

Arran & Campbeltown Mainland Ferry Terminal – Appraisal of Options

Final Report

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On behalf of Transport Scotland



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Final V2.1	10/03/17	Final report including edited proposal sections.			
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Executive Summary

The port of Ardrossan in the Firth of Clyde is currently the mainland landfall for the ferry service to and from the island of Arran, as well as for the summer service to Campbeltown in the Kintyre peninsula. Former Minister for Transport and Islands, Derek Mackay MSP, set up an Ardrossan Ministerial Task Force to oversee the improvement of Ardrossan Harbour to accommodate a new vessel, due to come into service on the route to Arran in 2018.

However, since the commencement of the Task Force, Transport Scotland was approached by Associated British Ports (ABP) with a proposal to consider Troon as an alternative to Ardrossan as the mainland port. Given the proposed scale of investment and the competitive situation, it is necessary to ensure that the selection of the future mainland port for Arran and Campbeltown is based on a robust review of the evidence and appraisal of options and meets the needs of ferry users.

In addition to reviewing ferry operations, the review covers four main areas:

- reliability;
- onward transport connectivity;
- socio-economic impacts; and
- cost to government.

The study is an appraisal of two mainland port options for Arran. The following points should be noted:

- The study will **not** provide a recommendation as to whether Ardrossan or Troon should be used as the mainland port for the Arran and Campbeltown services.
- Peel Ports (Ardrossan) and Associated British Ports (Troon) have both submitted formal technical and financial proposals to Transport Scotland. **For the purposes of this study, the proposals are to be taken as given and will not be challenged by PBA.**
- This study combines consultation, modelling and secondary data analysis to provide evidence on the key issues outlined above. It is important to note at the outset that it is not possible to reach a consensus position on a number of points given for example a lack of data, issues of attribution etc. Where there is uncertainty surrounding key variables, this is transparently stated and captured in a risk chapter.
- Whilst PBA does not comment on either proposal, we have identified what we perceive to be the risks associated with both proposals. These are reported in the risk chapter.
- To ensure equal treatment of both option, in appraisal terms the same assumptions regarding eg the setting of fares and the operating speeds of the vessels have been used with respect to both options.

Ferry Operations

The key points from a ferry operations perspective are as follows:

- The crossing time from Brodick to Troon would be **15 minutes longer** than the equivalent crossing time to Ardrossan. Assuming that the current number of connections is maintained, this would extend the length of the typical operating day by around 2 hours 20 minutes, giving rise to a need for additional crew.
- The crossing time from Campbeltown to Troon is **two minutes less** than the equivalent crossing time to Ardrossan.

- If the Arran services were to relocate to Troon, passenger fares would increase from £3.75 to £4.30 and car fares from £15.10 to £18.40 under the RET formula. The Campbeltown fares would be very marginally reduced by travelling to Troon.

Reliability

Assessing the relative weather related reliability characteristics of both the route overall and each potential harbour was a key element of this study, and the following data sources were used to support the analysis:

- Emerging results from a set of simulations commissioned by Caledonian Maritime Assets Limited.
- CalMac performance data for the routes in question and all other Clyde & Hebridean routes served by 'Intermediate' or 'Major' vessels.
- 2008-2010 P&O performance data for the Troon – Larne service, which was compared against the equivalent dates for Ardrossan – Brodick.
- The expert opinion of Master Mariners was also sought, although it was not possible to speak with the current CalMac Masters.

Key findings were as follows:

- The available data does not allow for a definitive statement on the comparative reliability of operating the Ardrossan – Brodick / Campbeltown route and a comparative Troon – Brodick / Campbeltown route.
- The simulations found that berthing in both locations was relatively similar, although in more difficult weather conditions, Troon was marginally better.
- The CalMac data does not suggest that the current Ardrossan – Brodick route is a particular outlier in terms of reliability (even more so if only the record of the MV *Caledonian Isles* is considered), particularly given the higher frequency of service on the route compared to the majority of comparator CalMac routes served by 'Intermediate' and 'Major' vessels.
- The unknown at this stage is the potential comparative reliability of Troon if the same service were to be operated to that port. The body of maritime opinion collected through this study suggests that approaching and berthing in Troon is less challenging than Ardrossan, principally because there is an 'escape route' if the vessel was to encounter any difficulties once an approach was committed to. However, there is a broad consensus that the manoeuvre to access the berth in Ardrossan, whilst more challenging, does not in itself materially impact upon reliability or safety. The simulations appear to bear out this narrative.

Onward Transport Connectivity – Accessibility Analysis

The outputs of the accessibility analysis are presented at two levels:

- a **local study area** comprising of the three Ayrshire authorities, East Renfrewshire, Renfrewshire, Glasgow City and South Lanarkshire. This reflects the dominance of west central Scotland in terms of movements to and from Arran (as evidenced by the Evaluation of the Impact of RET study published on 17/02/2017); and
- a wider study area comprising **Scotland as a whole**.

Road Based Accessibility

Road-based accessibility was modelled using the Network Analyst tool using 'HERE' data. The purpose of this analysis was to assess the impact of moving the mainland port to Troon on road-based journey times to all areas of Scotland.

The modelling showed that the road connections from Troon are generally better but that the 15-minute increase in crossing times from moving the service to Troon outweighs this benefit to such an extent that only Troon town centre and its immediate environs would benefit from a journey times perspective. The continued operation of the ferry to Ardrossan would offer comparatively shorter road-based journey times to / from Arran to almost all areas of Scotland.

Public Transport Accessibility

Public transport accessibility was modelled using the accessibility mapping software package TRACC.

From a public transport perspective, Ardrossan has a dedicated rail connection and a reasonably well developed bus network (albeit a number of the bus routes do not directly serve the harbour). Troon on the other hand would require a shuttle bus service to convey passengers from the ferry terminal to the station, but the rail service from Troon is markedly better (in terms of frequency, length of the operating day and the range of destinations) once the station is reached. Based on the assumption of a 10-minute journey time from gangplank to station (a key element of the ABP proposal), Troon generally offers reduced public transport journey times to most of Scotland compared to Ardrossan.

Outwith journey times, the ferry fare would of course be higher when travelling to Troon, whilst rail fares would also be very marginally higher to the majority of destinations.

Troon offers a road and public transport advantage for those travelling on the Campbeltown service in terms of journey times.

Transport Economic Efficiency Impacts

Transport Economic Efficiency (TEE) is a measure of the impact of an option in terms of social welfare, typically measured in terms of changes in generalised cost (i.e. the combined financial and travel-time impacts of an option on users). As the current Ardrossan – Brodick route is dominated by passengers who take a car onboard, the shorter car journey times from Ardrossan outweigh the shorter public transport times from Troon. The following impacts therefore emerge:

- **Travel Time:** the changes in travel time imply that an annual **disbenefit of £1.3 million** would arise if the services were relocated to Troon.
- **Fares:** moving from Ardrossan to Troon would result in an annual increase of **£1 million** for fare paying passengers, based on current fares and 2015 calendar year carryings. *Note, this figure assumes all passengers switch (i.e. it takes no account of elasticity of demand).*

Socio-Economic Impacts

The Ardrossan Harbour proposal stresses the importance of the retention of the ferry service to the future of the town's economy. Ardrossan has several areas characterised as amongst the most deprived in Scotland and both commercial and residential developer interest in the town has been weak over many years. The Ardrossan proposal contends that the retention of the ferry service and the associated harbour works would be the catalyst to £100 million of regeneration.

This study does not review the comparative socio-economic case at either landfall however, the research identifies a number of socio-economic points which will assist in the evaluation of the two proposals. Key points include:

- The 2011 Census indicates that the travel-to-work market to / from Arran and the Scottish mainland is very small, although this may have increased to some extent since the introduction of Road Equivalent Tariff, particularly for inbound travel to Arran.
- North Ayrshire Council would anticipate an increase in service delivery costs to Arran of £90,000 per annum if the ferry service was relocated to Troon.
- Consultations with the main Arran and Kintyre hauliers suggested that there was no conclusive evidence that one port would provide significant advantage over the other in delivering freight services for Arran and Kintyre.
- Transport Scotland has confirmed that there would be no changes to the status or service levels on the Ardrossan Harbour branch line, irrespective of whether the ferry service is relocated or not.

Cost to Government

Three scenarios are assumed in the cost modelling:

- Scenario 1: Growth in all carrying types on the Arran & Campbeltown routes of 1% per annum.
- Scenario 2: No growth in all carrying types on the Arran & Campbeltown routes.
- Scenario 3: Decline in all carrying types on the Arran & Campbeltown routes of 1% per annum.

Undiscounted Cost to Government

The table below sets out the undiscounted cost to government of operating the Arran and Campbeltown services from Ardrossan and Troon under three future route carryings growth scenarios.

Table S1: Cost to Government, Undiscounted (2018-2047)

	Troon: +1% per annum	Troon: 0% per annum	Troon: -1% per annum	Ardrossan: +1% per annum	Ardrossan: 0% per annum	Ardrossan: -1% per annum
Berthing, pier & ramp dues						
Additional fuel						
Additional crew						
Additional costs to NAC						
Lease termination costs						
Gross Cost						
<i>Additional fares revenue</i>						
Net Cost						
<i>Differential with Troon</i>						

Discounted Cost to Government

The table below shows the discounted cost to government over 30 years of the respective options.

Table S2: Cost to Government, Discounted over 30 Years (2018-2047)

	Troon: +1% per annum	Troon: 0% per annum	Troon: -1% per annum	Ardrossan: +1% per annum	Ardrossan: 0% per annum	Ardrossan: -1% per annum
Berthing, pier & ramp dues						
Additional fuel						
Additional crew						
Additional costs to NAC						
Lease termination costs						
Gross Cost						
<i>Additional fares revenue</i>						
Net Cost						
<i>Differential with Troon</i>						

In summary, the Ardrossan submission has a significantly lower cost to government than the equivalent Troon submission. The overwhelming reason for this is the additional crew required to maintain the current number of connections, given the longer crossing time.

1 Introduction

1.1 Overview

- 1.1.1 The island of Arran, which is located in the Firth of Clyde, has been served from the mainland port of Ardrossan since 1834. The current incarnation of this ferry service is operated by CalMac Ferries Ltd, which runs a year round service between Ardrossan and Brodick using the 94 metre ferry MV *Caledonian Isles*, which is supplemented for a number of the summer months by the 85 metre ferry MV *Isle of Arran*. The latter vessel also operates a summer only service between Ardrossan and Campbeltown.
- 1.1.2 The scale of ferry services operating from Ardrossan has expanded significantly in the last few years. The operation of a second vessel on the Ardrossan – Brodick route in the summer months was made permanent in 2013, which coincided with the piloting of the Ardrossan – Campbeltown service (now a permanent fixture in the summer timetable). The introduction of Road Equivalent Tariff (RET) to the Ardrossan – Brodick route in October 2014 and the Ardrossan – Campbeltown route for the 2016 summer season has led to a significant uplift in demand, particularly on the former route. Indeed, in 2015-16, the Ardrossan – Brodick service carried 52% more cars than in 2013/14, the last pre-RET year.
- 1.1.3 Given the recent scale of expansion, there is a need for a corresponding investment in the ferry infrastructure and services to future-proof the services to Arran and Kintyre. A new 100+ metre vessel for the Ardrossan – Brodick route, which will replace the MV *Caledonian Isles*, is on order and will arrive on the route in 2018, which will be accompanied by the current reconstruction of Brodick ferry terminal. However, the infrastructure at the mainland port of Ardrossan is ageing and in need of upgrading, not least to accommodate the new vessel from 2018.
- 1.1.4 Former Minister for Transport and Islands, Derek Mackay MSP, set up an Ardrossan Ministerial Task Force to oversee the improvement of Ardrossan Harbour to accommodate the new vessel. However, since the commencement of the Task Force, Transport Scotland was approached by Associated British Ports (ABP) with a proposal to consider Troon as an alternative to Ardrossan as the mainland port.
- 1.1.5 Given the proposed scale of investment and the competitive situation, it is necessary to ensure that the selection of the future mainland port for Arran and Campbeltown is based on a robust review of the evidence and appraisal of options and meets the needs of ferry users. Transport Scotland has commissioned Peter Brett Associates LLP and partners ProVersa Limited to assist in developing this evidence base.

1.2 Study Remit

- 1.2.1 The study is an appraisal of two mainland port options for Arran. The following points should be noted:
- The study will **not** provide a recommendation as to whether Ardrossan or Troon should be used as the mainland port for the Arran and Campbeltown services.
 - Peel Ports (Ardrossan) and Associated British Ports (Troon) have both submitted formal technical and financial submissions to Transport Scotland. **For the purposes of this study, the proposals are to be taken as given and will not be challenged by PBA.**
 - This study will combine consultation, modelling and secondary data to provide evidence on the key issues outlined above. It is important to note at the outset that it will not be possible to reach a consensus position on a number of points given for example a lack of data, issues of attribution etc. Where there is uncertainty or differences of opinion surrounding key variables, this will be transparently stated and captured in a risk chapter.

- The study will be completed in line with the Scottish Transport Appraisal Guidance (STAG), with a broad assessment of each option against the STAG criteria.
 - Whilst PBA will not comment on either proposal, we will identify what we perceive to be the risks associated with both proposals. These will again be reported in the risk chapter.
- 1.2.2 Following an initial round of consultations with both port authorities, North and South Ayrshire Councils, CalMac Ferries Ltd and Caledonian Maritime Assets Limited (CMAL), the following have been identified as potential differentiators between the two proposals:
- operations, including crossing times and reliability amongst other issues;
 - onward transport connectivity from Ardrossan and Troon;
 - local socio-economics; and
 - cost to government.
- 1.2.3 The report will be built around discussion of these key issues and will consist of eight further chapters as follows:
- Chapter 2 provides a factual overview of the current vessels and ports (i.e. pre-investment) as well as the crossing times, fares and timetables (indicative in the case of Troon) associated with the current route to Ardrossan and potential route to Troon.
 - Chapter 3 briefly highlights the key components of the respective proposals by Peel Ports (Ardrossan) and ABP (Troon).
 - Chapter 4 considers reliability at both ports.
 - Chapter 5 sets out the position in relation to onward road and public transport connectivity from Ardrossan and Troon harbours.
 - Chapter 6 provides a review of the wider socio-economic information.
 - Chapter 7 provides a broad assessment of Ardrossan and Troon against the STAG criteria.
 - Chapter 8 appraises the cost to government of both options based on their financial proposals and applying the parameters / methodology contained within the STAG guidance and technical database.
 - Chapter 9 sets out what PBA considers to be the key risks associated with the data used to inform this study and the respective proposals set out by ABP and Peel Ports.
- 1.2.4 Note that CalMac Ferries Ltd has provided operational and financial data to inform this study, and the report clearly states where this is the case. However, the report itself remains independent of CalMac Ferries Ltd.

1.3 Current Carryings

- 1.3.1 By way of context and to give an indication of the significance of the two routes, the carryings data for the two routes for 2015 is shown in the table below:

Table 1.1: Carryings Data, 2015¹

	Passengers	Cars	Coaches	Commercial Vehicles
Brodick – Ardrossan	761,948	189,861	548	8,625
Campbeltown – Ardrossan	10,714	2,299	3	21

¹ <https://www.calmac.co.uk/corporate/carrying-statistics>

- 1.3.2 These figures confirm the dominance of the Arran route accounting for 99% of the passengers and cars currently travelling through Ardrossan. Carrying of coaches and commercial vehicles are minimal on the Ardrossan - Campbeltown route.
- 1.3.3 In terms of modes of transport used to access the ferries, previous research undertaken as part of the evaluation of RET in Arran² suggested the following³:
- On the mainland, access to / from Ardrossan ferry terminal is dominated by car-based transport (comprising car taken on board, parked at terminal or lift), accounting for around 68% of trips. Train and bus accounted for 17% and 11% respectively.
 - On Arran, car based travel (68%), walk (11%) and bus (11%) account for the majority of trips to and from the ferry terminal

² http://www.transport.gov.scot/system/files/uploaded_content/documents/reports/TS%20-%20AMFC%20-%20RET%20Arran%20-%20Final%20Report.pdf

³ Based on Summer 2016 onboard surveys

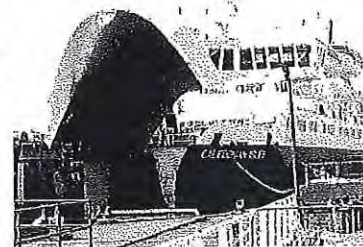
2 Ardrossan & Troon – Ferry Operations

2.1 Overview

2.1.1 In advance of considering the proposed investment plans in relation to both ports and their respective transport connectivity, it is valuable to establish the facts surrounding the **current operation**.

2.2 Current & Future Vessels

2.2.1 The primary vessel on the Ardrossan – Brodick route is the **MV Caledonian Isles**, one of the largest vessels in the fleet. The vessel can carry just less than 1,000 passengers and 92 cars. She is the primary vessel on the Ardrossan – Brodick route and is on station year round, except during periods of drydock. She is of a closed deck design.



2.2.2 Key statistics are as follows:

- Length overall (LOA): 94 metres
- Beam: 15.8 metres
- Draught: 3.2 metres
- Speed: 15 knots
- Deadweight capacity: 704 tonnes

2.2.3 The car deck incorporates a set of mezzanine decks, one down each side of the central casing and each divided into three sections. These can be deployed up and down to their deployed or stowed positions. If the mezzanine decks are fully deployed, there is insufficient height to accommodate lorries and over-height vehicles other than at the bow and stern of the vessel.

2.2.4 Given the growing (car-based) pressure on capacity on the *MV Caledonian Isles* during the summer months, she has, in recent years, been supplemented by a second vessel. Between 2005 and 2011, the additional service was provided by the 'Streaker', *MV Saturn*. However, following her sale, the second vessel on the route is now the **MV Isle of Arran**, a vessel initially built for the Ardrossan – Brodick route.

2.2.5 Unlike the main vessel, the *MV Isle of Arran* has an open car deck, with capacity for 659 passengers and 62 cars over five lanes. The open stern allows her to carry dangerous goods at the same time as passengers, a key benefit given the restrictions on the *MV Caledonian Isles*. However, she offers less capacity overall and there is insufficient height for lorries and coaches down either side of the car deck due to a gallery deck above.



2.2.6 The *MV Isle of Arran* is the secondary vessel on the Ardrossan – Brodick route, currently operating between the late April / early May and the end of September. As well as providing additional capacity on this busy crossing, she is also tasked with operating the Ardrossan – Campbeltown roster on Thursdays to Sundays during the summer timetable period, reducing the number of Arran crossings on those days.

2.2.7 Key statistics are as follows:

- Length overall (LOA): 85 metres
 - Beam: 15.8 metres
 - Draught: 3.3 metres
 - Speed: 15 knots
 - Deadweight capacity: 330 tonnes
- 2.2.8 Caledonian Maritime Assets Limited (CMAL) has recently placed an order for two new sister ships, hull numbers **FMEL 801/802**, one initially for the Ardrossan – Brodick route and the other for the Uig Triangle. The new vessel could allow for a year round two-vessel solution and is anticipated to come onto the route in 2018, replacing or supplementing the MV *Caledonian Isles*.
- 2.2.9 The new sister vessels will be of a high specification, with three bow thrusters & a stern thruster and high lift rudders, and will also be dual fuel, capable of running on both LNG and marine gas oil.
- 2.2.10 Key statistics are as follows:
- Length overall (LOA): may be as much as 104.8m
 - Beam: 17 metres
 - Draught: 3.45 metres
 - Speed: up to 16.5 knots
 - Deadweight capacity: 900 tonnes

2.3 Distances, Sailing Times and Fares

Distances & Sailing Times

- 2.3.1 The table below shows the crossing distances and times between Arran and Troon & Ardrossan. Crossing times associated with two speeds, 14.5 knots (current operating speed of both vessels on the route) and 16.5 knots (the potential speed of the new ferry).

Table 2.1: Crossing Length & Journey Times – Troon & Ardrossan

	Statute Miles	Nautical Miles	Crossing Times (14.5 knots)	Crossing Times (16.5 knots)
Brodick – Ardrossan	13.3	11.5 ⁴	55 minutes ⁵	50 minutes ⁶
Brodick - Troon	17.3	15.0	70 minutes ⁷	63 minutes ⁸
Campbeltown – Ardrossan	39.1	34.0 ⁹	160 minutes ¹⁰	132 minutes ¹¹
Campbeltown - Troon	38.0	33.0 ¹²	158 minutes ¹³	128 minutes ¹⁴

- 2.3.2 Whilst FMEL 801 / 802 could potentially operate at 16.5 knots, this would create an asymmetric timetable between the two vessels as any second vessel would be unable to operate at this speed. This arrangement would also mean that particular timetabled (fast) crossings could only be provided by the new vessel which would be operationally challenging. The alternative would be to run the new vessel at 16.5 knots on the crossing and extend the turnaround times to maintain the current departure times. It would also be more expensive to operate FMEL 801 / 802 at 16.5 knots given the relationship between cruising speed and fuel consumption.
- 2.3.3 In addition, whilst the new vessel could conceivably operate faster to Troon to partially offset the longer crossing distance, by the same token the new vessel could operate faster into Ardrossan, thereby reducing travel times from the present day and potentially providing more connections per day. **For the purposes of equality and consistency in this appraisal, it is therefore assumed that the both vessels would operate at a speed of 14.5 knots.**
- 2.3.4 Following on from this, the assumption adopted in this study is therefore that the **crossing time from Troon to Brodick would be approximately 15 minutes longer** and the difference in journey times on services to and from Campbeltown would be negligible (two minutes quicker to Troon).

Fares

- 2.3.5 As fares in the Clyde & Hebridean Ferry Services (CHFS) network are calculated using a combination of a fixed charge plus a distance-based element. If this formula is applied, any change in the crossing length would in turn have an impact on fares. **Again for the purposes of equality and consistency in the appraisal, we have assumed that the current RET formula is applied to both routes.** Any departure from the application of the formula would be at the discretion of Scottish Ministers. It should be noted that any departure from the

⁴ Source: Marine Traffic Voyage Planner

⁵ Timetabled time – assumed to be 45 minutes at cruising speed and fixed 10 minutes for manoeuvring to and from the berth (5 minutes at either end).

⁶ Assumes 11nm at 16.5knts and fixed 10 minutes for manoeuvring to and from the berth.

⁷ This journey time has been calculated by dividing the additional distance (3.5nm) by the speed (14.5 knots)

⁸ Assumes 14.5nm at 16.5knts and fixed 10 minutes for manoeuvring to and from the berth.

⁹ Source: Marine Traffic Voyage Planner

¹⁰ Timetabled service - assumed to be 150 minutes at cruising speed and fixed 10 minutes for manoeuvring to and from the berth.

¹¹ Assumes 33.5nm at 16.5knts and fixed 10 minutes for manoeuvring to and from the berth.

¹² Source: Marine Traffic Voyage Planner

¹³ This journey time has been calculated by dividing the additional distance (1nm) by the speed (14.5 knots)

¹⁴ Assumes 32.5nm at 16.5knts and fixed 10 minutes for manoeuvring to and from the berth, based on consultation with operator.

published formula as part of a move to Troon would represent an increased cost to government in terms of revenue foregone (and thus an increase in the overall subsidy).

- 2.3.6 The table below therefore shows the single RET fares for passengers and cars under both scenarios. The Troon fares are based on an additional crossing distance of four statute miles (as set out in Table 2.1).

Table 2.2: RET Fares from Ardrossan & Troon

	Arran		Campbeltown	
	<i>Passenger</i>	<i>Car</i>	<i>Passenger</i>	<i>Car</i>
Ardrossan	£3.75	£15.10	£7.65	£40.50
Troon	£4.30	£18.40	£7.50	£39.60

- 2.3.7 Passenger and car fares would increase on services between Arran and Troon by 15% and 22% respectively, and there would be a very small reduction in fares between Campbeltown and Troon.
- 2.3.8 As commercial vehicle fares are currently the subject of a review by Transport Scotland, a 'no change' position has been assumed.

Timetable

- 2.3.9 This section sets out a series of indicative timetables if the Arran and Campbeltown services were to operate from Troon. It contains a series of assumptions which will be used for the basis of this study **but does not imply a commitment from either Transport Scotland or CalMac Ferries Ltd to provide the implied levels of service from either Ardrossan or Troon.**
- 2.3.10 As noted in Table 2.1, it is anticipated that the crossing time between Brodick – Troon would be around 15 minutes longer than the equivalent service to Ardrossan. The difference on the Campbeltown service is negligible.
- 2.3.11 When the new vessel arrives, the Ardrossan – Brodick route, in line with the Ferries Plan commitment, could potentially become a year round two vessel service. It is therefore assumed that:
- The peak summer timetable, which includes the Campbeltown services, will continue to operate from late April to late September inclusive, defined as 'peak summer' henceforth.
 - For the rest of the year, it is assumed that:
 - The Campbeltown service will not operate; and
 - Ten return sailings per day will be operated on the mainland – Arran route Monday – Saturday, with eight return sailings on a Sunday.
- 2.3.12 The following tables set out **indicative timetables** for a Troon service and are based on the following assumptions:
- The start time of the service remains the same, with the service end time extended for Troon;
 - The number of daily crossings assumed for Ardrossan would be maintained for Troon;
 - Both vessels would operate the respective crossings at 14.5 knots;
 - There is no difference in manoeuvring time to and from the berth at either port; and

- There is no difference in turnaround time at Troon and Ardrossan.
- 2.3.13 The above assumptions provide a reasonable initial basis for developing a set of indicative timetables.

Peak Summer Timetable (late April to late September)

- 2.3.14 The 2016 summer timetable on the Ardrossan – Brodick / Campbeltown route (which operated between 28th April and 26th September 2016) allowed for 10 return crossings between Ardrossan – Brodick Monday through Wednesday. There are fewer connections on Thursday through Sunday due to the incorporation of the Campbeltown services.
- 2.3.15 In the five tables which follow, the times in red highlight sailings by Vessel 1 whilst the sailings in black are those made by Vessel 2.

Table 2.3: Indicative Troon – Brodick Timetable, Monday – Wednesday

Depart Troon	Arrive Brodick	Depart Brodick	Arrive Troon
07:00	08:10	07:00	08:10
08:35	09:45	08:35	09:45
10:15	11:25	10:15	11:25
11:50	13:00	11:50	13:00
13:30	14:40	13:30	14:40
15:05	16:15	15:05	16:15
16:45	17:55	16:45	17:55
18:25	19:35	18:25	19:35
20:00	21:10	20:00	21:10
21:35	22:45	21:35	22:45

- 2.3.16 The above timetable suggests that if the current number of summer connections is to be maintained, the operating day would have to be extended by 2 hours and 30 minutes for both vessels. Whilst the headway (the gap between sailings) would increase for Arran residents, there would be a corresponding benefit in terms of a longer operating day, which the rail services at Troon would facilitate.
- 2.3.17 That said, if the equivalent additional revenue resource required to facilitate the current number of crossings on the Troon service was applied to the Ardrossan – Brodick route, a longer operating day and one additional return crossing per vessel could be made, therefore an additional two return sailings per day.
- 2.3.18 The tables below set out the Thursday – Sunday timetables (the days on which the Campbeltown service currently operates):

Table 2.4: Indicative Troon – Brodick / Campbeltown Thursday Timetable

Depart Troon	Arrive Campbeltown	Arrive Brodick	Depart Brodick	Depart Campbeltown	Arrive Troon
07:00		08:10	07:00		08:10
08:35		09:45	08:35		09:45
10:15		11:25	10:15		11:25
11:50		13:00	11:50		13:00
13:30		14:40	13:30		14:40
15:05		16:15	15:05		16:15
16:45		17:55	16:45		17:55
18:40	21:20		18:25		19:35
20:00		21:10			
			21:35		22:45

Table 2.5: Indicative Troon – Brodick / Campbeltown Friday Timetable

Depart Troon	Arrive Campbeltown	Arrive Brodick	Depart Brodick	Depart Campbeltown	Arrive Troon
07:00		08:10		07:35	10:15
			08:35		09:45
10:15		11:25			
11:05		12:15	11:50		13:00
13:30		14:40	12:45		13:55
14:20		15:30	15:05		16:15
16:45		17:55	16:00		17:10
19:40	22:20		18:25		19:35
20:00		21:10			
			21:35		22:45
23:10		00:20			
			00:45		01:55

Table 2.6: Indicative Troon – Brodick / Campbeltown Saturday Timetable

Depart Troon	Arrive Campbeltown	Arrive Brodick	Depart Brodick	Depart Campbeltown	Arrive Troon
07:00		08:10		07:00	
		09:20	08:35		09:45
10:15		11:25	09:45		10:55
11:20		12:30	11:50		13:00
13:30		14:40	13:00		14:10
14:35		15:45	15:05		16:15
16:45		17:55	16:15		17:25
17:55		19:05	18:25		19:35
20:00		21:10	19:30		20:40
22:00		23:10	21:35		22:45

Table 2.7: Indicative Troon – Brodick / Campbeltown Sunday Timetable

Depart Troon	Arrive Campbeltown	Arrive Brodick	Depart Brodick	Depart Campbeltown	Arrive Troon
09:45		10:55	09:05		10:15
11:20		12:30	11:20		12:30
13:00		14:10	13:00		14:10
14:35	17:15		14:40		15:50
16:20		17:30		17:40	20:20
			17:55		19:05
19:30		20:40			
20:45		21:55	21:05		22:15

Winter Timetable & Off-Peak Summer (late September to late March)

2.3.19 When the Campbeltown service is not operating, it is assumed that the following timetable would operate on the Arran route if operating from Troon:

Table 2.8: Indicative Troon – Brodick Timetable, Monday – Saturday

Depart Troon	Arrive Brodick	Depart Brodick	Arrive Troon
07:00	08:10	07:00	08:10
08:35	09:45	08:35	09:45
10:15	11:25	10:15	11:25
11:50	13:00	11:50	13:00
13:30	14:40	13:30	14:40
15:05	16:15	15:05	16:15
16:45	17:55	16:45	17:55
18:25	19:35	18:25	19:35
20:00	21:10	20:00	21:10
21:35	22:45	21:35	22:45

2.3.20 The Sunday timetable would offer eight return sailings per day as follows:

Table 2.9: Indicative Troon – Brodick Timetable, Sunday

Depart Troon	Arrive Brodick	Depart Brodick	Arrive Troon
10:15	11:25	10:15	11:25
11:50	13:00	11:50	13:00
13:30	14:40	13:30	14:40
15:05	16:15	15:05	16:15
16:45	17:55	16:45	17:55
18:25	19:35	18:25	19:35
20:00	21:10	20:00	21:10
21:35	22:45	21:35	22:45

Crewing

Additional Crewing Requirement

- 2.3.21 An initial review of the timetables for both the MV *Caledonian Isles* and the MV *Isle of Arran* suggests that the crew are operating near or at their maximum hours. If the Arran and Campbeltown services were to operate from Troon, there would be a requirement for additional crew.
- 2.3.22 Assuming the start-up and close down tasks at Troon and Ardrossan take the same amount of time and the operating day is the same in summer and winter, the additional hours operated can be equated to the difference in the length of the operating day (i.e. first departure to last arrival). Based on the indicative timetables set out above, the following table shows the daily and cumulative additional hours by vessel in a typical peak summer week:

Table 2.10: Indicative Additional Running Hours Associated with Troon (Peak Summer)

Day	Vessel 1			Vessel 2		
	Troon	Ardrossan	Difference	Troon	Ardrossan	Difference
Mon	15:45	13:25	02:20	15:45	13:25	02:20
Tues	15:45	13:25	02:20	15:45	13:25	02:20
Wed	15:45	13:25	02:20	15:45	13:25	02:20
Thurs	15:45	13:25	02:20	14:20	14:20	00:00
Fri	18:55	15:35	03:20	14:45	13:45	01:00
Sat	15:45	13:25	02:20	16:10	15:55	00:15
Sun	12:30	10:30	02:00	12:50	11:50	01:00
Total			17:00			09:15

2.3.23 The table below shows the equivalent for the winter and off-peak summer timetable:

Table 2.11: Indicative Additional Running Hours Associated with Troon (Winter & Off-Peak Summer)

Day	Vessel 1			Vessel 2		
	Troon	Ardrossan	Difference	Troon	Ardrossan	Difference
Mon	15:45	13:25	02:20	15:45	13:25	02:20
Tues	15:45	13:25	02:20	15:45	13:25	02:20
Wed	15:45	13:25	02:20	15:45	13:25	02:20
Thurs	15:45	13:25	02:20	15:45	13:25	02:20
Fri	15:45	13:25	02:20	15:45	13:25	02:20
Sat	15:45	13:25	02:20	15:45	13:25	02:20
Sun	12:30	10:30	02:00	12:30	10:30	02:00
Total			16:00			16:00

2.3.24 A comparison of the indicative timetable for the Troon service versus the current Ardrossan service suggests the need for an additional:

- Vessel 1:
 - 17 additional hours per week in peak summer; and
 - 16 additional hours per week in winter and off-peak summer
- Vessel 2:
 - 9 hours & 15 minutes in peak summer and 16 hours in off-peak summer (note that Vessel 2 does not operate on the route in Winter)

2.3.25 Following on from this initial desk-based analysis, CalMac provided a more detailed review of crewing to feed into the cost model.

2.4 Tides

2.4.1 Both ports are affected by the same tidal influences and tidal rise and fall in this area is limited. It is unlikely that tidal streams have a significant influence on the manoeuvring of the vessels on the approaches to either port.

2.4.2 For the record, tidal ranges are summarised in the table below:

Table 2.12: Tidal Range – Ardrossan & Troon

	Ardrossan	Troon
Spring Tides	2.8m	2.9m
Neap Tides	1.5m	1.6m

2.5 Berthing

2.5.1 This section summarises the available berthing facilities at both ports.

Ardrossan

2.5.2 The annotated figure below shows the current berthing facilities at Ardrossan:

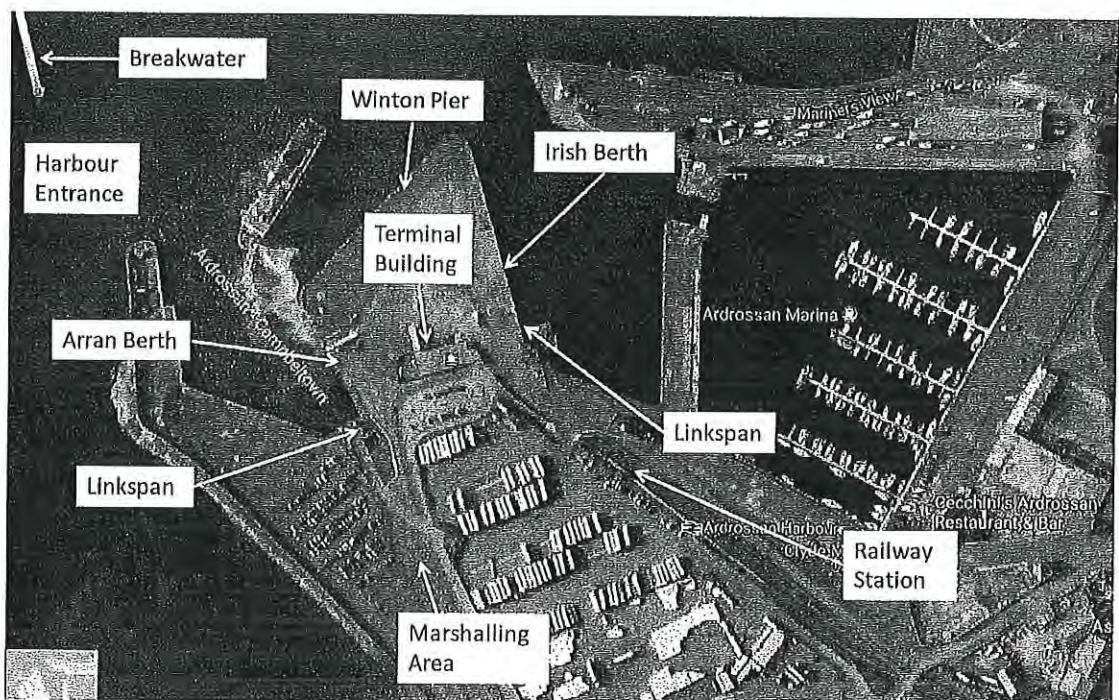


Figure 2.1: Ardrossan Harbour Orientation (Google Maps)

Ferry Berths

2.5.3 There are two berths in Ardrossan capable of accommodating vehicle ferry services, the Arran Berth and the Irish Berth.

2.5.4 The **Arran Berth** is 95 metres long running on alignment 333/152. This is the main berth for the Arran and Campbeltown services, with good foot passenger access to the ferry terminal and onwards to the railway station. The stern of the MV *Caledonian Isles* overhangs the end of the berth.

- 2.5.5 The **Irish Berth** is 140 metres long running on an alignment of 343/163. This is the secondary ferry berth and it is lightly used in comparison to the Arran berth due to the prevailing westerly winds. The infrastructure at the Irish Berth is dated and in need of replacement.
- 2.5.6 The **Winton Pier** can be used as a layby berth or for a passenger only service subject to the availability of a suitable gangway.

Troon

- 2.5.7 The annotated figure below shows the current berthing facilities at Troon:

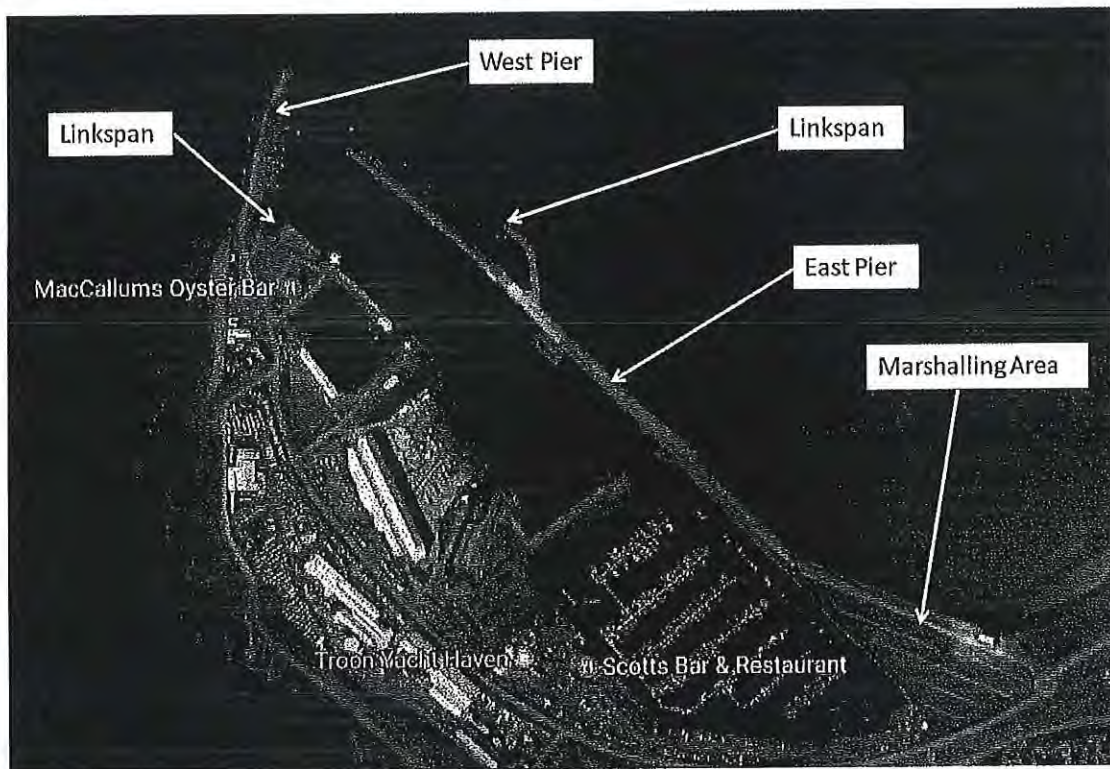


Figure 2.2: Troon Harbour Orientation (Google Maps)

- 2.5.8 As with Ardrossan, Troon has two dedicated ferry berths. ABP's proposal would involve operating the Arran and Campbeltown services from the **East Pier** (150m long, aligned 130/310), although the linkspan on the **West Pier** (125m long, aligned 015/195) would also be available for use (although given the facilities would be at East Pier, the latter would only be used *in extremis*).
- 2.5.9 There are various layby berths available at Troon, including Wee Hurry (170m long, aligned 132/312) and Portland Quay (125m long, aligned 054/234).
- 2.5.10 The East Pier is well-constructed and well-fendered. The berth was installed in 2001 for the freight service to Larne. With only one round trip per day, the facility has been lightly used. The linkspan and fendering are relatively new.

2.6 Limitations, Conditions & Sea State

Ardrossan

Approach to the Berth

- 2.6.1 Ardrossan is approached from a south-westerly heading. The port is protected by a low breakwater to the north, which runs broadly north to south. Whilst the breakwater affords a degree of protection, its height is such that at high water it will do little to dissipate the wind within the harbour, a particular issue in prevailing south-westerly winds.
- 2.6.2 The southern end of the entrance to the harbour is defined by a stone roundhead, which forms the north-west tip of the harbour. This is a much higher structure and offers some protection from westerly winds.
- 2.6.3 There are numerous potential approaches to the berth at Ardrossan. The chosen approach is dependent on the direction of the wind.
- 2.6.4 In the majority of cases, the ferry berths bow in at Ardrossan, which necessitates a tight turn once the ferry enters the harbour. The harbour entrance between the southern tip of the breakwater and the roundhead is around 110 metres wide¹⁵ and from the roundhead to the north-west tip of the Arran berth is around 105 metres¹⁶. This means that a ferry entering the harbour has around 100 metres to turn through 100 degrees to align with the berth (effectively an almost right angled turn).
- 2.6.5 CalMac noted that the current service is unable to operate from the Arran Berth in winds greater than 45 knots (Beaufort Force (BF) 9) and will be placed on 'amber alert' when winds reach 30 knots (BF7).

Troon

- 2.6.6 Whilst Troon is in close geographic proximity to Ardrossan, the harbour has a different alignment and berth layout.
- 2.6.7 With Troon harbour aligned approximately south-east to north-west, the harbour buildings offer a degree of protection from the prevailing westerly and south-westerly winds. There is, at the north-west tip of the harbour, a stone roundhead and along the northern side a long breakwater, which also fulfils the role of East Pier.

Approach to Berth – East Pier & West Pier

- 2.6.8 As Troon is not currently used as a port for scheduled CalMac services, extensive berthing trials would be required to determine the optimal approach to both berths.

Passage

- 2.6.9 Given the prevailing south-westerly winds, the direct passage to Troon would have the prevailing sea and swell on the beam of the vessel (i.e. a beam sea), which would make for a less comfortable trip in certain sea conditions. This could be alleviated to some extent by following a dog-leg track to Troon, but this could potentially extend the journey time (which would be a key issue for Arran residents given the already longer journey time to Troon).

¹⁵ Source – Google Maps

¹⁶ Source – Google Maps

Pilotage

- 2.6.10 It should be noted that a Pilotage Exemption Certificate would need to be obtained for Masters serving Troon prior to the commencement of services there (otherwise time would be lost to pilotage). This is a minor issue and pilotage exemption could be quickly obtained.

3 Summary of Proposals

3.1 Overview

- 3.1.1 This chapter provides a brief summary of the proposals put forward by Peel Ports / North Ayrshire Council (Ardrossan) and ABP (Troon). It is taken directly from the material provided to Transport Scotland, and both parties have had the opportunity to comment on and amend each section to ensure its accuracy. The full proposal documents are not publically available due to their commercially confidential nature.
- 3.1.2 This material is included here as a matter of record but the inclusion or otherwise of aspects of each proposal is not prejudicial to any of the subsequent independent analysis contained in this report. **It should again be emphasised that this chapter states the key points from each proposal as presented to Transport Scotland. It does not provide critical commentary in relation to either proposal.**

3.2 Ardrossan – Peel Ports

- 3.2.1 The Ardrossan proposal is entitled *Ardrossan – Brodick: Shortest, Fastest, Cheapest*. The proposal sets out as the Vision for Ardrossan and the ferry service as:
- ***Empowering communities and supporting inclusive growth through the creation of 21st century multi-modal hubs at Ardrossan and Brodick, that secure real additional value for communities and businesses through connectivity, place quality, economic activity and enterprise and delivering the best ferry service for the isle of Arran and Campbeltown.***
- 3.2.2 The proposal stresses the partnership approach adopted and the role of the ferry terminal and service as a catalyst for investment and economic development in the area. The proposal identifies 12 key factors which are seen to be positive differentiators in favour of Ardrossan – these are reproduced in the table below:

Table 3.1: Differentiating Factors in the Ardrossan Proposal

	Factor	Comment
1	Shortest	Ardrossan – Brodick is the shortest route by 8km. It is the most direct route thus offering economic, social and environmental benefits.
2	Fastest	Ardrossan – Brodick travel time assuming the same ferry speed is 55 minutes, 21 minutes less than Troon. This offers significant value of time travelled (VTT) benefits and the retention of the current 9 sailings per day.
3	Cheapest	Fares would be lower on the Ardrossan – Brodick route, providing economic benefits for Arran residents. A service operating from Troon would see increased fares of over £2M per annum should RET be applied.
4	Most Resilient	Ardrossan - Brodick with the new CalMac ferry provides a harbour of high resilience & reliability for both ferry services.
5	Best Connected	Ardrossan provides full multi-modal Transport Interchange (Ferry / Bus / Rail / Cycle / Pedestrian) all clustered within 120m. Enhanced by committed road improvements by Transport Scotland (i.e. the A737 Dalry Bypass).
6	Most Deliverable	Ardrossan - Brodick can offer risk free fully operational delivery from Day 1 (Q1 2018) co-ordinated with ferry commissioning with further committed investment by Q1 2019.
7	Best Capacity	Ardrossan offers twin separate berths and capacity for 3rd vessel (bad weather) and land area capacity to adapt / future-proof changing needs including passenger access system, parking, terminal growth.

	Factor	Comment
8	Best Value	Ardrossan - Brodick delivers the 'best value' based on VTT savings of [REDACTED] Significant operational staffing, fuel cost and maintenance benefits. [REDACTED]
9	Best Supported	Ardrossan - Brodick is overwhelmingly supported by the Arran community, Arran Ferry Group, Arran Economic Group, Chamber of Commerce and Ardrossan communities. Unanimous support from North Ayrshire Council and local MPs/MSPs. Over 5,000 letters of support signed.
10	Most Inclusive	Ardrossan - Campbeltown ports support areas of long standing high deprivation (SIMD). Ferry supports jobs (165), inclusion and is a key economic driver for regeneration. A move to Troon would see employment move from one of Ayrshire's most deprived areas, to one of the least deprived.
11	Lowest Carbon	Ardrossan - Brodick offers a low energy / low carbon route. Carbon reduction over 25 years on new ferry equates to 63,775m/tonnes and offers multi-modal, low-carbon user choice. The retention of the route at Ardrossan would therefore be in line with Scottish Government policy on carbon reduction.
12	Safest	Ardrossan - Brodick offers short/direct perpendicular crossing of sea-lane and a large multi-berth safe protected harbour capable of offering a home port to 3 vessels.

Harbour Investment

3.2.3 In terms of the investment itself, the proposal is to create a 21st century multi-modal hub at Ardrossan offering world class reliability. The proposals include:

- The delivery of a new port for the new ferry with improved maritime infrastructure including;
- a new linkspan, quay improvements and port upgrades funded and fully committed by Peel Ports;
- A 21st century multi-modal transport interchange including:
 - A new terminal building and community/maritime hub;
 - A new passenger access system;
 - Additional marshalling capacity;
 - Improvements to the car park; and,
 - The creation of a new public realm link into Ardrossan town centre.
- The land infrastructure area would be leased by North Ayrshire Council from Peel Ports. Investment in the land infrastructure would be funded by a combination of NAC (with the majority of investment funded by income from the facilities), Irvine Bay Regeneration Company, Peel Ports and other sources of grant funding. The investment would be managed by North Ayrshire Council in partnership with Peel Ports and CalMac Ferries Limited; and
- The proposals would help to deliver area-wide regeneration including:
 - port and marina development (north & south shore); and
 - Ardrossan town regeneration.

The figure below sets out the committed investment by Q2 2018:

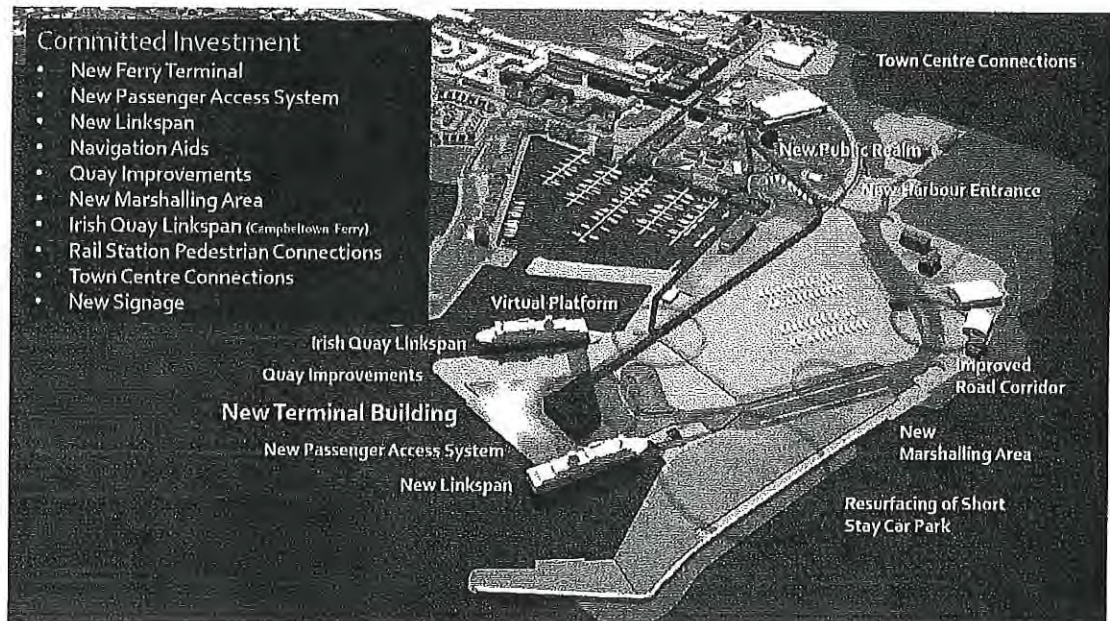


Figure 3.1: Ardrossan Harbour Proposal – Committed Investment by Q2 2018

Wider Regeneration

- 3.2.4 The Ardrossan proposal assumes that the investment in the harbour facilities and the retention of the Arran and Campbeltown ferry services would act as a catalyst to a further £60m - £100m of regeneration investment over the following ten years.
- 3.2.5 Regeneration, given low rates of commercial activity, requires a significant lead time. Notable local successes over the last 10-15 years include the new Health Centre, Residential Investment, Quayside offices, Marina Development and skills and training initiatives. The retention of the ferry service and associated investment would provide the catalyst for wider regeneration in the town and allow this momentum to be continued.
- 3.2.6 Alternatively, the loss of the ferry service would create a major additional area of vacant and derelict land with no obvious prospect of positive reuse, and the loss of business/investor confidence in an area where this is already marginal.
- 3.2.7 The scope of the anticipated investment in wider town regeneration is shown in the figure below:

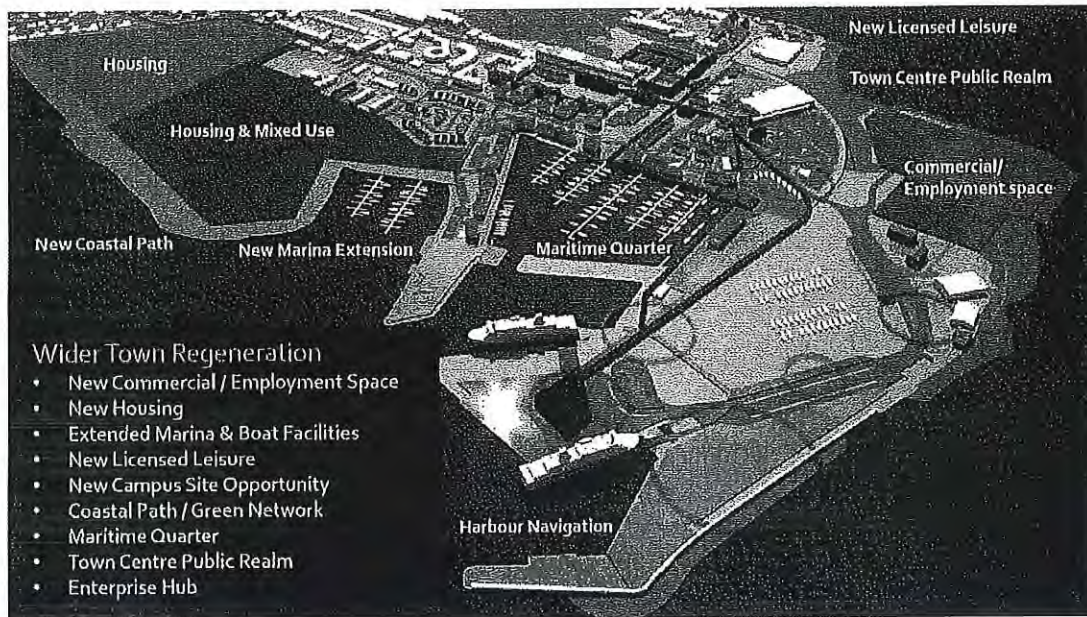
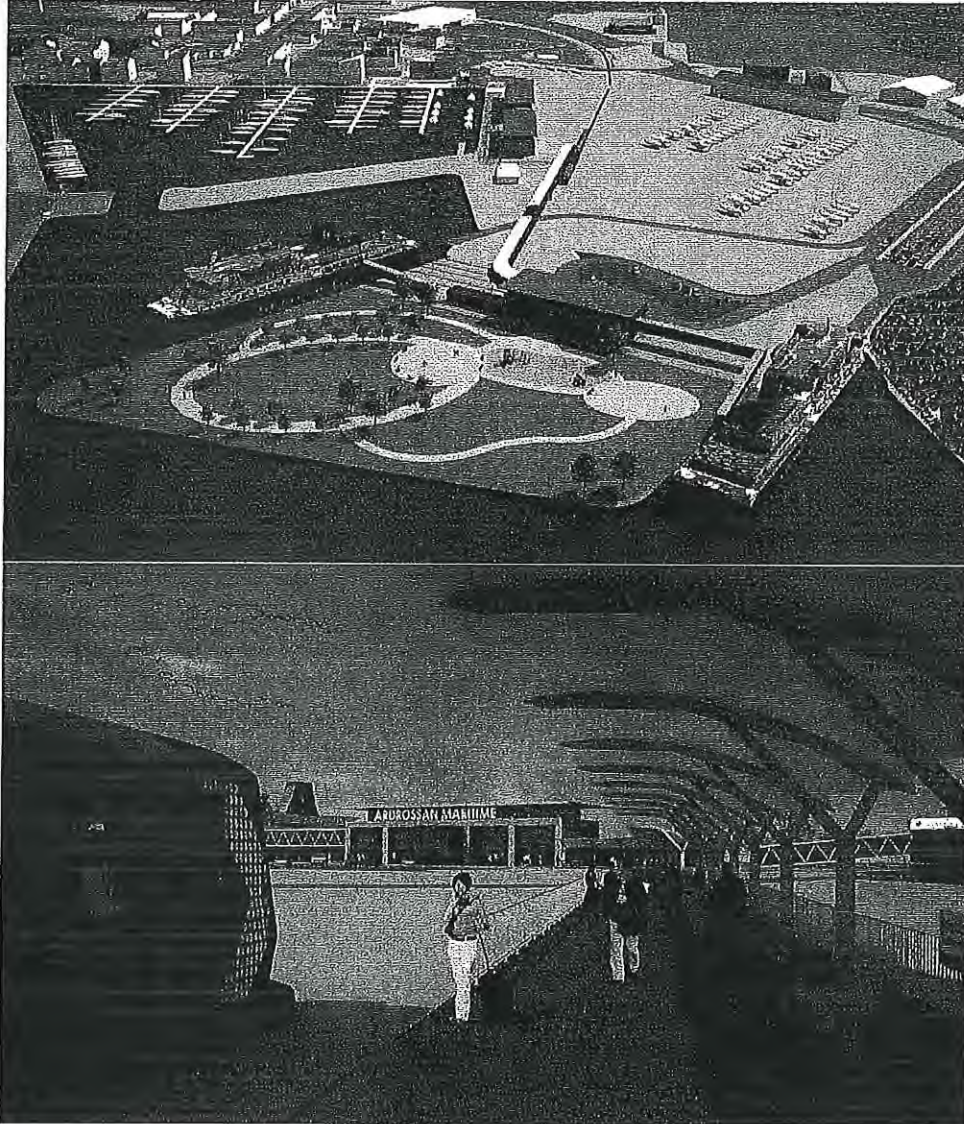


Figure 3.2: Ardrossan Harbour Proposal – Wider Town Regeneration

- 3.2.8 The proposal notes that the regeneration opportunities realised would offer sustainable and inclusive growth that spreads the benefits to support all of the communities in the area – this is noted as central to the Government Economic Strategy and the North Ayrshire Economic Action Plan.
- 3.2.9 Ardrossan is considered to represent a national scale regeneration project given a combination of: existing deprivation and derelict land; and, the opportunity provided by the ferry service and the potential investment this could release.
- 3.2.10 The economic baseline developed as part of the proposal identified the following key points:
- There are 2,000 jobs in Ardrossan, of which 1,250 jobs are within the town centre area.
 - It is estimated that 240 jobs are reliant on the ferry service (62 direct CalMac, 103 indirect CalMac servicing, 75 retail / food & drink / transport / visitor spend).
 - The ferry generates £9.2m of Gross Value Added (GVA) per annum and wages of £4.3m per annum.
 - The baseline identifies the continuous impact of the ferry service as £157m total GVA and £73m total wages, discounted over 25 years.
- 3.2.11 The proposal identifies the wider economic benefits of retaining the ferry services as:
- The retention of the ferry and associated investment generates £40m of GVA.
 - Investment will create 1,000 person year equivalent jobs.
 - New activity will generate £3m-£6m of additional GVA per annum.

Visuals of Proposals:



3.3 Troon – Associated British Ports

3.3.1 ABP is the UK's largest port operating company. In Scotland, they operate the ports of Ayr and Troon, whilst their wider UK portfolio includes major ports such as Southampton, Hull and Immingham. Their proposal highlights a range of significant recent investments in Ayrshire, demonstrating a commitment to the area.

Summary

3.3.2 ABP has set out nine key reasons as to why they believe the Arran and Campbeltown services should be operated from Troon. These are:

- **All weather berthing:** Troon is one of the most sheltered harbours on the west coast of Scotland. ABP note that the solution they are proposing will address the problem of cancelled sailings to Arran.

- **Extra resilience:** Along with two Ro-Ro ferry berths, the port also has layby berths and an operational drydock facility, adding 'on-the-door step solutions' when problems arise.
- **Future proofing the service:** Troon's Ro-Ro infrastructure at the East Pier was installed new in 2001. It will work with the new build vessel currently under construction as well as future generations of vessels.
- Troon is **extremely well connected** by road, rail and air.
- **Practical for both conventional and LNG fuelling:** The port of Troon's unique layout means that it can potentially offer critical support functions, such as fuelling that may be much harder at other ports.
- **ABP's commitment to the operation of Troon Harbour:** ABP note that they have a track record of investing significant sums of money in their port estate in Scotland at Ayr and Troon. They have also provided a binding commitment in their offer to repair and maintain the Port throughout the duration of the CalMac contract.
- **Local management team and winning customer service:** ABP's Scottish Management team is based in Ayr along with all of the support functions required to operate a modern port. The ABP team was recently voted number one for customer service in the UK by ABP's customers.
- **Peace of mind:** ABP note that Transport Scotland will be working with the UK's largest port operating company.

Marine Infrastructure

3.3.3 The ABP proposal notes that:

- Major concerns have been raised by the community on Arran for many years regarding the reliability of the service.
- Concerns have also been raised by businesses on Arran regarding the economic impact on the island of cancelled ferry sailings.

3.3.4 Building on the above points, the ABP proposal highlights Troon as an 'all weather alternative' port, arguing that the north-east facing harbour entrance shelters Troon from the prevailing wind.

3.3.5 The proposal also notes that almost all of the marine infrastructure required is already in place at Troon, as follows:

- **East Pier:**
 - East Pier terminal – conveniently located in the North Bay on the sheltered side of the port with nine acres of associated hard standing.
 - East Pier ferry berth – purpose built ferry berth built new in 2001 and constructed to take vessels with an overall length of up to 160 metres over a 180 tonne linkspan.
 - Dredged depth – for all tide access, the East Pier berth is currently dredged to a depth of 5.4 metres.
- **West Pier:**
 - West Pier ferry berth – inner harbour berth capable of taking vessels up to 110 metres over a 44 tonne linkspan facility.
 - For all tide access, the West Pier berth is currently dredged to a depth of 4.5 metres.
- **Other infrastructure:**

- Two layby berths are available to accommodate ferries.
- There is a fully operational drydock currently used by CalMac.

Passenger Terminal

- 3.3.6 Whilst most of the required marine infrastructure is already in place at Troon, ABP is proposing the construction of a new passenger terminal. The new purpose built passenger terminal would be situated on the East Pier at Troon and would be designed to complement the terminal currently under construction at Brodick. Artist's impressions of the proposed new terminal are provided below:

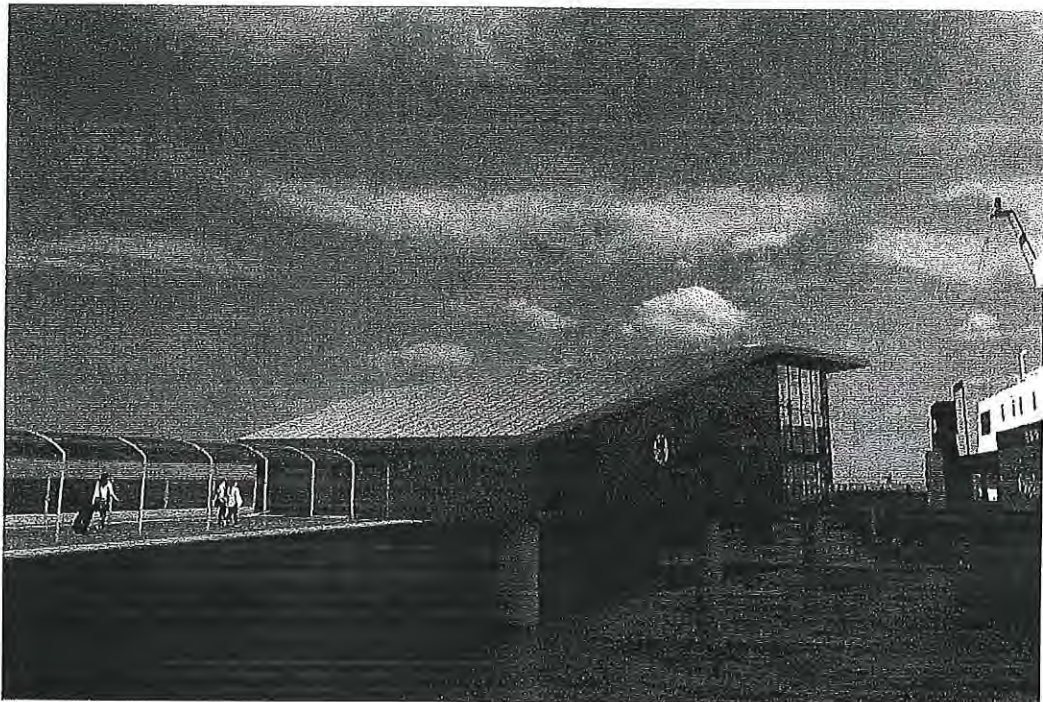


Figure 3.3: Artist's Impression of Proposed New Troon Ferry Terminal

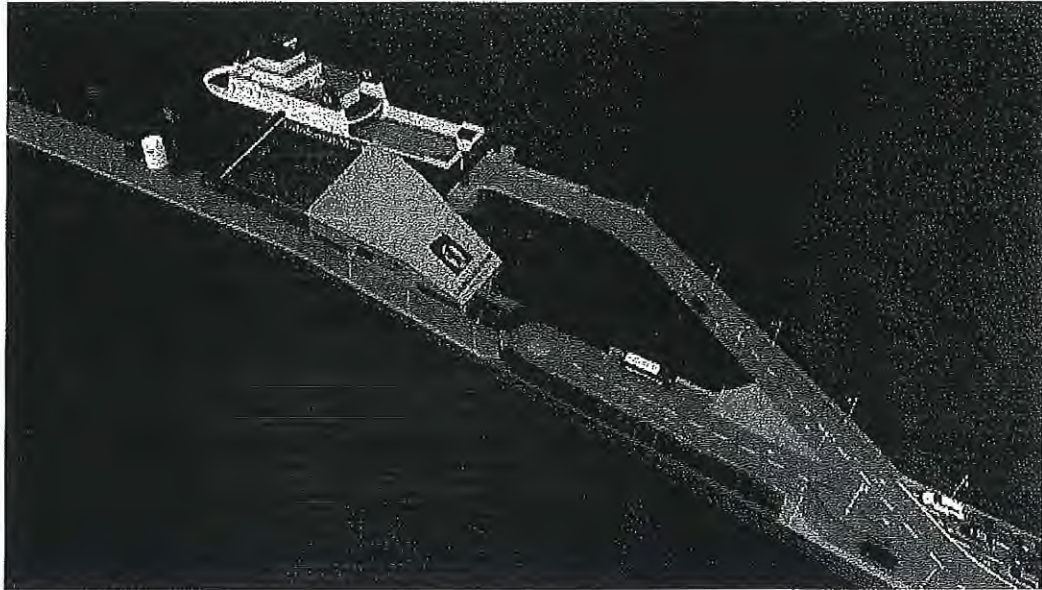


Figure 3.4: Artist's Impression of Proposed New Troon Ferry Terminal

- 3.3.7 In addition to the main passenger terminal building, the construction project would be fully inclusive of all associated infrastructure such as a fully covered passenger access system to the vessel, car parking, pre-departure vehicle marshalling, vehicle check-in booths, passenger drop-off, bus stops, cycle lane, disabled parking and a covered pedestrian walkway.
- 3.3.8 The proposal notes that construction of the new passenger terminal at Troon can be completed in time for the delivery of the new ferry in 2018, with the up-front construction costs met by ABP.

Shuttle Bus

- 3.3.9 ABP has committed to operating a free shuttle bus service between the port and Troon railway station. This would be committed for the 30-year duration of the appraisal.
- 3.3.10 The ABP proposal notes that the buses will be free to users and that the working assumption is the purchase of two buses, which will work on a continuous shuttle. The precise specification of the buses is yet to be defined but it is anticipated that these would be electric vehicles similar in design to those used in the long-stay car park at Edinburgh Airport. Peak flow analysis would be used to identify when additional buses would be required – these vehicles would be chartered as appropriate.
- 3.3.11 The ABP proposal works on the assumption of a short hop 4-minute bus journey to the railway station. On the journey to the railway station, there would be one on-demand stop for passengers, whilst the return journey would involve a stop at the long-stay car park. ABP would aim to plan this route out with the public.
- 3.3.12 ABP would also put in signed walking routes in partnership with South Ayrshire Council. There would be two routes, an express route to the railway station and an indirect route via the town centre.

Ongoing Commitments

3.3.13 In addition to the main ferry terminal construction project, ABP has indicated that they will provide a set of assurances for the duration of any signed contract with the Scottish Government. ABP note that they will:

- Continue to repair and maintain the harbour walls.
- Continue to repair and maintain the secondary West Pier linkspan.
- Continue to dredge the harbour.
- Continue to provide full on site marine control cover for the port.
- Continue to provide pilotage services at Troon.
- Set-up a community fund of circa £50k per annum to support good causes on the Isle of Arran.

4 Reliability

4.1 Overview

- 4.1.1 As noted in the previous chapter, a key element of ABP's proposal for Troon is that it would offer a more reliable service than Ardrossan given the relative configurations of the harbours. It is therefore important as part of this review to fully explore the issue of reliability in some detail.

4.2 Simulations

- 4.2.1 CMAL commissioned berthing simulations for Ardrossan and Troon. The tests included realistic modelling of the vessel hull form, windage, propeller/thruster forces, response rates and the operating ports.

- 4.2.2 An initial set of simulation trials for Ardrossan were carried out at the state of the art simulator suite at the City of Glasgow College on 23rd January 2017, followed by tests for Troon and Ardrossan on 20th February 2017. The testing was undertaken on these days by three Masters from CalMac. Pre-testing was carried out by Captain Phillip Taylor from the College. Arrival and departure manoeuvres to each port under a variety of weather conditions were undertaken to assess the vessels' manoeuvring response and capability.

- 4.2.3 The 'general observations' from the summary report are as follows:

- *Similar weather conditions were tested for both ports (further testing will be carried out on 27th March 2017). Berthing in both locations was relatively similar, although in more difficult conditions, Troon was marginally better.*
- *In weather conditions of 40+ knots, it is unlikely that the vessel would sail in such conditions, passenger safety being of paramount consideration.*

- 4.2.4 Overall, the simulations provide the most robust analysis of the comparative operational characteristics of the two potential mainland ports. However, the simulations report notes that it is difficult to give an accurate 'compare and contrast' between the ports as the true dynamic responses for the vessel had not been fed into the simulator model at the time of writing.¹⁷

4.3 Operator Data

- 4.3.1 In order to contextualise the reliability record on the Arran route, a set of *Performance* data was obtained covering the period October 2007 to September 2015¹⁸. These data contained a sailing-by-sailing record of all scheduled CalMac sailings over this period. Each sailing is classified as one of:

- On time or arrived early: arrival within 5 minutes of published arrival time (b);
- Level 1 Lateness: 5-10 minutes late for crossings less than 1 hour (c)¹⁹;

¹⁷ New Vessels 1 & 2 102.4m Dual Fuel Ro-Pax Ferries, Manoeuvring & Berthing Simulation Test (CMAL, 2017), pp. 2-5.

¹⁸ These time periods reflect the 'Contract Years' within the tendered CHFS contract structure and this definition is used in collating statistics relating to the operation of the ferry services.

¹⁹ <https://www.calmac.co.uk/corporate/route-performance>, states that 'In terms of punctuality (b), (c) and (d) above are applied after taking into account any knock-on delay from the previous sailing. Caledonian MacBrayne is subject to penalty on all cancellations, Level 1 lateness and Level 2 lateness, after taking relief events into account. There are a variety of relief events agreed by the Scottish Government: for example, sailings which were cancelled due to bad weather, in accordance with safety procedures; delays due to the unavailability or

- Level 2 Lateness: >10 minutes late for crossings less than 1 hour (d);
- Cancelled; or
- Additional: non-timetabled sailings, to clear backlogs etc.

4.3.2 It is noted that no comparison between routes can be definitive given that local weather and sea conditions can vary widely on any given day across the network. The purpose of this exercise is solely to record the weather related reliability record on the Ardrossan-Brodick route in the context of other CalMac routes operating with similar vessels.

4.3.3 The figure below sets out these performance statistics for Ardrossan – Brodick by month for the most recent year, October 2014 to September 2015 inclusive.

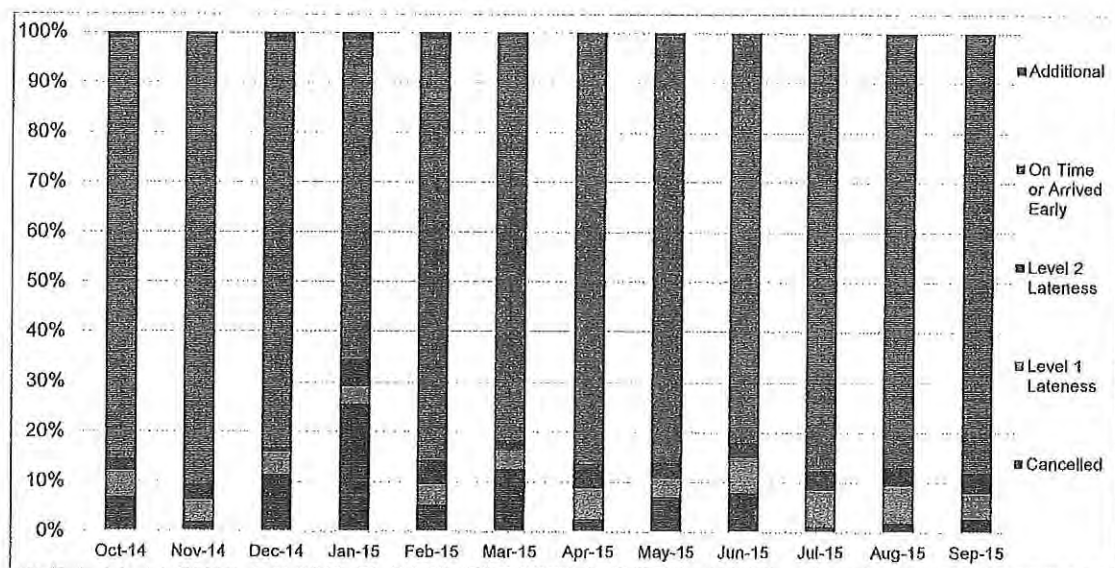


Figure 4.1: Ardrossan – Brodick Route Performance Statistics by Month, 2014-15

4.3.4 Over this 12-month period, 83.9% of sailings were defined as 'on time or arrived early', 8.9% were late (Level 1 or 2), 6.6% were 'cancelled' and 0.7% were 'additional' sailings. The chart below shows the breakdown of the 6.6% of sailings which were cancelled, by cause of cancellation across the year.

operational restrictions of harbour facilities, or having to wait for the arrival of other public transport connections. Relief events can also take into account the lifeline nature of the services'.

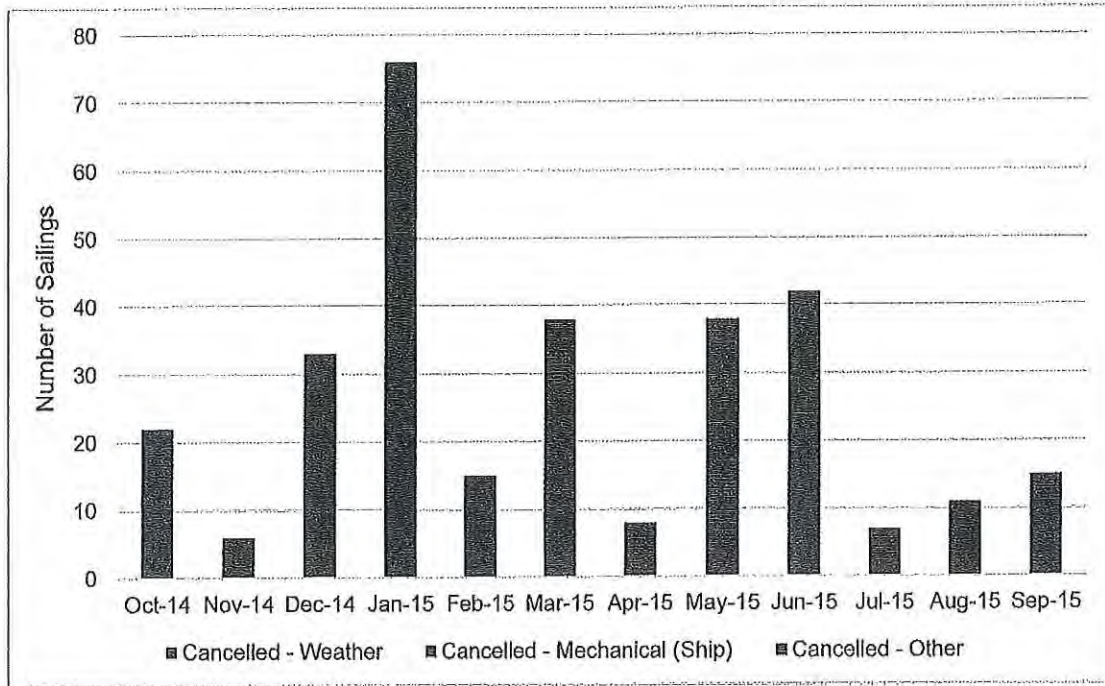


Figure 4.2: Ardrossan – Brodick Route Performance Statistics by Month, 2014-15

- 4.3.5 Of the 311 cancellations, 226 were attributed to 'adverse weather', 62 to mechanical difficulties with the ship(s) and 23 cancellations were attributed to 'other' reasons. No cancellations were attributed to shore based mechanical problems. Overall therefore, 4.8% of scheduled sailings in this year were cancelled due to adverse weather. The remainder of this section focusses on weather related cancellations, as this is the primary metric of interest to the public. It can reasonably be assumed that the trends identified here with respect to cancellations would also apply to punctuality. In addition, the late running of Arran services is likely to lead to cancellations later in the day given the constraints on crewing hours.
- 4.3.6 The Arran route is unusual in that it has operated with a second vessel in the summer. The chart below shows the number of cancellations on the Ardrossan-Brodick route due to adverse weather in each contract year by vessel.

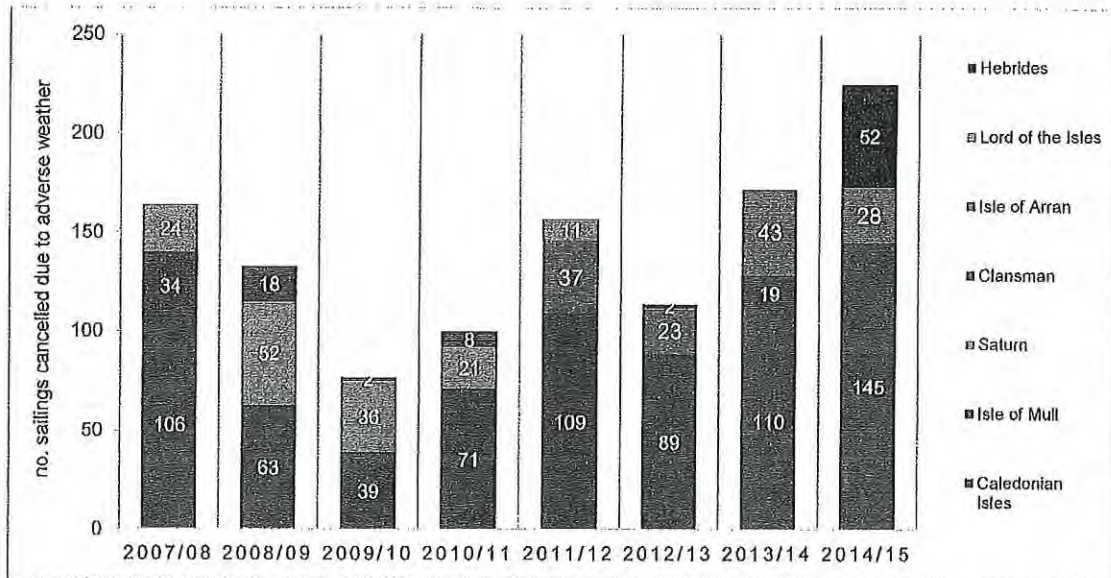


Figure 4.3: Ardrossan – Brodick Route, Weather-related Cancellations by Vessel, 2007/08 to 2014/15

- 4.3.7 It can therefore be seen that a significant proportion of these cancellations can be attributed to the 'second' or 'relief' vessels, which are less well suited to operating this route. For example, the MV *Saturn* was responsible for a high share of these cancellations in 2008/09 and 2009/10 despite operating in the summer only.
- 4.3.8 Over this eight-year period, the weather related cancellation rates per vessel are as follows: MV *Caledonian Isles* - 2.7%, MV *Isle of Mull* – 17.8%; MV *Saturn*: 6.5%; MV *Clansman* – 6.8%; MV *Isle of Arran*: 3.5%; MV *Lord of the Isles* – 6.9%; and MV *Hebrides* – 14.6%. These figures confirm that the MV *Caledonian Isles* has the lowest cancellation rate of these vessels.
- 4.3.9 In order to compare this figure with the wider CalMac network, the figure below shows the annual weather related cancellation rate for Ardrossan – Brodick together with the equivalent figures for all routes operating 'Large'²⁰ vessels and all routes operating 'Intermediate'²¹ vessels. In the light of the above analysis, the cancellation rate for the MV *Caledonian Isles* only is also shown separately.

²⁰ Kennacraig-Islay, Kennacraig-Islay-Colonsay-Oban, Oban-Castlebay/Lochboisdale, Oban-Coll/Tiree, Oban-Coll/Tiree-Castlebay, Oban-Colonsay, Oban-Craignure, Uig-Tarbert/Lochmaddy, Ullapool-Stornoway, Mallaig-Lochboisdale

²¹ Mallaig-Armadale, Small Isles, Wemyss Bay-Rothesay

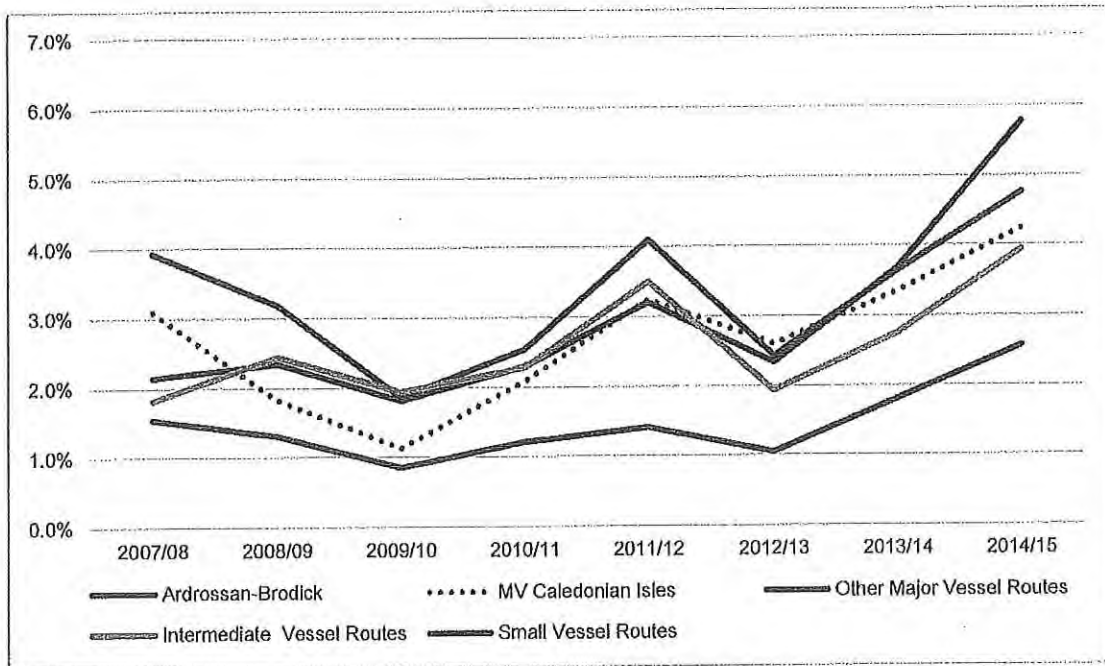


Figure 4.4: Ardrossan – Brodick Weather Related Cancellation Rate versus Wider Network, 2007/08 to 2014-15

- 4.3.10 It can therefore be seen that the pattern is common across all routes in terms of 'good' and 'bad' years. In the period 2007/08 to 2011/12, the record of Ardrossan – Brodick was generally worse than across the other Major Vessel routes, but the record is much more comparable in the more recent period from 2012/13 to 2014/15.
- 4.3.11 As noted above, this trend can in part be attributed to the use of the MV *Saturn* on the route during these early years. When the MV *Caledonian Isles* is considered in isolation, the rate of cancellations is lower, reflecting the higher cancellation rates of the second and relief vessels, and the cancellation rate is generally lower than the Other Major Vessels.
- 4.3.12 The record for Intermediate Ferries is better than for Major Vessels – this figure is dominated by Wemyss Bay – Rothesay which is a higher frequency service on a more sheltered route. As would be expected given the nature of the crossings, the cancellation rate on Small Ferries routes is lower again, at 2.6% in 2014/15.
- 4.3.13 If a 5-year average is taken for the last five years, the all vessel weather related cancellation figure at Ardrossan - Brodick is 3.5% (3.1% for MV *Caledonian Isles* only), and the figure for the other Major Vessels routes is also 3.5%. The equivalent figure for Intermediate Vessels is 2.9% and for Small Ferries the figure is 1.6%.
- 4.3.14 The figure below shows where the Ardrossan – Brodick routes sits in comparison to other named routes operated by Major and Intermediate vessels, with the figures reported being a 5-year average from 2010/11 to 2014/15.

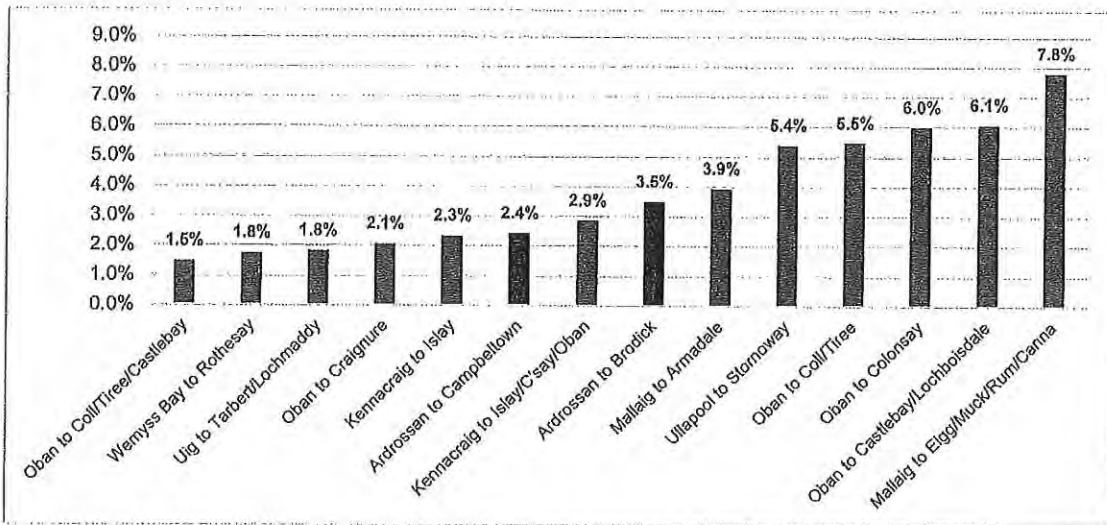


Figure 4.5: Major / Intermediate Vessel Routes, Weather Related Cancellation Rate, 5-Year Average 2010/11 to 2014/15

4.3.15 It can therefore be seen that the routes out of Ardrossan fall towards the middle of this range. The Ardrossan routes' cancellation figures are lower than routes out of Oban but higher than routes such as Kennacraig-Islay (which operates from two island terminals) and Oban-Craignure. The closest geographical comparator is Wemyss Bay to Rothesay although this route is more sheltered than Ardrossan-Brodick.

4.4 P&O Ferries Data

- 4.4.1 P&O Ferries operated a 6-days a week freight service from Ardrossan to Larne in Northern Ireland until 2001 (i.e. one sailing in each direction per day), at which point the service was relocated to Troon. A request was made to P&O for comparative reliability data when operating from Troon and Ardrossan. However, the data available did not extend as far back to the period during which the service was operating from Ardrossan.
- 4.4.2 However, P&O Ferries has provided data on delays and cancellations on the freight ferry service operated from Troon by the MV *European Mariner* for 2008, 2009 and 2010. This vessel was a 116m LOA ro-ro freight ferry, launched in 1978 and scrapped in 2011.
- 4.4.3 The data provided does show a degree of consistency between cancellations on Ardrossan-Brodick and cancellations / delay on the Troon-Larne service, i.e. days when both services were affected. There are also many days on which the Troon freight ferry sailed whilst there were cancellations at some point on that day on the Arran ferry. There are a number of days when the Arran ferry sailed whilst the Troon ferry suffered disruption, potentially at the Larne end.
- 4.4.4 The table below provides a comparison of the data provided by P&O and the CalMac data for the illustrative full year of 2008.

Table 4.1: Ardrossan – Brodick & Troon – Larne Comparison

<i>Date</i>	<i>CalMac: Ardrossan - Brodick Cancelled – Adverse Weather (cancelled / scheduled)</i>	<i>P&O: Troon - Larne Weather Impact</i>
05/01/2008	3/10	
09/01/2008	7/10	Cancelled
18/01/2008	2/10	
24/01/2008	1/10	
25/01/2008	6/10	Disrupted
26/01/2008	1/10	Cancelled
31/01/2008	10/10	Disrupted
01/02/2008		Cancelled
02/02/2008	10/10	
03/02/2008	6/8**	
04/02/2008	1/10	
08/02/2008	2/10	
22/02/2008	6/11	
25/02/2008	5/10	
26/02/2008	6/10	Disrupted
27/02/2008		Disrupted
29/02/2008	8/10	
01/03/2008	1/10	Disrupted
08/03/2008	2/10	
11/03/2008	2/10	Disrupted
12/03/2008	6/10	Cancelled
22/03/2008		Disrupted
01/04/2008	5/12	Disrupted
02/04/2008		Disrupted
01/05/2008		Disrupted
17/06/2008	2/18	
23/06/2008		Disrupted
26/06/2008	2/18	
01/07/2008	8/18*	
10/07/2008	2/18*	
15/07/2008	2/18*	
25/08/2008	8/18*	
06/09/2008		Disrupted
03/10/2008		Cancelled
19/10/2008	1/8**	
20/10/2008	4/10	
21/10/2008	1/10	
23/10/2008	6/10	

	CalMac: Ardrossan - Brodick	P&O: Troon - Larne
Date	Cancelled – Adverse Weather (cancelled / scheduled)	Weather Impact
24/10/2008	2/10	Disrupted
25/10/2008	5/11	Disrupted
08/11/2008	1/10	Disrupted
09/11/2008	2/8**	
10/11/2008	6/10	
11/11/2008	3/10	Cancelled
20/11/2008	3/10	Disrupted
21/11/2008	1/10	Disrupted
24/11/2008	1/10	
27/11/2008	1/10	
04/12/2008	1/10	Disrupted
10/12/2008		Disrupted
18/12/2008	1/11	
19/12/2008	5/10	
20/12/2008		Disrupted

* all cancelled sailings attributed to the MV *Saturn*

** Sundays – assumed no comparator P&O sailing

4.4.5 Overall, it can be seen that the CalMac service incurred weather related cancellations on 43 days across the year compared to 25 days on the Troon - Larne route where there was weather related disruption (i.e. delayed sailings) or cancellations. However, on only two occasions were all sailings in a given day cancelled due to adverse weather. Of the 43 days when there were weather related cancellations, on 30 of these days fewer than half of the sailings were cancelled.

4.4.6 It is difficult to draw any definitive conclusions from the above dataset based on the P&O service given the differences in the service type, frequency and the vessels used.

4.5 Views of Master Mariners

4.5.1 The final element of this task is to establish the views of a selection of Master Mariners in relation to operating to and from both Ardrossan and Troon. A number of mariners experienced in operating from one or both ports have provided comment in relation to the pros and cons of each.

4.5.2 This information is helpful in terms of providing operational insights from individuals that have operated services into one or both harbours. However, it is important to bear in mind that:

- the views expressed are in most cases opinions and can thus only be treated as anecdotal; and
- none of the mariners that have provided input have experience of taking the vessels in question into Ardrossan or Troon.

CalMac Masters

4.5.3 Permission was requested from CalMac (via Transport Scotland) to discuss berthing practices at Ardrossan. However, as this is a competitive proposal situation and CalMac will ultimately

operate into the chosen mainland port, it was considered inappropriate for individual crew members to comment on this issue.

[REDACTED]

Commissioning of Report

- 4.5.4 The report from [REDACTED] was commissioned by Transport Scotland. [REDACTED] received no remuneration for his inputs. A written submission was received and followed up in a face-to-face meeting between PBA and Captain Jones.

Biography

- 4.5.5 [REDACTED] had a seagoing career spanning over 40 years, much of it spent in Scottish waters. His first command was in 1973, at the age of 29, operating Ro-Ro services between Barry and Dublin. Following on from this, he served with P&O Ferries for 29 years until retirement in 2004.
- 4.5.6 From 1978-1980, [REDACTED] was Master on the MV *St Magnus*, operating the Aberdeen – Kirkwall – Lerwick service. In 1980, he assumed command of the P&O freight service between Ardrossan and Belfast (and latterly Larne). His commands included:
- MV *Pointer* (1980-1985)
 - MV *Belard* (1985-1987)
- 4.5.7 In 1987, [REDACTED] was reassigned to the Fleetwood – Larne service before returning to Ardrossan in 1994, taking command of the MV *Merchant Valiant / Lion / European Highlander / European Mariner* (all the same vessel) – (1994-2000 and then again from 2001 until the service relocated to Troon).
- 4.5.8 Following the decision of P&O to leave Ardrossan in 2001, [REDACTED] inaugurated the P&O freight services between Troon and Larne. His commands included:
- MV *European Mariner*, 2001 and from 2003 until his retirement in 2004; and
 - MV *European Navigator*, 2002.
- 4.5.9 [REDACTED] retired from P&O in 2004 and latterly worked with Irish Ferries as a training and relief Master on the MV *Isle of Inishmore*.
- 4.5.10 With a lengthy career operating from both Ardrossan and Troon, [REDACTED] is almost uniquely placed to objectively comment on the comparative merits of both ports.

Views

- 4.5.11 In his submission and the subsequent meeting, [REDACTED] sought to make clear that his experiences of operating to and from Ardrossan are not directly comparable with those of CalMac Masters. He points out that the vessels used by P&O were considerably larger and, at least in comparison to FMEL 801 / 802, less powerful. The P&O vessels also made use of the Irish berth rather than the Arran berth. This was generally more challenging because the vessel had to swing round over 90 degrees and reverse onto the berth, all the time being pushed off of that berth and onto the 'very hard' Montgomery Pier by the prevailing wind. In contrast, the CalMac vessels are afforded a degree of shelter when they pass the breakwater and are pushed onto the Arran berth by the prevailing wind.
- 4.5.12 [REDACTED] requested the inclusion of the above paragraph to highlight that his experiences are not exactly like-for-like with those of the CalMac Masters. He anticipates that the CalMac record would show they fared better than P&O with the success rate of getting in

and out safely. He further notes that getting out of the harbour in south-westerly gales was equally hazardous and would again say that CalMac had the advantage over P&O in terms of this manoeuvre. He noted that during the process of accessing / egressing Ardrossan, there were a number of incidences of damage to shell plating from time-to-time.

Ardrossan

- 4.5.13 [REDACTED] set out the approach to and challenges of accessing both ports in some detail, and expanded on this during our meeting.
- 4.5.14 From an Ardrossan perspective, the key point noted was that once a decision is made to pass through the breakwater, the Master is committed and there is no escape route. [REDACTED] generally made a judgement on whether to enter around one mile out. For the P&O vessels, an approach was generally not made if the wind was in excess of 30 knots (all directions), although it was noted that 35-40 knots would be a more reasonable cut-off point for CalMac vessels, particularly the new vessel which is designed to hold station in up to 50 knots of wind.
- 4.5.15 Whilst the vessel has to slow down to make the turn into Ardrossan, [REDACTED] noted that an approach speed of 6-8 knots was generally maintained so as not to compromise manoeuvrability. The approach itself, particularly in relation to the Arran berth would, depending on the wind direction, involve approaching close to the lighthouse at the end of the breakwater and, as soon as the bow has passed this point, screwing the vessel around. He noted that the Arran berth provides good shelter from swell and the prevailing wind generally pushes the vessel onto the berth.

Troon

- 4.5.16 In terms of the approach to Troon, [REDACTED] noted that the upper parameters would be broadly similar to Ardrossan, with no approach attempted in winds over 35-40 knots, or potentially up to 45 knots in a northerly wind.
- 4.5.17 [REDACTED] explained that the 'troublesome quadrant' in terms of the wind at Troon is greater than at Ardrossan. He explained that in Troon any strong winds between south and west could cause difficulties to a low powered vessel. He further noted that swell within the harbour would not be an issue except on the relatively rare occasions when the wind is coming from the north. For a stern on docking, the normal process would be to enter the harbour and drop the bow onto a selected dolphin and land a couple of headlines. Then, assuming the vessel had enough power, it would be screwed around and the stern manoeuvred onto the berth. Captain Jones noted that going bow in would be comparatively straightforward, although departing the berth would be more difficult when bow-in
- 4.5.18 A further challenge identified with Troon is that, in the prevailing south-westerly winds, the vessel will be getting blown off of the East Pier berth, whereas at Ardrossan, it will be getting blown onto it.
- 4.5.19 However, [REDACTED] noted that the key benefit of Troon is that it was possible to formulate an escape plan if issues arose during the approach. When [REDACTED] was operating from Troon using a stern loading vessel, the escape plan was typically to land the bow on a selected dolphin (making the vessel head to wind), throw a rope ashore and then let the wind bring the stern around. If the stern could be safely landed on the berth, cargo could be discharged, otherwise the bow could be held until conditions improve or pushed out and the vessel could put to sea again.

Passage

- 4.5.20 [REDACTED] explained that the passage to Ardrossan is relatively sheltered, with the island of Arran offering a natural lee. He noted that the passage to Troon is more exposed to winds from the south through south-west, with the sea typically being on the beam, causing

increased passenger discomfort. It was also noted that southerly winds on the passage to Troon would be challenging given the considerable fetch of the swell.

- 4.5.21 [REDACTED] explained that, in particularly inclement weather, alternative dog-leg courses could be chosen. This would significantly increase the journey time, could be bolsterous, and berthing in Troon may be untenable in any case.
- 4.5.22 Whilst the passage to Troon is more challenging, [REDACTED] noted that access to the chosen harbour will be the bigger issue rather than the passage itself.

Ardrossan / Troon Comparison

- 4.5.23 [REDACTED] noted at the outset that a number of cancellations can be expected on the Arran and Campbeltown services irrespective of the chosen mainland port. As he considers the entry parameters to be broadly similar, there would be certain spells of weather where the vessel simply would not sail to either port.
- 4.5.24 In terms of comparative reliability, [REDACTED] noted that it is the vessel capabilities and not the port *per se* which will determine reliability. In his view, given the specified capabilities of FMEL 801 / 802, she will establish a broadly similar track record irrespective of which port she is operating from.
- 4.5.25 With the current vessels, [REDACTED] believes that Troon would record a slightly better success rate than Ardrossan in the same weather conditions, but his view is that any benefit would be relatively marginal. In addition, he notes that the MV *Caledonian Isles* may struggle to come alongside at Troon in strong southerly and south-westerly winds (35 knots upwards) as the vessel will be getting blown off of the berth (the opposite of what happens at Ardrossan). Again, this impact is seen to be marginal as he would advise that the berth is not approached in over 40 knots of wind in any case.
- 4.5.26 Whilst [REDACTED] believes that the reliability differential between the two ports is likely to be marginal for the MV *Caledonian Isles* and equivalent for FMEL 801 / 802, he did explain that the ability to implement an 'escape plan' at Troon provides a Master with greater confidence in making the approach than at Ardrossan.

[REDACTED] (Master Mariner, Retired)

Commissioning of Report

[REDACTED] report was commissioned by CMAL on a consultancy basis.

Biography

- 4.5.27 Having completed his apprenticeship with Alfred Holt and Company, [REDACTED] remained with them for seven years serving as third then second officer on general cargo ships serving primarily the Far East and West Africa but also trading worldwide. He spent some time standing by a new-build car carrier in Rob Caledon's yard in Dundee which is when he gained an insight into short sea trading. [REDACTED] has gone on to attend and in some cases to superintend numerous dry dockings at a variety of ports including Glasgow, Greenock, Singapore, Hamburg, Rotterdam, Belfast and Liverpool.
- 4.5.28 After spending a further seven years in chemical tankers trading worldwide and serving as second then chief officer, he joined British Transport Ship Management Scotland and served on the Stranraer - Larne route before joining Sea Containers Ferries Scotland as Commander moving on to be Senior Commander and eventually Operations Manager.

- 4.5.29 It was during this time that he served on various vessels and honed his ship handling and management skills on different routes visiting many ferry ports throughout Britain; these included Belfast, Larne, Stranraer, Troon, Liverpool, Campbeltown, Ballycastle, Folkestone, Dover, Boulogne, Calais, Pembroke and Falmouth.
- 4.5.30 As a senior manager, [REDACTED] was part of a small team that established new ferry routes from Stranraer – Belfast, Campbeltown - Ballycastle; Troon - Belfast; Liverpool - Dublin and even Doha - Dubai. Most of these routes involved fast ferries operating all year round.
- 4.5.31 He finished his career as General Manager and Director of Heysham Port working firstly with Sea Containers, then Mersey Docks and finally Peel Ports.
- 4.5.32 Having responsibility for safety training in a number of the above positions, [REDACTED] has a good understanding of the limitations imposed on ferries by both tidal and weather conditions and found himself investigating a number of incidences of berthing contact damage usually associated with adverse weather, groundings and in one case a collision. The robustness and conclusions of these investigations sometimes precluded further investigations by the Marine Accidents Investigation Branch.

Views

- 4.5.33 [REDACTED] identifies two 'changes' which he believes would support an improved service on the routes to Arran and Campbeltown. The first is to provide a more powerful and more manoeuvrable vessel and that is already underway with FMEL 801 / 802 due to enter service in 2018. The second is to select berths that are either more sheltered or provide more sea room to manoeuvre in and provide sufficient length to allow the vessel more room to run moorings etc.
- 4.5.34 It is the opinion of [REDACTED] that the Port of Troon provides such a berth in the form of the East Pier.
- 4.5.35 [REDACTED] made a desk-based comparison of the marine and shoreside facilities available at each port. However, as the investment at whichever port is selected will address any current issues with the marine and shoreside infrastructure, it is not considered appropriate to reproduce this assessment here.

Commissioning of Report

- 4.5.36 As part of the Peel Ports / North Ayrshire Council submission in relation to Ardrossan, a 'Ports & Voyage Report' was provided by Marine Consultants Hanlon Harding. The report was audited by [REDACTED]

Biographies

- 4.5.37 The co-authors of the [REDACTED] report are [REDACTED] and [REDACTED]
- 4.5.38 [REDACTED] is a Master Mariner, Founding Partner and Managing Director of Hanlon Harding Ltd. He is a Marine Pilot with over 40 years of experience in the commercial shipping industry. During his seagoing career, he spent several years operating in the Firth of Clyde, Ports of Helensburgh, and Garelochhead piloting Royal Fleet Auxiliary and Royal Navy vessels. He is a qualified RN PWO (N) Specialist Navigator and has over 20 years' experience as a Senior Pilot at one of the UK's leading international ports, handling everything from small coasters to the largest container ships in the world. [REDACTED] has provided expert navigation

advice and conducted marine accident investigations for the UK government and Marine Accident Investigation Branch of the Department of Transport.

- 4.5.39 [REDACTED] is a Master Mariner, Founding Partner and Chairman of Hanlon Harding Ltd. He is a Marine Pilot with almost 45 years of experience in the marine industry, which started when he went to sea as a Cadet with the New Zealand Shipping Company in 1972. He has experience of Command with both Ro-Ro Ferries and Passenger Ferries alongside 14 years of experience with P&O in their Cruise Liner and Container Ship divisions. He was just 32 when he undertook his first Command with Maersk with whom he also had a spell of shore secondment to undertake maritime safety audits. He has held Pilotage Exemption Certificates for Medway, Thames, Zeebrugge and Dunkirk and has been responsible for DD& R preparation and Ship Society surveys. He also spent a period as an Assistant Superintendent with Sally Line. Clive has 23 years' experience as a Senior Pilot at one of the UKs leading international ports, handling everything from small coasters to ultra large container vessels.
- 4.5.40 [REDACTED] is a Master Mariner, Liveryman of the Honourable Company of Master Mariners, and a Fellow of the Institute of Engineers and Shipbuilders in Scotland. After a career at sea, he was Assistant Harbour Master, Deputy Harbourmaster and Harbourmaster of the Manchester Ship Canal. From December 1996 - August 2014 he was Harbourmaster of Clydeport and Ardrossan Harbour Company. In 2008, [REDACTED] gave evidence to the Scottish Ferries review. Now retired from Peel Ports Group, [REDACTED] acts as "Designated Person" for several smaller Statutory Harbour Authorities, namely Renfrewshire, West Dunbartonshire, North Ayrshire Council, Tarbert Loch Fyne and Tobermory. In 2015/2016 he assisted CMAL in appraising the proposals for the new Harbour Operating Agreement in the Clyde & Hebridean Ferry Services Tender, and is marine advisor to Renfrewshire and Glasgow City Councils on proposed new bridge crossings of the River Clyde. [REDACTED] is a Trustee of the Clyde Maritime Trust (Glenlee) and took the Chair in December 2016.

Views

Ardrossan

- 4.5.41 The [REDACTED] report notes that the harbour entrance channel is well marked by buoys and breakwater lights with a directional leading light providing additional guidance to the mariner approaching the channel. Tidal streams of up to 1.5 knots run across the entrance at their peak rate.
- 4.5.42 Ferries berth on the Ro-Ro terminal in the Old Tidal Basin just inside the breakwater on a south easterly heading of approximately 150 degrees true. The report notes that pilotage onto the berth is relatively straightforward with ample swinging room for ferries to berth bow-first onto the loading ramp.
- 4.5.43 [REDACTED] further explain that, whilst the harbour is well protected from the effects of heavy seas and swell from all directions, the surrounding low lying land leaves the berths relatively exposed to the effects of wind. It is noted that some shelter is afforded from buildings and port infrastructure, but not to any great degree from the prevailing south-westerly winds that predominate in the area.

Troon

- 4.5.44 [REDACTED] noted that the approaches to the port are well marked with navigational buoys and lights and ferries berth on the Outer East Pier, which is 160 metres long, catering for vessels up to 5.4 metres draught. Similar to Ardrossan, the Ro-Ro berth lies on a south-easterly heading.
- 4.5.45 The report explains that, whilst the East Pier has good protection from most directions, the berth is exposed to sea and swell from the north-west. [REDACTED] point out that this will, on occasions, make it difficult for vessels to lie alongside the jetty comfortably.

- 4.5.46 Pilotage into the port is again seen to be reasonably straightforward with ample room for vessels to swing and back in, or berth head onto the passenger terminal.
- 4.5.47 As with Ardrossan, [REDACTED] note that low lying surrounding land leaves the Ro-Ro berth relatively exposed to the effects of wind. They explain that some shelter is afforded from buildings and port infrastructure, but not to any great degree from the prevailing south-westerly winds that predominate in the area.

Voyage Analysis

- 4.5.48 [REDACTED] noted that the crossing from Ardrossan to Brodick generally affords better protection from adverse weather conditions from the prevailing wind directions provided by a lee from the Isle of Arran. They also point out that currently, in severe wind conditions when berthing is not possible at Ardrossan, Gourock is used as a port of refuge, which is significantly further from Troon than Ardrossan.

Conclusion

- 4.5.49 [REDACTED] conclude that:
- Due to the proximity of the Ports of Ardrossan and Troon to each other and the relatively exposed aspects of both sites, the weather conditions experienced at any single time for both locations will ostensibly be the same.
 - As the Ro-Ro terminals in both ports have jetties that lie in a South Easterly direction when approaching from seaward, a vessel that is unable to berth at Ardrossan will in all probability be unable to berth at Troon and vice versa.
 - In periods of strong north-westerly winds, sea and swell conditions in the Firth of Clyde may prevent vessels from safely lying alongside the Outer East Pier Ro-Ro terminal at Troon. Ardrossan harbour is protected from sea and swell at all times.
- 4.5.50 The findings of the [REDACTED] report are endorsed by [REDACTED]

4.6 Conclusions

- 4.6.1 The available data does not allow for a definitive statement on the comparative reliability of operating the Ardrossan – Brodick / Campbeltown route and a comparative Troon – Brodick / Campbeltown route.
- 4.6.2 The CalMac data does not, however, suggest that the current Ardrossan – Brodick route is a particular outlier in terms of reliability (even more so if only the record of the MV *Caledonian Isles* is considered), particularly given the higher frequency of service on that route compared to the majority of comparator routes served by 'Intermediate' and 'Major' vessels.
- 4.6.3 The unknown at this stage is the potential comparative reliability of Troon if the same service were to be operated to that port. The simulations and body of maritime opinion collected through this study suggests that approaching and berthing in Troon is less challenging than Ardrossan, principally because there is an 'escape route' if the vessel was to encounter any difficulties once an approach was committed to. However, there is a broad consensus that the manoeuvre to access the berth in Ardrossan, whilst more challenging, does not in itself materially impact upon reliability.
- 4.6.4 The reliability of any port is determined to a large extent by the specification of the vessel serving it. The simulations and consultation suggested that Troon may offer a marginal reliability benefit in terms of supporting the MV *Caledonian Isles* but that there would be little to no difference in terms of FMEL 801 / 802 given the higher specification of this vessel.

5 Onward Transport Connectivity

5.1 Overview

5.1.1 This chapter considers current public transport service provision and onward road connections at each port. It considers four elements of onward transport connectivity:

- physical infrastructure at both ports;
- current rail and bus connectivity;
- road connections from each port; and
- road and public transport accessibility mapping.

5.2 Physical Infrastructure

5.2.1 This section considers the physical rail and bus infrastructure at each prospective port.

Ardrossan

Railway Infrastructure

5.2.2 As previously noted, Ardrossan is a rail connected port. Ardrossan Harbour railway station is approximately 100 metres from the entrance to the ferry terminal building, with a covered walkway connecting the said building with the station platform. The station is of a single platform arrangement with a single waiting room. There are no ticket machines at the station, although there are platform smartcard validators.²²

5.2.3 The railway station itself is the terminus of a short branch line, which departs the main Glasgow Central – Largs line at a junction to the west of Ardrossan South Beach. On departure from South Beach, trains call at Ardrossan Town (another single platform station in the town centre) before terminating at Ardrossan Harbour.

5.2.4 The railway line is electrified and is generally served by the modern Class 380 rolling stock.

Bus Infrastructure

5.2.5 There is a bus layby immediately outside the terminal building. The Stagecoach X36 (Ardrossan – Glasgow) is the only bus which directly serves the terminal, although there are a number of other bus services which operate in and around Ardrossan town centre.

5.2.6 Outwith the harbour, the nearest bus station is on Harbour Street adjacent to the Asda supermarket. It would take approximately 10 minutes to walk from the ferry terminal to the bus stop.

Troon

Railway Infrastructure

5.2.7 The port of Troon is not directly connected to the national rail network, with the nearest station being Troon itself, which is approximately 1.6 miles from the ferry terminal.²³ Whilst more distant from the port, the station is more developed than the equivalent halt at Ardrossan, with

²² <http://www.nationalrail.co.uk/stations/ADS/details.html>

²³ AA Journey Planner

a two platform arrangement, ticket office / ticket vending machines, toilets etc. The station is located on the Glasgow – Ayr mainline, with a spur line providing a connection to the Glasgow & South Western Railway (GSWR) for connections to Kilmarnock, Dumfries and Carlisle.

5.2.8 The railway line is electrified and is generally served by the modern Class 380 stock, although various rolling stock classes can and have operated to and from this station. Diesel Class 156 *Super Sprinters* serve the GSWR and longer distance services to Girvan and Stranraer.

Bus Infrastructure

5.2.9 No scheduled bus services currently call at the port of Troon. The nearest bus stop to East Pier is on Harbour Road opposite Garden Place (Stop ID: 29724568).

5.3 Public Transport Connectivity

5.3.1 Having set out the physical infrastructure above, the next step is to define the levels of public transport connectivity at each port (this precedes detailed accessibility analysis in a subsequent section).

Ardrossan

Rail Integration

5.3.2 Rail is the dominant onward mode of transport from Ardrossan for those not using a car. The following figures show the integration between rail and ferry services at Ardrossan for both routes, in both directions, summer and winter.

Ardrossan to Brodick & Campbeltown

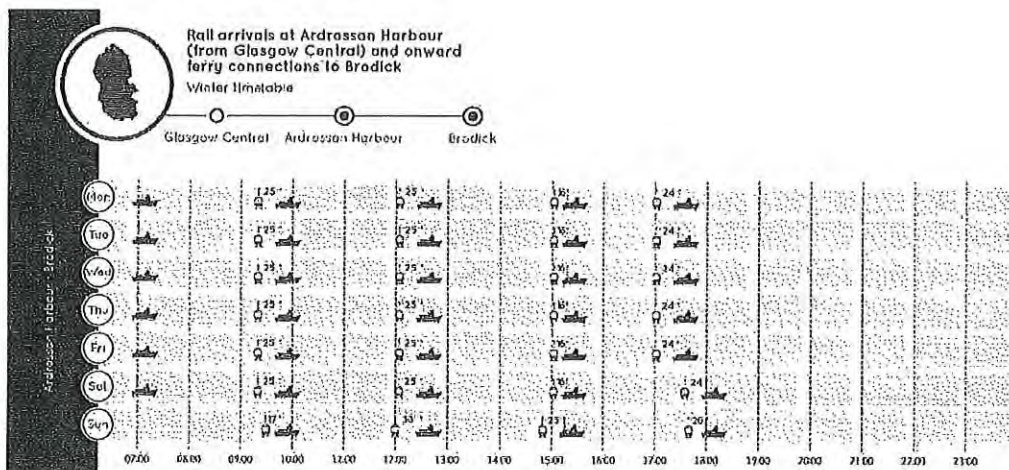


Figure 5.1: Rail Arrivals at Ardrossan Harbour and Onward Ferry Connections to Brodick – Winter Timetable

5.3.3 The key points of note from the above figure are as follows:

- The first rail service of the day arrives too late (by 36 minutes) to connect with the first departure from Ardrossan.
- Rail services are otherwise well integrated with outbound ferry connections to Brodick during the winter timetable.

5.3.4 The following graphic shows equivalent outbound integration for the summer timetable:

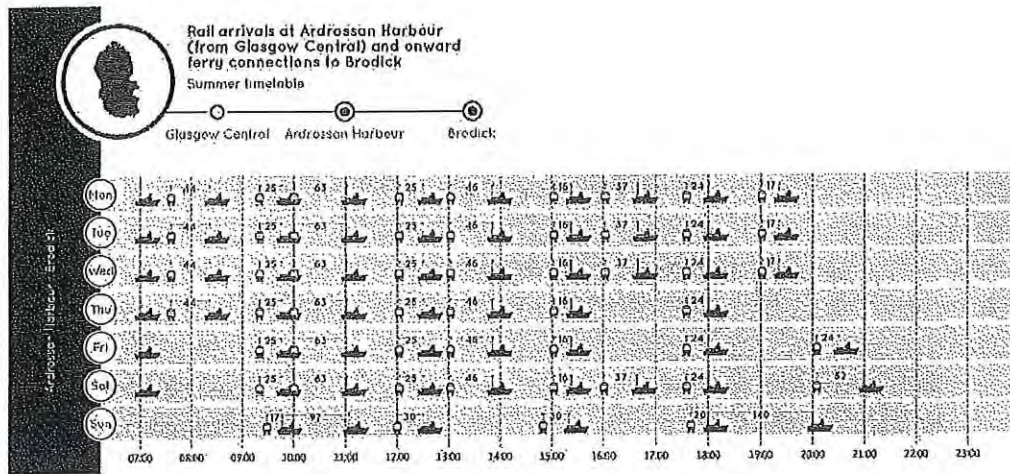


Figure 5.2: Rail Arrivals at Ardrossan and Onwards Ferry Connections to Brodick – Summer Timetable

5.3.5 The key points of note from the above figure are as follows:

- The first rail service of the day arrives too late to connect with the first departure from Ardrossan (train from Glasgow arrives in Ardrossan Harbour at 0736 but ferry departs from Ardrossan to Brodick at 0700).
- Rail services are generally well integrated with outbound ferry departures across the day, although there is a wait of 63 minutes for those using the 1100 departure Monday – Saturday and 97 minutes on a Sunday.
- Rail connectivity with the last outbound service on a Sunday evening is poor, with a layover in Ardrossan of 140 minutes.

5.3.6 The Ardrossan rail services are well integrated with Campbeltown departures. The maximum wait time is 30 minutes on a Sunday.

Brodick & Campbeltown to Ardrossan

5.3.7 The figure below shows the rail connection for each arrival into Ardrossan from Brodick in the winter timetable:

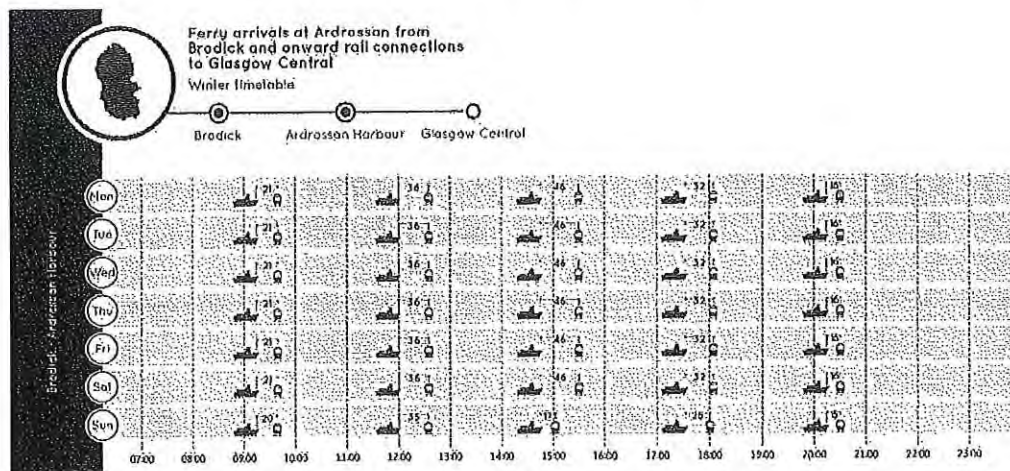


Figure 5.3: Ferry Arrivals at Ardrossan and Onward Rail Connections to Glasgow Central – Winter Timetable

- 5.3.8 It can be clearly seen from the above figure that rail services are generally well timed to meet ferry arrivals from Brodick. The longest wait for a train is on the 1450 arrival into Ardrossan, where the layover time is 46 minutes.
- 5.3.9 The equivalent figure for the summer timetable is shown below:

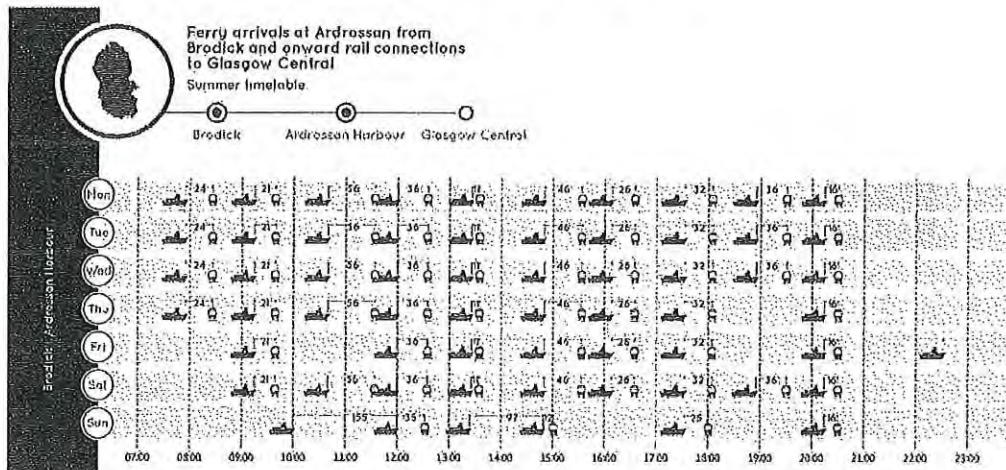


Figure 5.4: Ferry Arrivals at Ardrossan and Onwards Rail Connections to Glasgow Central – Summer Timetable

- 5.3.10 The key points from the above figure are:
- Rail services are generally well-timed to meet inbound ferries. There are only two weekday services with a wait time of over 40 minutes, the 1450 (in common with the winter) and the 1040 arrival, where the layover is 56 minutes.
 - Sunday connectivity is poorer, with lengthy layovers for passengers on the 1000 (155 minutes) and 1325 arrivals (97 minutes).
 - There is no connecting rail service for the 2235 arrival into Ardrossan on a Friday evening.
- 5.3.11 The connections with inbound Campbeltown services are poorer than the outbound equivalents. There are layovers in Ardrossan of 56 minutes on a Saturday or Sunday for any passenger using the train.
- 5.3.12 In summary, rail connectivity at Ardrossan is generally very good. The trains are timetabled to allow enough time to get between the ferry and station platform and vice versa (often with some contingency in the event that either the train or ferry is late). There are however isolated sailings in the summer and winter where there is a connection time in excess of 45 minutes, whilst Sunday connectivity is generally poorer. It is also worth noting that there are no trains in the summer or winter connecting with the first departure of the day, the 0700 ex Ardrossan.
- 5.3.13 It should be noted that if the ferry is late in arriving and the rail connection is missed, there can be a wait of over an hour for the next service. Consultation with Transport Scotland suggests that rail services cannot be held as this would have a knock-on impact on subsequent Ardrossan and wider Ayrshire services.

Bus Integration

- 5.3.14 The figure below shows the bus services operating from Ardrossan Harbour and the surrounding area:

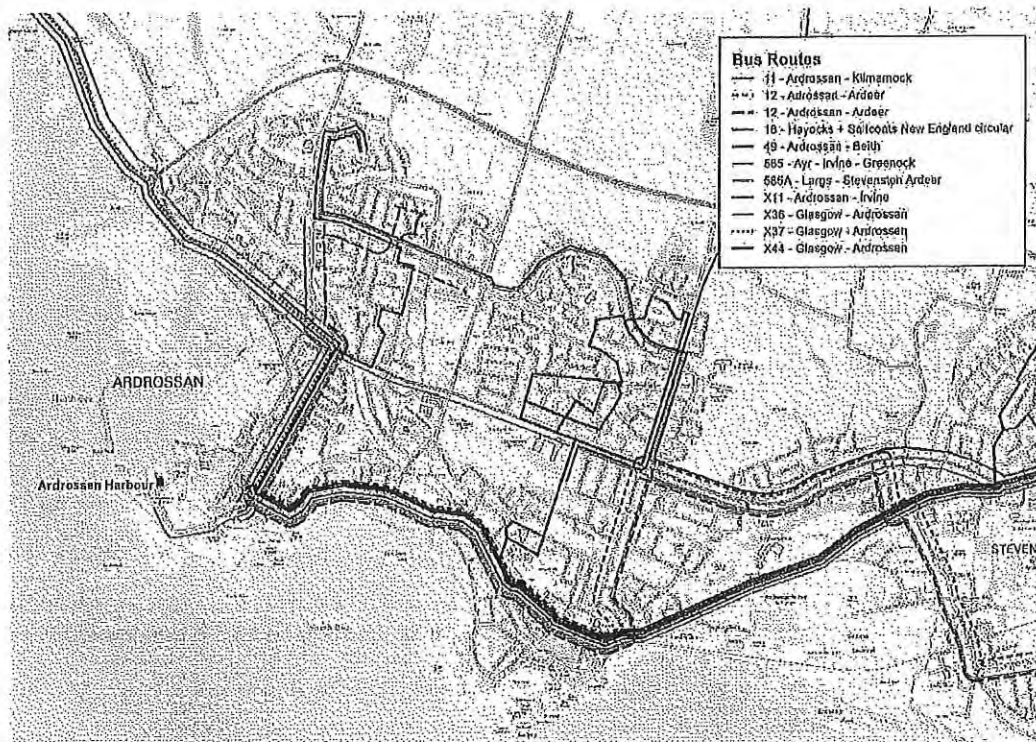


Figure 5.5: Ardrossan Bus Routes

- 5.3.15 The figure above shows the extensive bus network in and around Ardrossan, with good connections to local and strategic (i.e. Glasgow, Greenock, Kilmarnock, Irvine, Ayr etc) destinations.
- 5.3.16 The X36 is the only bus which directly serves the ferry terminal. In terms of straight journey times to Glasgow and a number of intermediate stops, it does not compare particularly favourably with the train. However, given the significant number of concessionary passengers on the Arran services in particular, the bus may be an attractive option for that segment of the market.

Troon

- 5.3.17 As previously noted, there is no railhead at Troon Harbour. If the mainland port for the Arran and Campbeltown ferry was to be relocated to Troon, there would be a need for dedicated shuttle buses between the ferry terminal and the railway station.
- 5.3.18 The need for a shuttle bus service to the station does mean that a foot passenger's trip from Arran to Glasgow would consist of three rather than two legs, with an associated disbenefit to the user from having to make two rather than one transport interchanges. There are also a number of practical issues which would need to be considered and these are set out in the risk chapter.
- 5.3.19 Whilst the logistics of getting to and from the station at Troon are more difficult, the rail service itself is by some margin more frequent. The figure below shows departures from Troon to Glasgow Central in a typical week (the reverse flow is similar):

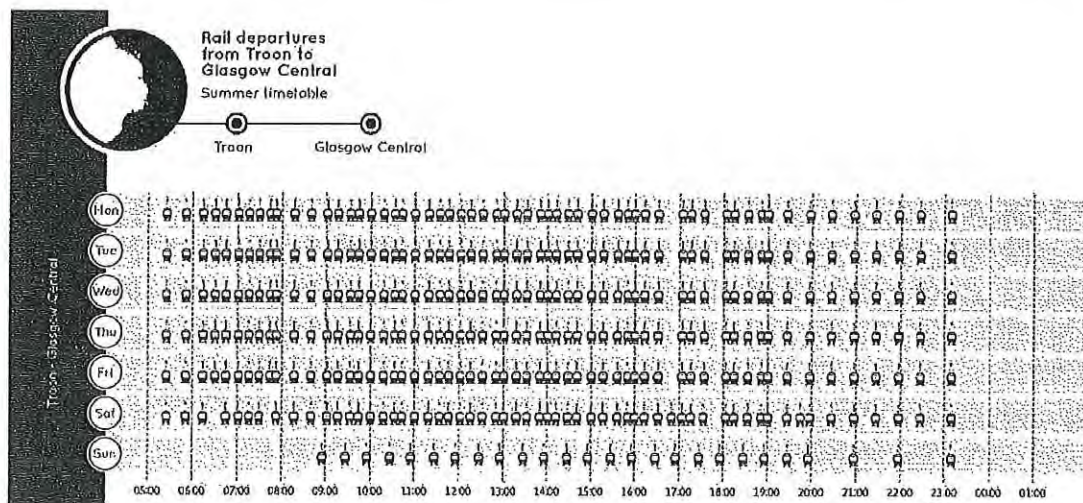


Figure 5.6: Rail Departures from Troon to Glasgow Central in a Typical Week

5.3.20 On a typical weekday, there are 59 services in either direction between Troon and Glasgow Central, around half of which are express services. This high service frequency is a key benefit of Troon as it means that passengers have an almost 'turn-up-and-go' service, lessening the risks associated with missed connections as a result of ferry delays. In addition, Troon would offer:

- better connectivity on arrivals (and departures to some extent) where there is a longer layover (e.g. in excess of 45 minutes);
- connections with the first outbound sailing of the day;
- connections with late evening sailings to and from Ardrossan at the weekend; and
- improved Sunday connectivity.

5.3.21 Troon also offers a greater range of directly served destinations, including Irvine, Ayr, Kilmarnock, Prestwick Airport and Stranraer.

Bus Integration

5.3.22 The figure below shows bus services in vicinity of Troon Harbour:

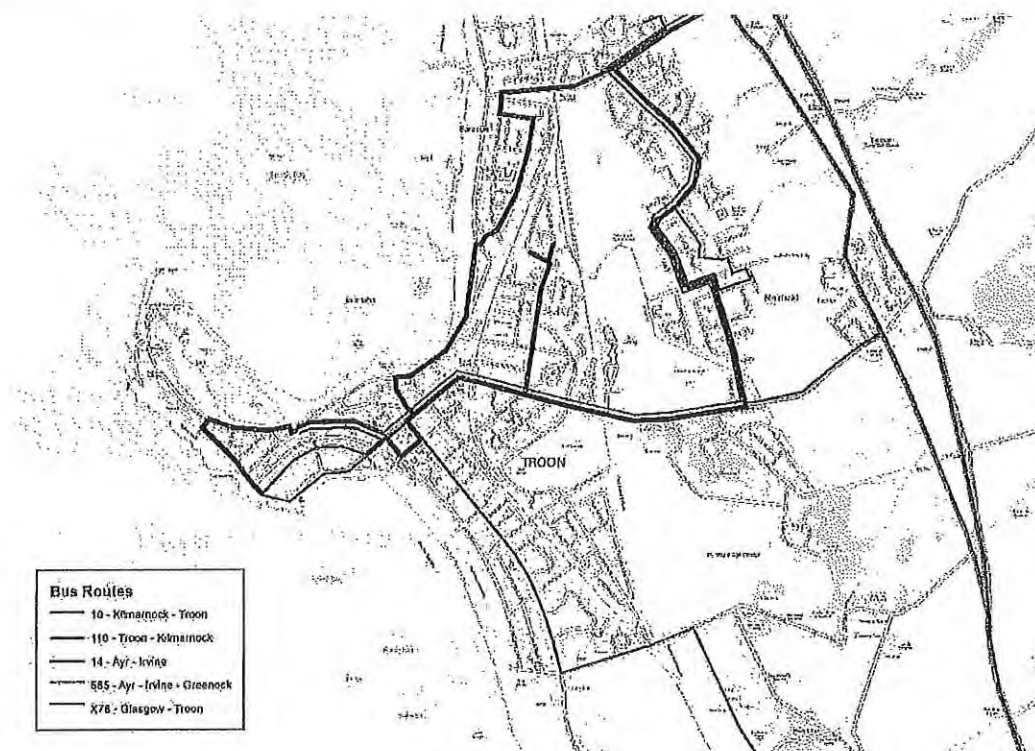


Figure 5.7: Troon Bus Routes

5.3.23 There are two local services which pass close to East Pier but the longer distance connections to Glasgow and Greenock do not currently call in close proximity to the harbour. It should however be noted that bus routing and timetabling tends to respond quickly to changes in demand and it is possible that if the Arran & Campbeltown services operated to Troon, connecting services with the ferry could be offered.

5.4 Road Connections

5.4.1 This brief section considers road access to and from both ports. No comment is made on comparative journey times as this is picked up in the accessibility analysis presented later in this chapter.

Ardrossan

5.4.2 No local road issues which could have a bearing on the choice of mainland port have been identified in the vicinity of Ardrossan.

5.4.3 Ardrossan is well connected to the trunk road network, with relatively easy access to the A78 (T) 'Three Towns Bypass'. The A78 itself provides onward connections east and south towards Kilwinning, Irvine, Kilmarnock and Ayr as well as north towards Largs and Greenock.

5.4.4 The main route to Glasgow is via the B714, which connects with the A737 (T) at Dalry, although the A737 (T) can also be accessed at Kilwinning. The A737 (T) itself is single carriageway between Dalry and Johnstone / Kilbarchan, at which point it becomes a dual carriageway before joining the M8 at St James Interchange.

5.4.5 The stretch of the A737 (T) through Dalry has been a pinchpoint for many years. However, Transport Scotland is in the procurement stage of a new bypass for Dalry and thus this issue will be alleviated in the near term.

Troon

- 5.4.6 No local road issues which could have a bearing on the choice of mainland port have been identified in the vicinity of Troon.
- 5.4.7 The B746 provides access from the port to the A78 (T) at Barassie. This section of the A78 (T) is dual carriageway and provides quick access to Irvine to the north and Ayr to the south. For eastbound and northbound access to Glasgow and Kilmarnock, a combination of the A78 (T) and A759 provides ready access to the A77 (T), A71 (T) and M77.

5.5 Carryings Analysis

- 5.5.1 A feature of the Troon proposition is that there would be a requirement to run a shuttle bus from the terminal to Troon Railway Station. The number of buses required to provide this service would depend on the passenger volumes on a sailing-by-sailing basis, and the proportion of these who are likely to use the train.
- 5.5.2 On this latter point, the Office of Rail and Road (ORR) provides volume data for Ardrossan Harbour station. Given that there are other stations in Ardrossan, it is reasonable to assume that all passengers using this station are ferry passengers. Therefore:
- ORR 2015-16 Financial Year Ardrossan Harbour passengers: 111,086 (station entries and exits, i.e. single trips through the station)²⁴
 - Ardrossan - Brodick passengers (April 2015 – March 2016): 788,276
 - Ardrossan - Campbeltown passengers (Summer 2015): 10,714
 - Average rail access mode share = $111,086 / (788,276 + 10,714) = 15\%$
- 5.5.3 It is therefore assumed that **15% of passengers travelling from Arran on any given sailing would require to use a shuttle bus to access Troon Station**. The equivalent figure for Campbeltown is 30%, although passenger numbers in absolute terms are much lower.²⁵
- 5.5.4 If it is assumed that a standard coach seats 50 people, this would imply that, on average, any sailing with **325** or more passengers would require a second bus and any sailing carrying more the **650** passengers would require a third bus. To put this figure into context, average passenger carryings per sailing by month are shown in the figure below for both routes, for the period October 2015 to September 2016.

²⁴ <http://orr.gov.uk/statistics/published-stats/station-usage-estimates>

²⁵ <http://www.transport.gov.scot/system/files/AMFC%20-Monitoring%20%20Evaluation%20-%20Campbeltown%20-%20March%202016.pdf> – p.7

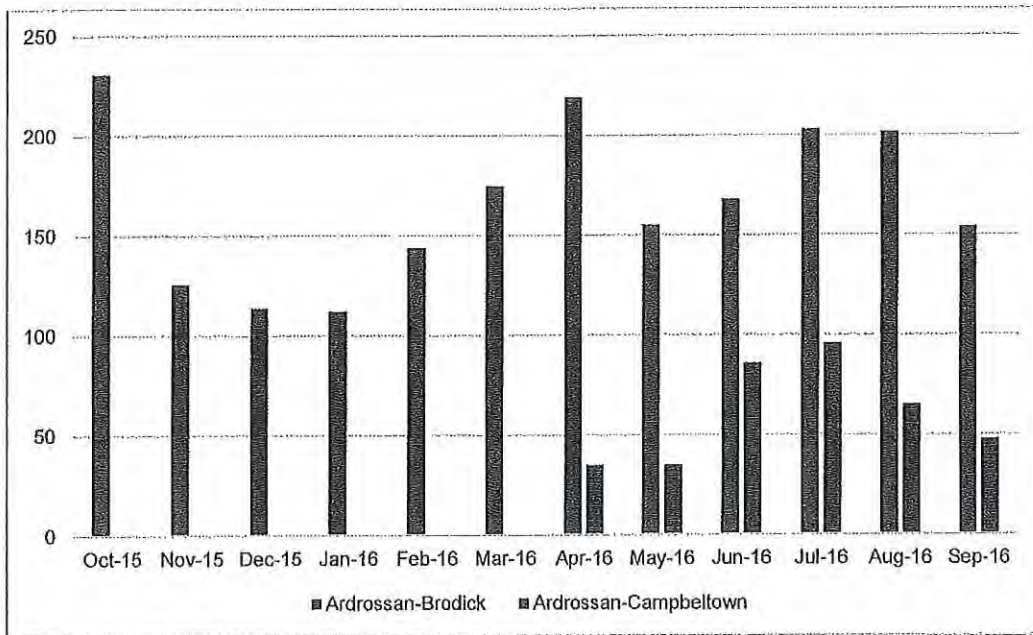


Figure 5.8: Average Passenger Carrying per Sailing per Month (2015/16)

5.5.5 On average, the figure of 325 ferry passengers is not reached in any month. However, any average comprises a range of high and low carryings, and the most recent year's carryings data (October 2015 to September 2016) have been analysed on a sailing-by-sailing basis to determine how often there would be likely to be >50 prospective rail passengers.

5.5.6 This is shown in the figure below.

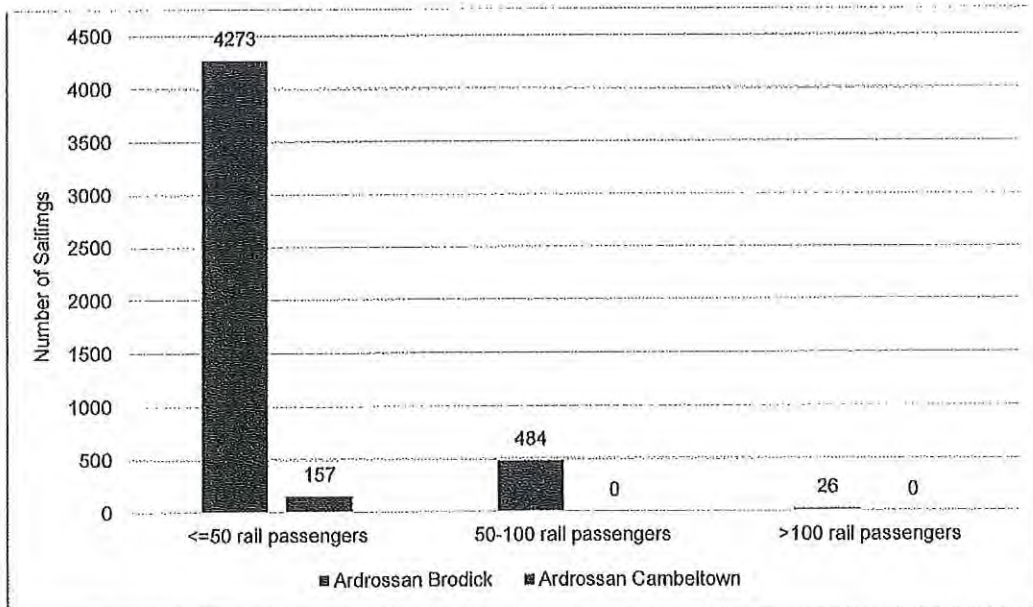


Figure 5.9: Number of Sailings by Prospective Rail Passengers (2015/16)

5.5.7 In this year, when individual sailings are considered, there were 510 Ardrossan – Brodick sailings (11% of the total) where there are estimated to be 50 or more rail passengers, and

where a second bus would be required. There were a further 26 sailings (0.5%) where there could be more than 100 rail passengers.

- 5.5.8 These sailings are spread across the year although almost half are between June-August. No Ardrossan – Campbeltown sailings reached this limit.

5.6 Accessibility Analysis

Approach & Assumptions

- 5.6.1 Both proposals have made representations in terms of road and public transport accessibility to regionally and locally important destinations. The cited journey times on both proposals are based on a series of assumptions in relation to crossing times, interchange times, public transport connectivity and assumed road speeds (generally taken from online journey planners). In order to provide a comparable basis for the two proposals, this study has made use of Network Analyst software (road) and TRACC²⁶ software (public transport) to compare the relative accessibility of both ports. In the analysis which follows, the term 'accessibility' relates to travel times only.

- 5.6.2 The outputs of the accessibility analysis are presented at two levels:

- a **local study area** comprising of the three Ayrshire authorities, East Renfrewshire, Renfrewshire, Glasgow City and South Lanarkshire. This reflects the dominance of west central Scotland in terms of movements to and from Arran (as evidenced by the Evaluation of the Impact of RET study published on 17/02/2017).
 - The accessibility analysis in the local study area is presented at Census output area level, the most detailed level of spatial definition.
- a wider study area comprising **Scotland as a whole**, which is presented at higher levels of spatial geography (a combination of datazone & intermediate geography).

- 5.6.3 For both study areas, the respective road and public transport accessibility software was used to determine:

- Changes in accessibility to / from Arran as a result of relocating the ferry port from Ardrossan to Troon. The software allows for the calculation of changes in travel time to / from Arran to every output area / datazone / intermediate zone in the study area / Scotland and then weights this by **population** to identify the number of potential 'winners & losers' from relocating the ferry service. The outputs are presented at both the local study area and national level.
- Changes in accessibility to employment opportunities from Arran. A similar approach is taken whereby changes in travel time from Arran to every output area / datazone / intermediate zone are identified and then weighted by **employment** (derived from Census travel-to-work destination data) to identify the number of potential 'winners & losers' in employment terms from relocating the ferry service. This is presented at both the local study area and national level.

Assumptions

- 5.6.4 Three key assumptions underpin all aspects of the accessibility analysis:

- All of the accessibility analysis is based on the assumption that the crossing time to Troon is **15 minutes longer** than the equivalent crossing time to Ardrossan (see Section 2.3).

²⁶ <http://www.basemap.co.uk/tracc/>

- The accessibility analysis focuses on changes in journey times only, and does not account for changes in cost (fuel, ferry fares, rail fares etc).
- All journey times are calculated from Brodick.

Road-Based Accessibility

- 5.6.5 The road-based accessibility has been undertaken using the Network Analyst tool using 'HERE' speed data. The data are collated through NAVTEQ GPS units which are fitted to Samsung mobiles, in-built car GPS units and some aftermarket GPS Units. This information is then further added to by HERE's own car surveys (which cover the whole of the UK) and all phones using windows operating systems as well as reported traffic camera information. The average days are then taken over a 5-year period for each time interval to remove outliers and issues caused by roadworks etc. The analysis is therefore based on a highly robust dataset.
- 5.6.6 The key assumption underpinning the road-based accessibility analysis is that the crossing time between Brodick and Troon is **15 minutes longer** than the equivalent crossing between Brodick and Ardrossan. On the Campbeltown service, the crossing time to Troon is assumed to be **2 minutes shorter**.

Arran

- 5.6.7 The outputs are based on an average of model runs starting at 0800, 1045, 1330, 1610 and 1900.

Local Accessibility

- 5.6.8 The accessibility analysis undertaken demonstrates that, for journeys commencing from the respective ports, Troon has a clear journey-time advantage in terms of access to Glasgow and to all areas broadly to the south and east of the A737 (T). However, the additional 15 minutes sea crossing time to Troon all but eliminates these benefits. This is illustrated in the figure below, which shows the differential between the Ardrossan and Troon landfalls in terms car-based journey times to a series of key destinations within Ayrshire:

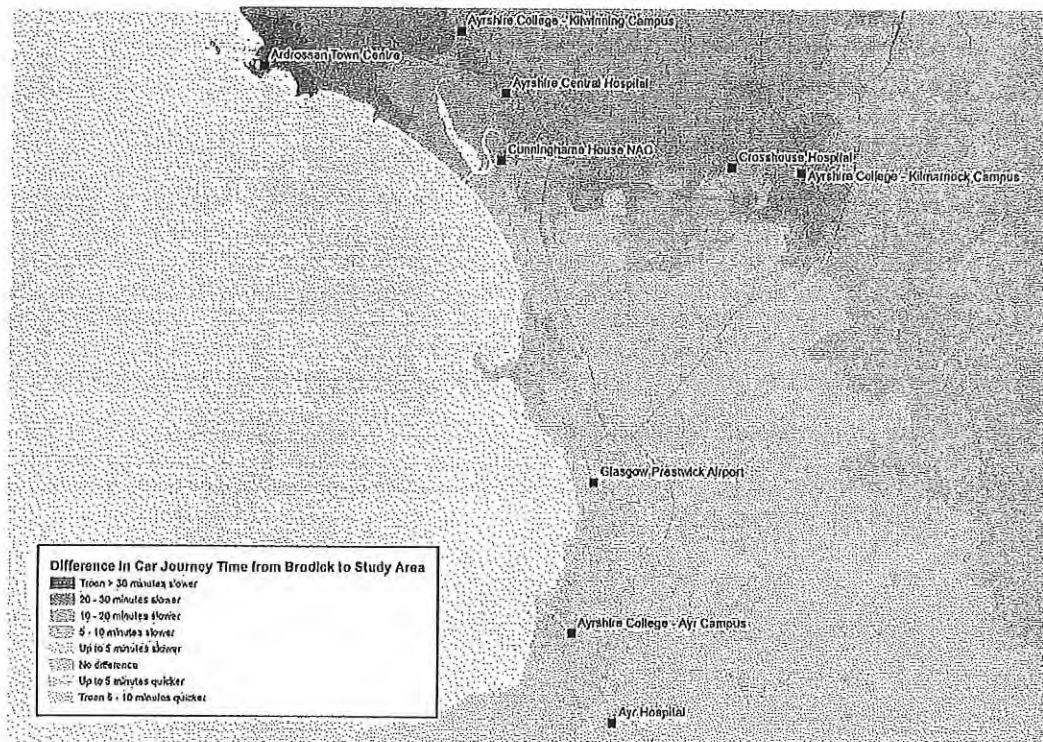


Figure 5.10: Difference in Car-Based Accessibility from Brodick to Key Destinations in Ayrshire

- 5.6.9 The key point from the above figure is that the increased sea-crossing time to Tron means that a move to Tron would result in increased journey times to virtually all of these destinations. Operating from Brodick to Tron would only provide accessibility benefits in terms of access to Tron and its immediate environs. Accessibility to all other areas of Ayrshire would worsen, particularly in terms of accessibility to north, central and east Ayrshire.
- 5.6.10 For example, the estimated drive time from Ardrossan to Ayr is 34 minutes. From Tron the time is 20 minutes. When the additional 15 minutes crossing time is added, the comparison becomes 34 minutes (Ardrossan) plus 35 minutes (Tron).

Regional & National Accessibility

- 5.6.11 As would be expected, this pattern is replicated when taking a regional / national view. The figure below shows comparative car-based accessibility to a wider study area consisting of the three Ayrshire authorities, East Renfrewshire, Renfrewshire, Glasgow City and South Lanarkshire.

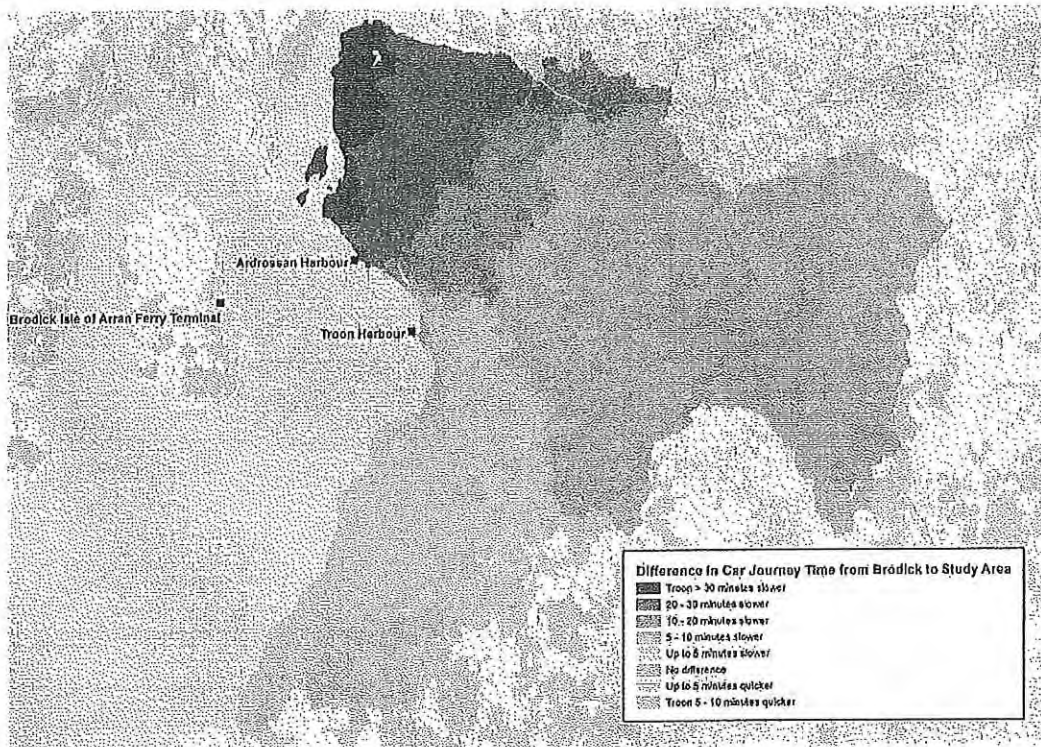


Figure 5.11: Difference in Car-Based Accessibility from Brodick to the west of Scotland

- 5.6.12 The figure above clearly highlights the scale of advantage that the shorter crossing to Ardrossan offers in terms of car-based accessibility. Journey times from Brodick to Glasgow are circa 10-20 minutes quicker via Ardrossan, whilst access to South Lanarkshire (which can be considered a proxy for destinations on the M74 and south) is 5-10 minutes quicker.
- 5.6.13 The above pattern is repeated when the analysis is applied to destinations across the rest of Scotland, including Edinburgh.
- 5.6.14 In order to further quantify this impact, the changes in travel times were cross-referenced with Census (population) and Census travel-to-work data (for employment) to quantify the 'winners & losers' in terms of car-based accessibility. This was carried out at the national and study area level²⁷. The study area outputs are reported here.
- 5.6.15 The table below shows the change in journey times to from / Arran via Ardrossan and Troon for the study area Output Areas (and associated populations):

²⁷ The study area consists of North Ayrshire, South Ayrshire, East Ayrshire, East Renfrewshire, Renfrewshire, Glasgow City and South Lanarkshire.

Table 5.1: Difference in Regional Car-Based Journey Times to / from Arran

Change in Journey Time	Population	% Change
<=-40 (Troon Slower)	0	0.0%
-30 to -40	77,252	4.8%
-20 to -30	200,011	12.3%
-10 to -20	606,821	37.4%
-5 to -10	613,174	37.8%
0 to -5	111,593	6.9%
No Change	4,038	0.2%
0 to 5	3,606	0.2%
5 to 10	6,599	0.4%
10 to 20	0	0.0%
20 to 30	0	0.0%
30 to 40	0	0.0%
>=40 (Troon Quicker)	0	0%

5.6.16 The table above reiterates the car-based journey time advantage enjoyed by Ardrossan as a result of the shorter crossing time. Overall, Ardrossan would provide a shorter journey to / from Arran for 99.2% of the study area population.

5.6.17 In the interests of completeness, the analysis was extended out to cover the whole of Scotland, providing a national accessibility perspective. The change in journey times at the national level is shown in an aggregate form below:

Table 5.2: Difference in National Car-Based Journey Times to / from Arran

Change in Journey Time	Population	% Change
Troon Slower	5,113,562	95.4%
No Change	35,718	0.7%
Troon Quicker	209,728	3.9%

5.6.18 The equivalent table is shown below for access to employment from Arran:

Table 5.3: Difference in Regional Car-Based Journey Times to Employment to / from Arran

Change in Journey Time	Employment	% Change
<=-40 (Troon Slower)	0	0.0%
-30 to -40	19,010	3.0%
-20 to -30	55,980	8.9%
-10 to -20	310,723	49.6%
-5 to -10	195,878	31.3%
0 to -5	41,515	6.6%
No Change	323	0.1%
0 to 5	227	0.0%
5 to 10	2,248	0.4%
10 to 20	0	0.0%
20 to 30	0	0.0%
30 to 40	0	0.0%
>=40 (Troon Quicker)	0	0.0%

5.6.19 Access to areas of employment is also almost wholly better through Ardrossan (99.6% of journeys would be quicker), the exceptions being access to employment opportunities within Troon and its immediate environs.

5.6.20 The change in access to employment at the national level is again shown in an aggregate form below:

Table 5.4: Difference in National Car-Based Journey Times to Employment from Arran

Change in Journey Time	Employment	% Change
Troon Slower	1,904,747	96.9%
No Change	58,875	3.0%
Troon Quicker	2,475	0.1%

5.6.21 The national picture closely reflects that of the study area. Troon is quicker for only 0.1% of journeys, all of which are to the town itself or in its immediate environs.

Campbeltown

5.6.22 The crossing to Troon from Campbeltown is two minutes quicker than the equivalent service to Ardrossan. The impact of this on car-based accessibility is shown below:

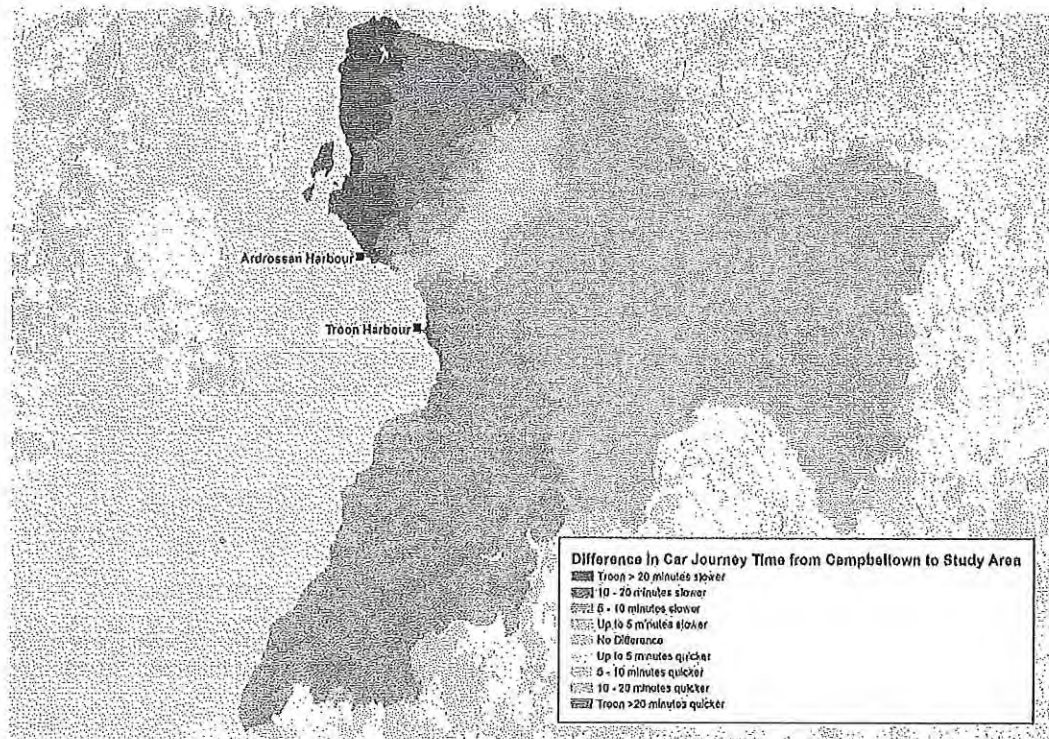


Figure 5.12: Difference in Car-Based Accessibility from Campbeltown to the west of Scotland

- 5.6.23 In contrast to the Arran services, Troon offers significantly better car-based accessibility for those travelling to / from Campbeltown. With the exception of the areas of North Ayrshire immediately to the north of Ardrossan, Troon offers quicker journey times across the board, including to Glasgow.
- 5.6.24 Access to employment and population has not been calculated for Campbeltown given the service is relatively infrequent²⁸, however the general pattern can be seen above.

Public Transport Accessibility

- 5.6.25 The public transport accessibility mapping is based on the TRACC accessibility software. TRACC calculates the quickest journey time by public transport and active modes between sets of defined locations within a defined timeframe using public transport timetable data, road network information and a range of user-defined parameters.
- 5.6.26 The following key assumptions were made when undertaking the TRACC analysis:
- The crossing time between Brodick and Troon is **15 minutes longer** than the equivalent crossing between Brodick and Troon. On the Campbeltown service, the crossing time to Troon is assumed to be **2 minutes shorter**.
 - The assumption in the ABP proposal that it takes **10 minutes from 'gangplank to railway station'** has been used to model the proposed bus service. Note, we have highlighted the risks attached with this assumption in Chapter 9.

²⁸ Service runs 27/04/17 to 24/09/17 as follows: Thursday (Ardrossan-Campbeltown), Friday (Campbeltown-Ardrossan-Campbeltown), Saturday (Campbeltown-Brodick-Ardrossan), Sunday (Ardrossan-Campbeltown-Ardrossan).

- With four trains per hour from Troon, it is assumed that the wait time at the station is **7.5 minutes** (in public transport modelling, the wait time is generally assumed to be half of the headway).
- A key issue in building up the travel times from Brodick via Ardrossan is the time associated with the transfer from ferry to train at Ardrossan Harbour. As has been shown in Figures 5.3 & 5.4, the time between ferries arriving at Ardrossan and trains leaving Ardrossan Harbour station varies across the day. To determine an average connection time, the following has been established:
 - Annual passengers carried by arrival time at Ardrossan, split by Monday-Wednesday, Thursday, Friday, Saturday and Sunday.
 - Time between each arrival and next train departure from Ardrossan Harbour Station.
 - Where this connection is long, if walking to a quicker departure at Ardrossan South Beach is possible, this becomes the connection.
 - A weighted average has then been calculated on the basis of carryings and connection times. **This resulting figure is 25 minutes.**

5.6.27 For ease of reference, these key assumptions are set out in the table below:

Table 5.5: TRACC Assumptions (all times in minutes)

	Arran Service		Campbeltown Service	
	<i>Ardrossan</i>	<i>Troon</i>	<i>Ardrossan</i>	<i>Troon</i>
Crossing Time from Brodick	55	70	180	158
Interchange Time	0	10	0	10
Train Wait Time	25	7.5	25	7.5
Total Journey Time to boarding an onward train	80	87.5	185	175.5

Arran

5.6.28 The outputs are based on an average of the quickest journeys undertaken over the period 0800-1200, 1200-1600 and 1600-2000 respectively.

Local Accessibility

5.6.29 The figure below shows the differential between the Ardrossan and Troon landfalls in terms of public transport based journey times to a series of key destinations within Ayrshire:

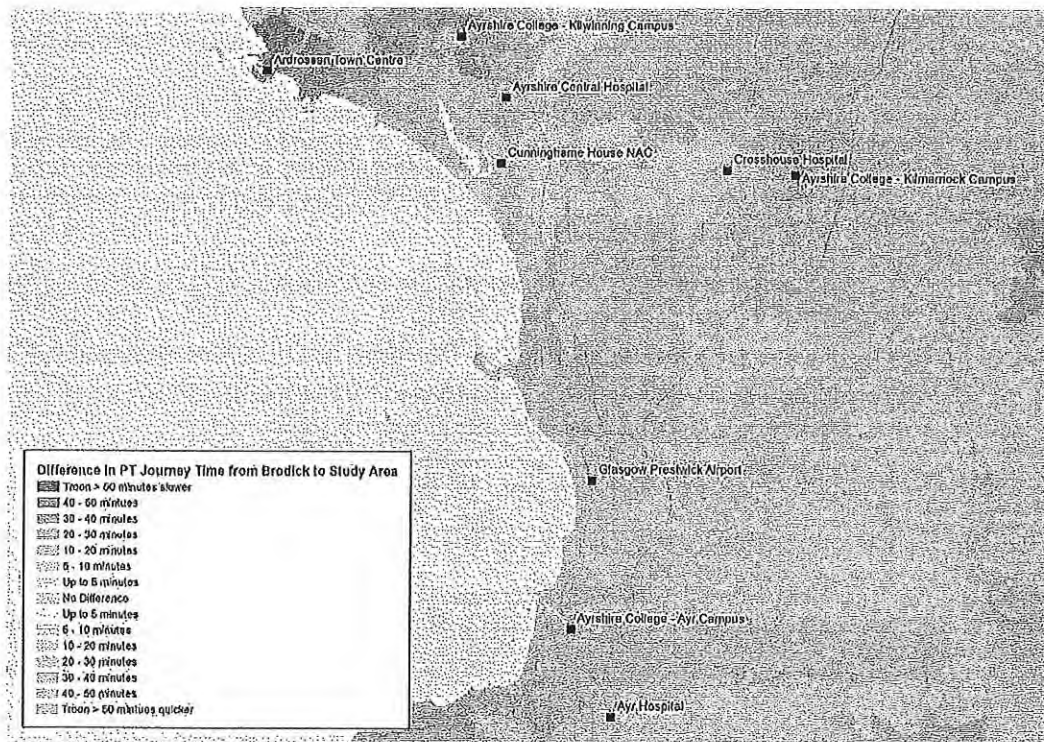


Figure 5.13: Difference in Public Transport Based Accessibility from Brodick to Key Destinations In Ayrshire

- 5.6.30 The 25-minute average transfer time at Ardrossan means that Tron generally has better accessibility to the majority of the key identified destinations in Ayrshire. As would be expected, Tron performs particularly well in terms of access to areas on the Ayrshire mainline and Kilmarnock (via the spur line connection to the Glasgow & South-Western Railway).
- 5.6.31 Under the assumptions used, Tron would also hold a marginal journey time advantage in terms of access to Irvine. Ardrossan would have comparatively better public transport accessibility to settlements within the Irvine Bay area.

Regional & National Accessibility

- 5.6.32 As with road-based accessibility, the public transport pattern in the local context is largely replicated at the regional / national level. The equivalent regional comparative accessibility plot is highlighted in the figure below:

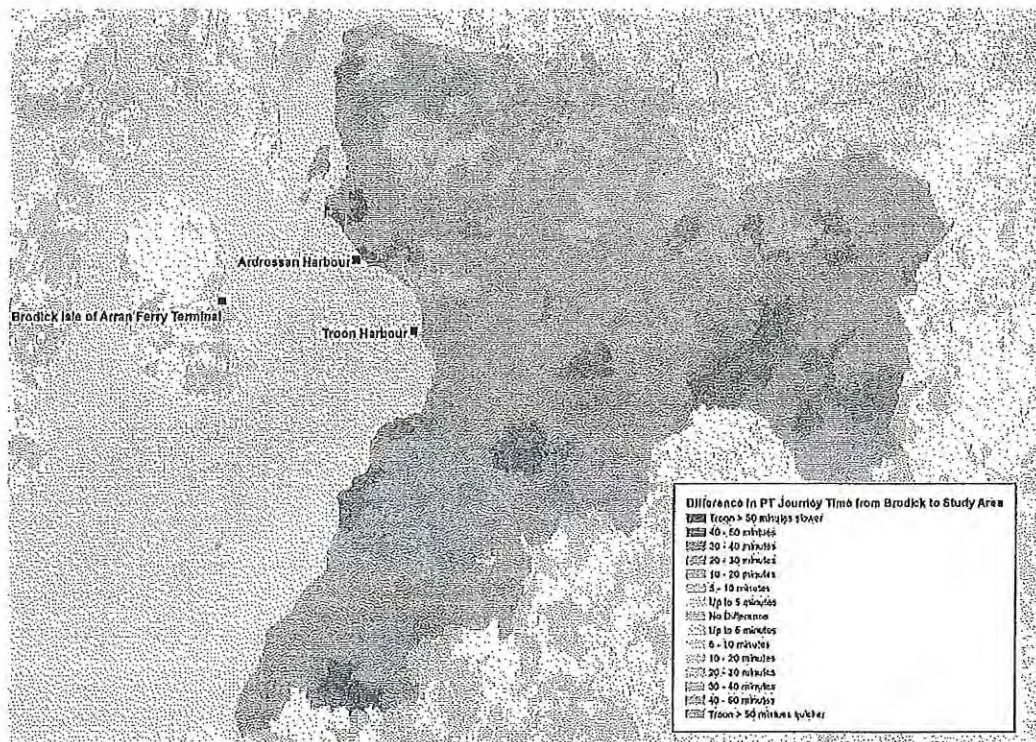


Figure 5.14: Difference in Public Transport Based Accessibility from Brodick to the west of Scotland

- 5.6.33 The above figure illustrates the public transport connectivity advantage offered by Troon. Whilst Ardrossan offers comparatively lower journey times to the north by rail (e.g. West Kilbride, Largs etc) and bus (e.g. Wemyss Bay & Skelmorlie), Troon offers a comparatively shorter journey time to Glasgow Central and, as a result, all areas to the east and north.
- 5.6.34 The table below shows the change in journey times to / from Brodick from the study area Output Areas (and associated populations).

Table 5.6: Difference in Regional Public Transport-Based Journey Times to / from Arran

Change in Journey Time	Population	% Change
<=-40 (Troon Slower)	1,394	0.1%
-30 to -40	10,285	0.6%
-20 to -30	30,429	1.9%
-10 to -20	36,916	2.3%
-5 to -10	55,908	3.4%
0 to -5	136,594	8.4%
No Change	82,609	5.1%
0 to 5	263,185	16.2%
5 to 10	462,595	28.5%
10 to 20	279,287	17.2%
20 to 30	83,676	5.2%
30 to 40	131,854	8.1%
>=40 (Troon Quicker)	48,362	3.0%

5.6.35 The table above highlights the advantage in terms of public transport journey times which Troon holds based on the assumptions used. The journey time for trips to Arran by public transport would decrease for 77% of the population of the regional area.

5.6.36 The change in access to / from Arran at the national level is shown in an aggregate form below:

Table 5.7: Difference in National Public Transport-Based Journey Times to / from Arran

Change in Journey Time	Population	% Change
Troon Slower	938,902	17.7%
No Change	1,217,740	23.0%
Troon Quicker	3,138,761	59.3%

5.6.37 The equivalent table is shown below for access to employment from Arran by public transport for the regional study area:

Table 5.8: Difference In Regional Public Transport-Based Journey Times to Employment from Arran

Change in Journey Time	Employment	% Change
<=-40 (Troon Slower)	150	0.0%
-30 to -40	371	0.1%
-20 to -30	5,196	0.8%
-10 to -20	7,969	1.3%
-5 to -10	20,541	3.3%
0 to -5	27,516	4.4%
No Change	41,677	6.6%
0 to 5	75,729	12.1%
5 to 10	243,444	38.8%
10 to 20	129,511	20.7%
20 to 30	29,541	4.7%
30 to 40	29,613	4.7%
>=40 (Troon Quicker)	15,551	2.5%

5.6.38 Access to areas of employment are also almost wholly better through Troon, with a reduction in journey times to 84% of employment locations. This is dominated by the shorter journey times to central Glasgow and the immediately surrounding areas, with 51% of employment locations realising a journey time reduction of up to ten minutes,

5.6.39 The change in access to employment at the national level is again shown in an aggregate form below:

Table 5.9: Difference In National Public Transport-Based Journey Times to Employment from Arran

Change in Journey Time	Employment	% Change
Troon Slower	322,811	16.4%
No Change	398,550	20.3%
Troon Quicker	1,244,736	63.3%

Campbeltown

5.6.40 In terms of the Campbeltown service, the marginally shorter crossing time means that Troon offers a benefit in terms of public transport journey times. This is shown in the figure below:

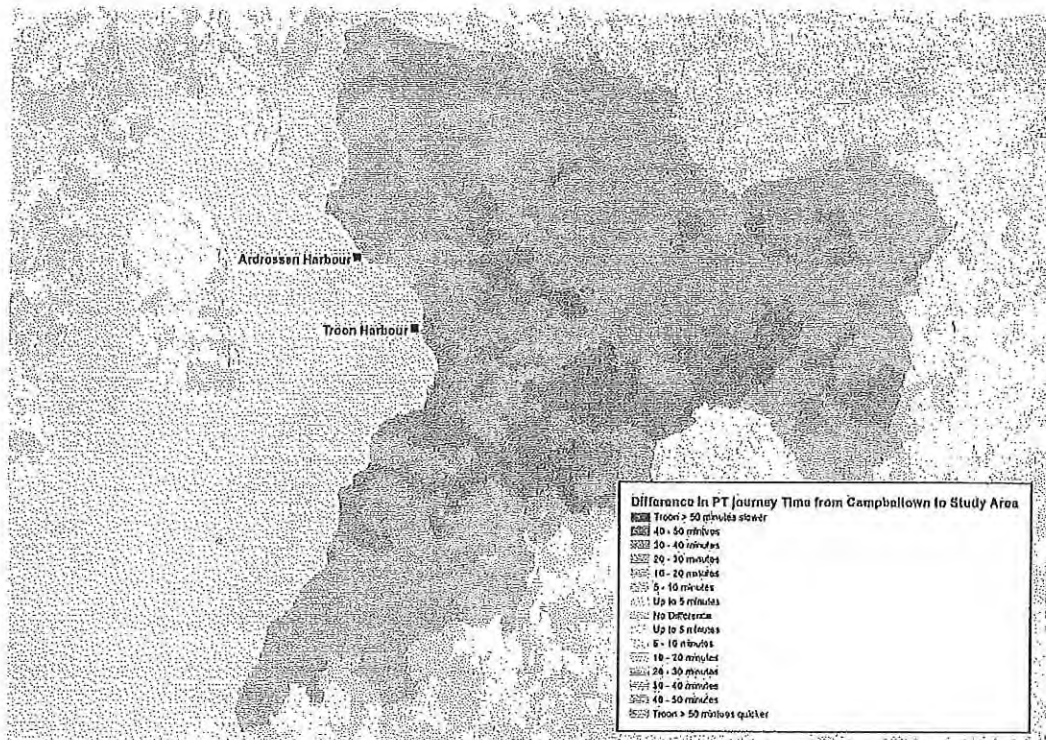


Figure 5.15: Difference in Public Transport Based Accessibility from Campbeltown to the west of Scotland

5.6.41 Troon offers demonstrable benefits to those using the Campbeltown service in terms of public transport journey times & connections. Troon offers reduced journey time across almost all of Scotland, although Ardrossan would continue to experience slightly lower journey times in the immediate vicinity of the town.

5.7 Summary

5.7.1 From a car-based accessibility perspective, the road connections from Troon are generally better but the increase in crossing times from moving the service to Troon outweighs this benefit to such an extent that only Troon town centre and its immediate environs would benefit from moving the service. The continued operation of the ferry to Ardrossan would offer comparatively shorter road-based journey times to / from Arran to almost all areas of Scotland.

5.7.2 From a public transport perspective, Ardrossan has a dedicated rail connection and a reasonably well developed bus network (albeit a number of the bus routes do not directly serve the harbour). Troon on the other hand would require a shuttle bus service to convey passengers from the ferry terminal to the station, but the rail service from Troon is markedly better (in terms of frequency, length of the operating day and the range of destinations) once the station is reached. Based on the assumptions set out in this report, Troon generally offers reduced public transport journey times to most of Scotland compared to Ardrossan. It should however be noted that this benefit is calculated on the ABP commitment that the shuttle bus journey time from the gangway to the station would be 10 minutes, an assumption reviewed in more detail in the risk chapter.

5.7.3 Outwith journey times, the ferry fare would of course be higher when travelling from Arran to Troon, whilst rail fares would also be very marginally higher.

Troon offers a clear road and public transport advantage for those travelling on the Campbeltown service.

6 Socio-Economic Issues

6.1 Overview

- 6.1.1 The principal (although not exclusive) impact of the choice of the mainland port location for the Arran and Campbeltown communities will be changes in travel times, cost and relative accessibility to different locations.
- 6.1.2 From a local socio-economic perspective, the choice of mainland port will have more direct implications for Ardrossan and Troon. This is particularly the case in Ardrossan where the ferry service is already established – whilst both Ardrossan and Troon would benefit from securing the ferry service, the disbenefits in Ardrossan would be more significant if the ferry service was to be relocated out of the town. The socio-economic impacts of the mainland port choice are therefore clearly an important consideration.
- 6.1.3 This study does not review the comparative socio-economic case at either landfall. However, the research identifies a number of socio-economic points which will assist in the evaluation of the two proposals. In addition, the key risks from our review of the proposals will be highlighted in Chapter 9.

6.2 Census Travel-to-Work

- 6.2.1 Respondents to the Census are asked to state their normal place of work, thus providing a national dataset showing work-based origins and destinations at the point in time at which the Census is undertaken. This dataset is therefore a useful tool in determining the location of 'off-island' employment for Arran residents as well as the origin of those travelling to Arran for employment.
- 6.2.2 Whilst the Census is an invaluable tool for understanding the travel-to-work market, there are three important caveats which need to be borne in mind when interpreting it:
- The Census provides a snapshot of travel-to-work activity in 2011 and is thus becoming somewhat dated.
 - The data is focussed on main place of work identified by respondents. It will not therefore pick-up those whose employment takes them to / from Arran but where this is not their main place of employment (e.g. Council or NHS staff).
 - The significant reduction in fares brought about by RET for Arran in October 2014 may have significantly altered travel-to-work patterns, with both the mainland and island becoming more accessible. The *Impact of RET on Arran* evaluation, recently undertaken by PBA on behalf of Transport Scotland, suggested that the impact in terms of off-island commuting has been limited, but that there has been a small increase in in-commuting, particularly for seasonal / weekend work. The 2011 Census will not represent this increase.
- 6.2.3 The following table and figure show the employment destinations of **Arran residents**:

Table 6.1: Arran Residents – Travel-to-Work, Census 2011

Destination	Number
Arran (i.e. Internal)	1,172
Mainly work at / from home	526
No fixed place of work	231
England	12
Irvine Fullarton	12
Outside UK	9
Paisley North	8
Saltcoats Central	7
Kilwinning Central & North	7
Offshore Installation	6
Glasgow City Centre South	6

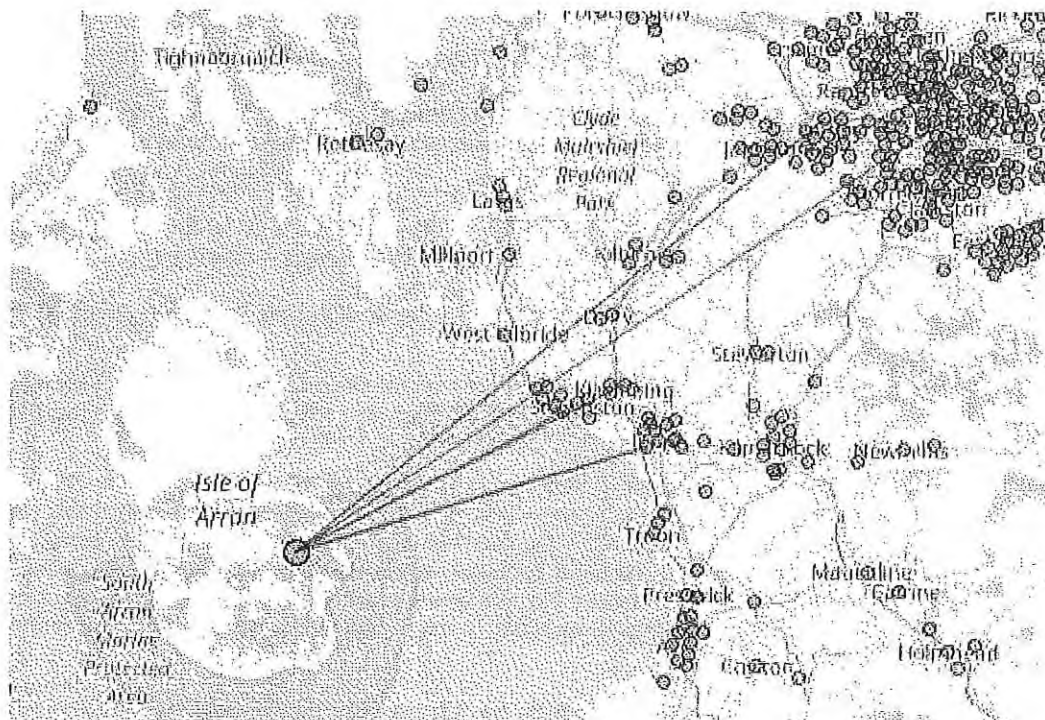


Figure 6.1: Arran Residents – Travel-to-Work, Census 2011

- 6.2.4 It can be seen from the above figure that the travel-to-work flows from Arran (pre-RET) to the mainland are very small. Excluding those with no fixed place of work and those who travel to England, outside the UK or an offshore installation, only 46 residents travelled to their main place of work on the Scottish mainland.
- 6.2.5 Of these 46 residents, 14 work in close proximity to Ardrossan (Saltcoats Central and Kilwinning Central & North), although no Arran residents work in Ardrossan itself. 12 respondents work in Irvine and the remainder work in Paisley and Glasgow.

6.2.6 The following table and map set out the equivalent material for those travelling to Arran for work:

Table 6.2: Non-Arran Residents Travelling to the Island for Work – Travel-to-Work, Census 2011

Destination	Number
Kilbirnie North	21
Saltcoats North West	9
West Kilbride and Seamill	9
Stevenston Hayocks	8
Stevenston North-West	7
Skelmorlie and Rural	7
Kilwinning Whitehirst Park and Woodside	6

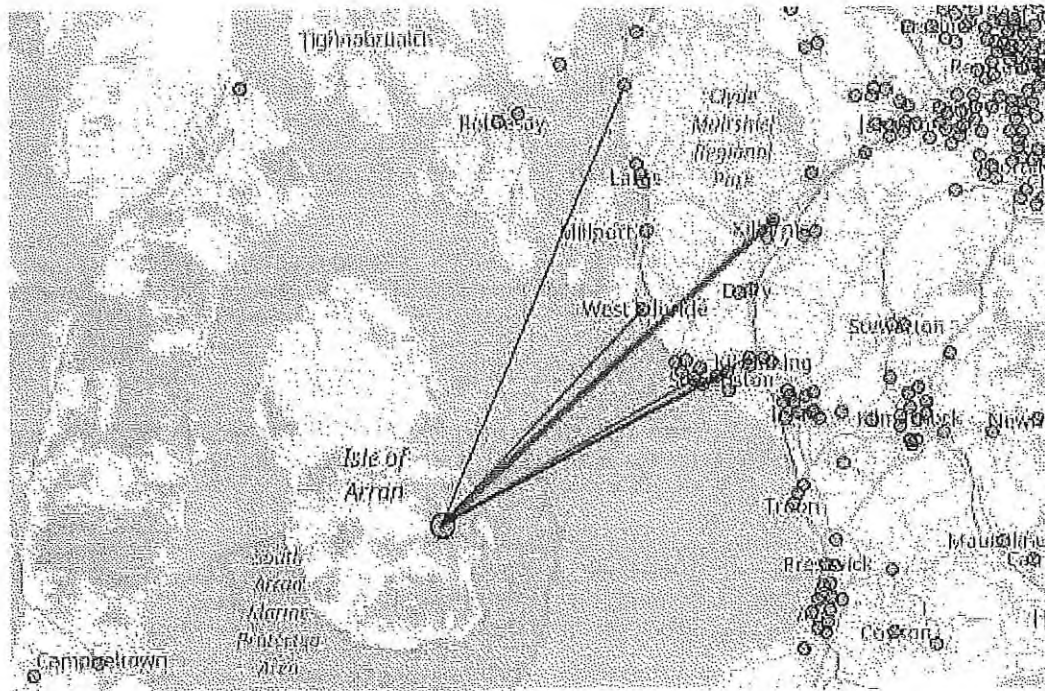


Figure 6.2: Non-Arran Residents Travelling to the Island for Work – Travel-to-Work, Census 2011

The 2011 Census identified 67 mainland residents whose main place of work is on the island of Arran. Whilst none of those travelling to the island are residents of Ardrossan *per se*, the majority come from neighbouring areas (e.g. Stevenston and Saltcoats) or settlements more proximate to Ardrossan than Troon (e.g. Kilbirnie and Skelmorlie). It is notable that all of those travelling to a place of work on Arran live within the North Ayrshire Council area. By extension, there are no Troon residents travelling to Arran for work.

6.3 Direct Employment Impacts

6.3.1 CalMac has provided information on the direct employment associated with operating services through Ardrossan Harbour.

Vessel Crew

- 6.3.2 All crew numbers are presented in terms of headcount rather than full time equivalent.
- 6.3.3 The crew on the two vessels currently operating the Arran and Campbeltown services are vessel-based. Crew numbers on the vessel vary over the year, with CalMac providing the following figures:
- MV *Caledonian Isles* had 33 crew in September 2016 and 29 in January 2017; and
 - MV *Isle of Arran* had 28 crew in September 2016 and 25 in January 2017.

Shore-Based Crew

- 6.3.4 CalMac noted that, at Ardrossan, there were 31 staff servicing the Arran route in both September 2016 and January 2017. A further six staff are employed to support the summer only service between Ardrossan and Campbeltown.
- 6.3.5 It is assumed that these staff would move to Troon if the ferry service was to relocate.

6.4 Local Authority Services

- 6.4.1 Arran is included within the North Ayrshire Council administrative area. The local authority therefore has the responsibility for the delivery of a wide range of services to the island including social care, waste management, housing etc. As part of the consultation, North Ayrshire Council was asked to consider any potential implications for service delivery stemming from the ferry service moving to Troon.
- 6.4.2 Council Directors from each service area were asked to estimate how many trips are made to Arran each year based on records of available ticket purchases. It is estimated that circa 4,300 return journeys are made to Arran each year, which amounts to around 83 per week. It is further estimated that around 75% of these trips are made from Irvine, with the rest from other areas of North Ayrshire (typically to the north of Irvine).
- 6.4.3 As the majority of trips are made from Irvine, and given that the travel time from Irvine to both Ardrossan and Troon is broadly similar by road, it is assumed that all journeys increase by 30 minutes as a result of the 15-minute increase in crossing time in each direction.
- 6.4.4 The increase in the fares cost for 4,300 annual journeys would be £4,730 in passenger fares plus any additional costs for staff members taking their vehicles. The Council has calculated that the additional cost of moving to Troon would be in the region of £90,000 per annum, which suggests there would be impact of around £85,000 in staff costs over and above the fares increase.

6.5 Evidence on Local Spend

- 6.5.1 As part of the Transport Scotland study assessing the impact of Road Equivalent Tariff on Arran, four waves of on-ferry surveys of Arran residents were undertaken (winter 2014/15 & 2015/16 and summer 2015 & 2016). The outputs from this set of surveys provide evidence on the extent to which Arran residents travel to Ardrossan as their final destination and spend money in the town. Note, the equivalent information for inbound visitors to Arran is not available.
- 6.5.2 Respondents were asked about the journey they were making on that day and provided information on:
- the main purpose of the trip;
 - the final destination of the trip;

- trip duration; and
 - spending on that trip, split by accommodation and non-accommodation expenditure.
- 6.5.3 Across the four survey waves, 842 responses were received from island residents. It should be noted that the same resident could have been captured in different survey waves, so the number of individual responses is likely to be less than the total number of responses.
- 6.5.4 Each survey distinguished between Arran residents (permanent and second home owners) and visitors to Arran. In order to investigate how spending patterns may have changed with the introduction of RET, Arran residents were asked about the spending associated with their trip to the mainland and visitors were asked about their spending in Arran.
- 6.5.5 Of the details of the 842 journeys made by Arran residents obtained, 130 trips had 'shopping' as their main purpose. This 130 is broken down as follows in terms of main destinations:
- No destination specified: 33 (note that a number of these are likely to be trips to Ardrossan only);
 - Glasgow: 28;
 - Saltcoats: 17;
 - Ardrossan: 13; and
 - Stevenston: 3.
- 6.5.6 The sample size of resident shopping trips to Ardrossan is therefore small (1.5% of the total trips), and the average spend on these trips was £60 per person, presumably reflecting a shop for groceries and potentially fuel at Asda in Ardrossan. Given the low sample size, it is not meaningful to quantify the annual level of spend in Ardrossan by Arran residents.
- 6.5.7 The survey data has however confirmed that Arran residents do indeed make trips to Ardrossan for the purposes of Shopping.
- 6.5.8 The Ardrossan – Campbeltown Ferry Service Pilot Evaluation study suggests that the ferry service generates a net £56,000 of benefits per annum for the North Ayrshire economy in terms of direct, indirect and induced impacts.²⁹ It seems likely that these benefits would be displaced to Troon / South Ayrshire if the ferry service was to be relocated there. Whilst there would be no net impact at the national level, there would be a local redistribution of activity from Ardrossan to Troon, which would be considered a negative impact given the differing socio-economic profiles of the two towns.

6.6 Impact on the Haulage Industry

- 6.6.1 In order to understand the impact of any potential port move on the haulage industry, specialist freight & logistics consultancy Proversa was commissioned by PBA to carry out a consultation with selected companies in the haulage industry in Arran and Kintyre.
- 6.6.2 The following companies were contacted:
- Arran Haulage Ltd;
 - Arran Deliveries Ltd;
 - John Thompson Construction Ltd (Arran);
 - Peter McKerral Ltd (Kintyre); and

²⁹ <http://www.transport.gov.scot/system/files/AMFC%20-Monitoring%20%20Evaluation%20-%20Campbeltown%20-%20March%202016.pdf> – p.22.

- McFadyens Transport Ltd (Kintyre).

6.6.3 The three Arran companies, taken as a whole, carry the majority of freight on the Ardrossan – Brodick service, collectively between 10 and 15 vehicles per day. These operators are integral to the supply chain of the major businesses and economic activity on Arran and Kintyre.

Views of the Industry

- 6.6.4 Haulage operators in Kintyre were found to make little to no use of the ferry for commercial traffic between Campbeltown and the mainland. Timber moves in large volumes to sawmills at Troon and along the Ayrshire coast, but makes use of the dedicated 'Timberlink' service that calls into Campbeltown. The ferry frequency, cost and reliability were considered to offer an unattractive proposition for other commercial traffic. Were the ferry a viable option, Troon was considered the favoured location due to its proximity to their major customers and its capacity to handle the larger volumes of freight traffic that would use it.
- 6.6.5 Haulage operators serving Arran in the general freight and parcels sector typically have operations in the Central Belt of Scotland connecting them into multi-customer supply chain structures and other onward network operations. In effect, a significant proportion of activity comprises shuttling freight between Arran and mainland depots. In this regard, good accessibility to the industrial parks of Glasgow is important, with the M77, and A737 (via A760 avoiding road restrictions for larger vehicles at Dalry) being key corridors.
- 6.6.6 From a purely operational perspective, hauliers were indifferent to the port used. Time and distance to core markets would be broadly similar. Troon is seen to benefit from slightly better access to the M77 and was thought to have greater space and better facilities due to its past role handling high freight volumes to and from Ireland, but Ardrossan offered the shorter crossing time, although this was seen as a minor advantage. More valuable characteristics were identified as service reliability, frequency, cost and ability to get onto the sailing of choice. Little compelling advantage was identified from use of Troon over Ardrossan. For the volume of freight being moved on the Arran ferry, either port is seen as adequate. One haulier has employees based at Ardrossan, the others use it solely as a transit point.
- 6.6.7 Hauliers identified externalities that favoured Ardrossan; businesses already established at or near the port, employees living in Ardrossan, the community of support services already existing at Ardrossan. Replicating them at Troon would make little difference to the operation of freight services but hauliers recognised the longstanding nature of these businesses in the area.
- 6.6.8 Hauliers identified that ferry cancellations in poor weather is a reality of island operations and did not consider reliability to be a particular issue. There was a pragmatism that what does not move today, will move tomorrow. Their businesses are set up to be flexible to respond to this. Underpowered vessels were considered to be a root cause of cancelled sailings, hauliers taking the view that FMEL 801/802 will improve reliability. The larger capacity of the new vessel was also identified as giving them greater ability to get onto their sailing of choice, especially following cancellations when there is backlogged passenger traffic.
- 6.6.9 There was no conclusive evidence that one port would provide significant advantage over the other in delivering freight services for Arran and Kintyre.

6.7 Future of Ardrossan Harbour Branch Line

- 6.7.1 A number of consultees expressed concern that making the case for maintaining this branch line if the ferry service was to be discontinued would be challenging. There were 111,086 entries and exits at Ardrossan Harbour station in 2015/16, the majority of which can reasonably be assumed to relate to the ferry. The equivalent figure for Ardrossan Town was

20,068, making it the second lowest used station across North and South Ayrshire (after Barrhill).³⁰

- 6.7.2 We consulted with Transport Scotland who confirmed that there are no plans to close the branch line should it be determined that ferry services be relocated to Troon. Services to Ardrossan South Beach, Ardrossan Town and Ardrossan Harbour would continue to be operated as per the franchise agreement.

³⁰ <http://orr.gov.uk/statistics/published-stats/station-usage-estimates>

7 Assessment against STAG Criteria

7.1 Overview

7.1.1 Chapters 2-6 of this report have discussed the evidence and key issues surrounding operations, reliability, onward transport connectivity and socio-economics in relation to the ports of Troon and Ardrossan. As this options appraisal is STAG-based, this chapter considers the respective merits of each proposal in terms of the STAG criteria.

7.1.2 Two key points should be noted at the outset:

- The purpose of this chapter is not to provide an exhaustive narrative against each of the STAG criteria, rather it is to summarise the key points in relation to each port, drawing out the main differentiators between the two.
- For comparative purposes, the merits of both ports are compared against the current day operation at the respective ports (which can be considered as the Do Minimum for comparison purposes – i.e. comparing the present day situation at Ardrossan and Troon against what would be the case if the ferry operates from either port in the future).

7.1.3 The STAG seven-point scoring scale (set out below) is used to compare both options against the present day situation:

- Major Positive = ✓✓✓
- Moderate Positive = ✓✓
- Minor Positive = ✓
- Neutral = o
- Minor Negative = ✕
- Moderate Negative = ✕✕
- Major Negative = ✕✕✕

7.2 Environment

7.2.1 Both Ardrossan and Troon are working ports and have current or recent experience of accommodating ferry services. The works proposed at each port are also largely contained within the current area of ferry operations (i.e. the berthing area, terminal etc) and thus no significant 'new' civil engineering works are planned. There are therefore unlikely to be any environmental 'showstoppers' or particularly adverse impacts at either port.

7.2.2 The table below shows how the respective ports compare against the environmental sub-criteria when compared against the present day operation.

Table 7.1: Ardrossan & Troon – Environmental Sub-Criteria

Environment Sub-Criteria	Ardrossan	Troon
Noise & vibration	o	o
Global air quality	o	x
Local air quality	o	o
Water quality, drainage and flood defence	o	o
Geology	o	o
Biodiversity and habitats	o	o
Landscape	✓	o
Visual Amenity	✓	o
Agriculture & Soils	o	o
Cultural heritage	✓	o

- 7.2.3 The key point in respect of the above table is that Troon records a minor negative in terms of **global air quality** due to the increase in emissions associated with additional steaming hours. There is no net effect in terms of the other environmental criteria in relation to Troon. The impact on road-based vehicle kilometres of moving to Troon would be broadly neutral.
- 7.2.4 The retention of the ferry terminal at Ardrossan would score a minor positive in terms of **landscape and visual amenity**. If the ferry service was to be relocated, it is highly likely that the land on which the terminal is situated would become vacant / derelict, whilst the Ardrossan proposal notes that regeneration plans for adjacent sites would not proceed. Developer interest in Ardrossan has historically been relatively low and there are significant areas of vacant land in the town, particularly to the north of the harbour at the former Shell-Mex refinery site. The creation of a further derelict site at the current terminal would therefore have a negative impact in this respect.
- 7.2.5 Ardrossan is also very much a port town and a ferry service has been operating from there to Arran since 1834. The loss of this service would therefore be negative from a **cultural heritage** perspective and thus retention of the service at its current location records a minor positive in this respect.

7.3 Safety

- 7.3.1 It should be noted the appraisal against the safety criterion is a relatively minor consideration in the context of this options appraisal. CalMac Ferries Ltd has an outstanding safety record and there is no reason to believe that there would be any major differential in the safety of operating into either port. There are a number of safety considerations to be taken into account (discussed below) but, in our view, they cannot be considered as a means of differentiating the two proposals.
- 7.3.2 The following table shows the equivalent appraisal for the safety criterion.

Table 7.2: Ardrossan & Troon – Safety Sub-Criteria

Safety Sub-Criteria	Ardrossan	Troon
Accidents	o	o
Security	o	o

- 7.3.3 In terms of safety considerations at **Ardrossan**, feedback from Master Mariners suggests that, once a commitment is made to enter the harbour, there is no 'exit strategy' available. This is however a minor consideration – Ardrossan fully complies with the Port Marine Safety Code and there have not, to our knowledge, been any incidents of note with CalMac vessels in the harbour.
- 7.3.4 The quality of the road connection north to Glasgow (using local roads before joining the A737) is for the best part poorer than the equivalent connection from Troon, using the A77 (which has average speed cameras as far north as Symington) or A71 to connect with the M77. The A737 is single carriageway as far north as Johnstone / Kilbarchan and there are local safety issues currently associated with the journey through Dalry (although this will be addressed through the Dalry Bypass, which is currently being procured by Transport Scotland). The data available from the *Reported Road Casualties 2015* dataset does not allow for a comparative assessment to be made but it is reasonable to state that the M77 offers a higher quality road for northbound journeys.
- 7.3.5 In terms of safety considerations at **Troon**, the key point of note is that the longer crossing time will lead to an increase in daily steaming hours / ferry kilometres. In the STAG Technical Database, any increase in 'vehicle' kilometres is considered a negative from a safety perspective as it statistically increases the possibility of an accident. However, this is generally a consideration in large scale schemes that generate significant additional vehicle kilometres and is thus of limited relevance here. In addition, given the safety procedures and record of the ferry operator, any such impact is likely to be negligible.
- 7.3.6 From a personal safety and security perspective, the crossing to Troon is more exposed to the prevailing south-westerly winds. The island of Arran itself provides a lee and the seas on the Ardrossan – Brodick route tend to be on the bow of the vessel, whereas on a passage to Troon, they would be on the beam (which causes greater passenger discomfort / personal safety risks).

7.4 Economy

- 7.4.1 The performance of each option against the STAG Economy criterion is set out below:

Table 7.3: Ardrossan & Troon – Economy Sub-Criteria

Economy Sub-Criteria	Ardrossan	Troon
Transport Economic Efficiency (TEE)	o	xx
Wider Economic Impacts (WEI)	✓✓✓	✓

- 7.4.2 It is important to note that the assessment under the economy criterion is a measure of the social welfare impact of the two options. The financial impacts are considered under 'cost to government'.

Transport Economic Efficiency

- 7.4.3 TEE is a measure of the impact of an option in terms social welfare, typically measured in terms of changes in generalised cost (i.e. the combined financial and travel time impacts of an

- option on users). TEE will capture changes in total journey times and the cost of travel (fares in this context). There is no evidenced difference in terms of reliability and this cannot therefore be quantified.
- 7.4.4 In the context of this study, the TEE impact at Ardrossan would be neutral as the proposed harbour investment would not impact on any of the above referenced factors.
- 7.4.5 The onboard surveys undertaken during the RET Evaluation Study in 2015 and 2016 provided details of around 4,000 individual journeys. For these journeys, passengers were asked how often they made that trip allowing an annual figure to be determined. When annualised, this corresponds to around 150,000 trips. The mainland origins / destinations of these trips were determined in the survey (for public transport and car separately) and these have been cross-referenced with the equivalent implied changes in journey time associated with moving from Ardrossan to Troon established from the analysis undertaken here.
- 7.4.6 The proportional distribution of the observed / surveyed trips is applied to the total 2015 carryings figure of 761,948 passengers and a total travel time impact by journey purpose and mode can be determined. A monetary value of this time can be estimated using standard STAG³¹ / DfT WebTAG³² approaches and values. This allows a calculation to be made of the impact of moving from Ardrossan to Troon in terms of 'Social Welfare'. Values have been estimated for 2015 and 2016 based on the survey data and carryings for each year, and an average of the two years has been taken. As we do not know how the increase in fares associated with a move to Troon would impact demand on a spatial basis (ie the fare would form a different proportion of the total generalised cost depending on the length of the trip), the TEE analysis here has been undertaken on a 'fixed matrix' basis, ie we have assumed here that the demand would not change in response to the change in fares and travel time associated with a move to Troon.
- 7.4.7 As has been noted, moving from Ardrossan to Troon would have a negative impact on car-based travel times to / from Brodick, with the longer crossing time negating any mainland leg advantage. For public transport, the position is more balanced.
- 7.4.8 On this basis, the table below shows the single year impact of moving from Ardrossan to Troon.

Table 7.4: Moving Mainland Port from Ardrossan to Troon – TEE Impacts

£ (2010 values)	Car / Van / Motorhome etc	Public Transport	Total
Residents			
Visitors			
Total			

Redundant

- 7.4.9 Troon would therefore record a negative impact in terms of TEE. This means that, in terms of travel time, moving from Ardrossan to Troon would generate an annual disbenefit of £1.3m based on current fares and 2015 demand.
- 7.4.10 The table below shows the estimated annual implied change in fares paid by current ferry users based on the fares calculated in Chapter 2 and the published 2015 carryings. It is assumed that there is an 88% / 12% split between adult and child passengers. Note that the table below does not include any estimation of the price elasticity of demand.

³¹ http://www.transport.gov.scot/sites/default/files/documents/rrd_reports/uploaded_reports/i9760/i9760.pdf

³² <https://www.gov.uk/guidance/transport-analysis-guidance-webtag>

Table 7.5: Moving Mainland Port from Ardrossan to Troon – Change in Fares Paid by Current Ferry Users

	Carryings	Fare Ardrossan / Troon	Fares Paid Ardrossan	Fares Paid - Troon	Change
Passengers – Arran route	761,948	£3.75 / £4.30			
Cars – Arran route	189,861	£15.10 / £18.40			
Total – Arran route					
Passengers – Campbeltown route	107,14	£7.65 / £7.50			
Cars – Campbeltown route	2,299	£40.50 / £39.65			
Total – Campbeltown route					
TOTAL					

Robert

7.4.11 Based on these assumptions, it can be seen that moving from Ardrossan to Troon would result in an annual increase of around £1m for fare paying passengers, based on current fares and 2015 carryings.

7.4.12 Note, any differential in reliability between the two ports would have a TEE impact, in terms of the travel time disbenefits associated with a higher number of delays or cancellations. However, as the evidence available to date does not highlight an attributable reliability differential between Ardrossan and Troon, there are assumed to be no TEE impacts in respect of this.

Wider Economic Impacts

7.4.13 There are unlikely to be any significant regional / national impact associated with the choice of mainland port in terms of e.g. agglomeration, labour market impacts etc. However, as a local decision of some significance, there are likely to be **distributional** impacts associated with each option (conventionally known as Economic Activity & Location Impacts, or EALIs), which are of critical importance in the context of this study. In particular, EALIs in Scotland have typically been viewed as positive options which retain or attract investment / employment into an area of multiple deprivation (as defined by the SIMD) as they support the Scottish Government's 'inclusive growth' agenda.

7.4.14 Ardrossan records a major positive in terms of the wider economic impacts criterion as it is anticipated that the retention of the ferry services would:

- Retain the economic activity associated with the ferry services in the town, which has several datazones categorised as amongst the most deprived in Scotland.
- Based on the proposal documents, support regeneration within Ardrossan itself, also avoiding an alternative future where the harbour falls into disuse and regeneration priorities are not realised.

7.4.15 Troon would record a minor positive under the wider economic impacts criterion as there would be an economic benefit to the town associated with increased footfall. However, it should be borne in mind that this would be offset against the negative impact on Ardrossan.

7.5 Integration

7.5.1 The performance of each option against the STAG Integration criteria is set out below:

Table 7.6: Ardrossan & Troon – Integration Sub-Criteria

Integration Sub-Criteria	Ardrossan	Troon
Transport integration	o	✓
Transport and land-use integration	✓✓✓	✓✓
Policy integration	✓✓✓	✓

Transport Integration

- 7.5.2 As the situation at Ardrossan would represent a continuation of the present day situation, there would be no net impact in terms of transport integration.
- 7.5.3 Troon would however score a minor positive in terms of public transport integration. Whilst the crossing time is longer, the assumed connection time to the station and shorter wait time for a train, coupled with the faster service to Kilwinning (where the Ayrshire mainline and Largs / Ardrossan branch line converge), would provide Troon with an advantage in this respect. It should however be noted that this outcome is predicated on a 10-minute connection between the ferry gangway and the train station. In addition, the requirement to interchange via bus is a slight negative factor here.
- 7.5.4 Troon would offer enhanced public transport integration for the Campbeltown service.

Transport and Land-Use Integration

- 7.5.5 Ardrossan scores highly positively from a transport and land-use integration perspective. The Ardrossan submission argues that the retention of the ferry service will act as a catalyst for £100 million of regeneration investment in the harbour area and improved connections to the town centre. The submission also noted that, if the ferry service is relocated to Troon, the land on which the harbour is currently situated would become derelict, and would also undermine the wider regeneration initiatives planned for the town.
- 7.5.6 The Troon proposals would also score well from a transport and land-use integration perspective as they would bring currently redundant marine and landside infrastructure back into use and offer improved connections between the town centre and the harbour. However, the corresponding negative impact on Ardrossan again has to be borne in mind.

Policy Integration / Fit with Established Policy Directives

- 7.5.7 The proposals for Ardrossan demonstrate a strong alignment with national, regional and local policies covering the economy, land-use and transport. The Troon proposals do likewise but the key difference can be considered the contribution that Ardrossan makes to the Scottish Government's inclusive growth agenda. If the regeneration plans in the Ardrossan proposal are realised as a consequence of the continuation of the ferry service, they would make a positive contribution to addressing the long-term socio-economic inequalities experienced by Ardrossan, as evidenced through the SIMD. Whilst investment in Troon would also be positive, the town does not demonstrate the same degree of multiple deprivation as its neighbour in North Ayrshire.

7.6 Accessibility & Social Inclusion

7.6.1 The performance of each option against the STAG Economy criteria is set out below:

Table 7.7: Ardrossan & Troon – Accessibility & Social Inclusion Sub-Criteria

Accessibility & Social Inclusion Sub-Criteria	Ardrossan	Troon
Community accessibility	✓	✓
Comparative accessibility	✓	x

Community Accessibility

- 7.6.2 Both proposals score positively in terms of access to local services, as they would each create improved pedestrian and cycling facilities linking the respective ferry terminals and town centres.

Comparative Accessibility

- 7.6.3 The issue of comparative accessibility can only be considered from the Arran & Campbeltown perspective as it is these communities which would experience a change in accessibility if the ferry terminal was to be relocated.
- 7.6.4 Ardrossan would score a minor positive in terms of comparative accessibility as the proposed new Passenger Access System would enhance ferry boarding / alighting arrangements for those with mobility impairments, the elderly etc.
- 7.6.5 Troon would record a minor negative as the need for a bus connection would involve an additional interchange for those of lesser mobility.

7.7 Technical Feasibility

- 7.7.1 A review of the technical aspects of each proposal is outwith the scope of this commission, although any risks in this respect are set out in Chapter 9. However, given that both Ardrossan and Troon are working harbours and that plans have been developed to a reasonably advanced stage, there are unlikely to be any technical feasibility issues which would act as clear differentiator between the respective proposals.

7.8 Operational Feasibility

- 7.8.1 There would be no operational feasibility issues associated with continued operation to Ardrossan.
- 7.8.2 The key operational issue in relation to Troon would be the requirement for additional crew to maintain the current number of return connections per day. Of particular importance here is finding suitable onshore accommodation to host additional crew, which would be a challenge during the peak summer months.

7.9 Public Acceptability

- 7.9.1 It is our understanding that the Ardrossan proposal has letters of support (although these have not been provided to PBA / Transport Scotland) from the:
- Arran Community Council;
 - Arran Economic Group;
 - Visit Arran; and
 - a number of Arran and Ardrossan businesses.

- 7.9.2 The Arran Ferry Committee also provided a letter of support for Ardrossan in February 2017 (reported in the *Herald* newspaper).
- 7.9.3 It is our understanding that the Arran community as a whole supports the shorter journey times and lower fares offered by the Ardrossan option.

8 Cost to Government

8.1 Overview

- 8.1.1 Peel Ports / North Ayrshire Council and ABP submitted costed bids to Transport Scotland setting out the financial implications of hosting the Arran and Campbeltown services at Ardrossan and Troon respectively.
- 8.1.2 Following a series of clarification questions provided by PBA, the information provided by the respective parties was used to develop a 30-year outline cost model.
- 8.1.3 The following sections set out the key parameters used in the cost model, the assumptions underpinning each parameter and the absolute and discounted 30-year cost of each option. The cost model has been provided separately to Transport Scotland.

8.2 Cost Model

- 8.2.1 The cost model is focussed purely on the overall cost to government from operating the ferry services from Ardrossan and Troon respectively. There are six elements to this:
 - berthing, pier and ramp dues;
 - fuel;
 - crew;
 - additional costs to North Ayrshire Council associated with the longer journey times on services from Troon;
 - termination costs associated with the current lease at Ardrossan; and
 - fares revenue.
- 8.2.2 It should be noted that:
 - all costs presented in the model are in current (i.e. 2016) prices, unless stated otherwise;
 - growth and cost parameters are capped after 20 years in the appraisal in line with STAG; and
 - the costs are based on the **current fleet and number of daily sailings**.

Berthing, Pier & Ramp Dues

- 8.2.3 Both Peel Ports / North Ayrshire Council and ABP stated that all harbour investment and operational costs required to deliver the ferry services will be recovered through dues (and lease of terminal building at Ardrossan). There would be no additional cost over and above these dues.

Ardrossan

- 8.2.4 The Peel Ports / North Ayrshire Council submission is based on:
 - a fixed monthly berthing charge of [REDACTED]
 - Ardrossan – Brodick service, 12 months @ [REDACTED]
 - Ardrossan – Campbeltown, 5 months @ [REDACTED]
 - These figures would be adjusted annually by the lesser of Port Group Charges or RPI, and would not change with either volume of calls or the vessel mix used.

- Pier and ramp dues based on passenger & vehicle numbers and vehicles respectively.
- 8.2.5 As the pier and ramp dues are based on carryings, if carryings on the route were to increase, the overall cost to government would increase proportionally. The reverse is true if carryings were to decline.
- 8.2.6 The introduction of RET on the Ardrossan – Brodick route in October 2014 and Ardrossan – Campbeltown in October 2015 makes it difficult to extrapolate a trend on the routes. However, given the potential volume-based variability in the Ardrossan submission, three scenarios are reported (it should be noted that these scenarios are illustrative only and are not based on analysis of carryings data):
- Scenario 1: Growth in all carrying types on the Arran & Campbeltown routes of 1% per annum.
 - Scenario 2: No growth in all carrying types on the Arran & Campbeltown routes.
 - Scenario 3: Decline in all carrying types on the Arran & Campbeltown routes of 1% per annum.

Troon

- 8.2.7 ABP has quoted a fixed annual charge of [REDACTED]. This is inclusive of the provision and operation of two shuttle buses over a 30-year period. This figure would be adjusted annually by RPI and would not change with either volume of calls or the vessel mix used.

Fuel

- 8.2.8 CalMac estimated the annual increment in fuel costs from operating to Troon as [REDACTED] per annum. Fuel prices are assumed to grow at the rate specified in WebTAG for Gas Oil.

Crew

- 8.2.9 With the longer crossing time, running to Troon whilst retaining the same number of sailings across the day would have an impact on crewing requirements. Given the complexities associated with crewing, CalMac was asked to provide an indication of the additional crewing resource associated with operating to Troon.
- 8.2.10 CalMac made the following assumptions when estimating the crewing requirement:
- Passage time Troon-Brodick 75 minutes (increase of 20 minutes over current).
 - *Note this differs from the assumption of a 15 minutes increase in current crossing times otherwise used in this appraisal – this is explained in Chapter 9, Risk & Uncertainty.*
 - No consideration is made of costs associated with providing relief during overhaul period.
 - It is assumed that additional crew will need to be housed at local accommodation providers overnight due to insufficient space onboard the vessels. Accommodation costs for crew members at £85 per person per night are included within the crew costing estimation.
- 8.2.11 The current manning requirement estimated by CalMac to deliver the service is as follows:

MV Caledonian Isles

- Summer:
 - 2 crews for full timetable period (36 additional crew members for 31-week period).

- Winter:
 - 2 crews for full timetable period (36 additional crew members for 21-week period).

MV Isle of Arran

- Summer
 - Current manning levels 4 days a week.
 - Full additional crew (28 additional members in total) required for 3 days a week for 22-week period.
- Winter:
 - Not applicable – vessel deployed elsewhere on network during the winter period.

8.2.12 CalMac estimate the cost of this *additional* crew resource (including onshore overnight accommodation) as [REDACTED] per annum.

8.2.13 It is assumed that this cost grows at 0.5% per annum in real terms.

Additional Costs to NAC

8.2.14 It is estimated by North Ayrshire Council that relocating the ferry service from Ardrossan to Troon would increase their cost of service provision by [REDACTED] per annum.

8.2.15 It is assumed that this cost grows at 0.5% per annum in real terms.

Ardrossan Lease Termination Costs

8.2.16 The Ardrossan Commercial Case states a [REDACTED] lease termination should the ferry service be relocated to Ardrossan. This consists of:

- CMAL lease surrender value - [REDACTED]
- 2 years unrecovered revenue for Campbeltown service trial - [REDACTED]
- Campbeltown ferry services revenue based on a 3-year contract - [REDACTED] and
- Brodick service lost revenue based on a 3-year contract - [REDACTED]

8.2.17 These figures were cross-checked with CMAL, which indicated the following by way of response:

Lease Surrender Value

8.2.18 In terms of the lease, CMAL responded that this runs to 11th June 2026, a further nine years. The rent is [REDACTED] per annum with an annual RPI-based increase. There are no break clauses within the lease.

8.2.19 In the cost model, an annual fee of [REDACTED] has been assumed from year 1-7, with half that value for the final year of the lease (as it ends in June).

Campbeltown Ferry Service Revenue

8.2.20 Transport Scotland noted that, given the potential for challenge, a figure of 50% of the Campbeltown service trial figure should be used, so a one off payment of [REDACTED] has been used for modelling purposes.

Brodick and Campbeltown Ferry Services Lost Revenue

8.2.21 Transport Scotland noted that these figures should not be included at this stage.

Fares Revenue

8.2.22 As previously noted, relocating the mainland ferry terminal to Troon would increase the fares for those travelling to / from Arran through the application of the RET formula. The impact on Campbeltown fares is a very small reduction.

8.2.23 As part of the Evaluation of the Impact of RET study, a price-based elasticity of demand was calculated for the Ardrossan – Brodick route. This elasticity was applied to calculate the change in demand and revenue from relocating the ferry service to Troon. As the elasticity of demand is greater than -1, fares revenue increases from relocating the service to Troon, despite the reduction in volumes.

8.3 Summary of Results

Undiscounted Cost to Government

8.3.1 The table below sets out the undiscounted cost to government of operating the Arran and Campbeltown services from Ardrossan and Troon over the 30-year appraisal period (for all three growth scenarios).

Table 8.1: Cost to Government, Undiscounted (2018-47)

	Troon: +1% per annum	Troon: 0% per annum	Troon: -1% per annum	Ardrossan: +1% per annum	Ardrossan: 0% per annum	Ardrossan: -1% per annum

Discounted Cost to Government

8.3.2 The table below shows the discounted cost to government over 30 years of the respective options:

9 Risk & Uncertainty

9.1 Overview

- 9.1.1 Whilst undertaking a critique of the respective proposals was outwith the scope of this study, it is important to identify both the risks within this analysis and within the two respective proposals.

9.2 Data / Analysis Risks

- 9.2.1 This section considers the risks within the data used for this study and the analysis undertaken.

CalMac Data

Crossing Times

- 9.2.2 It should be noted that the majority of the analysis contained within this study assumes the crossing time between Brodick and Troon is 15 minutes longer than the additional crossing time to Ardrossan. This is based on factoring up the crossing time on a *pro rata* basis to account for the longer distance and initial estimates from CalMac.
- 9.2.3 However, CalMac noted on 27th February 2017 that, after further analysis, they would anticipate an additional crossing time of 15 minutes being difficult to maintain. The operator explained that they consider 20 minutes to be a more realistic differential and their cost estimates are therefore based on this figure, as a 'worst case'. If a figure of 20 minutes were applied to all the analysis undertaken here, the balance of benefits (including road & public transport accessibility and TEE benefits) would shift further in favour of Ardrossan, ie it would not materially affect the substantive findings.

Crew Accommodation

- 9.2.4 The CalMac data assumes the additional crew required to operate the service would need be accommodated ashore. Given the significant uplift in numbers, the operator notes that it would be extremely challenging to find suitable local accommodation, particularly in the summer months.

Length of Operating Day

- 9.2.5 CalMac notes that that the longer operating day required to maintain the current number of connections would result in sailings taking place at unfavourable times of the day or night.

New Vessel Performance

- 9.2.6 Whilst the two new vessels currently under construction will be the most advanced and powerful in the CMAL fleet, a number of stakeholders have highlighted that the performance characteristics will not be fully understood until the new vessel has been on-station for a year or more. This is seen to be common with any new ship and is not a major issue in the context of this study. Nonetheless, it adds a small element of additional uncertainty into the overall debate.

Comparative Reliability

- 9.2.7 The operator data provides a record of the performance events associated with the Ardrossan – Brodick route and allows a degree of comparability with other routes in the Clyde & Hebrides

network. However, it is important note that there is no direct comparison with Troon available and it is therefore difficult to ascertain whether a cancelled sailing operating to / from Ardrossan would have sailed had Troon been the mainland landfall.

9.2.8 There are various means of comparison, but each has its limitations:

- **Simulations:** The simulations provide the most robust estimation of the comparative reliability of access to the two ports. However, as well as the caveat in relation to new vessel performance outlined earlier in this report, a 'real-world' comparison could only be made through operating to and from Troon for an extended trial period (which is an impractical proposition).
- **Operator Data:** The CalMac data allow for a comparison of the Ardrossan – Brodick route with other routes using an 'intermediate' or 'major' vessel. This provides a means of identifying the comparative reliability of the Ardrossan – Brodick route *vis a vis* other routes on the network. However, such a comparison again has its limitations as the factors affecting the Arran sailing in terms of weather, sea conditions, port access will differ from other routes on the network.
- **Comparison with MV *European Mariner*:** 2008-10 cancellation data are available for the P&O freight vessel MV *European Mariner*, which operated between Troon and Larne in Northern Ireland. These data were compared against sailings on the Ardrossan – Brodick route to determine whether there were days on which the Troon – Larne service sailed but the Arran service did not. However, there are a number of issues with this comparison:
 - On the one hand, the MV *European Mariner* was an old and relatively underpowered vessel and should thus be less reliable than the MV *Caledonian Isles*. However, on the other hand, a freighter will often sail in worse weather than a passenger vessel as the Master does not have to consider passenger comfort and safety to the same degree. Such a comparison is therefore imprecise.
 - The MV *European Mariner* only operated one rotation per day between Troon and Larne and thus there was a greater degree of flexibility in terms of working around weather windows.
 - There is no means of clearly identifying whether a sailing was cancelled as a result of difficulties accessing Ardrossan. It may be that a sailing was cancelled due to conditions at Brodick, again limiting the value of the comparison.
- **Expert Opinion:** A number of Master Masters that have sailed to and from both ports have provided an opinion on the matter. Whilst highly useful in providing a 'real-life' operational context, individual opinion cannot in itself be considered a statement of fact.

Census Travel-to-Work

9.2.9 The 2011 Census travel-to-work data has been used to map employment flows to and from Arran. These data provide a valuable snapshot of travel patterns but it is important to note that the introduction of RET to the Arran routes in October 2014 has impacted on travel opportunities to and from the island. Evidence from the Arran RET Evaluation suggests that there has been an increase in commuting, particularly inbound travel to Arran to fill seasonal and weekend posts. The Census data therefore has to be treated with a degree of caution.

Accessibility Analysis

9.2.10 The accessibility analysis is based on a number of assumptions in relation to sea-crossing times, interchange times and rail headways. These have been clearly set out in this report as the basis for a consistent comparison. However, any change in these assumptions could impact on the balance of the analysis.

- 9.2.11 Of particular importance is the assumption in the Troon proposal that the journey time from the gangway to the railway station would be ten minutes, as this shapes the public transport accessibility analysis. This is a key assumption which requires to be scrutinised closely in the proposal evaluation (see Section 9.4 below).

9.3 Ardrossan Proposal - Risks

- 9.3.1 The Ardrossan proposal consists of four volumes, as follows:

- Volume 1: Ardrossan Prospectus;
- Volume 2: Ardrossan Regeneration Supporting Growth Report;
- Volume 3: Ardrossan Report to Inform STAG Report; and
- Volume 4: Ardrossan Port Resilience and Engineering Report.

- 9.3.2 As part of this study, PBA has reviewed all four documents with a view to identifying any risks in terms of the assumptions / assertions made in the proposal. As previously explained, our remit does not involve critiquing the respective proposals.

Passenger Access System

- 9.3.3 Page 7 of the Ardrossan Commercial Case notes that '*CMAL has indicated that they will provide the required investment in the passenger access system* [REDACTED]. However, CMAL has indicated that this has not been agreed. This is unlikely to have a material impact on the study overall but the issue of which organisation pays for the PAS can be considered unresolved at this stage.

Inclusive Growth & Area Regeneration

- 9.3.4 The operational case for selecting Ardrossan (Volume 4) is supported by two reports produced by Ironside Farrar and EKOS (Volumes 2 & 3) which make a case for Ardrossan based on inclusive growth and area regeneration. Much of the material contained within these two reports is factual in nature (e.g. SIMD categorisations, environmental baselining etc) and is thus not commented on in this report. However, given the weight placed on this issue in the proposal, it is important to consider the risks associated with the economic impact assessment and value for money assessment provided.

Baseline Employment & GVA Figures

- 9.3.5 The Ardrossan submission sets out a series of baseline figures in relation to the economic impact of the ferry service drawn from the *Your Town Audit Report and Framework* prepared by Scotland's Towns Partnership and subsequent analysis by Ironside Farrar. The key points are:
- In terms of employment, the proposal notes that there are 2,000 jobs in Ardrossan, of which 1,250 jobs are within the town centre area.
 - It is estimated that circa 240 of these jobs are reliant on the ferry service – 62 direct CalMac, 103 indirect CalMac servicing and 75 retail / food & drink / transport / other service from visitor spend.
 - Using standard economic impact calculations, the identified jobs are used as the basis for calculating GVA and wages, estimated at £13.1m per annum and £6m per annum respectively.
 - The GVA and wages are then discounted over a 25-year period, providing net additional GVA of £223 million and net additional wages of £103 million.

- 9.3.6 The means by which the baseline employment figures have been calculated is not set out in the proposal). In particular:
- It appears that the 'direct CalMac' employment relates to crew, who are generally resident on the vessel and thus likely contribute little to Ardrossan itself. This needs to be established.
 - Details are required on what the 103 'indirect CalMac servicing' jobs relate to.
 - It would be beneficial to understand how the figure of 75 induced jobs have been arrived at.
- 9.3.7 The implication within the Ardrossan proposal is that these jobs would be lost if the ferry service relocated to Troon. We would suggest that further evidence is required to substantiate this claim as it would appear likely that most if not all of the CalMac jobs would transfer (potentially with Ardrossan residents travelling to Troon), whilst a number of the induced jobs would be displaced (albeit noting that this would be negative from a social inclusion point of view as the jobs would transfer to an area of lesser deprivation).

Economic Impact Assessment

- 9.3.8 The Ardrossan proposal notes that the retention of the ferry service in the town would generate new business opportunities, spend & turnover, jobs, GVA and wages. Indeed, the Masterplan for the regeneration of the town is predicated on retaining the ferry services. The proposal estimates that a further 215 gross direct jobs will emerge from:
- growth in passenger numbers and enhanced links with Ardrossan town centre that will generate spend / turnover and therefore employment creation for Ardrossan businesses and residents;
 - 300 additional berths at the marina that will support direct jobs and indirect jobs through spending / turnover and therefore jobs in local retail and service businesses;
 - development of new industrial, office, leisure and commercial business space;
 - development of 300 new houses and new school provision, with the new housing generating indirect jobs through household expenditure; and
 - delivery of an Enterprise Hub and take-up of vacant shop units within the town centre.
- 9.3.9 It does appear unlikely that the scale of investment set out above would be realised if the ferry service was to move and the current land used to accommodate the service became vacant / derelict. There does not appear to be any consideration of 'deadweight' (i.e. what would happen in any case without the intervention) in the proposal, suggesting that **all** of the investment is predicated on retention of the ferry service.
- 9.3.10 Nonetheless, there remains a risk that even if the ferry service was retained in Ardrossan that the above scale of investment would not materialise in any case. Further certainty is required as to the current position of the proposed developments and the probability of their being realised as a result of the ferry service remaining in Ardrossan.

Resilience During Construction

- 9.3.11 The rebuild of the ferry facilities at Ardrossan would have to be undertaken in a way that minimises the disruption to the existing service.
- 9.3.12 The proposal does not specifically cover this issue but, at our consultation meeting, Peel Ports noted that the existing linkspan would be usable almost up until the point at which the new linkspan is inaugurated.

Timescales

9.3.13 The 2016 masterplan for Ardrossan has three proposed packages of work, as follows:

- Current proposed works – deliverable in 2017:
 - linkspan for new ferry;
 - passenger access system;
 - harbour quay maintenance works;
 - bollards / fenders / quay protection;
 - dredge pocket / marine works; and
 - quay / docking arrangements for Brodick & Campbeltown ferries.
- Short-term works – deliverable in 2018:
 - terminal building waiting room enhancement / extension;
 - site works / utilities;
 - surface main car park (450 spaces);
 - extend marshalling capacity;
 - town centre connections;
 - multi-modal hub;
 - new signage; and
 - terminal externals including lighting / CCTV-SMART systems.
- Longer-term works 2019-2025:
 - new terminal building; and
 - all regeneration investment.

9.3.14 The programme set out in the proposal suggests that the marine infrastructure would be in place well in advance of the new vessel commencing operation, with supplementary landside work undertaken through 2018. The new terminal building would not be completed (although the PAS would be in place) until after the new vessel commences operation.

9.3.15 The timescale risks associated with the new terminal at Ardrossan therefore appear minimal, although a detailed project plan would of course be required in due course.

9.4 Troon Proposal - Risks

9.4.1 The ABP proposal in relation to Troon is very much operationally focussed and does not include wider consideration of socio-economics.

9.4.2 The majority of the marine infrastructure in Troon is already in place, with the main focus of the proposal being on the development of a new passenger terminal, PAS and surrounding infrastructure work. The main risks in relation to this proposal surround the proposed shuttle bus service, as detailed below:

Shuttle Bus Service

9.4.3 As previously noted, ABP proposes to operate a shuttle bus service between the port and Troon railway station, with an estimated 10-minute journey time from the ferry gang plank to the station. It is important to highlight the risks with the proposed shuttle bus service:

- The shuttle bus service would need to be capable of meeting the peak rail passenger demand if no passengers are to be left worse off. A review of recent summer carryings data suggests that the demand for rail travel could be met by two coaches on all but a handful of occasions where a third vehicle would be required.
- The shuttle buses would also need to be capable of accommodating e.g. luggage, prams, bicycles etc and would perhaps be similar in nature to a typical airport bus. This would reduce seating capacity and may thus dictate a larger number of buses or the option of standing (whilst legal, the safety of standing passengers would need to be carefully considered, particularly given the demographics of Arran).
- If there is an additional peak vehicle requirement, it is likely that coaches would have to be chartered from a local operator and may not therefore be e.g. low floor, have luggage space etc.
- Even with dedicated bus services, there could be delay at the port as passengers disembark the ferry and board the bus. The shuttle buses would also need to be capable of enabling access for travellers with differing mobility. On busy sailings, this may make the target of 10 minutes from gangplank to railway station challenging.
- From a contractual perspective, there would be a need for a clear and costed commitment to operate the required number of vehicles over the 30-year appraisal period.

Timescales

- 9.4.4 The marine infrastructure is currently in place at Troon although presumably berthing trials would be required before the service commenced, whilst the Masters would need to obtain their pilotage exemption (a relatively simple matter) prior to the start of operations.
- 9.4.5 The project plan prepared by ABP suggests that the new required terminal facilities would be completed by the end of June 2018.