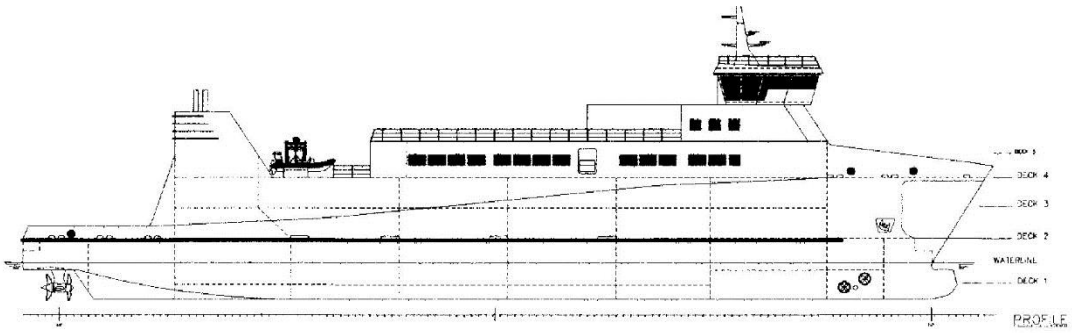
Little Minch Ferry Options



A Consultancy Study
Undertaken for

HITRANS

by

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CONSULTING

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A Consultancy Proposal Prepared for HITRANS

The Brief

Pedersen Consulting was commissioned by HITRANS to examine and set out alternative options for ferry services across the Little Minch between Skye and North Uist and Harris. This study will consider in particular the proposition, advocated over several years, as to how a two vessel service, utilising a lower cost design specification than the one vessel options currently operated and proposed can in the medium term provide a more frequent and convenient service that will encourage traffic growth while giving better value to the public purse.

Executive Summary

The present ferry operation connecting Skye with North Uist and Harris is operated by one vessel, MV *Hebrides*, (612 pax (passengers), 90 cars and 34 live-on board crew). The service is capacity constrained in terms of vehicle space although passenger capacity is well in excess of demand, resulting in a larger crew and higher operating costs than necessary to cope with the demand. Increasing vehicle capacity is, however, a matter of some urgency if island well-being is to be preserved. The service is infrequent and the timetable inconvenient which is a disincentive to traffic growth and there is limited opportunity for a day trip market to be developed from Skye. The traffic, revenue, costs, shortfall and £63 subsidy per car figures represent the base case in considering alternative options.

A new larger vessel (1,000 pax, 127 cars and an estimated 36 crew) currently in build, will relieve the vehicle capacity constraint *pro tem*, although in the mid-term the capacity ceiling will be breached. As with the current vessel, the passenger capacity and crewing is again much higher than required to meet demand. The limitations of the existing timetable will remain unresolved. Traffic and revenue will grow marginally, but costs (mainly due to high capital expenditure and large crew) will rise, shortfall and £131 subsidy per car will rise by 70%, 140% and 110% respectively compared with the base case.

Two ship option (A) utilising the existing *Hebrides*, but with passenger capacity and crewing reduced to 250 and 12 respectively, plus a smaller new build (250 pax, 80 car, 12 live-ashore crew) vessel virtually doubles route capacity and frequency of service. It offers a convenient and regular timetable which will lead to traffic growth of 150% leaving a good margin of capacity for future growth. Revenue, costs and shortfall grow proportionately. The £66 subsidy per car is very slightly higher than the base case – effectively base case parity, within the margin of error, but much less than the one new large vessel.

Two ship option (B) whereby both ships are purpose built with the same 250 pax, 80 car, 12 live-ashore crew characteristics as the second ship in option (A), but utilising lock-on linkspan or alternative efficient terminals, whereby the need for terminal mooring personnel is eliminated. As with option (A) above a convenient and regular timetable is provided giving the same 150% traffic growth and margin of capacity for future growth. Of all the above options, this is the most cost effective, with a lower £55 subsidy per car than the base case.

By providing two standardised vessels and more efficient berthing, this *modus operandi* represents a model that could be rolled out for other Scottish ferry services to provide more capacity in an economical manner with minimum investment in terminal upgrades.

The potential economic and social benefits attributable to the projected traffic growth that either of the two ship options would generate, together with the further contribution to the local community that an island based crew would bring about, seem clear. The case in favour of a two ship service for the Little Minch operation in the medium term as set out in Option (B) above seems proven and is recommended.

Background

The sea passages between Uig (Skye) and, alternately, Lochmaddy (North Uist) and Tarbert (Harris) are shortest currently available between the Western Isles and the Scottish mainland road network (via Skye).

One of the features of the two Uig routes is that they are operated by one single vessel, MV *Hebrides* (34 crew, 612 pax and 90 cars). In summer this ship provides two departures from Lochmaddy on Mondays, Wednesdays, Fridays, Saturdays and Sundays and but one departure at a different time on the intervening days. On alternate days Tarbert receives the two and one pattern. Previous reports[1] have indicated that his schedule does not provide the range of useful travel options that should be expected of a modern short distance ferry service.

Vehicle traffic demand is now in excess of capacity. The current plan is to replace *Hebrides* with one new larger (1,000 pax, 127 cars) vessel now building. This will ease the vehicle capacity constraint somewhat in the short-term, but will do nothing at all to eliminate the inadequacy of the timetable and will require expensive terminal works. The vessel's passenger capacity (and therefore crewing) is greatly in excess of passenger demand which will lead to unnecessarily high operating costs. As has been noted, however, at the Scottish Government's Expert Ferry Group, the inconvenient timetable and low frequency can only be satisfactorily mitigated by providing two vessels – one dedicated to each of Harris and Uist. The wider effect of this approach will be to deliver increased ferry capacity for the islands of Lewis, Harris, Berneray, North Uist, Baleshare, Grimsay, Benbecula, South Uist and Eriskay. This group of islands accounts for a residential population of 26,420 (2011 Census).

Objectives

Pedersen Consulting agreed to work with HITRANS and key contacts in examining ferry services across the Little Minch between Skye and North Uist and Harris, utilising a two ship service, operated by vessels of appropriate size with lower passenger capacity and less crew (say 80 cars, 250 pax and 12 crew). This concept has been discussed on a number of occasions at the Expert Ferry Group and has been proposed in several papers presented to Transport Scotland[2]. Such an arrangement would double the route's frequency to three return

[1] *E.g.* Skye-Harris/Uists Ferry Services Development, HITRANS, February 2010
[2] Western Isles Ferry Fares Mechanism Study, Report For Comhairle nan Eilean Siar, 2006
West Coast Ferries – Shaping Change, HITRANS, 2016, *et al*

trips per day from each of the Scottish Government's Outer Hebridean ports and would almost double car capacity on both routes. After examining the characteristics and cost of the new large vessel, currently building, the study will in the first instance consider the possibility of building a single new 80 car vessel of the type described above, while keeping the current vessel *Hebrides* as consort, but with a reduced passenger certificate and crewing (solution "A"). The option of introducing two new more economical vessels is also considered (solution "B"). These solutions may seem to have the effect of increasing rather than reducing costs, but coupled with using more economical operating methods while significantly increasing revenue due to increased frequency and capacity, the study seeks to demonstrate that costs would be contained.

The build and operating cost of a new more economical vessel or vessels are to be assessed, and costs and benefits of the two ship option will be compared with the both the present *Hebrides* operation and the large single vessel currently proposed. On ascertained this information assumptions were to be discussed with CMAL and CalMac Ferries.

Service schedules will be suggested such as to avoid conflict at Uig pier and longer term options for the development of Little Minch ferry services will be outlined.

Method

In carrying out the commission Pedersen Consulting agreed to work in close co-operation with HITRANS officers to:

- Review available data on Little Minch ferry services and draft alternative scenarios
- Interview key individuals to ascertain practicalities, constraints, possibilities
- Set out outline alternative ship and terminal capital and operating costs in outline
- Write and submit report

Traffic figures, costings and other data are based on the best information available at the time of writing and upon a number of assumptions that are set out in the text below. These data and assumptions were subject to change in the light of the consultation process. Progress was to be reported and instructions noted between Pedersen Consulting, HITRANS and others involved by telephone, e-mail or face to face meetings as appropriate.

The Current Operation

The crossings, between the Outer Hebrides and the mainland connected road system (via Skye), namely – the passages between Uig (Skye) and, alternately, Lochmaddy (North Uist) at 26 nautical miles (48km) and Tarbert (Harris) and 25.4 (47km) respectively – are the shortest and cheapest to patrons currently available.

As mentioned under "Background", the two Uig routes are operated by one single vessel, such that in summer this ship provides two departures (early morning and late afternoon) from Lochmaddy on Tuesdays, Thursdays, Saturdays and Sundays and but one departure at around midday on the intervening days. On alternate days Tarbert receives the two and one pattern. The daily variation in times mean that the service is perceived as inconvenient to

hauliers, local residents and to tourists nor is it possible for islanders to have daily access to a mainland regional centre with adequate time for business or social purposes without an overnight stay. In winter the number of sailings is reduced.

Current Vessel Characteristics

The vessel that normally operates the combined routes is the 5,506 GRT MV *Hebrides*, callsign ZQYC3. She was built in 2000 at a cost of £15 million. Her main particulars are:

Length 99m x beam 15.8m x draught 3.22m
Capacity 612 passengers (European Class B) and 90 cars or equivalent on the main deck
10 additional cars can be carried on a hoistable mezzanine deck
Two MAK engines have an output of 8,000kW giving a maximum speed of 16.5 knots
Fuel consumption is 1,500 heavy fuel oil per hour steaming
Auxilliary machinery: two Ulstein 1500 AGSC 415 / 250 volts, 3 Phase, 50Hz
Two Ulstein electric 90TV bow thrusters each of 7 tonnes thrust
Hebrides is also fitted with retractable fin stabilizers
The 34 crew live on board and normally work fortnight on-fortnight off with a generous ten weeks leave

It will be noted that the ratio of the ship's passenger to car capacity is 6.8 to 1, compared with an actual carrying ratio of 2.55. This demonstrates a significant over provision of passenger space. During annual overhaul *Hebrides* is relieved by another vessel such as *Lord of the Isles*, *Clansman* or *Finlaggan*. For simplicity, no account is taken of this in calculating comparative costs.

Terminals

Each of the three terminals features a berth for the vessel to lie alongside, passenger gangway and is equipped with a hydraulically operated linkspan, vehicle marshalling area administrative and booking office with toilets, vending machines and waiting room. Ownership is as follows:

Uig – The Highland Council
Tarbert – CMAL (Caledonian Marine Assets)
Lochmaddy – Comhairle nan Eilen Siar

Carryings

Traffic carried on the combined routes in 2014 was:

Passengers	*Cars*	*Commercial Vehicles/Coaches*
194.400	76,100	6,200

Source Scottish Transport Statistics

Separate data are not published for the Tarbert and Lochmaddy crossings but it is known that approximately 85% of the freight traffic is attributable to Lochmaddy. Much of the Harris commercial vehicle traffic is routed *via* the Stornoway-Ullapool service. For passenger and car traffic, until more accurate data are available, it is assumed that this is divided equally between both ports. The split of traffic between Tarbert and Lochmaddy is, therefore, estimated as follows:

	Passengers	*Cars*	*Commercial Vehicles/Coaches*
Tarbert	97,200	38,050	930
Lochmaddy	97,200	38,050	5,270

During the summer season, while there is more than sufficient capacity to carry passengers, the combined service is unable to cope with the demand to carry vehicles. There are also some limitations to onward bus connectiosn at both the island and Skye sides which amplifies the reliance on vehicle travel.

Revenue

By applying the published unit charges to the data for the combined route, the revenue has been calculated as shown below resulting in the annual income of £5.4 million.

	Rate (£)	*Revenue (£)*
Pax (less 5% for juveniles)	6.10	1,126,548
Cars	30.00	2,283,000
CV (10 metre average)	132.85	823,670
On-board sales at £6/pax	6.00	1,166,400
TOTAL		**5,399,618**

Costings

Actual operating cost figures were not available for the duration of this study. It has been possible, however, to compute or estimate costs. To cover time on and time off plus leave entitlement, two and a half crews are employed to operate CalMac vessels. Crew costs have, therefore, been computed by multiplying crew numbers, by estimated remuneration for different grades, times two and a half. As steaming time, fuel consumption and the (variable) cost of fuel are known ($310 per tonne has been assumed), it is a relatively straightforward matter to calculate fuel costs. Other costs are based on best estimates of industry norms. All costs can be adjusted in the light of more accurate values becoming available. On these assumptions, the annual operating and discounted capital costs of the current Little Minch operation are calculated as follows:

	£
Crew	3,001,500
Bunkers	1,432,200
Auxiliaries	50,000
Insurance and fees	300,000
Victualing	900,000
Survey and maintenance	300,000
Company overheads at 30% of above	1,128,285
Berthing charges	1,500,000
Ship capital interest & repayment discounted at 4%	950,000
TOTAL	**10,228,810**

It is to be noted that, because of the high level of passenger provision, by far the highest cost is the manning of the vessel and that the operating shortfall for the combined route between costs and revenue is computed at some £4.8 million. This is treated as the base case when considering other options.

In comparing other operating options, the same costing assumptions have been applied in each case.

The Current Big Ship Plan

As mentioned above, car traffic demand on the Little Minch combined routes is now in excess of capacity. To address this, the current plan is to replace MV *Hebrides* with a new larger vessel now building at Ferguson Marine Engineering Limited. The vessel is designed to carry 127 cars or 16 HGVs or a combination of both and up to 1,000 passengers. The ferry, one of a pair, will be 'dual-fuel' so she can operate on liquefied natural gas (LNG) and marine diesel. The quoted capital cost is extremely high at £48.5 million per vessel.

This solution will undoubtedly ease the vehicle capacity constraint in the short-term, but will do nothing at all to eliminate the inadequacy of the timetable and is anticipated to require expensive shore works, estimated at £30 million. The vessel's passenger capacity (and therefore crewing) is even more in excess of passenger demand, than *Hebrides*, leading to high operating costs.

The increase in vehicle carrying capacity by the proposed larger vessel may be assumed to increase car traffic by 15% within five years of introduction. Passenger traffic would increase by a similar amount since most passengers are car borne, there being relatively few independent foot passengers. As commercial vehicle traffic is related to levels of economic activity rather than capacity, no increase in that category is projected. The resultant traffic predictions and revenue attributable are set out below.

Using the same costing assumptions as those employed under "The Current Operation", annual operating and discounted capital costs for the proposed single large ship option are now considered.

Carryings and Revenue

Passengers	*Cars*	*Commercial Vehicles/Coaches*
223,560	87,525	6,200

	Rate (£)	*Revenue (£)*
Pax (less 5% for juveniles)	6.10	1,295,530
Cars	30.00	2,625,450
CV (10 metre average)	132.85	823,670
On-board sales at £6/pax	6.00	1,341,360
TOTAL		**6,086,010**

Costings

Again using the same methodology as for the current operation, operating and discounted capital costs have been calculated. Crew complement is not currently available and 36 has been assumed. As before, capital costs have been annualised and a discount rate of 4% applied. The cost of terminal works is assumed at £30 million. Annual costs work out as:

	£
Crew	3,234,375
Bunkers	1,909,600
Auxiliaries	60,000
Insurance and fees	450,000
Victualing	900,000
Survey and maintenance	300,000
Company overheads at 30% of above	1,956,255
Berthing charges	1,500,000
Terminal capital works discounted at 4%	1,900,000
Ship capital cost discounted at 4%	3,100,000
TOTAL	**17,540,168**

While there is some increase in operating costs due to the increased size of the ship, the annualised and discounted capital costs of ship and terminal accounts form the most substantial elements the 70% increase in costs compared with the current operation, resulting in an estimated £11.4 million shortfall compared with revenue.

Limitations and Drawbacks

As demonstrated above, the proposal to operate the Little Minch services with one large vessel will incur a very large capital outlay of some £80 million and more than doubling of the subvention from the public purse as compared with the present operation. Yet this solution will only achieve a circa 30% increase in vehicle capacity, such that the service will again be operating at full capacity within the medium terms (say seven to ten years). Neither

does the one large ship solution resolve the route's infrequent service and inconvenient schedules, which act as a constraint on both traffic growth and on the economic and social development of the communities served. Furthermore, if the one ship solution is pursued in the longer term an even larger and more expensive *Loch Seaforth* type vessel would be required to meet anticipated traffic growth.

Alternative solutions are now considered and provide a more cost effective way of delivering these services.

Two Ship Solution A

It has long been suggested that the North Uist and Harris ferry services be served by two separate and dedicated vessels. This would, at a stroke remove the inconvenient scheduling issue by providing twice the frequency of service to both Tarbert and Lochmaddy and provide timings at the same hours every day. Such an increase in frequency and convenience would yield an immediate increase in traffic as a result of the frequency elasticity of demand (FED as set out in the Western Isles Fares Mechanisms Study (Pedersen Consulting and Napier University, 2006). In broad terms the practical effect of this FED is that increasing route frequency (i.e. number of single journeys by car and passenger per day) on a route with FED of around 1, would have a similar effect as halving fares on an existing frequency. Thus a doubling of frequency would have the effect of at least a 50% increase in car and passenger traffic. Freight demand is in contrast relatively inelastic, being a function of economic activity rather than price or frequency *per se*.

Earlier Analysis

A report on Skye / Harris/Uists Ferry Service Development commissioned by HITRANS and completed in 2010 featured a number of assumptions that led to the decision to build a single large ship to serve the Little Minch routes, rather than a two vessel solution, which this study recommends.

The report rightly stated that the current and future one ship operation resulted in an infrequent service and inconvenient schedules. It also noted that almost all traffic on the route originated or was destined for places furth of Skye and that the number of "walk-on" passengers was small. It was admitted that a two ship operation, *i.e.* a dedicated vessel for each of Harris and Uist, rather than a shared vessel, would result in doubling of frequency, consistent daily timetables, increased capacity and would attract additional traffic with potential economic benefits. It was also noted that, if operating to a single Skye port, *e.g.* Uig a two vessel service could occasion conflict in timing berthing and connecting bus links.

In considering the two vessel option, it was assumed, however, that the *Hebrides* would continue as one of the vessels and that the second vessel of similar design would be required. Such a solution would lead to significant over-provision, particularly of passenger capacity, leading to greatly increased capital and crewing costs. For this reason, the two ship option was dropped from that report's recommendation.

A More flexible Approach

As one alternative to the above, what this study considers is splitting the Little Minch service(s) by utilising two vessels, each one dedicated to Tarbert and Lochmaddy respectively. One of the vessels would be a new build of circa 85 metres length with a capacity of 190 lane metres (including mezzanine) equating some 80 cars and 250 passengers year round (and possibly 350 in summer) operated by a crew of around 12. All covered passenger accommodation should be on the shelter deck with an open promenade deck above. As recommended in the draft document, West Coast Ferries Shaping Change, discussed at the Expert Ferry Group in October 2016, the crew would be shore based rather than living on board. An on-board crew mess would be provided, however, with limited overnight accommodation for a skeleton crew required for positioning voyages. The ship's compliment would be recruited locally and live at home. Assuming two and a half crews of twelve, this represents 30 additional well-paid local jobs in their local communities with associated families having a stake in and making a contribution to each of Harris and North Uist. In the interim, if local recruitment proves difficult, it may be necessary to create a temporary accommodation block for crew members based off island.

To give an idea of scale, the illustrative new vessel would be some five metres shorter than MV *Finlaggan*, but with greatly reduced top hamper, due to lower passenger compliment and minimal on-board crew accommodation. A broadly similar configuration is illustrated at Appendix A. Such an arrangement will offer increased deadweight and reduced windage and, therefore, greater operational flexibility compared with *Finlaggan*. A build cost of £25 million has been assumed. The vessel should be designed to operate to both the existing link-spans and the Norwegian type of lock-on link-spans as described in the Shaping Change document and considered later in this report. For the purposes of this study a monohull design has been selected. A medium-speed catamaran may offer a more cost effective alternative.

The other vessel under this option would be MV *Hebrides*, but with a reduced passenger capacity and crew. This would probably require blocking off some parts of the existing passenger accommodation, but would result in significantly lower crewing costs per vessel than the present and currently proposed single large ship operation. It is worth noting that Pentland Ferries were able to operate two ex CalMac vessels (*Iona* and *Claymore*) with much reduced crewing on year round open water European Class B operation. The current Pentland Ferries vessel *Pentalina*, with a year round capacity for 250 passengers (350 in summer), operates with a crew of 10 in winter and 11 in summer.

A two ship operation, utilising vessels as configured above, would increase combined route capacity for vehicles by 90% (as compared with the 30% of the proposed big ship option) allowing ample scope for long-term traffic growth beyond the 50% increase in cars and passengers immediately attributable to FED effect resulting from improved frequency and scheduling. No immediate increase in commercial vehicle traffic is assumed, although such traffic would increase gradually in the medium term due to improved economic growth on island communities attributable to improved access.

Carryings and Revenue

By applying the FED formula, traffic by year two is estimated as:

Passengers	*Cars*	*Commercial Vehicles/Coaches*
291,600	114,150	6,200

	Rate (£)	*Revenue (£)*
Pax (less 5% for juveniles)	6.10	1,689,822
Cars	30.00	3,424,500
CV (10 metre average)	132.85	823,670
On-board sales at £6/pax	6.00	1,749.600
TOTAL		**7,689,592**

Costings

Using the same methodology as for the current and big ship operations, operating and discounted capital costs have been calculated. As before capital costs have been annualised and a discount rate of 4% applied. The cost of terminal works is assumed as £30 million. Annual costs for each vessel work out as:

Hebrides	***£***
Crew	1,305,250
Bunkers	1,432,200
Auxiliaries	50,000
Insurance and fees	300,000
Victualing	900,000
Survey and maintenance	300,000
Company overheads at 30% of above	1,128,285
Berthing charges	1,500,000
Ship capital cost discounted at 4%	950,000
TOTAL	**7,239,335**

Second Ship (assumed capital cost £25 million)

Crew	1,305,250
Bunkers	1,145,760
Auxiliaries	50,000
Insurance and fees	300,000
Victualing	900,000
Survey and maintenance	300,000
Company overheads at 30% of above	1,042,353
Berthing charges	1,500,000
Ship capital cost discounted at 4%	1,580,000
TOTAL	**7,761,313**

TOTAL COMBINED COST	**15,264,998**

Thus the operating shortfall for the two routes between costs and revenue is computed at some £7.6 million, a saving of some £3.8 million compared with the big ship option, while at the same time providing substantially greater route capacity, greater frequency, a more useable schedule and with greater traffic generation potential and concomitant economic benefit to the communities served.

Two Ship Solution B

For a number of reasons, including the possible need to cascade *Hebrides* to serve on other CalMac stations and the possible difficulties associated with reducing crewing on that vessel to the required level, the medium term option of providing two new build purpose built more cost effective vessels to a vessel design as described in Solution A, namely: circa 85 metres length with a capacity of say 80 cars and 250 passenger operated by a shore based crew of around 12. This concept could then be gradually introduced as standard design and operating method on other routes serving the Western Isles, Coll and Tiree, *etc*.

As the vessels would be to a common design, thereby aiding crew familiarity and interchangeability during periods of refit or breakdown, the opportunity should then be taken to install Norwegian style lock-on linkspans or an equally cost effective loading method at each terminal, thereby greatly reducing berthing costs. The reduction of berthing costs is attributable to the fact that no shore personnel would be required and only one ship's crew member would be required to operate the linkspan wirelessly.

The scheduling and operating and capital costs of each of the new vessels is assumed to be the same as for the "second ship" as set under option A above, except that, on account of the introduction of lock-on linkspans (or similar) and no need to employ shore-based berthing personnel, the berthing charges per ship would be less, viz:

Each new ship (assumed capital cost £25 million)

Crew	1,305,250
Bunkers	1,145,760
Auxiliaries	50,000
Insurance and fees	300,000
Victualing	600,000
Survey and maintenance	300,000
Company overheads at 30% of above	1,110,303
Berthing charges	600,000
Ship capital cost discounted at 4%	1,580,000
TOTAL	**6,991,303**

TOTAL COMBINED COST	**13,982,626**

The operating shortfall for the two routes between costs and revenue is computed at some £6.3 million, a saving of some £5.1 million compared with the big ship option, while at the same time providing substantially greater route capacity, greater frequency, a more useable

schedule and with greater traffic generation potential and concomitant economic benefit to the communities served.

Discussions with CMAL and CalMac Ferries

To test the assumptions in an earlier working draft of this paper, meeting was held in Port Glasgow on Monday 3 July 2017 at which the following were in attendance:

Ranald Robertson, HITRANS
Kevin Hobbs, CMAL
Brian Fulton, Calmac Ferries
Roy Pedersen, Pedersen Consulting

The discussion was most helpful and, in its light, a number of changes were made to the text and the costings were reworked as above.

It is to be noted that CMAL voiced reservations about the suitability of the Norwegian style lock-on linkspans proposed under "Two Ship Solution B". Pros and cons regarding lock-on linkspans, set out in subsequent exchanges, can be summarised thus:

In their favour, Lock-on linkspans are: a widely used, proven and reliable and safe technology; simple and relatively inexpensive in capital costs: require only piling or dolphins for vessels to lie against. As passengers are shipped and discharged *via* the linkspan (safely segregated from vehicular traffic by a barrier), no quay or adjustable gangway is required for side loading passengers. This saves a lot of shore infrastructure. Berthing is quicker than present methods and handled wirelessly by a single on-board hand rather than up to ten on-board/shore based mooring personnel – a huge saving in operating costs.

To the contrary, in CMAL's view, there are issues of tidal range, strong currents and operational factors that in many instances preclude their use. While they may work in some but certainly not all locations and CMAL are tasked with keeping flexibility within the fleet in the event that vessels have to be redeployed at short notice. As an alternative automatic mooring systems such as "Cavotec MoorMaster" deployed by a control module (hand held) by the Master or Chief Officer. Automatic Mooring systems are said to be broadly similar in costs to the lock-on system. CMAL also expressed the view that on the larger vessels with high foot passenger numbers (not generally applicable on Harris/Uist routes) there are operational implications and delays incurred by loading both passengers and cars/lorries over the link span.

This issue cannot be wholly resolved in this report, but it is to be noted that it is possible to design a vessel to operate to both lock-on and regular link-spans. Western Ferries *Sound of Islay* and *Sound of Jura* were so configured half a century ago. It is also to be noted that the linkspan at Dunoon (tidal range 3.75 metres) is designed to handle both lock-on and conventional vehicle ferries. At ports where large numbers of foot passengers are common, side loading can be provided so long as vessels have both linkspan and side passenger loading capability.

In recognition of the above, it should be possible, with good design, to build in maximum flexibility while pulling down both the capital and operating costs. It is therefore

recommended that, the medium term option of installing lock-on linkspans for a two vessel Little Minch remain as an option unless an alternative such as the Cavotec MoorMaster can be shown yield similar capital and operating cost savings.

Scheduling

The 2010 HITRANS report on Skye Harris/Uists Ferry Services Development, indicated that, if the two vessels each operating from Tarbert and Lochmaddy ran to a single Skye port, *e.g.* Uig, this could result in conflict in timing berthing and connecting bus links. Such a conflict would be obviated by creating a second Skye landfall at, say, Dunvegan, thereby allowing a shorter passage between Lochmaddy and Skye. During the inaugural period of the proposed two ship operation, however, in the short term, it is assumed that Uig will be the sole Skye port.

To eliminate, or at least, greatly reduce the prospect of both vessels attempting to berth at Uig simultaneously, it is recommended that departures from the island ports be staggered one hour apart, so that the first vessel to berth at Uig would be well clear, by the time the second vessel was due to arrive. A suggested pattern of sailings is illustrated below.

Vessel one

		SuX			SuO
Lochmaddy	*dep*	07:00	11:00	15:00	19:00
Uig	*arr*	08:40	12:40	16:40	20:40
Uig	*dep*	09:00	13:00	17:00	21:00
Lochmaddy	*arr*	10:40	14:40	18:40	22:40

Vessel two

		SuX			SuO
Tarbert	*dep*	08:00	12:00	16:00	20:00
Uig	*arr*	09:40	13:40	17:40	21:40
Uig	*dep*	10:00	14:00	18:00	22:00
Tarbert	*arr*	11:40	15:40	19:40	23:40

The suggested seasonal Sunday variation would allow islanders to return home after a weekend away and be in time for work on Monday morning.

As regards mainland connecting bus links there are two options. As traffic would be 50% higher than at present, due to the FED effect of increased frequency, it may be economic, during the summer at least, to provide separate bus links for each sailing for which a connecting link would normally be provided. Not all sailings are bus connected at present. During quieter periods, the northbound bus would be scheduled to arrive in time for the departure of the earlier Lochmaddy sailing. This would require Tarbert bound passengers to wait an hour before boarding their vessel. In the case of the southbound bus connection, the bus would wait until the arrival of the later Tarbert sailing, requiring the passengers ex Lochmaddy to wait an hour. To put the wait time into perspective, an hour is less than the

normal check-in time at airports to board an aircraft or the time allowed between connecting flights.

Summarised Comparison

Drawing all of the above together, the comparison between the four scenarios of the present operation, the planned big ship solution and the alternative two ship option is set out below in tabular form.

	Present Set-up	*Big Ship*	*Two Ship A*	*Two Ship B*
Capacity cars/day	540	762	1,020	960
Traffic cars/yr	76,100	87,525	114,150	114,150
Revenue (£)	5,339,618	6,086,010	7,689,592	7,689,592
Costs inc disc cap £	10,228,810	17,540,168	15,264,998	13,982,626
Shortfall (£)	4,829,192	11,454,158	7,575,406	6,293,034
Subsidy/car (£)	63	131	66	55

These data are interpreted as follows:

The present ferry operation connecting Skye with North Uist and Harris is operated by one vessel, MV *Hebrides*, (612 pax (passengers), 90 cars and 34 live-on board crew). The service is capacity constrained in terms of vehicle space although passenger capacity is well in excess of demand, resulting in a larger crew and higher operating costs than necessary to cope with the demand. Increasing vehicle capacity is, however, a matter of some urgency if island well-being is to be protected. The service is infrequent and the timetable inconvenient which is a disincentive to traffic growth. The traffic, revenue, costs, shortfall and £63 subsidy per car figures represent the base case in considering alternative options.

A new larger vessel (1,000 pax, 127 cars and an estimated 36 crew) currently building, will relieve the vehicle capacity constraint *pro tem*, although in the mid-term the capacity ceiling will be breached. As with the current vessel, the passenger capacity and crewing is again much higher than required to meet demand. The infrequent and inconvenient timetable will remain unresolved. Traffic and revenue will grow marginally, but costs (mainly due to high capital expenditure and large crew), shortfall and £131 subsidy per car will rise by 70%, 140% and 110% respectively compared with the base case.

Two ship option (A) utilising the existing *Hebrides*, but with passenger capacity and crewing reduced to 250 and 12 respectively, plus a smaller new build (250 pax, 80 car, 12 live-ashore crew) vessel virtually doubles route capacity and frequency of service. It offers a convenient and regular timetable which will lead to traffic growth of 150% leaving a good margin of capacity for future growth. Revenue, costs and shortfall grow proportionately. The £66 subsidy per car is very slightly higher than the base case – effectively base case parity, within the margin of error, but much less than the one new large vessel.

Two ship option (B) whereby both ships are purpose built with the same 250 pax, 80 car, 12 live-ashore crew characteristics as the second ship in option (A), but utilising lock-on linkspan or alternative efficient terminals, whereby the need for terminal mooring personnel is eliminated. As with option (A) above a convenient and regular timetable is provided giving

the same 150% traffic growth and margin of capacity for future growth. Of all the above options, this is the most cost effective, with a lower £55 subsidy per car than the base case. By providing two standardised vessels and more efficient berthing, this *modus operandi* represents a model that could be rolled out for other Scottish ferry services to provide more capacity in an economical manner with minimum investment in terminal upgrades.

The potential economic and social benefits attributable to the projected traffic growth that either of the two ship options would generate, together with the further contribution to the local community that an island based crew would bring about, seem clear. The case in favour of a two ship service for the Little Minch operation in the medium term as set out in Option (B) above seems proven and is recommended.

Future Options

In summarising the specification for the recommended new 250 passenger capacity vessel or vessels for the Little Minch, it was recommended that the ship(s) be "future proofed" to be capable of berthing both at the current type of link-span and the lock-on type. As already mentioned, the lock-on linkspans and terminals are cheaper to build and to operate as they require no shore personnel to berth the vessel. When the time comes to install lock-on link-spans, the ship(s) will be readily adapted for the changeover.

So long as Uig remains the only Skye landfall for the Little Minch service, one of the issues with the two ship service will be the possibility of both vessels seeking to berth at the same time as a result of service disruption caused by weather or other circumstances. This would be obviated by the construction of a new terminal at Dunvegan.

Dunvegan is sheltered and the road access is of a good standard. The passage distance from Dunvegan to Lochmaddy is 20 nautical miles or a crossing of just under an hour and a half, a saving of ten minutes as compared with Uig. If speed was reduced, rather than reducing passage time, the saving in fuel and, therefore, operating costs would be marked.

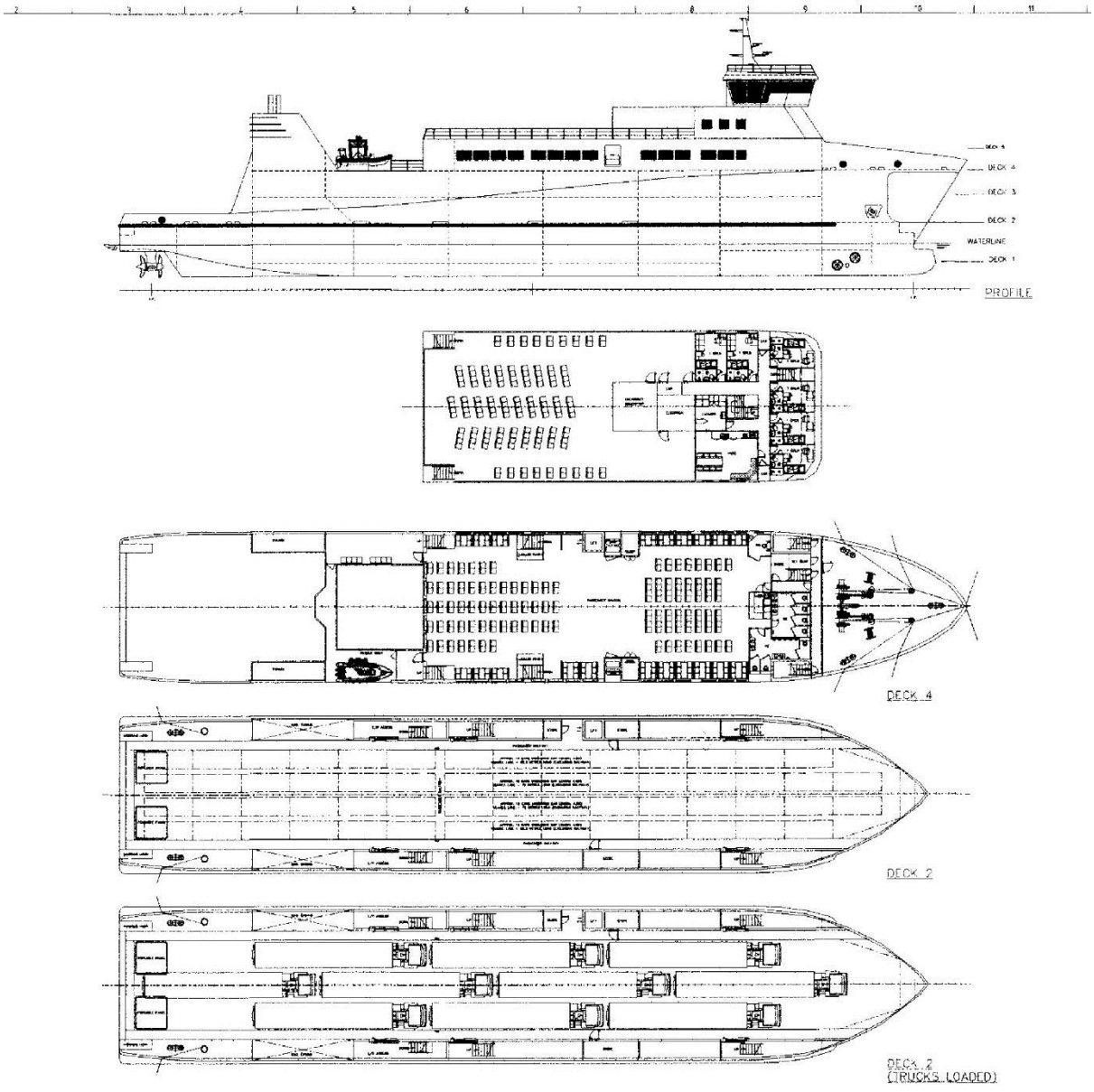
As regards public transport inter-connections, if the two ferry services were timed to arrive and depart from Dunvegan and Uig at the same time, the bus connections can be timed to arrive and depart at Broadford simultaneously, to exchange passengers and luggage bound for either Glasgow or Inverness. A connection could also be made there with Armadale and the Mallaig ferry.

Roy Pedersen
20 July 2017

Appendix A

Illustrative Vessel General Arrangement

General arrangement for a vessel similar to that proposed under Two Ship Solutions A and B. The vessel is designed to comply with EU Directive 19/18 EC Class B.



Note: power-plants are located well aft to facilitate rapid access and replacement in the event of failure or routine maintenance, thereby reducing disruption to service..