel and lub oils purchases	0.5
Vessel unloading	0.4
Pier activity, storage and TimberLINK administration	1.5
Haulage-quay to end users	2.5
Total	**4.9**

There is a total of 4.9 FTE jobs. These very largely come from the onward haulage and ABP's activities at their two ports (i.e. Troon and Ayr). Table 4.4 shows the total employment impacts (direct, indirect and induced) in Ayrshire.

Table 4.4: Ayrshire – total FTE employment

Supply Chain	FTE			
	Direct	Indirect	Induced	Total
Vessel operation (MV Ayress)	0.0	1.9	0.5	**2.4**
Shipping fuel and lub oils Purchases	0.5	0.1	0.1	**0.7**
Vessel unloading	0.4	0.1	0.1	**0.6**
Pier activity, storage and TimberLINK administration	1.5	0.5	0.2	**2.2**
Haulage-quay to end users	2.5	0.5	0.3	**3.4**
Total	**4.9**	**3.2**	**1.2**	**9.2**

The inclusion of indirect and induced effects increases the total employment impact to 9.2 FTE. The indirect impacts include spend by the MV Ayress on various goods and services within Ayrshire; e.g. vessel repairs, chandlery and victualling (the direct employment on the ship is included within Scottish level impacts, as shown later. Table 4.5 shows estimated direct employment impacts for Scotland as a whole.

Table 4.5: Scotland – direct FTE employment

Supply Chain	FTE
Haulage-forest to quay	3.9
Pier activity-Argyll	0.4
Vessel loading	0.7
Vessel operation (MV Ayress)	5.5[36]
Shipping fuel and lub oils purchases	0.5
Vessel unloading	0.4
Pier activity, storage and TimberLINK administration-Ayrshire	1.5
Haulage-quay to end users	2.5
Total	**15.3**

[36] Some of these employees are non-Scottish nationals. However, their employment is still attributable to the Scottish economy.

Total direct employment in Scotland is around 15 FTE. This is the sum of the employment in Argyll and Ayrshire, plus the employment associated with the MV Ayress that is attributable to its TimberLINK related activity. The latter has simply been assigned to Scotland as the vessel is neither based in Argyll nor Ayrshire.

The operation of the vessel plus haulage accounts for around 12 of the c.15 FTE jobs. The levels of employment in Argyll (5.0 FTE) and Ayrshire (4.9 FTE) are very similar to one another.

Finally for employment, the total impact within Scotland is set out at Table 4.6.

Table 4.6: Scotland – total FTE employment

Supply Chain	FTE			
	Direct	Indirect	Induced	Total
Haulage-forest to quay	3.9	1.3	0.8	**5.9**
Pier activity-Argyll	0.4	0.3	0.1	**0.8**
Vessel loading	0.7	0.5	0.2	**1.4**
Vessel operation (MV Ayress)	5.5[37]	2.9	1.9	**10.3**
Shipping fuel and lub oils Purchases	0.5	0.3	0.1	**0.9**
Vessel unloading	0.4	0.3	0.1	**0.8**
Pier activity, storage and TimberLINK administration-Ayrshire	1.5	1.0	0.5	**2.9**
Haulage-quay to end users	2.5	0.8	0.5	**3.9**
Total	**15.3**	**7.2**	**4.3**	**26.8**

The total impact is around 27 FTE jobs. Over half (15.3 FTE) are direct jobs within the supply chain. The other c.11 FTE are from indirect and induced impacts. These are larger at the national level than within Argyll and Ayrshire. This is due to the much wider range of suppliers available across Scotland than in the two local economies.

4.1.2 Quantified economic impacts – Gross Value Added (GVA)

Table 4.7 shows estimated total GVA impacts (direct, indirect and induced) in Argyll.

Table 4.7: Argyll – total GVA impacts

Supply Chain	GVA (£,000)			
	Direct	Indirect	Induced	Total
Vessel operation (MV Ayress)	0	4	1	**5**
Haulage-forest to quay	270	9	22	**302**
Pier activity	27	4	5	**36**
Vessel loading	45	6	5	**56**
Total	**342**	**23**	**33**	**398**

The total impact within Argyll is just under £400,000 of GVA. The vast majority (£342,000) is within the supply chain itself (i.e. the direct impact).

Table 4.8 shows estimated total GVA impacts (direct, indirect and induced) for Ayrshire.

Table 4.8: Ayrshire – total GVA impacts

Supply Chain	GVA (£,000)			
	Direct	Indirect	Induced	Total
Vessel operation (MV Ayress)	0	72	22	**94**
Shipping fuel and lub	33	8	4	**45**

[37] Ibid.

Supply Chain	GVA (£,000)			
oils purchases				
Vessel unloading	26	9	3	**38**
Pier activity, storage and TimberLINK administration	106	35	12	**154**
Haulage-quay to end users	177	37	16	**230**
Total	**342**	**161**	**58**	**561**

The total impact within Ayrshire is £561,000 of GVA. Again, most (£342,000) of it is within the supply chain itself (i.e. the direct impact).

Finally for GVA, the total impact within Scotland is set out at Table 4.9.

Table 4.9: Scotland – total GVA impacts

Supply Chain	FTE			
	Direct	Indirect	Induced	Total
Haulage-forest to quay	270	94	40	**405**
Pier activity-Argyll	27	18	6	**51**
Vessel loading	45	30	10	**85**
Vessel operation (MV Ayress)	251	108	92	**452**
Shipping fuel and lub oils purchases	33	16	7	**56**
Vessel unloading	26	17	6	**49**
Pier activity, storage and TimberLINK administration-Ayrshire	106	70	22	**198**
Haulage-quay to end users	177	62	26	**265**
Total	**936**	**415**	**209**	**1,561**

The total impact within Scotland is over £1.5 million of GVA. Around 60% of this is within the supply chain itself (i.e. direct). Most of the rest (around one quarter of the total) is from indirect effects. As with employment the largest impacts are for the vessel operation and haulage activity.

In 2015/16, the TimberLINK subsidy was £665,215. The Scottish level GVA impacts imply a TimberLINK "multiplier" of:

- £1.41 of direct GVA (i.e. in the supply chain) per £1 of subsidy; and
- £2.35 of total GVA (direct, indirect and induced) per £1 of subsidy.

4.1.3 Quantified economic impacts – summary

Table 4.10 summarises the preceding information.

Table 4.10: Summary of quantified Impacts

Area	Employment (FTE)		GVA (£,000)	
	Direct	Total	Direct	Total
Argyll	5.0	6.0	342	398
Ayrshire	4.9	9.2	342	561
Scotland	15.3	26.8	936	1,561

4.1.4 Non-quantified impacts – supply chain investment

We were able to secure only limited information on investments by supply chain businesses within the life of the current contract that can be attributed to TimberLINK. In part, this reflects that much

of the port infrastructure and mobile equipment (i.e. lorries, cranes) is used for a range of purposes and not simply TimberLINK related work.

In terms of the ports:

- Investment in Campbeltown harbour has freed up additional space for timber movements, some of which are for TimberLINK. However, the driver for the investment appears to be related to movement of heavy loads in relation to wind turbine production rather than TimberLINK;
- We were unable to obtain investment related spend from ABP for their port at Troon; and
- As far as we can determine there do not appear to have been any significant investments at either Sandbank or Ardrishaig within the current contract period.

There have been some ongoing investments by the four hauliers involved in TimberLINK. However, it appears that most of these would have occurred in the absence of TimberLINK given that it forms a relatively small proportion of their total turnover. Figures of around £200,000 for lorries and £400,000 for cranes were quoted. However, it was also noted that almost all of this equipment is manufactured outside Scotland. Thus, any impacts within the Scottish economy will have been slight.

Based on available information we conclude that there will have been some (albeit quite limited) economic impacts from investments that are attributable to TimberLINK.

4.1.5 Non-quantified impacts – Argyll timber growers

There were some mixed views on TimberLINK's impacts on growers. Some consultees felt that the availability of the service had widened the catchment for sales from the "TimberLINK area". However, it was never fully articulated why this would be the case especially given that the transport cost charged by TimberLINK is the same as for road haulage.

One consultee (a TimberLINK user) reported the **advantages of using TimberLINK** as being:

- Greater reliability than road-only transport at some points in the winter; and
- Attractive to buyers as it reduces the buffer stock they require in case road transport is delayed by weather, road closures, etc.

However, another TimberLINK user stated that their use of the service was limited. This is because they see it as being **less flexible than moving timber wholly by road;** due to having to fit around the requirements of the vessel's timings and capacity. They also felt that receiving a large load over a short period can be logistically challenging.

Another consultee also felt that moving timber by road is probably slightly better than by TimberLINK because of what they saw as a lack of clarity over who is responsible for the timber during the various parts of the overall movements. They also referred to the potential for losses of timber given the amount of double handling involved.

Another stated benefit of TimberLINK was the company acting in a **socially responsible and sustainable manner** by reducing the number of lorries travelling through local communities. The consultee saw these as the real benefits to their company, given that the transport rate is the same whether or not TimberLINK is used; i.e. it gives no direct commercial advantage.

4.1.6 Non-quantified economic impacts – end-users in Ayrshire

Among end-users in Ayrshire who were consulted as part of this research, TimberLINK accounts for between 10% and over 30% of the total timber they source. Some of these users also receive timber from Argyll which is road-only rather than via TimberLINK. *In general*, road and TimberLINK are seen as being equally reliable but the latter is more reliable during wintry weather.

Advantages of sourcing timber via TimberLINK were seen as:

- Potentially more reliable than Argyll's trunk roads in the winter when they can be closed due to weather and / or landslides;
- Ability to receive large volumes over a short period of time. This brings operational efficiencies and ensures that volume requirements are met. This was also mentioned by a non-TimberLINK mill as a key benefit of shipping over road transport. It appears to be a particular benefit to higher volume mills; and
- Demonstrating that the company is socially responsible, and improving its environmental credentials.

In terms of impacts on the sourcing of timber:

- One consultee felt that TimberLINK had a positive impact for them as the buyers in Ayrshire looked more to Argyll for timber and thus did not look for it in the consultee's own local area; and
- A number of consultees believe that TimberLINK has led them to source timber over a wider area, although it is not wholly clear why this could not be the case by using road transport alone.

There were mixed views on TimberLINK's impacts on other timber buyers. It was noted that buyers from the north of Scotland also source timber from the "TimberLINK area" of Argyll. The road haulage rates per tonne that they pay appear similar to those for the TimberLINK service.

Some consultees believe that TimberLINK places their companies at a disadvantage in their efforts to source timber within Argyll. A number did so because they are not convinced / had no basis to accept that the TimberLINK rates are actually the same as the equivalent road journey. Thus, TimberLINK was in some way "subsidising" the cost of timber transport to end-users in Ayrshire. One consultee felt that this could act to the detriment of efforts to add more value to timber within Argyll.

However, others are of the view that there is no unfair advantage offered to the end users in Ayrshire. This is because there is a limited ability for buyers from the north to compete due to their distance from south Argyll and the consequent timber transport costs. Further, some timber buyers mentioned exports to Ireland as a constraint on their purchases in south Argyll rather than TimberLINK.

A number of consultees view a weakness of TimberLINK as being that it **supports deliveries to only a small number of companies in one area of Scotland**.

4.1.7 Non-quantified economic impacts – efficient use of freight transport

A number of consultees see the use of the Argyll piers as "hubs" as a **more efficient use of local haulage capacity** than taking the timber to Ayrshire by road. Haulage is seen as a "scarce resource" which needs to be fully utilised. A truck making a number of movements in a day to a TimberLINK pier is seen as more productive than a single long distance run to Ayrshire with many of the return legs likely to be empty.

This is seen as an issue beyond Argyll. Long distance running requires additional equipment. It is also viewed as exacerbating the industry's challenges in recruiting / retaining drivers.

4.1.8 Other non-quantified economic impacts

Most of the mills / end-users currently make some use of shipping for timber transport. This is through:

- TimberLINK;
- Non-subsidised intra-Scottish movements; and
- Imports to, or exports from, Scotland.

Most consultees believe that there are currently sufficient timber vessels in the market. This view is generally held for both larger vessels (i.e. over 1,500 tonnes capacity) and smaller ones. It is likely

that the timber moved on a commercial basis by the MV Ayress (in addition to the subsidised TimberLINK runs) would still be moved in the absence of TimberLINK.

Nevertheless, some TimberLINK users saw the service itself as a means of ensuring vessel availability for sourcing timber from Argyll. One stated that they did not have the administrative capacity in their company to source shipping.

Vessels in the market include the landing craft operated by the Troon Tug Company. This moves timber for a range of customers, some of whom also use TimberLINK. On occasion, the vessel uses Troon and makes use of its facilities. However, our overall consultations suggest that its activity would be unchanged if TimberLINK was not in operation. Thus, none of its activity has been attributed to TimberLINK for the purpose of the economic impact assessment (however, we recognise that some consultees stated that the landing craft operation does benefit indirectly from TimberLINK through, for example, unloading at Troon using equipment that is also used for TimberLINK).

A number of consultees believe that the routings involved in TimberLINK have **placed additional pressure on local link roads**, and on the roads in the areas around the ports; notably Ardrishaig.

4.1.9 Wider impacts – tourism

Consultees offering a view generally see **TimberLINK's impacts on tourists' travel as significant**. This is through reducing HGV volumes on key routes. Further information on the impact of TimberLINK (and other timber transport scenarios) on traffic flow and congestion is provided in the environmental evaluation at Chapter 3 above.

This significant impact will, in part, reflect the local context in Argyll. In particular, the importance of the tourism sector to the local economy. *Accommodation and Food Services'* total share of Argyll and Bute employment is 79% higher than the Scottish average[38].

A recent report summarised tourism's position in Argyll and Bute as follows:

> *"The tourism sector is reliant on the transport network in order for tourists to access the area. Key activity providers attract large volumes of visitors, including Machrihanish Dunes at Campbeltown (30,000 visitors) and Portavadie Marina (32,500 visitors), with golf tourism in Scotland expected to rise by 30% to 2020. Key tourist attractions / destinations include Inveraray, Oban and the islands. Tour operators are also transport dependent e.g. Lochs & Glens Holidays cater for around 55,000 tourists per year in Argyll and Bute"39*

Second, the impacts reflect the nature of Argyll's main road network; notably the A83 and A82. They have congested points, limited alternative routings when the road is closed and can be prone to weather related incidents. The recent report[40] refers to *"issues around limitations and quality of the road network"*, with:

- Low average speeds;
- Challenging terrain, poor road alignment and carriageway width, volumes of HGV traffic and reduced speed limits when passing through settlements affecting journey times;
- The vast majority of car journeys between Argyll's five main settlements and to / from Glasgow taking over 1½ hours with most over 2 hours; and
- Due to the significance of tourism, a significant uplift in traffic levels in the summer.

Third, one consultee believes that road freight to / from the area is increasing (e.g. through growing whisky production in Islay and Campbeltown). In addition, some of Argyll's other main economic sectors are freight transport intensive; notably food and drink, forestry and renewables.

[38] Business Register and Employment Survey 2014
[39] *Argyll and Bute Transport Connectivity and Economy* (ekosgen and Reference Economic Consultants, 2016*)*
[40] Ibid

One consultee reported a further impact from TimberLINK. That is, when a timber boat is being loaded then visitors will stop to watch, as many of them won't have seen this before. Thus, there is an increase in visitor dwell time in the area around the port.

4.1.10 Wider impacts – community reaction

No direct contact was made with community representatives as part of the economic aspects of the evaluation. However, based on our consultations undertaken as part of the economic assessment, **there appears to have been little negative community reaction to TimberLINK in Argyll**, in terms of either:

- Timber lorries travelling to / from the piers; or
- The loading of the timber ships.

Consultees contrasted this with their experience of reaction to timber operations in locations nearer to major population centres; there complaints are much more prevalent.

The general view was that there are relatively few complaints / opposition. Their incidence is less than might have been expected given that both Ardrishaig and Sandbank piers are quite close to residential areas.

For Ardrishaig in particular, this was attributed to local residents' appreciation of the economic contribution of the forestry sector. We were told that many residents will know people who are employed in the sector; whether directly or indirectly.

However, these findings from consultations undertaken as part of the economic evaluation differ to those obtained as part of the environmental evaluation where community stakeholders were interviewed. Whilst no TimberLINK related impacts were identified by community stakeholders in Ardrishaig or Campbeltown, significant issues were identified in Sandbank, primarily due to poor relations between the pier operator there and the community. These issues are discussed in relation to various environmental impacts in Chapter 3 above.

4.1.11 Summary

The total (direct, indirect and induced) quantifiable employment impact of TimberLINK in Scotland is c.27 FTE jobs. Some 6 FTE of these are within Argyll, with around 9 FTE in Ayrshire. Most of the employment impact is direct (within the supply chain) rather than through indirect and induced effects.

The total quantifiable GVA impact of TimberLINK in Scotland is £1.56 million. Around £400,000 of this is within Argyll and a further £560,000 is within Ayrshire. The Scottish level GVA impacts imply a TimberLINK "multiplier" of:

- £1.41 of direct GVA (i.e. in the supply chain) per £1 of subsidy; and
- £2.42 of total GVA (direct, indirect and induced) per £1 of subsidy.

In addition there are a number of non-quantifiable impacts, principally:

- Capital investments made by the supply chain to undertake TimberLINK work, although we expect that their economic impact will be relatively slight;
- For some end-users, greater security / reliability of timber supply;
- For some larger volume users in particular, the benefits of receiving ship load volumes of timber;
- Growers and their customers benefiting from projecting a socially responsible and sustainable image; and
- Greater productivity for Argyll based hauliers involved in TimberLINK to their benefit and also to that of TimberLINK users.

Consultees were generally of the view that:

- TimberLINK's impact on tourist travel has been significant; and
- There appears to have been little negative community reaction to TimberLINK in Argyll.

4.2 Ex-ante assessment of timber transport scenarios: Business as usual (80,000 t/yr)

4.2.1 Analysis

This scenario assumes that TimberLINK continues to operate with a demand of 80,000 tonnes per annum.

Our consultations suggest that, in general, the service would be able to operate as at present. The only exception could be in the use of Ardrishaig pier. We understand that the pier currently handles around 110,000 tonnes of timber per annum, some 42,000 of which are for TimberLINK (38% of total timber traffic). Ardrishaig has very few other cargoes.

Scottish Canals do not anticipate any issues around continuing with TimberLINK "as is". They told us that there is, in fact, some room to increase traffic. However, a number of consultees referred to times when there is a lack of "slots" at Ardrishaig pier. Further, Ardrishaig can also stockpile only up to 1,000 tonnes, which could be an issue if non-TimberLINK demand increased.

It has also been suggested that the rationale for the new floating pier at Ardcastle reflects, in part, a lack of additional capacity at Ardrishaig. Thus some extant Ardrishaig traffic could potentially use Ardcastle.

A wider issue may be the demand for timber to be moved on TimberLINK. Our consultations show that there are a number of competing forces: those that suggest a possible increase in TimberLINK demand and those that imply a decrease.

In terms of potential for increased volumes on TimberLINK:

- Underlying production in Argyll is forecast to increase over the next decade; and
- Some existing end-users of TimberLINK may look / are looking to increase production.

In terms of potential for reduced volumes on TimberLINK:

- Mills from the outside the area (Norbord and BSW) may look / are looking to source more timber from Argyll as they expand production;
- There are plans for more economic value to be realised in Argyll from timber grown in the area. These include two biomass plants, planned for Sandbank and near Lochgilphead. Each would require feedstock of 60-70,000 tonnes of small roundwood, accepting that some of this would not otherwise go to market;
- Argyll timber appears particularly susceptible to any general reduction in demand. That reflects its relatively high transport costs given its distance from main areas of demand;
- Exchange rates could drive up demand for exporting thus reducing intra-Scotland sales made via TimberLINK; and
- Current TimberLINK customers may make increasing use of co-products rather than timber itself.

4.2.2 Summary

There may be some issues with access to Ardrishaig pier. However, the owner's view is that current demand can continue to be accommodated, while the development of a floating pier at Ardcastle could help relieve capacity constraints.

The economic impacts for this scenario will essentially be the same as those set out in the *ex-post* evaluation. The total (direct, indirect and induced) quantified impacts are shown at Table 4.11.

Table 4.11: Business as usual scenario – summary of quantified impacts

Area	Employment (FTE)		GVA (£,000)	
	Direct	Total	Direct	Total
Argyll	5.0	6.0	342	398
Ayrshire	4.9	9.2	342	561
Scotland	15.3	26.8	936	1,561

4.3 Ex-ante assessment of timber transport scenarios: non-TimberLINK (road based alternative) scenario

4.3.1 Introduction

This scenario assumes that TimberLINK is discontinued. Almost all of the consultees who gave a view expect that the current c.80,000 tonnes of timber would revert to road.

The exception was one consultee. They felt that the forestry industry would look at the costs of the TimberLINK operation. This would be with a view to possible savings that would allow the service to at least break even. This would safeguard the benefits that the current service provides. In particular, the image of the industry and its desire to minimise the number of lorry movements.

For the purposes of the assessment we have assumed that the existing TimberLINK shipments revert to road-only transport between Argyll and Ayrshire. The analysis covers:

- Quantified economic impacts through the supply chain *if transport by road did, in fact, prove feasible*. There was no consensus among consultees on this point and on whether all the timber that would otherwise be moved by TimberLINK would still be sold in the non-TimberLINK scenario;
- Non-quantified impacts;
- Wider impacts – tourism and community reaction; and
- Summary of findings.

4.3.2 Quantified economic impacts – employment

Based on our consultation findings we have assumed that the haulage employment under this scenario would all be in Argyll, *if transport by road did, in fact, prove feasible*. However, a small number of consultees thought that limited capacity within Argyll could mean some of the haulage being undertaken by companies based elsewhere.

Table 4.12 sets out estimated employment impacts within Argyll.

Table 4.12: Argyll – total FTE employment

Supply Chain	FTE			
	Direct	Indirect	Induced	Total
Road haulage operation	17.1	1.0	2.0	**20.1**
Net change compared to existing TimberLINK operation				**+14.1**

The road based movements are estimated to generate work equivalent to 17.1 FTE jobs within Argyll hauliers. The addition of indirect and induced effects increases the total impact to around 20 FTE. That is around 14 FTE greater than the impact of the current TimberLINK operation.

Table 4.13 shows estimated employment impacts within Scotland.

Table 4.13: Scotland – total FTE employment

Supply Chain	FTE			
	Direct	Indirect	Induced	Total
Road haulage operation	17.1	5.6	3.6	**26.2**
Net change compared to existing TimberLINK operation				**-0.6**

The total impact would be c.26 FTE jobs. That is very similar to the employment generated by the current TimberLINK operation.

In addition, there would be a loss of 9.2 FTE within the Ayrshire economy.

4.3.3 Quantified economic impacts – Gross Value Added (GVA)

Table 4.14 shows estimated total GVA impacts in Argyll.

Table 4.14: Argyll – total GVA impacts

Supply Chain	GVA (£,000)			
	Direct	Indirect	Induced	Total
Road haulage operation	729	49	99	**877**
Net change compared to existing TimberLINK operation				**+479**

These are £877,000 or around £480,000 more than the current position with the TimberLINK operation.

Table 4.15 shows the estimated GVA impacts within Scotland.

Table 4.15: Scotland – total GVA impacts

Supply Chain	GVA (£,000)			
	Direct	Indirect	Induced	Total
Road haulage operation	729	254	127	**1,108**
Net change compared to existing TimberLINK operation				**-453**

The total impact would be £1.1 million; £453,000 lower than the current position with the TimberLINK operation. Under this scenario, there would be a loss of £561,000 GVA within the Ayrshire economy.

4.3.4 Quantified economic impacts – summary

Table 4.16 summarises the preceding information, showing total (direct, indirect and induced) impacts of the non-TimberLINK scenario. Again, these impacts would occur only *if transport by road proved feasible*; and there was no consensus among consultees on this point and on whether all the timber otherwise moved by TimberLINK would still be sold in the non-TimberLINK scenario.

Table 4.16: Non-TimberLINK scenario – summary of total quantified Impacts

Area	Employment (FTE)		GVA (£,000)	
	Total	Net change over current position	Total	Net change over current position
Argyll	20.1	+14.1	877	+479
Ayrshire	0.0	-9.2	0	-561
Scotland	26.2	-0.6	1,108	+453

There would also be a saving to the public purse as there would no longer an annual subsidy for TimberLINK. In 2015/16, when the service carried around 76,000 tonnes, the subsidy was £665,000.

Based on the earlier ex-post evaluation, the non-TimberLINK scenario would see some loss of activity in:

- Ports in Argyll and Ayrshire;

- Ship loading and unloading; and
- Haulage from Ayrshire ports to mills / end-users.

Using information from our consultations we estimate that current TimberLINK volumes account for:

- **Troon:** c.45% of total timber volumes. However, its share of revenues will be lower given there are other activities at the port;
- **Ardrishaig:** c.30% of total timber volumes, with very few other cargoes through the port. However, operations-and employment at Ardrishaig also include those related to the operation of the Canal;
- **Sandbank:** c.40% of total timber volumes. Timber is the only cargo moved through the port. However, the business as a whole and its employment-also includes a marina; and
- **Campbeltown:** c.10% of total timber volumes and the port also handles other cargoes (e.g. wind turbine-related).

Troon, Ardrishaig and Sandbank are the ports most exposed to the loss of TimberLINK traffic. Any loss of employment at these ports from the cessation of TimberLINK could be greater than the total c.2 FTE implied by the *ex-post* evaluation. However, the numbers employed in direct port operations at each site is quite low (two to four employees, with some also having other duties).

The *ex-post* evaluation suggests a decrease in direct employment from ship loading and unloading / onward haulage in Ayrshire of 3.6 FTE. These would largely fall within JST which has a workforce of around 60 employees.

The other loss of direct employment would be the 5.5 FTE associated with operation of the MV Ayress. Around half of those affected would be non-Scottish residents.

4.3.5 Non-quantified impacts – supply chain investment

There would be an initial significant investment in lorries by the Argyll hauliers. This reflects that different types of lorries would be required from those currently used for TimberLINK work. They would not have cranes attached which would increase their payload for the longer distance runs. More vehicles would also be required because of the less productive nature (in terms of tonnes moved) of the long distance road trips.

The number of vehicles involved cannot be estimated until the hauliers looked at the detail of the road-based operations. However, as noted earlier the vehicles purchased will be made outside Scotland. Thus, the related economic impacts will be slight.

4.3.6 Non-quantified economic impacts – haulier capacity and operational feasibility

The current Argyll TimberLINK hauliers would prefer TimberLINK to continue. However, all three are prepared to make the necessary investments that would be required to move the current volume by road. It is also the case that the three hauliers already do longer distance timber movements from Argyll. Destinations include the Highlands and the central belt outside Ayrshire.

A number of other consultees expressed concerns about the feasibility of switching the TimberLINK volumes to road. First, due to possible insufficient road haulage capacity, given the limited number of hauliers in the relevant areas. There are expected to be challenges in recruiting additional drivers, reflecting existing challenges in doing so and the relatively small labour markets that are available.

Unlike larger, more extensive operators the three Argyll hauliers have few staff based outside their local area. Some consultees felt that the hauliers may need to recruit staff based in the central belt to achieve the shift of traffic to road.

Some concerns were expressed that recruitment issues would mean higher wages for drivers leading to increased transport rates for customers. The issue of rates would be exacerbated by what are seen

as limited potential for backloads. This reflects both the Argyll economy and the nature of the vehicles that would be used which are only suited to a limited range of goods.

A number of consultees wondered if at least some of the loads would need to be moved by hauliers based outside Argyll. One noted that they were already seeing an increasing number of non-Argyll lorries in the area. Also, when the forestry sector is faring well there may simply not be sufficient available capacity from elsewhere in Scotland to plug any gaps in timber haulage in Argyll.

The second issue was the reliability of service that could be provided. This reflects concerns about the impacts of increased road traffic on the A83 and A82 and existing issues with these roads (as described earlier and in the environmental evaluation also). The longest distance hauls (i.e. from the Campbeltown area) were seen as most likely to be affected.

One consultee told us that current forest roads and timber routes have been designed around the availability of TimberLINK. Altering this would represent a major change. It could also mean a redesign of forest roads and public road timber routes being required, particularly for the areas to the north of Lochgilphead and around Ardrishaig.

4.3.7 Non-quantified economic impacts – end-users

As noted earlier we estimate that, among end-users consulted during the research, TimberLINK accounts for between 10% and over 30% of the total timber sourced by the Ayrshire-based companies. Their comments reflected the concerns stated above regarding the feasibility and reliability of the road-based alternative. The possible impacts on where companies' would source timber from in the absence of TimberLINK would depend on their assessment and review of sourcing options, including timber availability and price.

Other end-users / shipments of Argyll timber moved on the A83 / A82 would also be affected by longer journey times and / or reduced journey time reliability. These issues could also affect other types of freight.

4.3.8 Other non-quantified impacts

As noted earlier, our research suggests that the timber moved on a commercial basis by the MV Ayress (in addition to the subsidised TimberLINK runs) would still be moved in the absence of TimberLINK.

4.3.9 Wider impacts – tourism

It is expected that there could be a significant impact on tourist travel under this scenario. This reflects the nature of the trunk roads (including limited overtaking opportunities) and their traffic flows, as described earlier and in the environmental evaluation (see Chapter 3). HGVs are seen as causing congestion / platooning at their existing levels. One tourism consultee remarked that there is a noticeable difference in traffic levels when the TimberLINK boat is not running.

4.3.10 Wider impacts – community reaction

Increased HGVs on the trunk roads are likely to create a strong adverse reaction. That would be from the affected communities and other regular road users.

The additional local area traffic and vessel loading at the three Argyll ports has been largely accepted because of a recognition of forestry's economic contribution. However, we expect that it is also accepted because of some awareness that TimberLINK reduces lorry traffic on the trunk roads in particular. This benefit would be lost under the non-TimberLINK scenario.

The forestry sector would be concerned that they would face pressure to somehow "sort" the resultant traffic issues. Our consultations identified a genuine desire among the industry to reduce timber lorry traffic as much as possible and not simply for strictly operational / commercial reasons.

4.3.11 Summary

The total (direct, indirect and induced) quantifiable employment impact in Scotland is c.26 FTE jobs. That is very similar to the current impacts of TimberLINK. Again, these impacts would occur only *if*

transport by road did, in fact, prove feasible; and there was no consensus among consultees on this point and on whether all the timber that would otherwise be moved by TimberLINK would still be sold in the no TimberLINK scenario.

Some 20 FTE jobs would be generated in Argyll under this scenario, compared to the present 6 FTE with TimberLINK. This scenario would also see a reduction of around 9 FTE in Ayrshire.

The total quantifiable GVA impact in Scotland under this scenario is around £1.1 million. That is around £450,000 less than at present with TimberLINK.

The total quantifiable GVA impact within Argyll is around £877,000 some £480,000 more than from the present TimberLINK operation. This scenario would also see a reduction of around £560,000 GVA in the Ayrshire economy.

These estimates assume that moving 80,000 tonnes of timber wholly by road is:

- Achievable, in terms of haulage capacity and reliability of road delivery; and
- Undertaken by Argyll hauliers.

In addition, there are a number of non-quantifiable impacts, principally:

- Capital investments in new lorries would be made by Argyll hauliers, although we expect that their economic impact will be relatively slight;
- Some ports are quite dependent on TimberLINK volumes. The loss of the service may have higher impacts on their employment levels than implied by the ex-post evaluation. However, any such employment losses would be slight in absolute terms;
- Some current end-users of TimberLINK timber could look to source timber from other areas. This reflects their current concerns about the feasibility of switching to road-only deliveries from Argyll; and
- Other end-users / shipments of Argyll timber using the A83 / A82 would also be affected road-related issues. Other types of freight could also be affected.

Further:

- There could be a significant negative impact on tourist travel; and
- Increased HGVs on the trunk roads may create a strong adverse reaction. The forestry sector may receive part of the “blame” for this.

4.4 Ex-ante assessment of timber transport scenarios: expanded TimberLINK service (120,000 t/yr)

4.4.1 Introduction

This scenario assumes that TimberLINK continues but with annual volumes of 120,000 tonnes. That is, 50% above the level under the TimberLINK BAU scenario. The analysis covers:

- Quantified economic impacts through the supply chain;
- Non-quantifiable impacts;
- Wider impacts – tourism and community reaction; and
- Summary of findings.

4.4.2 Quantified economic impacts

There are various options for delivering the service under this scenario. These could include:

- A dedicated TimberLINK vessel;
- Two vessels; and / or

- Possibly, some use of a larger vessel than MV Ayress (accepting that such a vessel could not use Ardrishaig pier).

Irrespective of these options, the general view of consultees was that costs under this scenario would increase on a pro rata basis, in line with the 50% increase in tonnages, reflecting the nature of the various cost elements. On that basis, the quantified economic impacts have been increased by 50% from those under the TimberLINK BAU scenario.

The impact estimates also assume sufficient port capacity in Argyll to handle the higher TimberLINK volumes. This issue is discussed later.

Table 4.17 sets out the estimated total (direct, indirect and induced) impacts for the Expanded TimberLINK scenario.

Table 4.17: TimberLINK expanded service scenario – summary of total quantified impacts

Area	Employment (FTE)		GVA (£,000)	
	Total	Net change over current position	Total	Net change over current position
Argyll	9.0	+3.0	597	+199
Ayrshire	13.8	+4.6	842	+281
Scotland	40.2	+13.4	2,342	+781

Based on 2015/16 TimberLINK tonnages and subsidy levels, the TimberLINK expanded service scenario would likely require a subsidy of around £1 million.

4.4.3 Non-quantified impacts – supply chain investment

Hauliers would need to make some investments in new vehicles. This reflects the increased tonnages to be moved and the specific requirements of vehicles to work from in-forest to piers. There may also be some requirement for small investments in craneage and other handling equipment at the ports.

However, in line with the other scenarios this equipment would very largely be manufactured outside Scotland. As such, the purchases will create relatively little economic impact.

4.4.4 Non-quantified impacts – end-users in Ayrshire

The impacts for end-users would be the ability to move larger volumes on TimberLINK. This would benefit larger volume operators and, for some, the movement of timber in what they see as a more reliable, sustainable and socially responsible mass.

4.4.5 Non-quantified impacts – operational feasibility

The main operational issue is the ability of Ardrishaig pier to accommodate a 50% uplift in TimberLINK volumes. The pier operator told us they *"could handle more than at present but not sure if that could be as much as a 50% increase"*. That is because of the limited stacking capacity at the site.

The site is also limited to boats of up to 80m. This rules out using a larger vessel making fewer calls. There do not appear to be any current investment plans to increase Ardrishaig's capacity.

It is recognised that TimberLINK previously carried more than 120,000 tonnes in single year; and that Ardrishaig saw more TimberLINK traffic in earlier years than in recent ones. However, capacity at Ardrishaig is also a function of the level of non-TimberLINK volumes being moved through the port.

As noted earlier, a floating pier will be installed at Ardcastle. This could free up space at Ardrishaig if it captured some of Ardrishaig's current (or any future additional) timber exports.

It is not certain that the facility at Ardcastle will be used for TimberLINK traffic. Its focus would likely be on shipments for Norbord (Inverness) and to Northern Ireland / Ireland. One consultee also stated that there would be higher costs in using Ardcastle rather than Ardrishaig. That is because of the additional timber handling involved with the floating pier.

Otherwise, the supply chain stated they could accommodate a 50% increase in TimberLINK volumes. In some cases this reflects that TimberLINK is a relatively small part of their business (e.g. the hauliers, Campbeltown harbour).

Aside from Ardrishaig, one consultee felt that there could be capacity issues at the other two Argyll ports. This was attributed to:

- Limited stacking capacity at Sandbank; and
- Campbeltown seeing increased demand from other clients (e.g. ro-ro ferry service, wind tower-related cargoes).

4.4.6 Wider impacts – tourism

There would be more pressure on roads in the port areas. This would be particularly be at times close to the vessel departure as there is some feeding of the vessel at both Ardrishaig and Sandbank.

However, these would be relatively localised effects, as opposed to timber lorries travelling long distances on individual roads (as would be the case under the non-TimberLINK scenario).

4.4.7 Wider impacts – community reaction

There would be more pressure on roads in the port areas. This would likely generate more of a reaction among some local residents than visitors, given that they would experience this all year round. There could also be some reaction to increased evening / weekend working at the pier, particularly at Ardrishaig[41].

4.4.8 Summary

The total (direct, indirect and induced) quantifiable employment impacts under this scenario are estimated as:

- Argyll: 9.0 FTE jobs (+3 FTE compared to the current TimberLINK impact);
- Ayrshire: 13.8 FTE (+c5 FTE); and
- Scotland: 40.2 FTE (+c13 FTE).

The estimated total (direct, indirect and induced) quantifiable GVA impacts:

- Argyll: £597,000 (+£199,000 compared to the current TimberLINK impact);
- Ayrshire: £842,000 (+£281,000); and
- Scotland: £2,342,000 (+£781,000).

These estimates assume, in particular, that there is sufficient port capacity in Argyll to cater for 120,000 tonnes. There would be limits to the level of increase that could be achieved at Ardrishaig, although these could be reduced through the floating pier at Ardcastle.

This scenario is likely to require a subsidy of around £1 million per year. That is some £335,000 above that paid in 2015-16.

In addition are a number of non-quantifiable impacts, principally:

- Capital investments in new lorries and other transport equipment, although the related economic impacts would be very slight; and

[41] However, feedback from community stakeholders at "port communities" as part of the environmental evaluation suggests that additional timber lorry movements at Ardrishaig and Campbeltown would be acceptable. The main issues would be at Sandbank (see Chapter 3). It was not possible to resolve these issues during the evaluation project. Community reaction to any increase in TimberLINK volumes should be monitored as part of operations.

- End-users would be able to move larger volumes on TimberLINK. This would benefit larger volume operators and, for some, the movement of timber in what they see as a more reliable, sustainable and socially responsible fashion.

Further:

- **Tourism:** there would be more pressure on roads in the port areas. However, these would be relatively localised effects. Thus, impacts on tourist travel would be quite modest; and
- **Communities:** increased pressure on roads in the port areas would likely generate some reaction from local residents. There could also be some reaction to more working at the pier into the evening and at weekends.

5. Evaluation synthesis

5.1 Findings of the policy impact evaluation

A further requirement of the brief was to undertake an assessment of TimberLINK and the other timber transport scenarios on policy objectives in terms of potential support or undermining of the objectives. The key policy context for TimberLINK and timber transport more generally is introduced at section 1.3 (Table 1.1).

An initial scoping step was undertaken at the start of the project to review the policies in Table 1.1 to extract key policy objectives and targets therein. A simple assessment of compatibility between the three timber transport scenarios and each policy has then been undertaken. This assessed and identified areas of support, conflict, neutral interaction or mixed impacts. The assessment has been undertaken in line with standard methodological principles for policy impact assessment, most notably SEA (Scottish Government, 2013b). It is presented in a matrix at Table 5.1 below.

A short description of the assessment findings, per scenario, is provided in the sub-sections below. In summary, however, the two TimberLINK scenarios exhibit much greater potential to support the objectives of the key policies reviewed with limited conflict. This is unsurprising given the environmental focus of the initiative and the sustainable (albeit relatively small) quantifiable economic impacts it delivers (in terms of employment and Gross Value Added).

5.1.1 Potential policy impacts of the TimberLINK BAU and expanded service scenarios

Overall, the two TimberLINK scenarios (BAU and expanded service) are highly favourable in terms of their potential to support key policy objectives. They support objectives from all the key policies considered except for the *Transportation Noise Action Plan*, *UK Air Quality Strategy* and *Low Carbon Scotland (RPP2)*. The nature of timber transport via the TimberLINK service is such that there will always be noise and air pollution impacts. However, these are likely to be small in magnitude and significance given that there are few other sources of these impacts in the areas affected and the relatively small and infrequent nature of the impacts (see section 3.10). Further, these impacts are likely to be neutral / negligible for the TimberLINK BAU scenario. However, all impacts will conflict with the objectives from these noise and air quality related policies. Both scenarios have the potential for mixed impacts on *RPP2* though more on the side of support than conflict. TimberLINK provides a much lower carbon timber transport system than the road-only (non-TimberLINK) alternative though it does still produce substantial emissions (see section 3.3). This conflicts with *RPP2's* objective of decarbonised road transport by 2050 though clearly there is still plenty of time for this objective to be achieved.

5.1.2 Potential policy impacts of the non-TimberLINK scenario

The non-TimberLINK (road based alternative) scenario has predominantly conflicting impacts across most of the policies assessed. However, there is also potential for mixed impacts in many cases, particularly where the policy has economic objectives. This includes: *FCS' Climate Change Programme*, *National Planning Framework 3*, *Scottish Planning Policy*, *Scotland's Economic Strategy* and the *Scottish Forestry Strategy*. For these policies, the economic benefits of the non-TimberLINK scenario are important (especially in terms of regional cohesion and equal access to employment opportunities) though the sustainability of road based timber transport is a key negative factor (i.e. due to higher carbon emissions). This scenario also has potential for key conflicts with: the *National Transport Strategy* and *Strategic Transport Projects Review* (increased timber lorries on the A83 etc may cause congestion and lengthen journey times), the *Transportation Noise Action Plan* and *UK Air Quality Strategy* (increased HGV flows through settlements on the A83 may contribute to significant noise and air quality impacts) and *Low Carbon Scotland (RPP2)* (carbon emissions are substantially higher when transporting timber under a road-only alternative).

Table 5.1: Policy impact evaluation summary matrix

Policy / key policy objectives	Timber transport scenario			Comments
	Scenario No.1: TimberLINK BAU	Scenario No.2: TimberLINK expanded service	Scenario No.3: Non-TimberLINK (road based alternative)	
Key to impact scoring	***Potential support for objective***	***Potential conflict with objective***		***Neutral support / conflict***
National Performance Framework (Scottish Government, 2016). **Key objectives / outcomes:** *economic growth; labour market participation; regional cohesion; sustainability / tackling climate change*.				**TimberLINK BAU and expanded service:** both scenarios promote investment in sustainable infrastructure (short sea coastal shipping of timber) and support more diverse employment opportunities. **Non-TimberLINK:** supports greater employment in Argyll but little difference at the Scottish level. This employment is also less diverse and sustainable (in environmental terms).
National Transport Strategy (Scottish Government, 2016). **Key objectives:** *improved journey times and connections; tackling congestion; reduced emissions to tackle climate change and air quality improvements*.				**TimberLINK BAU and expanded service:** both scenarios remove a portion of timber lorry miles helping to reduce traffic flows (on the A83 etc), fuel usage and carbon emissions.
Scotland's Economic Strategy (Scottish Government, 2015). **Key objectives:** *investing in our people and our infrastructure in a sustainable way; promoting inclusive growth and creating opportunity through a fair and inclusive jobs market and regional cohesion*.				Similar issues to **National Performance Framework** assessment above.
National Planning Framework 3 (Scottish Government, 2014a). **Key objectives:** *successful, sustainable place; low carbon place; connected place*.				**Non-TimberLINK:** mixed impacts, more on the side of conflict. If it is feasible, road based haulage will generate higher levels of employment in Argyll (*successful place*) though

Policy / key policy objectives	Timber transport scenario			Comments
	Scenario No.1: TimberLINK BAU	Scenario No.2: TimberLINK expanded service	Scenario No.3: Non-TimberLINK (road based alternative)	
Key to impact scoring	***Potential support for objective***	***Potential conflict with objective***	***Neutral support / conflict***	
				via a less sustainable approach; i.e. higher carbon emissions and potential traffic flow and congestion impacts under this scenario.
Scottish Planning Policy (Scottish Government, 2014b). **Key objectives:** *as per NPF3*.				As per **NPF3**.
Transportation Noise Action Plan (Scottish Government, 2014c). **Key objectives:** *manage exposure to noise in NMAs; incorporate noise management with transport planning*.				**TimberLINK expanded service and non-TimberLINK:** both scenarios are likely to increase exposure to transport related noise levels that *may* cause a nuisance though impacts are likely to be small.
Low Carbon Scotland RPP2 (Scottish Government, 2013a). **Key objectives:** *carbon emissions reductions; almost complete decarbonisation of road transport by 2050*.				**TimberLINK BAU and expanded service:** both scenarios substantially reduce the amount of carbon that would otherwise be emitted however this is still some way from *complete decarbonisation* (though the target is for 2050 so this is not a critical issue at present).
Scotland's Road Safety Framework to 2020 (Scottish Government, 2009). **Key objectives:** *joining up the strands of road safety across Scotland's delivery partners; reducing the tolerance of risk on the roads*.	?	?	?	**All scenarios:** the Framework focusses on partnership working and awareness-raising rather than the delivery of road safety measures *per se*. All scenarios have the potential to contribute to driver frustration and accident risk though the links between these impacts and the Framework's objectives are unclear.
Climate Change Programme (FCS, 2013). **Key objectives:** *enhance land-based carbon*				**Non-TimberLINK:** mixed impacts. Road based haulage facilitates harvesting and utilisation of

Policy / key policy objectives	Timber transport scenario			Comments
	Scenario No.1: TimberLINK BAU	Scenario No.2: TimberLINK expanded service	Scenario No.3: Non-TimberLINK (road based alternative)	
Key to impact scoring	***Potential support for objective***	***Potential conflict with objective***	***Neutral support / conflict***	
stocks and increase the use of wood and timber; reduce greenhouse gas emissions.				Argyll timber however carbon emissions are substantially higher under this scenario.
Scottish Forestry Strategy (FCS, 2006). **Key objectives:** *reducing the impact of climate change; getting the most from Scotland's timber resource; strengthening forestry through business development*.				Similar issues to **Scotland's Economic Strategy** assessment above.
Tourism Development Framework for Scotland (VisitScotland, 2013). **Key objectives:** *coordinating investment in infrastructure and highlighting potential development opportunities to help secure growth in the visitor economy*.				**TimberLINK BAU and expanded service:** both scenarios invest in infrastructure / services (short sea coastal shipping of timber) that have the potential to support the visitor economy (e.g. by reducing timber lorry traffic on key Argyll roads and the A82).
UK National Air Quality Strategy (Defra *et al.*, 2011). **Key objectives:** *quantitative targets for key air pollutants including those caused by transport (e.g. NOx, particulates)*.				Similar issues to **Transportation Noise Action Plan** assessment above.
Strategic Transport Projects Review (Transport Scotland, 2008). **Key objectives:** *the STPR identifies projects to support the delivery of the National Transport Strategy objectives and outcomes (see above)*.				Similar issues to **National Transport Strategy** assessment above.

5.2 Evaluation synthesis across all three timber transport scenarios

5.2.1 Introduction to the evaluation synthesis

This section brings together the environmental and economic aspects of the evaluation by synthesising the evaluation results across each of the three scenarios considered (sections 5.2.2 – 5.2.4). A final overview synthesis is then provided that considers the overall balance of *quantifiable* costs[42] and benefits across the scenarios relative to the level of subsidy paid (section 5.2.5). The synthesis is based on data from the *ex-ante* baseline year (2015/16). Overall evaluation matrices are presented at Tables 5.2 and 5.3 below for the environmental and economic aspects of the evaluation respectively.

It is important to bear in mind at this point the nature of timber transport via the TimberLINK service (see sections 1.4 and 3.1 also). As with all forms of freight haulage, regardless of mode, timber transport will always cause environmental impacts; i.e. it will result in environmental costs. The objective of the TimberLINK service is to **reduce these impacts** (and therefore costs) by shifting a portion of Argyll's timber transport related lorry miles to short-sea coastal shipping instead.

Therefore, although timber transport via TimberLINK still causes environmental impacts, the overall rationale for the service is that these are less than those that would arise under the road transport only option (i.e. the non-TimberLINK scenario). This has been borne out by the results of the environmental evaluation (see Chapter 3). In effect, **the environmental "benefit" of the service is more accurately described as a reduction in environmental costs**; i.e. the TimberLINK subsidy funds a reduction in environmental costs rather than a positive environmental benefit *per se*. When considering the overall balance of TimberLINK's (quantifiable) costs and benefits therefore, we have calculated **net** (i.e. reduced) environmental costs thus:

> *Environmental costs of the road based alternative (non-TimberLINK scenario)* ***minus*** *environmental costs of TimberLINK.*

In terms of delivering against its primarily environmental objectives therefore, the differential in environmental costs between TimberLINK and a non-TimberLINK (road based) alternative **can be construed as the environmental benefit of the service**. However, as demonstrated in the economic evaluation (see Chapter 4), TimberLINK also delivers economic benefit (in terms of GVA) at the Scotland level greater than that delivered by the non-TimberLINK (road based alternative) scenario. This balance of costs and benefits has been considered in the overall evaluation synthesis in section 5.2.5 below.

Furthermore, it is important to bear in mind that there are several environmental and economic impacts that we have not been able to quantify in the evaluation. The overall balance of costs and benefits are therefore somewhat conservative; i.e. the cost benefit ratio would most likely be more favourable (positive) were it possible to monetise all impacts. Furthermore, the impacts identified under the non-TimberLINK (road based alternative) need to be caveated as they would only be realised if the road option was proven to be feasible (e.g. in terms of capacity of the Argyll hauliers).

5.2.2 TimberLINK BAU scenario – evaluation synthesis

The TimberLINK BAU scenario's environmental impacts are a direct result of less timber lorry movements under this scenario than the other two. Accordingly, all quantified impacts linked to distance travelled are relatively lower than the other two scenarios (fuel usage; carbon emissions; road damage; accident risk; noise; and air pollution) although clearly negative impacts will still arise due to the nature of the activity.

The total quantifiable costs and benefits of the TimberLINK BAU scenario are as follows:

[42] In calculating the environmental costs of each scenario, an average value has been taken for the cost of carbon emissions (three different values were calculated in the evaluation – see section 2.2.5 and Table 2.3).

Total costs / negative impacts:

- Total cost[43] of quantifiable environmental impacts: **£115,578**;

Total benefits / positive impacts

- Total employment impact at the Scotland level: **26.8 FTE**; and
- Total Gross Value Added (GVA) impact at the Scotland level: **£1,561,000**.

There is potential for some minor to moderate negative environmental impacts at the local level at / around the three ports used by the TimberLINK service. This relates to: traffic flow and congestion; driver frustration and accident risk; and visual impact. For all these impacts, feedback from community stakeholders suggests that issues are likely to be less significant in Ardrishaig and Campbeltown. However, ongoing tensions between the pier operator and the local community in Sandbank mean that these local impacts are likely to be more significant (although the TimberLINK service only makes up a portion of all such impacts at that port).

Non-quantified economic impacts of the TimberLINK BAU scenario include minor positive impacts on growers and end-users in Ayrshire due to greater reliability of transport (and therefore supply) in winter, when the road based alternative can be closed due to weather related hazards. A key additional benefit for the end-users is the ability to receive larger volumes over a short time period contributing to operational efficiencies.

5.2.3 TimberLINK expanded service scenario – evaluation synthesis

The assessment of the TimberLINK expanded service scenario's environmental and economic impacts was undertaken on a pro rata basis using data from the TimberLINK BAU assessment. Accordingly, much of the rationale behind the assessment is similar to that described above. It should be noted, however, that the quantifiable costs and benefits of the TimberLINK expanded service scenario listed below are not directly comparable with those for the non-TimberLINK (road based alternative) scenario (section 5.2.4). To enable a direct comparison of these two scenarios, the costs and benefits of the non-TimberLINK scenario would need to be increased pro rata in line with the expanded service scenario necessitating some further (relatively complex) calculations. This was not a requirement of this contract.

As part of the environmental evaluation however, community stakeholders across the three ports used by the service were asked to consider key impacts of TimberLINK in light of increased delivery days and timber lorry movements (as a proxy for the impact causing activities). In consequence, the noise and air pollution impacts of the TimberLINK service were felt to be more pronounced under an expanded service scenario (especially in Sandbank – see above). These impacts have therefore been assessed as **minor negative** under this scenario (in contrast to **neutral** under the BAU scenario).

The total quantifiable costs and benefits of the TimberLINK expanded service scenario are as follows:

Total costs / negative impacts:

- Total cost[44] of quantifiable environmental impacts: **£181,323**;

Total benefits / positive impacts:

- Total employment impact at the Scotland level: **40.2 FTE**; and
- Total Gross Value Added (GVA) impact at the Scotland level: **£2,342,000**.

5.2.4 Non-TimberLINK (road based alternative) – evaluation synthesis

The environmental impacts of the non-TimberLINK scenario that are dependent on timber lorry movements are considerably higher than the two TimberLINK scenarios above. This is because of the

[43] TimberLINK still causes negative environmental impacts (i.e. costs) though these are less than the non-TimberLINK (road based alternative) scenario (see sections 5.2.1, 5.2.4 and 5.2.5).
[44] Ibid.

much longer distances travelled on the road based alternative; 1,255,939km in contrast to 189,685km under the TimberLINK BAU scenario. Accordingly, all quantified impacts linked to distance travelled are relatively higher than the other two scenarios (fuel usage; carbon emissions; road damage; accident risk; noise; and air pollution). It is important to note however that all impacts identified under this scenario would only be realised if this option was proven to be feasible.

The total quantifiable costs and benefits of the non-TimberLINK (road based alternative) scenario are as follows:

Total costs / negative impacts:

- Total cost of quantifiable environmental impacts: **£283,238**;

Total benefits / positive impacts:

- Total employment impact at the Scotland level: **26.2 FTE**; and
- Total Gross Value Added (GVA) impact at the Scotland level: **£1,108,000**.

It is noteworthy that the total cost of quantifiable environmental impacts under the non-TimberLINK scenario is only greater than equivalent costs for the TimberLINK BAU scenario by a factor of 2.4. This is despite the fact that timber lorry movements are greater by a factor of 6.6.

There are two key reasons for this. Firstly, the carbon values (£/tCO_2e) used in the evaluation, whilst endorsed by UK Government guidance, are low and do not adequately account for the wider societal benefits of emissions reductions. Secondly, the road damage cost method used attributes a much higher cost to damage caused by HGVs on "other" roads than "A" roads (by a factor of 7.7). The Argyll road network used by timber lorries transporting timber from forest exit point to corresponding port is comprised 40% of "other" roads therefore road damage costs are higher than the non-TimberLINK scenario which uses primarily "A" roads.

The non-TimberLINK scenario is likely to cause some additional **minor negative** environmental impacts in relation to: 1) regional traffic flow and congestion (e.g. on the A83); and 2) amenity / community severance. Both impacts would be caused by increased timber lorry traffic on the road based alternative route (A83 etc) under this scenario. Whilst the magnitude of the impacts is likely to be small (i.e. in terms of increases in overall traffic and HGV specific flows), specific issues regarding the overall geometric standard of the A83 (including within key "road communities") is such that the impacts are likely to be significant.

In terms of other non-quantified economic impacts of the non-TimberLINK scenario, there is key uncertainty regarding the feasibility of using a road-only alternative to make up the timber transport shortfall (in the absence of the TimberLINK service). This is particularly the case regarding the capacity of the timber hauliers (including in terms of the required investment in equipment and drivers / ability to attract and retain additional drivers). This has potential implications for growers and end-users; i.e. ensuring sufficient road haulage capacity for growers to transport their product and for end-users to receive the required volumes.

5.2.5 Overview of evaluation synthesis

The overview of the synthesis presented here includes an overall assessment of the (quantitative) costs and benefits of the TimberLINK BAU and non-TimberLINK (road based alternative) scenarios. We have provided a comparison of these two scenarios only as the TimberLINK expanded service scenario is not directly comparable (see section 5.2.3).

As discussed above, the cost of the quantifiable environmental impacts under the non-TimberLINK scenario is higher than the TimberLINK BAU scenario due to the much greater distance travelled by timber lorries under that scenario. The cost differential is perhaps lower than expected though due to the low price of carbon. For mixed methods (qualitative) environmental impacts that are directly comparable (noise and air pollution), the impacts are likely to be **minor negative** under the non-TimberLINK scenario and **neutral** under TimberLINK BAU.

Table 5.2: Overall environmental evaluation synthesis (Note: data has been included for the *ex-ante* baseline year – i.e. 2015/16)

Note: for the non-TimberLINK scenario, the quantified economic impacts (FTE and GVA) are those that would be achieved *if* road-only timber transport proved feasible. Significance scores (major negative, neutral etc) are provided only for the mixed methods (qualitative) assessments. The quantitative assessments are self-explanatory.

Impact	Scenario 1: TimberLINK BAU	Scenario 2: TimberLINK expanded service	Scenario 3: non-TimberLINK (road based alternative)
Key to qualitative scoring of impacts: *Major negative*	*Minor negative*	*Neutral*	*Minor positive* / *Major positive*
Timber lorry movements (km)	189,685	297,592	1,255,939
MV Ayress movements (nautical miles)	4,668	7,324	*Non-applicable*
Diesel fuel usage (litres)	113,811	178,555	753,564
Gas oil fuel usage (litres)	107,811	169,141	*Non-applicable*
Carbon emissions (tCO_2e)	640	1,004	1,968
Carbon cost_DECC low carbon value (£)	3,780	5,931	11,631
Carbon cost_DECC high carbon value (£)	14,968	23,483	46,052
Carbon cost_DfT MSB method (£)	7,634	11,967	50,238
Road damage cost (£)	95,459	149,763	175,047
Traffic flow and congestion_Regional	*Non-applicable*	*Non-applicable*	
Traffic flow and congestion_Local	*(Uncertain)*	*(Uncertain)*	*Non-applicable*
Driver frustration & accident risk_Regional (£)	*Non-applicable*	*Non-applicable*	(44,743)
Driver frustration & accident risk_Local (£)	(6,758)	(10,602)	*Non-applicable*
Amenity and community severance	*Non-applicable*	*Non-applicable*	
Visual impact	*(Uncertain)*	*(Uncertain)*	*Non-applicable*
Regeneration	*(mixed impacts)*	*Non-applicable*	*Non-applicable*
Noise (£)	(4,448)	(6,978)	(26,689)
Air pollution (£)	(119)	(186)	(785)

Table 5.3: Overall economic evaluation synthesis (Note: data has been included for the *ex-ante* baseline year – i.e. 2015/16)

Note: for the non-TimberLINK scenario, the quantified economic impacts (FTE and GVA) are those that would be achieved *if* road-only timber transport proved feasible. Significance scores (major negative, neutral etc) are provided only for the mixed methods (qualitative) assessments. The quantitative assessments are self-explanatory.

Impact	Scenario 1: TimberLINK BAU	Scenario 2: TimberLINK expanded service	Scenario 3: non-TimberLINK (road based alternative)
Key to qualitative scoring of impacts: *Major negative* / *Minor negative* / *Neutral* / *Minor positive* / *Major positive*			
Total FTE employment impact_Argyll	6.0	9.0	20.1
Total FTE employment impact_Ayrshire	9.2	13.8	0.0
Total FTE employment impact_Scotland	26.8	40.2	26.2
Total GVA impact_Argyll	£398,000	£597,000	£877,000
Total GVA impact_Ayrshire	£561,000	£842,000	£0
Total GVA impact_Scotland	£1,561,000	£2,342,000	£1,108,000
Total GVA: Subsidy ratio	2.35:1	2.35:1	*Non-applicable (annual saving of current £665,000 subsidy)*
Capital investment impact	Minor positive	Minor positive	Minor positive
Grower impacts	Minor positive	Minor positive	Uncertain
End-user impacts	Minor positive	Minor positive	Uncertain
Company / industry image impact	Minor positive	Minor positive	Minor negative

In terms of economic impacts, total employment impact in Argyll is higher under the non-TimberLINK scenario due to the increased road haulage requirement (20.1 FTE compared to 6.0 FTE). However, the impact at the Scotland level is very slightly higher under TimberLINK BAU (26.8 FTE compared to 26.2 FTE).

The GVA impact at the Scotland level under TimberLINK BAU is higher than the non-TimberLINK scenario (£1.56M compared to £1.1M). It is important to note that the non-TimberLINK scenario has no economic impact in Ayrshire. This is because there are no Ayrshire based shipping, port or haulier activities under this scenario.

At the national level, the economic impacts of both scenarios are not significant in the context of the overall size of the Scottish economy. It should be borne in mind, however, that generating economic impact is not a core objective of the TimberLINK project.

Overall assessment of quantifiable costs and benefits

Table 5.4 below summarises the quantifiable costs and benefits data (environmental and economic) for the TimberLINK BAU and non-TimberLINK (road based alternative) scenarios showing clearly how the environmental costs of the former are substantially lower than the latter (only 41%). It also highlights how TimberLINK's GVA impact (at the Scotland level) is higher than the non-TimberLINK scenario (by more than 40%). Looking at it from a different perspective, TimberLINK's environmental costs are 59% less and its economic benefits 41% greater than the non-TimberLINK scenario.

Box 5.1 then presents calculations undertaken to assess the overall balance of quantifiable costs and benefits between these two scenarios, based on the rationale outlined at section 5.2.1 above. Environmental costs and economic benefits have been integrated across both scenarios to calculate the net benefit of the TimberLINK BAU scenario as of 2015/16 (i.e. the *ex-ante* baseline year). It is important to note that the assessment here excludes several key costs and benefits where it has not been possible to obtain monetary values (e.g. visual impact, amenity and community severance, all the non-quantified economic impacts). This means that the assessment of benefits compared to costs is likely to be conservative.

Table 5.4: TimberLINK BAU and non-TimberLINK scenarios – quantifiable costs and benefits

Timber transport scenario	Total GVA impact at the Scotland level (£)	Total cost of quantifiable environmental impacts (£)
TimberLINK BAU	1,561,000	115,578
Non-TimberLINK (road based alternative)	1,108,000	283,238

Box 5.1: Calculating the overall costs and benefits of the TimberLINK service

The following steps have been undertaken to calculate the overall costs and benefits:

1. Sum all TimberLINK BAU scenario quantifiable environmental costs: **£115,578**
2. Sum all non-TimberLINK scenario quantifiable environmental costs: **£283,238**
3. Subtract the output of calculation (1) from calculation (2) to obtain the total environmental costs avoided through the operation of the TimberLINK service: **£167,660**
4. Subtract Scottish GVA foregone from the operation of the road based alternative (non-TimberLINK) from the Scottish GVA impact of the TimberLINK BAU scenario to obtain net GVA impact at the Scotland level: **£453,000**
5. Sum the outputs of calculation (3) and calculation (4) to obtain the overall cost benefit of the TimberLINK BAU scenario for 2015/16: **£620,660**

On the basis shown at Box 5.1 therefore, the operation of the TimberLINK service in 2015/16 had a net benefit of **£620,660**. This accounts for the environmental costs avoided by not using the road based alternative (non-TimberLINK) to transport the 76,488 tonnes of timber shipped by TimberLINK in 2015/16. It also accounts for the higher Scotland level GVA under the BAU scenario compared with the non-TimberLINK scenario.

The net environmental and economic benefit of the TimberLINK service is roughly equal to the subsidy rate in 2015/16 (£665,000); it is short by **£44,340** or **6.7%**. We would expect this shortfall to be made up by full consideration of the non-quantifiable environmental / economic impacts and / or by considering the full value of the reduced carbon emissions (i.e. using a carbon value that properly accounts for the wider societal benefits of greenhouse gas abatement A more comprehensive and accurate quantification of environmental benefits / costs avoided should be a focus for any future monitoring and evaluation of TimberLINK (see Chapter 6).

It is noteworthy that the monetary value of the environmental benefit (i.e. reduction in environmental costs over the road based alternative) provided by TimberLINK is less than the subsidy paid (£167,660 to £665,000 or **25%**). **However, we suggest that the gap between TimberLINK's environmental benefit and subsidy paid would decrease markedly were a more accurate carbon price used (Valatin, 2011). A methodology that allowed all environmental impacts to be fully monetised would have a similar effect**. Notwithstanding this, parity between environmental benefit and subsidy payments could perhaps only be achieved where the environmental costs of the road based alternative were substantially higher.

6. Conclusions

6.1 Summary of main findings and overall conclusions

TimberLINK was conceived principally as an environmental initiative aimed at reducing the environmental impacts of timber transport between Argyll and Ayrshire. The nature of timber transport however is such that there will always be an environmental impact, hence TimberLINK's focus on *reducing* environmental impacts (i.e. avoiding the impacts entirely is impossible).

The evaluation work undertaken in this project has demonstrated how **key quantifiable environmental impacts are lower in magnitude when timber is transported by TimberLINK than by the road-only alternative** (via the A83, A82 etc). This is true for fuel usage, carbon emissions and road damage related impacts, amongst others.

Within the evaluation, it has also been possible to monetise several key environmental impacts. Recognising that timber transport via TimberLINK does still cause environmental impacts, the value of the environmental costs *avoided* through sea transportation of timber instead of road-only was **£167,660**; the total environmental costs of TimberLINK (£115,578) are equivalent to only 41% of those that would be caused by the non-TimberLINK (road based alternative) scenario (£283,238). **This reduction in environmental costs is, in essence, the environmental benefit of the TimberLINK service**. When the economic benefits (in terms of Scottish level GVA) are incorporated, TimberLINK produces a net benefit of **£620,660** (all values are for 2015/16).

Given a TimberLINK subsidy payment for 2015/16 of **£665,000**, the overall environmental and economic benefit of the service is similar to the subsidy rate. Indeed, we suggest that the overall benefit is actually likely to exceed the subsidy rate as several non-quantified environmental and economic impacts are not included and the carbon price used is likely to underestimate the true value of emissions reductions. **We conclude therefore that the TimberLINK subsidy payments are commensurate with the realised environmental and economic benefits of the service**.

While **the value of the *environmental* benefit (environmental cost reduction) provided by TimberLINK is less than the subsidy payment** (25%), we suggest that two key methodological factors have influenced this result. Firstly, not all environmental impacts have been monetised meaning that the quantified environmental benefit (cost reduction) will be a conservative estimate. Secondly, the carbon price used in the assessment is low and does not fully capture the wider societal benefit of climate change mitigation. Nonetheless, it may be the case that parity between environmental benefit and subsidy payments is not possible and / or only possible if the environmental costs of the road based alternative were substantially higher[45].

In addition to the overall benefit however there are also **several key local environmental impacts of TimberLINK experienced in and around the three ports used by the service**. These include: impacts on local traffic flows and congestion; driver frustration and accident risk; visual impacts; impacts on local regeneration objectives; and noise and air pollution impacts.

On balance, **none of these impacts are particularly significant** as the magnitude of the impact causing activities (TimberLINK delivery days and related timber lorry movements) are relatively low. Indeed, feedback from community stakeholders at the busiest port (Ardrishaig) suggests that the impacts are generally accepted due to the importance of the forestry sector to the local economy and the courteous behaviour of operators within the service (e.g. lorry drivers).

However, **several local environmental impacts are likely to be much more significant in Sandbank**, especially traffic flow and congestion, driver frustration and accident risk, visual impact and noise. This is principally due to the pier's location close to the centre of the village, poor access to the pier and an ongoing grievance between a substantial portion of the community and the pier operator.

[45] This latter point being a function of the way in which TimberLINK's environmental benefit (in monetary terms) has been calculated (see sections 5.2.1 and 5.2.5).

Closely related to this issue, it is important to note that **TimberLINK is only a subset of overall Argyll timber transport by sea**. As such, stakeholders (including affected communities) may perceive TimberLINK's impacts to be greater than they necessarily are (e.g. there may be at least a partial assumption that *all* timber transport by sea is TimberLINK related). This may be particularly pronounced given that the MV Ayress is clearly branded with the TimberLINK name and logo but is also used for non-TimberLINK timber movements.

The evaluation quantified some of the supply chain economic impacts of TimberLINK within the economies of Argyll, Ayrshire and Scotland. The **magnitude of employment and GVA impacts is very slight in the context of the overall size of each of the three economies**. Indeed, there is a higher impact within Argyll under the non-TimberLINK scenario. Again, however, it should be appreciated that generation of economic impact is not a core objective of the project.

The economic evaluation showed that the **TimberLINK BAU scenario has a positive GVA to subsidy ratio**; i.e. greater than 1 (2.35). However, there are several points to note here. First, there is no suitable benchmark available to indicate whether the figure of 2.35 is "high" or "low". Second, the ratio is only one of several indicators used to assess TimberLINK's economic impacts, not all of which are quantifiable. Third, TimberLINK does not have economic impact as a scheme objective (it is principally an environmental initiative). Thus, it would be incorrect to compare it against the ratios for schemes which have a principal aim of generating economic impacts.

Finally, it is important to note that the **economic impact of a non-TimberLINK scenario on growers and end-users is highly uncertain**. TimberLINK is a proven service that is valued by growers and end-users for various reasons. In the absence of TimberLINK, it remains unclear as to whether the road haulage sector would be able to fully "take up the slack". This uncertainty is compounded by the fact that there was no consensus among stakeholders on the likely scale / nature / location of changes in timber sourcing and timber sales under a non-TimberLINK scenario.

6.2 Review of methodological constraints

There were several constraints inherent to the evaluation method used, particularly in terms of the environmental aspects. These are summarised below. The constraints have important implications for future TimberLINK contracts as many of the issues could be resolved through the collection of more detailed operational data (e.g. using simple sheets to log distance travelled, fuel usage etc attributable to TimberLINK). Suggestions for improving the methodology are highlighted in boxes.

6.2.1 Fuel usage and carbon emissions

All aspects of the fuel usage and carbon emissions assessment were underpinned by *estimates* of distance travelled by timber lorries (this data is not routinely collected as part of the TimberLINK service / contracts). These estimates were used to calculate a further estimate for fuel consumption based on a (generic) average fuel consumption multiplier. Similarly, fuel usage by port equipment was estimated using a generic "loading rate" (tonnes/hour) combined with data on tonnages shipped. In line with DfT *et al.* (2013), the preferred method for calculating carbon emissions in terms of accuracy uses *actual* data on fuel consumption. Our use of estimates of distance travelled / loading rates combined with average fuel consumption multipliers is, therefore, sub-optimal in terms of accuracy (ibid).

Recommendation for improving assessment accuracy No.1

Consider imposing a contractual requirement for key operators within the TimberLINK supply chain (hauliers, port operators) to maintain accurate records of: 1) TimberLINK related fuel usage; and / or 2) TimberLINK related distance travelled / hours of operation. Option (1) would be preferred in terms of accuracy. A simple recording sheet could be developed to allow operators (lorry drivers, port workers etc) to log data as activities are undertaken.

The method used to estimate distance travelled by timber lorries (Box 2.2) on the "Argyll leg" assessed a one-way journey only (i.e. forest exit point to port). Accordingly, there are potential *underestimates*

of fuel usage and carbon emissions as return journeys – from ports back to the next forest exit point – are not included in the assessment. Where these return legs are TimberLINK related, the fuel usage and carbon emissions should arguably be incorporated in the assessment. At present, they are not and (theoretically) the assessment could underestimate these impacts by up to a factor of 2. This shortcoming could be addressed, ideally, through the collection of more detailed data as per assessment accuracy recommendation No.1 above. Alternatively, distance travelled estimates could be increased by a (nominal) agreed value (e.g. 30%) to account for these journeys.

6.2.2 Damage to roads and maintenance costs

The assessment of potential road damage costs caused by timber lorry movements was undertaken in line with the Department for Transport's (DfT) Mode Shift Benefit (MSB) values methodology (DfT, 2009; 2014). A key aspect of the method is pence per lorry mile multipliers for different impacts and, crucially, different road types. For road damage, the multiplier is much higher for "other" roads (B, C and unclassified roads) than it is for "A" roads. This is due to the susceptibility of "other" roads to HGV damage by virtue of their design.

FCS provided spatial data on the Argyll road network used by timber lorries on the "Argyll leg". This included a field providing the road name from which it was possible to infer road type. This data was used to calculate the proportion of the "Argyll leg" network comprised of "A" and "other" roads (approximately 60% and 40% respectively). Combined with the distance travelled estimates, this network-wide split was used as a basis for calculating road damage costs in line with MSB pence per lorry mile multipliers for different road types.

Clearly the above method does not account for the actual roads used by timber lorries as part of the "Argyll leg" so there are accuracy issues inherent to the assessment results. This is a particular issue given the pence per lorry mile differentials discussed above. Also, the road type split has been calculated at the "Argyll leg" network level although during the period assessed in the evaluation, most timber was consistently shipped through Ardrishaig. It could be the case, for example, that the road type split is different at the "Ardrishaig network" level. This would introduce further inaccuracies.

As a *UK Government* guidance document, a final issue concerns the relevance and accuracy of the MSB method in the Scottish context; i.e. where much more of the territory is considered remote and rural in nature (Scottish Government, 2014d). Accordingly, what the MSB method considers to be an "A" road (in terms of design and resilience to HGV damage) may be different to an "A" road in remote rural Scotland (i.e. pence per lorry mile values for road damage to "A" roads may be higher in Scotland).

Recommendation for improving assessment accuracy No.2

A more accurate assessment of road damage impacts could be achieved by undertaking the assessment at the port or "zone" level[46]. This would require calculating "A" to "other" road ratios for these more discrete geographies. Alternatively, it may be possible for timber lorry drivers to record the actual usage of different road types (km per road type) as per assessment accuracy recommendation No.1 above. Future evaluations of TimberLINK should also consider in more detail the data and assumptions underpinning the DfT MSB method for road damage and pence per lorry mile values for "A" roads adjusted accordingly (in discussion with relevant stakeholders – e.g. Transport Scotland).

6.2.3 Capturing the views of community stakeholders

In the environmental evaluation, the views of community stakeholders were sought to add a qualitative dimension to the impacts that were assessed using mixed methods techniques (see sections 2.2.3 and 2.2.7). Within the scope and resources of this project however, it was only possible

[46] Although assessments at the "zone" level will be dependent on the future configuration of the TimberLINK contract (i.e. the zone system may be dropped as the means for calculating subsidy rates).

to interview a limited number of community stakeholders; one stakeholder for each of the three port (Ardrishaig, Campbeltown and Sandbank) and three road (Arrochar, Inveraray and Lochgilphead) communities. As such, the views expressed in the interviews cannot be seen as representative of the wider community, although this issue was mitigated to the extent possible by interviewing Community Councillors from each settlement. However, future monitoring and evaluation of TimberLINK should consider how more representative data on community perceptions of the service can be obtained.

Recommendation for improving assessment accuracy No.3

A more representative picture of community perceptions of the TimberLINK service and Argyll timber transport more generally could be achieved by surveying a representative sample of residents from the three port and three main road communities. A simple quantitative survey could be undertaken annually as part of routine monitoring of the TimberLINK service. The survey questions could be based on the questions used in this evaluation as well as the main issues identified. This data could provide a useful annual picture of key community related TimberLINK impacts (e.g. traffic congestion / disruption, noise, visual impact) and a useful source of evidence for any future evaluations of TimberLINK.

6.3 Suggestions made during consultation

A parallel objective of this TimberLINK evaluation study was to *"explore potential improvements and alternatives to TimberLINK through stakeholder input"* (see Box 1.1). This objective was considered principally alongside the economic evaluation which undertook a much more comprehensive stakeholder engagement exercise (see section 2.3).

It should be noted that the majority of those in the TimberLINK supply chain did not see the need for any changes to the way in which the service operates. They tended to state that it works *"well"* or *"very well"* and the underlying principle of modal shift is seen as important and valid. A number also commented positively on the efficiency and responsiveness of ABP staff.

- A number of constructive suggestions were provided by stakeholders covering:
- Clearer reporting of the costs underlying the operation of the TimberLINK service;
- Clearer reporting of TimberLINK performance;
- Capital investment and consideration of additional ports;
- Widening the geographic scope of a TimberLINK type service; and
- Financial assistance to access landlocked sites by sea.

Details of stakeholders' suggestions have been passed to FCS for further consideration in light of this evaluation report and ongoing and future management and delivery of the TimberLINK service.

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Annex 1: Details of individual assessments in the environmental evaluation

Impact being assessed	Scale of impact	Quantitative or mixed assessment	Ex-post and / or ex-ante assessment	Scope of assessment	Use / timing of stakeholder interviews (where relevant)
1. Fuel usage & carbon emissions	Societal	Quantitative	Both	**4 assessments: TimberLINK BAU assessed *ex-post*; all scenarios assessed as part of the *ex-ante*.** TimberLINK BAU fuel usage and carbon emissions for all *ex-post* years have been calculated using historic fuel usage data. *Ex-post* calculations for the TimberLINK expanded service and non-TimberLINK scenarios have also been undertaken for this impact though the *ex-post* analysis focusses on the TimberLINK BAU scenario.	N/A – this is a purely quantitative assessment using distance travelled data and conversion factors. Additional discussions with FCS were held to determine data availability and method for calculating distance travelled by timber lorries on the Argyll leg (this data is not routinely collected as part of TimberLINK operations, nor is actual fuel usage data).
2. Damage to roads & maintenance costs	Regional	Quantitative	Both	**4 assessments: TimberLINK BAU assessed *ex*-post; all scenarios assessed as part of the *ex-ante*.** Damage to roads and maintenance costs associated with the TimberLINK BAU scenario has been calculated for all *ex-post* years using historic data on timber lorry trips / distance travelled. *Ex-post* calculations for the TimberLINK expanded service and non-TimberLINK scenarios have also been undertaken for this impact though the *ex-post* analysis focusses on the TimberLINK BAU scenario.	N/A – this is a purely quantitative assessment using distance travelled data and multipliers from the DfT MSB values method.
3. Congestion	Regional *[A83 counterf actual route]*	Mixed	Ex-ante only	**1 assessment: non-TimberLINK scenario (road based alternative) *ex-ante* assessment only.** Regional congestion impacts are taken to be impacts on the A83 as a result of additional timber lorry movements due to operation of the road based alternative under the non-TimberLINK scenario. Impacts were assessed for the *ex-ante* baseline year (2015/16) and for the non-TimberLINK scenario only.	Email correspondence with Transport Scotland was undertaken to: • Identify existing pinch points along the road based alternative route. • Obtain traffic flows data for traffic counters along the route. • Evaluate the significance of increased timber lorry traffic on flows given road capacity at key pinch points. Interviews / emails with community and tourism stakeholders (community stakeholders in "road

Impact being assessed	Scale of impact	Quantitative or mixed assessment	Ex-post and / or ex-ante assessment	Scope of assessment	Use / timing of stakeholder interviews (where relevant)
				Quantitative data for the assessment was obtained from: 1) the fuel usage & carbon emissions *ex-ante* assessment of the non-TimberLINK scenario (calculated data on additional timber lorry movements on the road based alternative); and 2) data gathering interviews (see opposite). .	communities"; Visit Scotland) were undertaken to gather evidence on actual / perceived congestion impacts on the A83: at present; in relation to HGV traffic; and in light of potential increases in timber lorry traffic under the non-TimberLINK scenario.
4. Congestion	Local *[Port communities]*	Mixed	Both	**3 assessments: TimberLINK BAU assessed *ex-post* and *ex-ante*; TimberLINK expanded service scenario assessed *ex-ante* only.** Assessments underpinned by quantitative TimberLINK operational data as a proxy for the magnitude of impact causing activities. Historic data was obtained for all *ex-post* years as part of the BAU assessment.	Interviews with community stakeholders in "port communities" undertaken to gather evidence on actual / perceived local congestion impacts.
5. Noise	Local *[Port communities]*	Mixed	Both	**4 assessments: TimberLINK BAU assessed *ex*-post; all scenarios assessed as part of the *ex-ante*.** Assessments underpinned by quantitative TimberLINK operational data (distance travelled) as a proxy for the magnitude of impact causing activities. Impacts were monetised using the DfT MSB values method. Historic operational data was obtained for all *ex-post* years as part of the BAU assessment. *Ex-post* calculations for the TimberLINK expanded service and non-TimberLINK scenarios have also been undertaken for this impact though the *ex-post* analysis focusses on the TimberLINK BAU scenario.	Interviews with community stakeholders in "port and road communities" and with an Argyll and Bute Council environmental health expert were undertaken to gather evidence on actual and perceived local noise impacts.
6. Air	Local *[Port & road*	Mixed	Both	As per noise.	As per noise.

Impact being assessed	Scale of impact	Quantitative or mixed assessment	Ex-post and / or ex-ante assessment	Scope of assessment	Use / timing of stakeholder interviews (where relevant)
	communities]				
7. Driver frustration	Regional and local	Mixed	Ex-ante only	**3 assessments: all scenarios assessed as part of the *ex-ante*.** Assessments underpinned by quantitative TimberLINK operational data for the *ex-ante* baseline year (2015/16) as a proxy for the magnitude of the impact causing activities. The regional assessment also utilised data on traffic flows as part of the evidence base for qualitative scoring in the mixed assessment.	Interviews / emails with community and tourism stakeholders (community stakeholders in "port" and "road" communities; Visit Scotland) were undertaken to gather evidence on experiences of driver frustration on timber transport routes. Email correspondence with transport stakeholders (Transport Scotland) was undertaken to identify known driver frustration issues / hot spots on timber transport routes.
8. Accident risk	Regional and local	Mixed	Ex-ante only	**4 assessments: TimberLINK BAU assessed *ex*-post; all scenarios assessed as part of the *ex-ante*.** Assessments underpinned by quantitative TimberLINK operational data (distance travelled) as a proxy for the magnitude of impact causing activities. Impacts were monetised using the DfT MSB values method. Historic operational data was obtained for all *ex-post* years as part of the BAU assessment. *Ex-post* calculations for the TimberLINK expanded service and non-TimberLINK scenarios have also been undertaken for this impact though the *ex-post* analysis focusses on the TimberLINK BAU scenario.	As per driver frustration but focussing on experiences / known hot spots of accident risk.
9. Visual impact	Local *[Port communities]*	Mixed	Ex-ante only	**1 assessment: TimberLINK BAU *ex-ante* only**. Quantitative TimberLINK operational data (number of delivery days; number of timber lorry trips) for the *ex-ante* baseline year was assessed as a proxy for the magnitude of the impact causing activities.	This assessment focussed on interviews with relevant stakeholders (community stakeholders in "port communities" and an economic development specialist from Argyll and Bute Council) to gather evidence on experiences of negative and positive visual impacts associated with the operation of the TimberLINK service.

Impact being assessed	Scale of impact	Quantitative or mixed assessment	Ex-post and / or ex-ante assessment	Scope of assessment	Use / timing of stakeholder interviews (where relevant)
10. Amenity / community severance	Local *[Road communi tes]*	Mixed	Ex-ante only	**1 assessment: non-TimberLINK scenario (road based alternative) *ex-ante* assessment only.** The assessment was underpinned by quantitative data from the regional congestion assessment; i.e. impact on existing traffic flows (including at pinch points) caused by additional timber lorry movements.	Interviews with community stakeholders in "road communities" to gather evidence on severance impacts of traffic flows on the A83.
11. Regeneration	Local *[Port communi ties]*	Mixed	Ex-ante only	**1 assessment: BAU ex-ante only**. Assessments underpinned by quantitative TimberLINK operational data (timber lorry movements) for the *ex-ante* baseline year as a proxy for the magnitude of the impact causing activities.	This assessment focussed on interviews with community stakeholders in "port communities" to gather evidence on experiences of TimberLINK operations conflicting with / supporting regeneration activities in TimberLINK ports.

Annex 2: Example interview schedule

The text below is an example interview schedule used in the environmental evaluation. Categories of questions were modified according to stakeholder interests. Text highlighted in **bold** relates to specific aspects of the interview that were modified by stakeholder / interviewee.

Introduction to the interview

Dear **x** thank you for agreeing to an interview.

Introduction to the TimberLINK service:

A public service contract to support short-sea coastal shipping of roundwood from Argyll to Ayrshire: road hauliers transport harvested timber from Argyll forests to Argyll ports (**Ardrishaig / Campbeltown / Sandbank**); timber is loaded onto the TimberLINK vessel which then transports timber across the Firth of Clyde to Troon; it is then transported by road to processors in the vicinity

Funded by the Scottish Government through Forestry Commission Scotland (2000 onwards)

Ships approximately 85 –110 thousand tonnes per year - acts as a sustainable alternative to road haulage; this option takes a long route (up to 168 miles) via the A83 and the A82

The main objective of our discussion today is for us to gain your input on the actual and / or perceived impacts of the TimberLINK service, specifically in relation to its **direct impact on Local congestion, Driver frustration, Noise, Visual impact and Regeneration in Argyll port communities / Troon harbour and potential knock-on impacts for tourism**.

Qualitative data collected across all interviews will then be used in conjunction with quantitative data, where available, to inform our assessment of the TimberLINK service. Historic operational data will act as a proxy for the magnitude of impacts.

Local congestion, driver frustration, noise, visual impact

1. Thinking about the area in and around the port during normal operations (i.e. not a TimberLINK delivery day) what is your general perception of:
    a. Traffic congestion in and around the port?
    b. Driver frustration – caused by heavy traffic and in particular getting stuck behind HGVs (including timber lorries)?
    c. Noise levels?
    d. The view of the port?
2. How is the area in and around the port affected on TimberLINK delivery days? [Prompts: worse, better, no real difference].
    a. Traffic congestion in and around the port?
        i. Why?
        ii. Where would you attribute that?
        iii. What are the specific activities (i.e. traffic / HGVs / timber lorries) connected to the impact?
    b. Driver frustration on **[name of specific roads / road links]?**
        i. Why?
        ii. Are these issues attributable at all to timber lorry movements?
    c. Noise levels
        i. Why?

ii. Where would you attribute that?

iii. What are the specific physical elements (e.g. cranes and other port machinery and infrastructure) and/or activities connected to the impact?

d. What is the difference between the port and what it looks like on a normal day compared to what it looks like on a TimberLINK delivery days? [Prompts: worse, better, no real difference]

i. Why?

ii. Where would you attribute that?

iii. What are the specific physical elements and / or activities connected to the visual impact?

Question for TimberLINK BAU scenario ex-ante

3. In 2015/16 the average number of timber lorry trips per TimberLINK delivery day was **x**. There were **y** delivery days in 2015/16. Does this match-up with your understanding of the scale of TimberLINK operations on delivery days? Does this alter your opinion of TimberLINK's impact on:

a. Traffic congestion in and around the port?

b. Driver frustration

c. Noise levels

d. The view of the port

Question for TimberLINK expanded service scenario ex-ante

4. Based on TimberLINK operational data for 2015/16, increasing the TimberLINK service to ship 120,000 tonnes of timber/year would result in **x** more TimberLINK delivery days and **y** more timber lorry trips across the year. How might this affect issues in **[name of TimberLINK port]** around:

a. Traffic congestion in and around the port?

i. If so how? [Prompts: worse, better, no real difference]

ii. Why?

b. Driver frustration

i. If so how? [Prompts: worse, better, no real difference]

ii. Why?

c. Noise levels

i. If so how? [Prompts: worse, better, no real difference]

ii. Why?

d. The view of the port

i. If so how? [Prompts: worse, better, no real difference]

ii. Why?