

Ferry Alternatives

Improving Scotland's ferry
networks by emulating international best practice

by

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The Norse way

1954 Shipping cars, different approaches. Note balanced linkspan

Norway, *Gudvangen*, 300 pax, 30 cars

40.1m x 9.5m x 2.3m, 11.5 knots, 10 crew

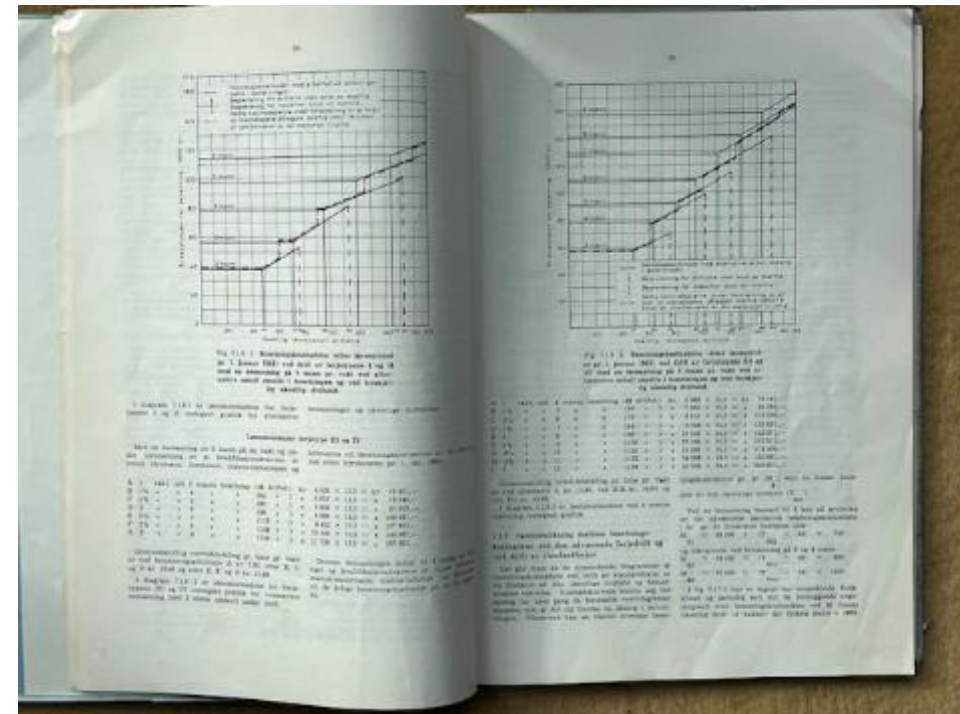
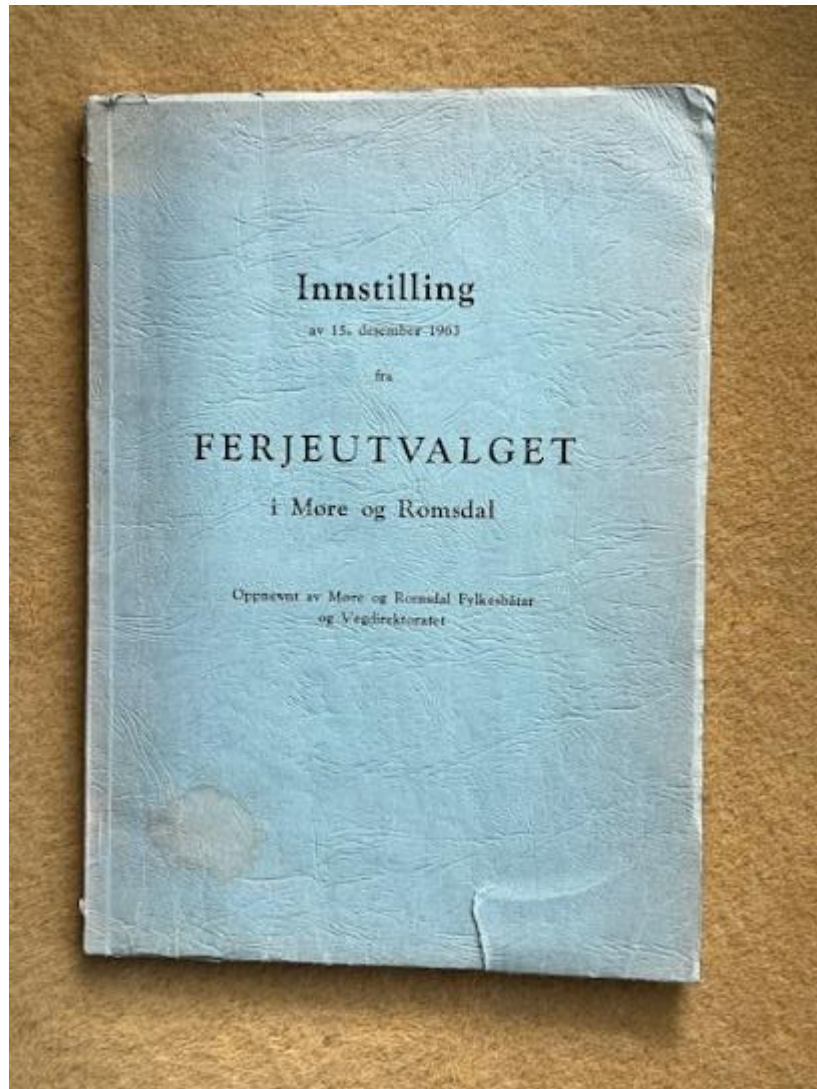


Scotland, *Arran*, 399 pax, 30 cars

57m x 11m x 2.3m, 15.5 knots, 20 crew



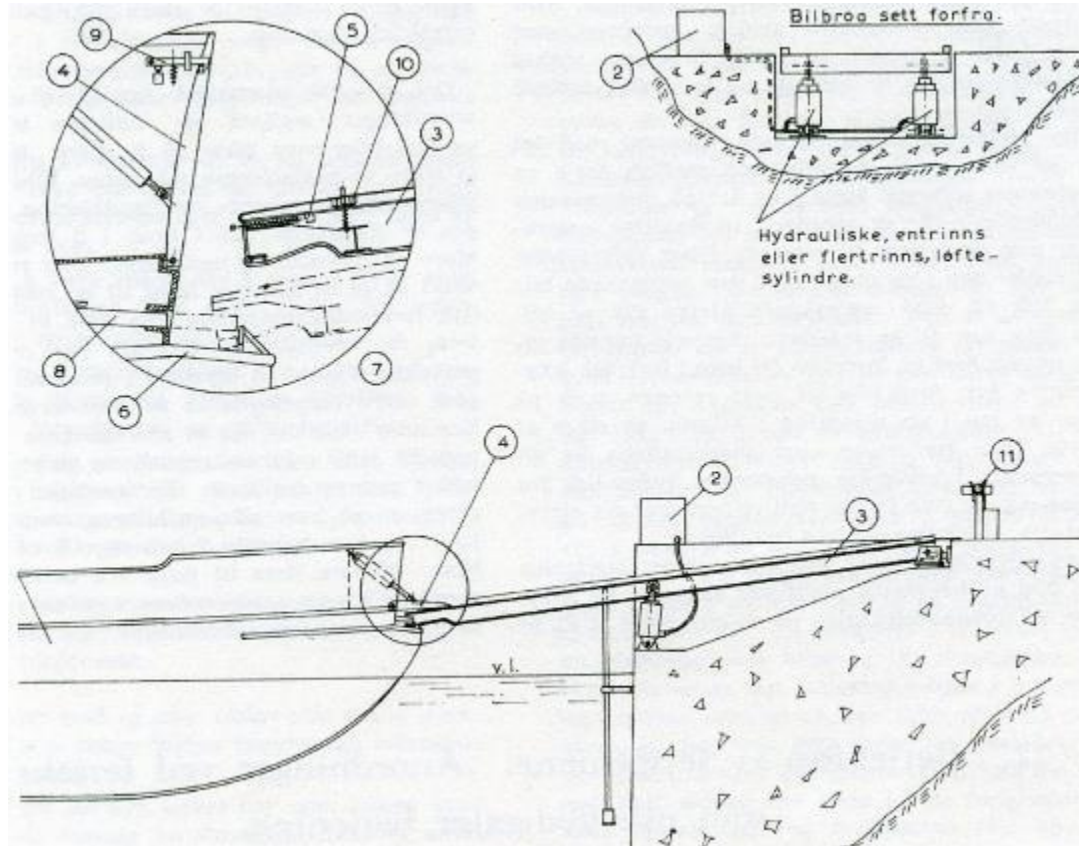
The MRF Report 1963



Main Findings:

Ferries part of the road system, shortest frequent crossings, simple ships, minimal crewing, crew live ashore, lock-on linkspans, ship and land passengers over the linkspan.

The Lock-on Linkspan



- Linkspan rests on ship ledge
- Locked in place with short ramp
- 5% sheer fore and aft allows smooth transition between ship and linkspan
- One man on board operation; no mooring lines required; no shore personnel required
- No heavy ship-mounted ramps

Norwegian Vehicle Ferry Connections Today



- High degree of standardisation and interchangeability
- Frequent services from early till late, many 24/7
- Shore based crews working shifts
- Individual routes or small groups of route tendered separately
- Five main operators
- Electric replacing diesel
- Increasingly replaced by fixed links

Open Water Solutions

Lofoten route 3½ hours – Islay Route 2 hours

**Norway, *Landegode*, 390 pax, 120 cars
96m x 17m x 4.2m, 18 knots, 12 crew**



**Scotland, *Isle of Islay*, 450 pax, 100 cars
95m x 17m x 4m, 16 knots, 27 crew**



Fast Pax Cats

- 35 Knots, 3 crew
- Numerous multi-port routes linking regional centres with coastal communities



Impact of Norwegian Methods

- Shortest feasible vehicle ferry crossings
- Higher frequency, high capacity, operating from early till late
- Reduced operating cost, reduced emissions
- Simple ships, minimal (live ashore) crewing, working shifts
- Terminals unmanned or minimal manning
- Attracts a high level of patronage and increased revenue
- Fast passenger catamarans link coastal communities
- Aids local economic and social well-being

Part two – The Antipodean Approach



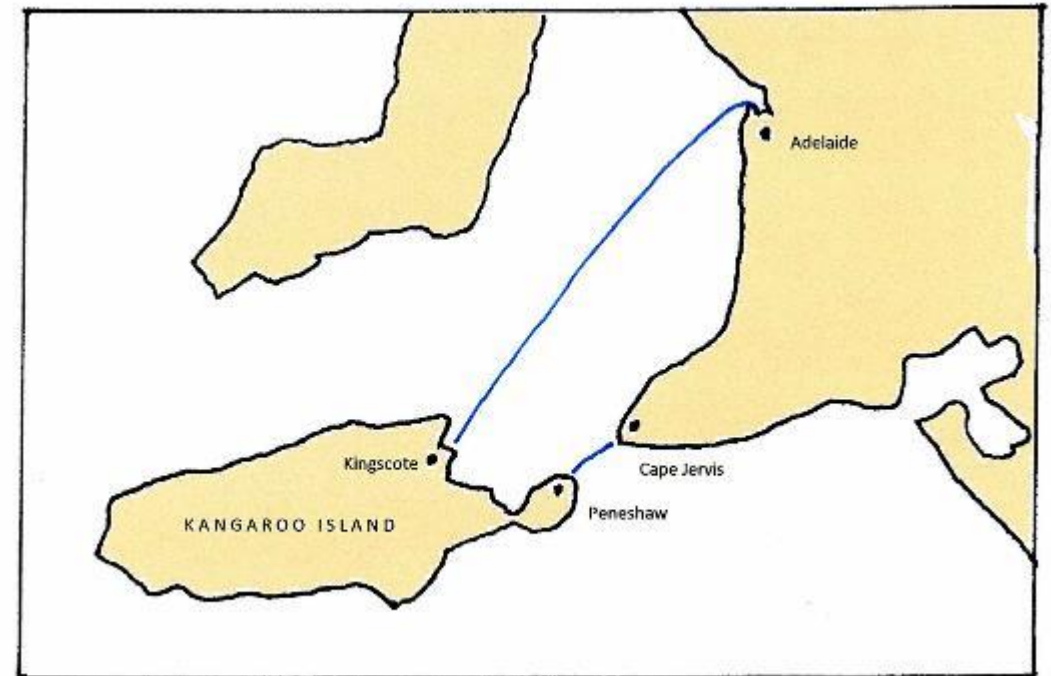
Kangaroo Island the Long Way

***SS Karratta* 1907-1961 (top left)**

***MV Troubridge* 1961-1987 (bottom left)**



The long Adelaide-Kingscote route replaced by the short Cape Jervis-Peneshaw crossing in 1987



Kangaroo Island Short 45 min Crossing

Up to 12 return sailings per day

1984, *Philanderer III*, Catamaran, 250 pax, 25 cars, introduced by Peter March



1998, *Sealion 2000*, 50m, 378 pax, 55 cars, 16 knots, 2 x 1007 kW, sister ships operated by SeaLink



Stuart Ballantyne. Designer Extraordinaire



Pentalina and Finlaggan Compared

2008, *Pentalina*, £7m, 70m x 20m x 2.2m draft, 247 pax, 70 cars, 10 crew, 3,876kW, 19 knots

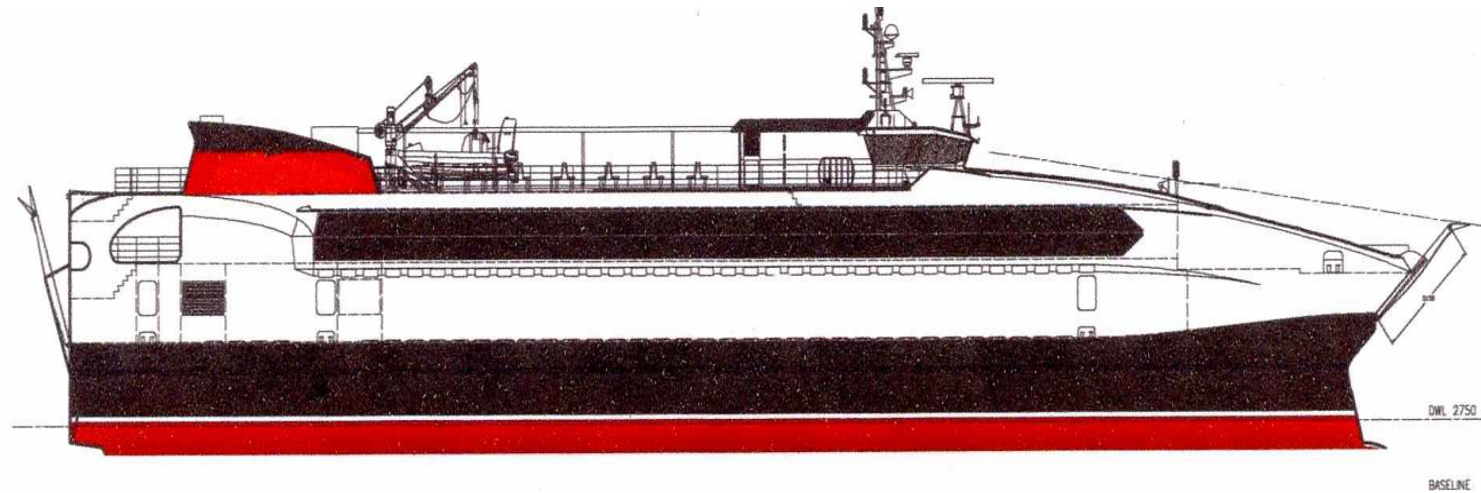


2011, *Finlaggan*, £24m, 81.8m x 16.4m x 3.4 draft, 550 pax, 85 cars, 26 crew, 8,000kW, 16.6 knots

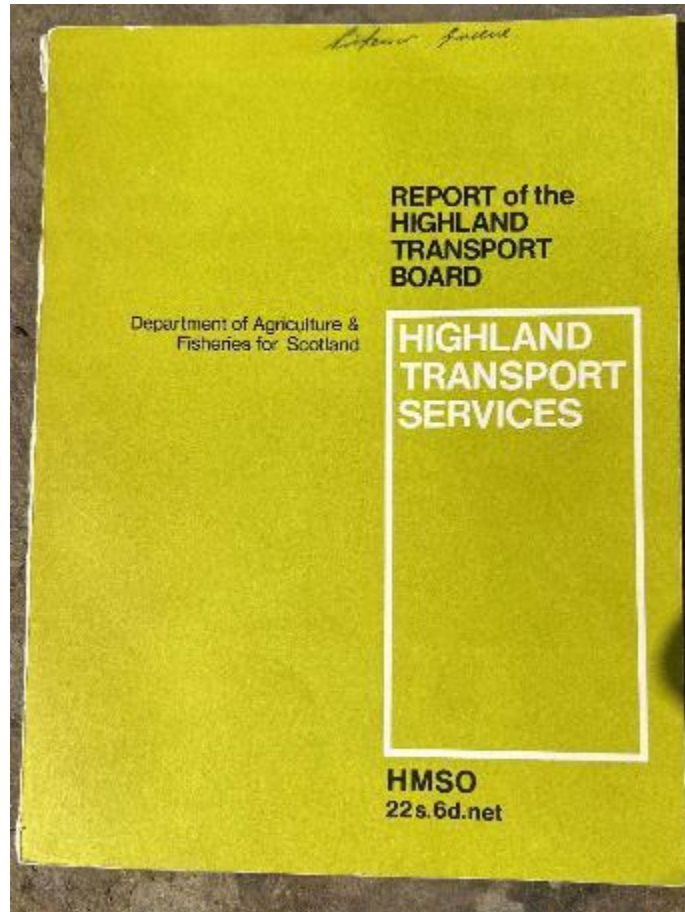


Part Three – Scottish Emulation

The good, the bad and a better future

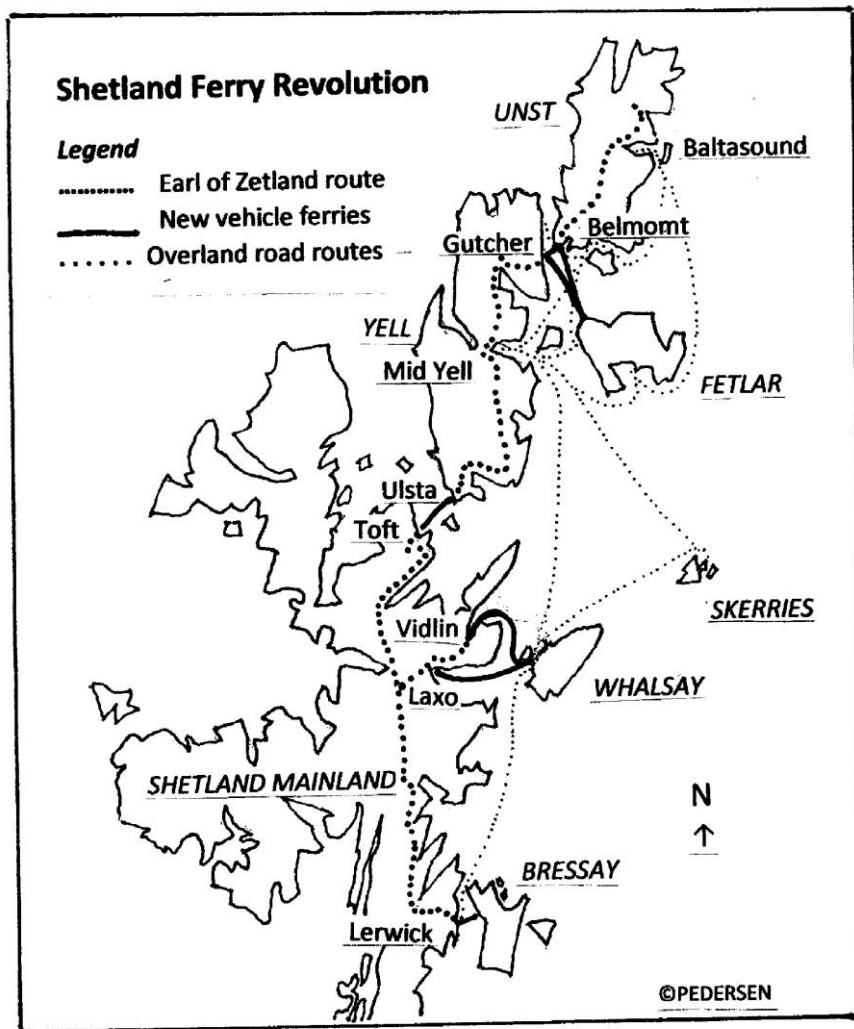


The Highland Transport Board Report 1967

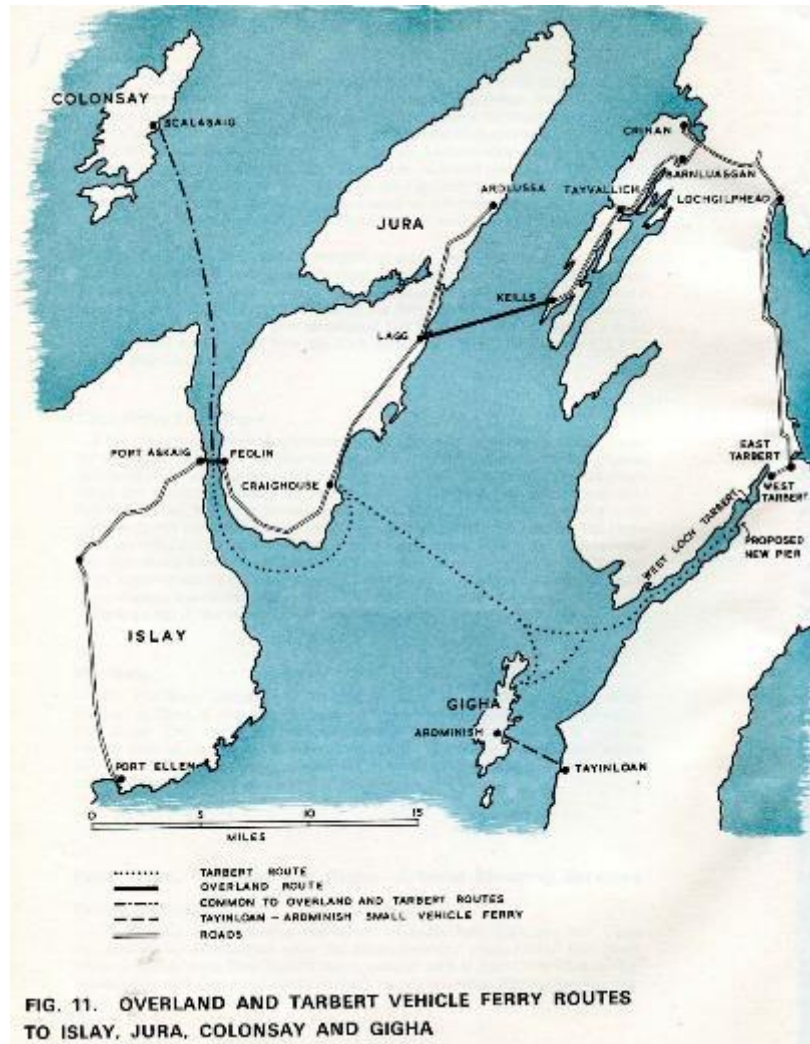


- The board noted Norwegian vehicle ferry experience and sought advice from Mr K H Oppegaard.
- He advised on possible adoption of Norwegian type ferries for Islay, Jura, Colonsay, Gigha, Barra, S Uist and also Shetland.
- A vehicle ferry should act as close as possible to a bridge between island and mainland.

First Scottish Uptake – Shetland



The Islay/Jura Overland Proposal



- Two or three small ferries would provide a much more frequent, less costly service and about twice the capacity of one larger vessel on the East Loch Tarbert route.
- The scheme would however require major road upgrades, which proved a stumbling block.

Western Ferries Step In

Completely unsubsidised



Sound of Jura (left) 6 crew
Clyde ferries (Below) 4 crew



Cowal Route Comparison

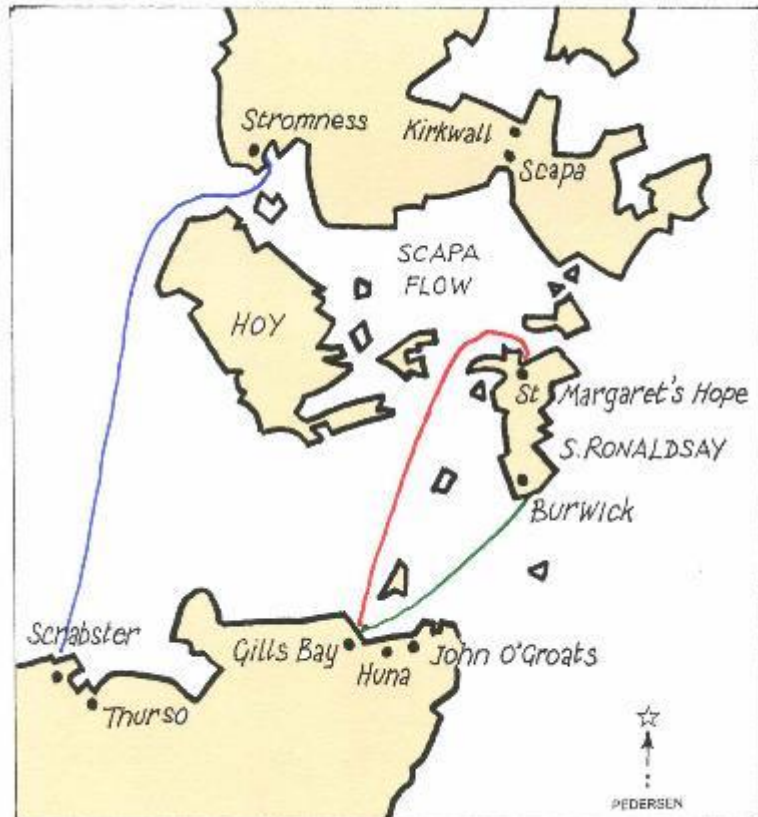
	<i>Western</i>	<i>CalMac</i>
Pax/yr	1,307,000	615,200
Cars/yr	577,800	77,800
CVs/yr	33,700	6,000
Fuel/yr	1,180 tonnes	1,212 tonnes
CO2/vehicle	5.13kg	46.5kg

Pentland Firth Debates

Scrabster-Stromness (St Ola) **BLUE**

Shortest Crossing Burwick **GREEN**

Pentland Ferries **RED**



Pentland Firth Comparison

PENTALINA



- Build cost £7 million
- 78 cars, 247 pax, 10 crew
- 15 miles passage, 4 trips/day
- 708 litres per trip,
- 624 vehicle cap/day
- **NIL** subsidy per annum

HAMNAVOE



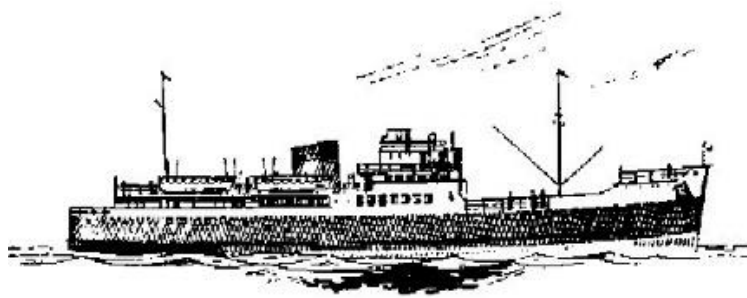
- Build cost £28 million
- 98 cars, 600 pax, 28 crew
- 28 miles passage, 3 trips/day
- 2,757 litres per trip
- 588 vehicle cap/day
- c **£10 million** subsidy per annum

Aberdeen – Kirkwall: The Reality



- 37,000 pax/yr = 8% of traffic
- 18 cars/trip = 7% of traffic
- Fuel burn = 4,000 litres/hr or 1½ l/pax/ml
- **Or 2 gallons per car per mile !!**
- Subsidy = circa £230 / pax / return trip
- This equals or exceeds tourist spend/cap
- **Why is this a “lifeline” ferry ??**

The Demise of Traditional Multi-port Services



- *Earl of Zetland* Shetland N Isles
- Outer Isles mail (Armadale & Uig)
- Sound of Mull (OB-Craignure)
- Clyde long-distance cruising
- Ardrishaig mail service
- Portree mail service (replaced by overland via Kyle-Kyleakin)
- Stornoway mail service (UL-SY)
- Etc.

Shuttle Ferries and Slipways

Partial adoption of Norwegian Principles

***Loch Portain, 49m x 14.1 x 1.5m draft,
146 pax, 34 cars, 10.5 knots, 5 crew***



- Existing ferry crossings developed, e.g. Kyle-Kyleakin, Corran, Colintraive
- New crossings created, e.g. Fishnish-Lochlaine
- Sounds of Harris and Barra surprise reluctant officials
- Minimal live-ashore crewing, but limited hours of operation
- Turn up an go, no shore personnel
- Slipways poorer geometry than lock-on linkspans and necessitate heavy on board ramps

The Strange Case of the Electro-diesels

Both ships built 2013

***Lochinvar*, £12m, 23 cars, 9 knots,
Diesel/car space/hour 3.89 litres**



***Sound of Seil*, £4m, 40 cars, 12 knots,
Diesel/car space/hour 1.83 litres**



RO RO Ineficiencies

Norway: Utne, 4 crew, nil shore staff, total 4



Scotland: Loch Frisa, 7 crew, 5 shore staff Mull, 6 shore staff Oban, total 18



Arran – Catamaran or Monohull?

Guess which CMAL selected?

Catamaran, 74m x 22m, 762 pax, 98 cars, 14 crew, cost £15m (Far East), £25m (Europe), power 3,800kW, speed 17 knots



Glen Sannox, 94m x 17m, 1,000 pax, 130 cars, 34 crew, estimated cost £175m, power 5,900kW, speed 16.5 knots



The Islands (Scotland) Act 2018

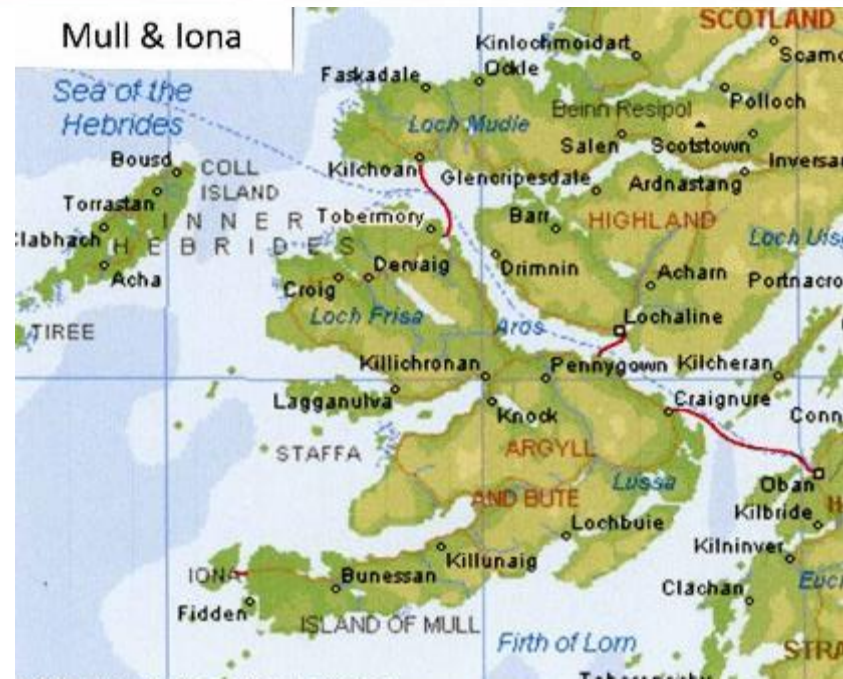
- Increasing population levels,
- Improving and promoting:
 - (i)sustainable economic development,
 - (ii)environmental wellbeing,
 - (iii)health and wellbeing, and
 - (iv)community empowerment,
- Improving transport services,

Craignure – Oban Options

Left, as proposed by the Mull & Iona Ferry Committee

2 catamarans, 74m, 550+ pax, 98 cars,
10-14 crew, 3,800kW, 17 knots

Isle of Mull, 1,000 pax, 70 cars, 28 crew
Loch Frisa, 200 pax, 34 cars, 7 crew



Proposed Mull Schedules

Summer Schedule (left) operated by both catamarans
Winter Schedule (right) operated by one catamaran

Daily		SuX A	SuX B	A	B	A	B	A	B	A
Craignure	dep	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00
Oban	arr	06:45	07:45	08:45	09:45	10:45	11:45	12:45	13:45	14:45
		SuX	SuX							
Oban	dep	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00
Craignure	arr	07:45	08:45	09:45	10:45	11:45	12:45	13:45	14:45	15:45

		SuX								FSO
Craignure	dep	06:00	08:00	10:00	12:00	14:00	16:00	18:00	20:00	22:00
Oban	arr	06:45	08:45	10:45	12:45	14:45	16:45	18:45	20:45	22:45
		SuX								FSO
Oban	dep	07:00	09:00	11:00	13:00	15:00	17:00	19:00	21:00	23:00
Craignure	arr	07:45	09:45	11:45	13:45	15:45	17:45	19:45	21:45	23:45

Daily		B	A	B	A	A	FSO A
Craignure	dep	15:00	16:00	17:00	18:00	20:00	22:00
Oban	arr	15:45	16:45	17:45	18:45	20:45	22:45
Oban	dep	16:00	17:00	18:00	19:00	21:00	23:00
Craignure	arr	16:45	17:45	18:45	19:45	21:45	23:45

A = Roster A (two shifts, second shift **BOLD**)

B = Roster B

FSO = Fridays and Saturdays only

SuX = Sundays excepted

Approx. £4m per annum **less subsidy** and **community ownership** gives **£50m+ saving in capital charge** to the public purse while almost **doubling capacity**.

Islay/Jura Overland

Overland route in RED

Oversea route in BLUE

Phase one: cars and light commercials

Phase two: all vehicles



Islay Overland Comparisons

Current Roads with Minor Upgrades

<i>Overland</i>	<i>Road Miles</i>	<i>Time Mins</i>	<i>CO2/car kg</i>
Port Ellen - Port Askaig	21	35	1.65
Terminal wait time		15	
Ferry Passage		10	5.00
Feolin - Lagg	17.5	25	1.37
Terminal Wait time		15	
Ferry Passage		30	11.00
Keills - Lochgilphead	18	30	1.41
Totals	58.5	160	20.44

Via Kennacraig

Terminus: wait time	30	
Port Ellen - Kennacraig	130	150.00
Kennacraig - Lochgilphead	19 27	2.12

Totals

Totals	19	187	152.12
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Bowmore - Lochgilphead

Bowmore - Lochgilphead	Time hrs
Via Port Ellen	03:20
Via Port Askaig	03:10
Via Overland	02:50

The Challenge – Road Upgrades

A816 Feolin-Ardlussa Jura (left)

The last mile to Lagg Pier (right)



Islay/Jura Overland Cost/Benefit Estimates

25 year costs

- 25 year total oversea cost (less revenue) = c£500m
- Cost of minor road upgrades = c£40m (phase one)
- Cost of full road upgrades = c£300m (phase two)
- 25 year total small (40 car) ferry cost less revenue = c50m

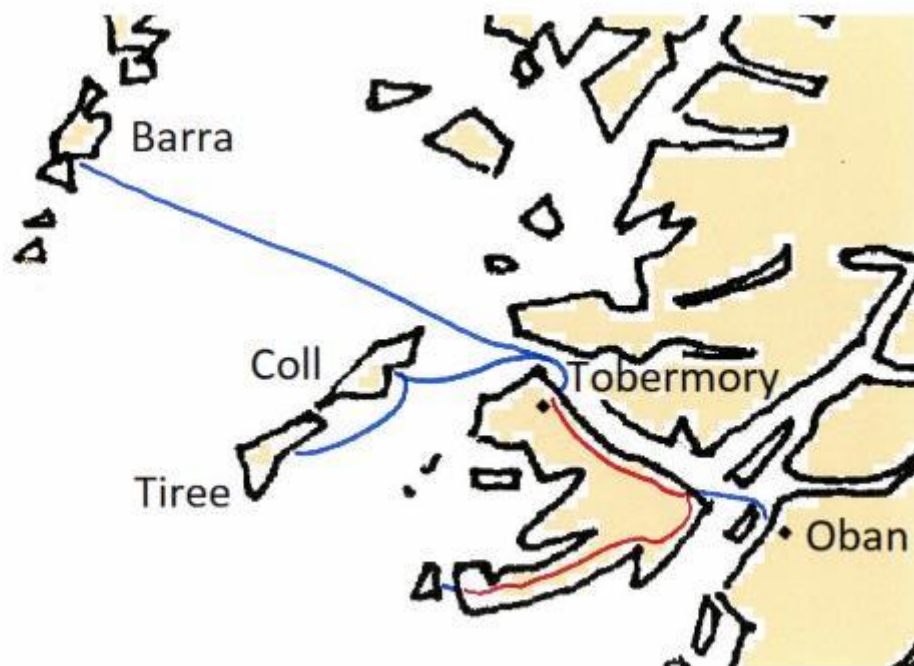
Benefits of the Overland

- Phase one doubles capacity and frequency for cars, shorter overall journey times, much lower emissions and less cost to users.
- Full implementation doubles capacity and quadruples frequency for all vehicles, even shorter overall journey times.
- Possible to run through bus Port Ellen-Glasgow.

Mull Land Bridge

Mull land bridge **RED**

Ferry connections **BLUE**



The Barra Connection

Castlebay	<i>dep</i>	07:00	15:00
Tobermory	<i>arr</i>	10:00	18:00
Oban	<i>arr</i>	x	x
Oban	<i>dep</i>	z	z
Tobermory	<i>dep</i>	10:30	18:30
Castlebay	<i>arr</i>	14:00	22:00

x = connection arrives Oban 1hr. 45 min. later

z = connection departs Oban 1 hr. 30 mins. earlier

The Tiree and Coll Connection

Tiree	<i>dep</i>	06:00	12:00	18:00
Coll	<i>arr</i>	07:00	13:00	19:00
Tobermory		08:15	14:15	20:15
Oban	<i>arr</i>	x	x	x
Oban	<i>dep</i>	z	z	z
Tobermory		08:45	14:45	20:45
Coll	<i>dep</i>	10:00	16:00	22:00
Tiree	<i>arr</i>	11:00	17:00	23:00

x = connection arrives Oban approx 1hr. 30min. later

z = connection departs Oban approx 1hr. 45min. earlier

The Little Minch – Separate Harris and Uist



North Uist

Lochmaddy	dep	07:30	11:00	13:30	17:00	20:30
Loch Poolteil	arr	08:35	11:05	14:35	18:05	21:35
Loch Poolteil	dep	09:15	11:45	15:15	18:45	22:15
Lochmaddy	arr	10:20	12:50	16:20	19:50	23:20

Harris

Tarbert	dep	07:30	11:00	13:30	17:00	20:30
Dùn Tùilm	arr	08:35	11:05	14:35	18:05	21:35
Dùn Tùilm	dep	09:15	11:45	15:15	18:45	22:15
Tarbert	arr	10:20	12:50	16:20	19:50	23:20

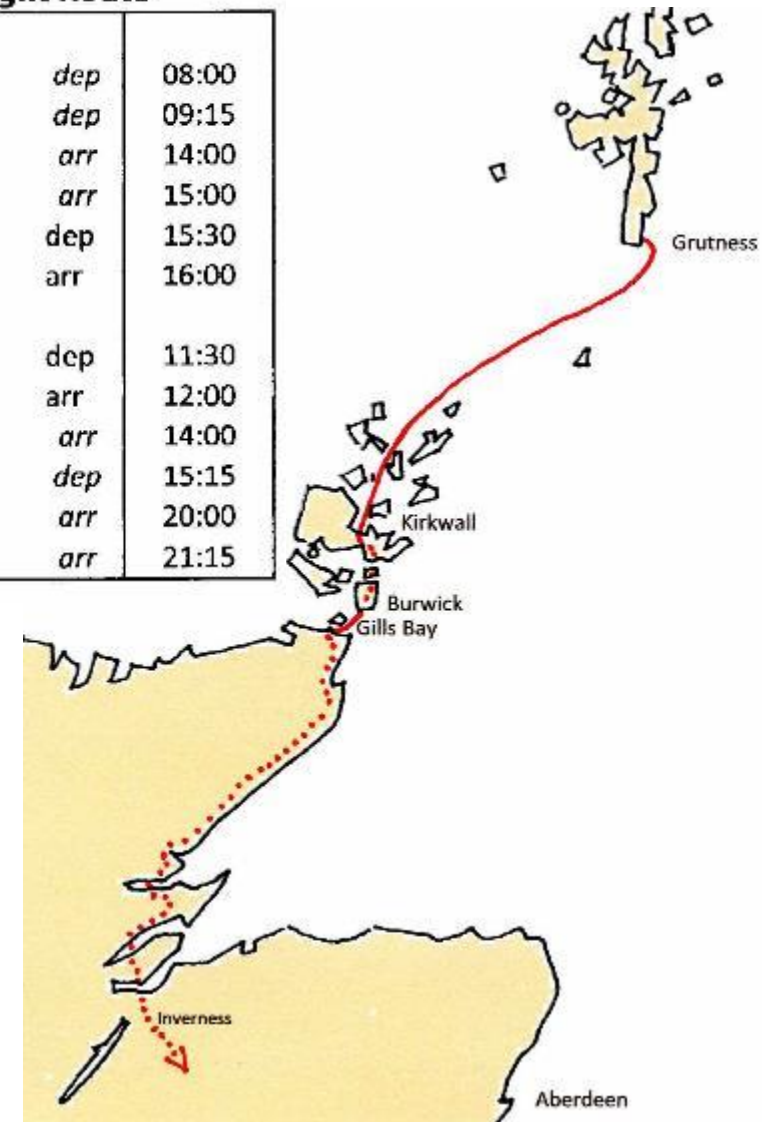
Shetland Daylight

Offers daylight travel between Shetland and the Central Belt.
One sixth the emissions.



The Shetland daylight Route

Lerwick Bus	dep	08:00
Grutness	dep	09:15
Kirkwall	arr	14:00
Bus to Burwick	arr	15:00
Burwick	dep	15:30
Gills Bay	arr	16:00
Gills Bay	dep	11:30
Burwick	arr	12:00
Bus to Kirkwall	arr	14:00
Kirkwall	dep	15:15
Grutness	arr	20:00
Lerwick Bus	arr	21:15



Net Zero: Battery Electric Ferry - Iceland

- The Vestmannaeyjar islands (Iceland) ferry *Herjólfur* runs smoothly on electricity, resulting in major fuel cost savings and reduced emissions.
- Under favorable conditions, the ship runs on electricity alone, c100,000 kWh weekly plus from nil to c2.5t diesel. Without electricity, the vessel would require c35t of diesel/week.



Net Zero: Lofoten Hydrogen Ferries (by 2025)

£30 million, 120 cars, 599 pax, 100km open water passage



Vehicle Ferry Developments Summary

Vessel requirements (examples)

- Islay, Jura, Colonsay: 3-4 x 40 car catamarans
- Arran: 3 x 98 car catamarans
- Mull: 2 x 98 car catamarans
- Bute: 2 x 65 car catamarans
- Barra & Tiree: 2 x ships (type?)
- Split Uig-Tarbert/Dunvegan-Lochmaddy (ship types?)
- Orkney N & S Isles: 3 x 50 car catamarans and 3 x 30 car catamarans
- Gills Bay-Burwick (hourly): 2 x 98 car cats
- Shetland daylight: 1 x *Landegode* type vessel

Marine and road works

- Road upgrades Jura and Knapdale, terminals Lagg & Keills, etc.
- Mull road upgrade Salen-Tobermory, new terminal Mull, sheltered harbour Tiree
- New terminals Dunvegan (or Glendale) and Dun Tuilm with road upgrades

Fast Pax Opportunities

Multi- port connections re-born

Wightrider II, 1,900 kW, 22 knots, 26 knots max, 260 pax 4 crew, 148 pax 3 crew, 5 crews, 2 shifts, 4 days on, 2 days off



Sound of Mull Fast Service

Tobermory	dep	07:00		14:00	
Lochaline	dep	07:40		14:40	
Craignure	dep	-	09:40	14:15	17:45
Oban	arr	08:15	10:05	15:40	18:05
Oban	dep	08:30		16:30	
Lismore	dep	08:40		16:40	
Oban	arr	08:50		16:50	
Oban	dep	09:10	11:40	17:10	18:20
Craignure	arr	09:35	12:05	17:35	
Lochaline	arr		12:25		18:55
Tobermory	arr		13:00		20:35

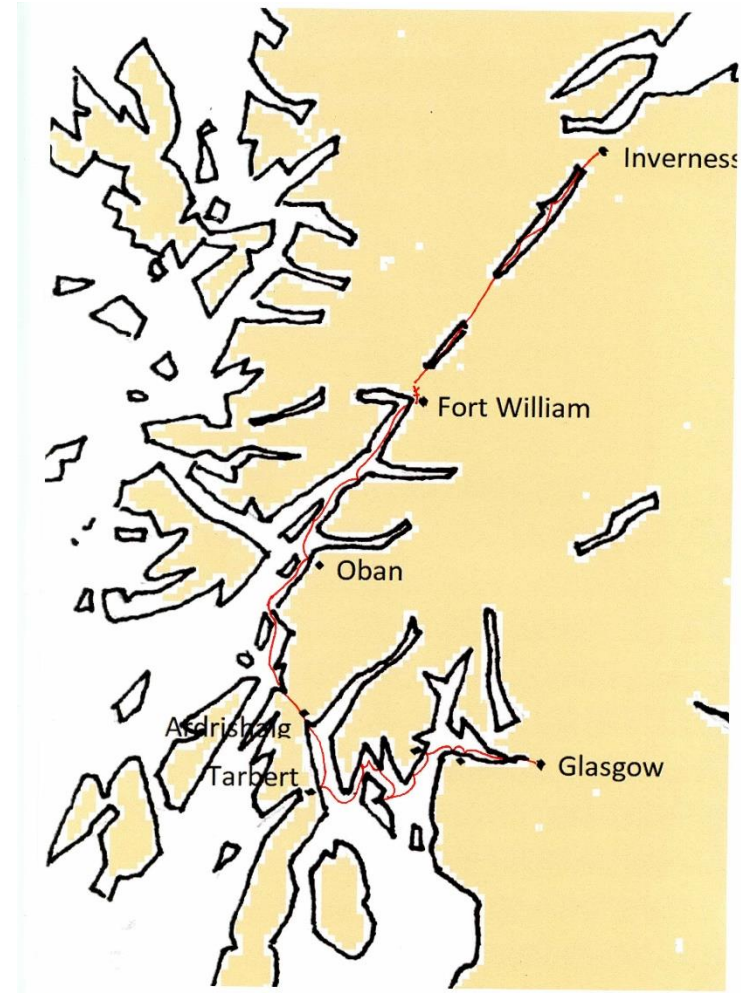
Portree Fast Service

Mallaig	dep	10:30
Glenelg	dep	11:20
Kyle	dep	11:40
Applecross	dep	12:00
Raasay	dep	12:40
Portree	arr	13:05
Portree	dep	14:55
Raasay	dep	15:20
Applecross	dep	16:00
Kyle	dep	16:20
Glenelg	dep	16:40
Mallaig	arr	17:30

The Royal Route Then

***Columba*, 2,116 pax, 74 crew**

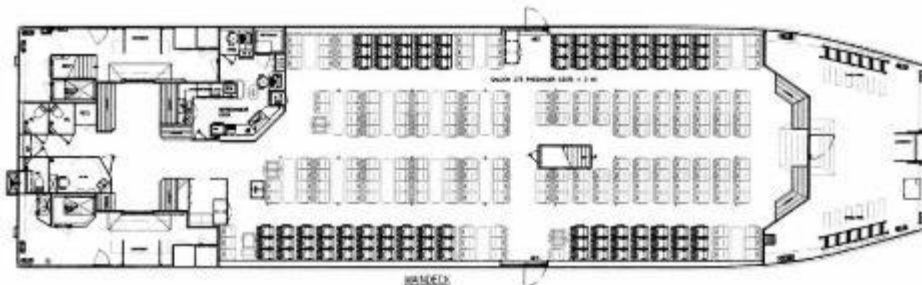
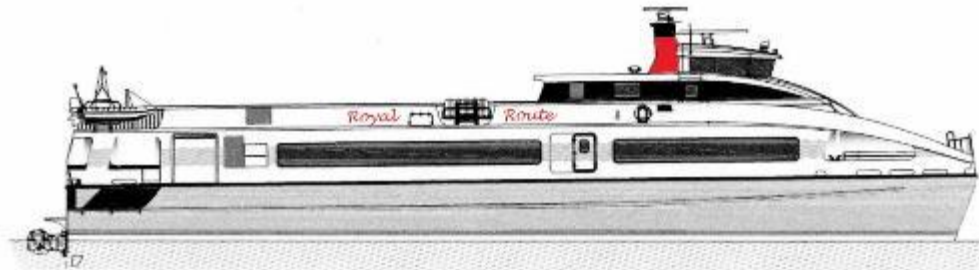
***Chevalier*, 1,074 pax, 24 crew**



Royal Route Revived

A pipe dream ??

Swift ships, 1,900 kW, 22 knots service, 26 knots max, 260 pax, 4 crew. Not competitive with coach on price, therefore, marketed as special experience. Would it be viable?



The Royal Route Revived

Glasgow (train)	dep		08:56	14:50
Wemyss Bay	dep		10:00	15:55
Rothsay	dep		10:25	16:20
Tighnabruaich	dep		11:05	17:00
Tarbert	arr		12:00	17:55
Ardrishaig	arr		12:40	
<i>Coach to Crinan</i>				
Crinan	dep		15:00	
Easdale	dep		15:55	
Oban	dep	07:30	16:30	
Lismore	dep	07:15	16:40	
Fort William	arr	08:55	17:55	

Fort William	dep		09:00	18:00
Lismore	dep		10:15	19:15
Oban	dep		10:30	19:25
Easdale	dep		12:05	
Crinan	arr		12:00	
<i>Coach to Ardrishaig</i>				
Ardrishaig	dep		13:10	
Tarbert	dep	07:40	13:40	
Tighnabruaich	dep	08:45	14:45	
Rothsay	dep	09:25	15:25	
Wemyss Bay	arr	09:45	15:45	
Glasgow (train)	arr	10:44	16:47	

Glory Days Once More



- **Greener** is more **cost effective**
- Route tendering
- More connections
- Shorter crossings, efficient ships
- More capacity generates business
- Less CO2 emissions
- Less **public subsidy**
- More prosperous vibrant island communities

What's not to like?



Thank you and enjoy wonderful sailing

