Mull & Iona Ferry Committee

Craignure – Oban New Vessels Service Requirements

Parts one and two

An analysis by Mull and Iona Ferry Committee of vehicle and passenger demand, and service models / capacities suitable to satisfy them.

(Subsequent parts to consider other service requirements)

03/09/2026

Executive Summary

Part One - Vehicle Demand Projections and Capacities

- Despite unprecedented disruption in recent years, traffic to Mull has recovered to pre-pandemic levels.

- A large amount of vehicle traffic (18% of the total) has transferred from Craignure – Oban to Fishnish – Lochaline due to disruption on the main service. If demand constraints were lifted on the Craignure-Oban route, this displaced traffic will return. This has not been noted by CalMac's demand projections.

- It is not appropriate to measure utilisation on Craignure – Oban on a whole-day basis. Craignure – Oban is a high-frequency, short-crossing service linking a major service centre with its island hinterland. 80% of traffic demand is between the hours of 08:30 and 18:30. Services outside of these hours should not be included in utilisation calculations, because it counts capacity at times when demand is low. It is not credible to expect many travellers who's first choice of sailing is in daytime hours, to transfer to an early morning or late night sailing. Inclusion of early and late sailings in utilisation calculations therefore gives a falsely positive measure of true congestion levels.

- Together, there are several indicators of high levels of un-met demand (ie congestion):
    - There is strong evidence that Craignure – Oban has been effectively full and capacity constrained since the introduction of RET in 2016.
    - Craignure – Oban is the most congested service in the CalMac major vessel network.
    - There is evidence that these high levels of congestion have reached their limits, with traffic growth flat-lining since 2016, whilst less-congested parts of the network continued to grow.

  This high and persistent level of un-met demand is damaging to the island economy not just in itself, but it inflicts continued reputational damage and reduces traveller appetite to visit our islands.

- When modelling new services, we uphold the Transport Scotland / VRDP target that utilisation should not exceed 70% in the first 10 years of service, but apply it to the 08:30 – 18:30 period.

- We are very concerned that Transport Scotland appear not to be applying the VRDP utilisation target to our route, and are currently proposing a service model that far exceeds the 70% target, and therefore perpetuates our chronic congestion.

- We compare five different potential service models and find:
    - Hourly cadence (combined crossing and turnaround time being no more than 60 minutes) is key to meeting demand.

- Two vessels of 60 PCU (the accepted optimum capacity) do not meet demand, irrespective of cadence.

- Two service models satisfy demand and will be taken forward for further assessment of other attributes:

  A – Three vessels each of 60 PCU. This model satisfies demand, performing the best relative to the 70% utilisation target. Utilisation is projected to remain under 70% well into the 2050s.

  D – 2.5 vessels of 60 PCU – two dedicated to the route, and the third shared with Colonsay. This model also satisfies demand, by keeping projected utilisation under 70% until the mid-2040s. It provides sufficient additional capacity at peak times whilst also offering multiple operational and business-case benefits to the wider network.

Part Two - Passenger Demand Projections and Capacities

- The key requirement so far as passenger capacity is concerned is to meet peak demand, which is heavily concentrated on the 10am sailing from Oban, and the 5pm sailing from Craignure.

- The current CalMac / TS proposal of 2 vessels with 450 pax capacity would result in significant unmet demand of over 3,000 passenger journeys in 2030, rising to 19,000 in 2055. That represents denied visitor spend of £176,000 in 2030, rising to £853,000 in 2055.

- If a 2-vessel service was adequate from a vehicle capacity perspective (which it is not), in order to meet passenger demand each vessel would need to have a capacity of at least 650 – and even at that level, there would be peak summer sailings where demand was not met, requiring demand management solutions.

- There is strong evidence from the introduction of the 2 vessel service in 2016 that Mull's peak demand pattern is not affected by increased sailing frequency.

- It is unknown how demand would spread out in response to a three vessel service with sailings at 40 minute intervals. Passenger capacity of 650 would likely be necessary, adding significantly the capex and opex burden on the service. An increase in passenger capacity from 450 to 650 could add £890k in operating costs, per vessel, per year. The increased superstructure would also compromise weather-resilience due to the increased windage, as well as increasing fuel burn and slowing turnaround times.

- The 2.5 vessel model enables 'near simultaneous' services to operate at peak times (10am and 5pm), thus effectively delivering 1000 pax capacity by sharing the demand between two very closely timed services (suggested at 10 minutes apart). This would meet all forecast demand until the mid 2040s.

- The 2.5 vessel service offers significant benefits over a three vessel service:
    - Meets demand at times when needed, without excessive over-provision
    - Provides daily, reliable service for Colonsay
    - Relieves Clansman and Isle of Islay to operate more service on their primary routes
    - Facilitates inter-island travel
    - Satisfies the rigid passenger demand peaks better and more certainly than the 3-vessel service, without burdening the vessels with the excessive crew and superstructure required for higher passenger capacities.

- The 2.5 vessel service requires:
    - Two linkspans in Craignure (much more practical and lower cost than the frequently-mooted third berth in Oban, which would likely be required for a 3 vessel service)
    - Only select usage of berth 2 in Oban, at times when it is generally unused.
    - Auto-mooring systems or lock-on linkspans to enable 'near simultaneous' departures / arrivals without crew and shore staff burden (not essential, but logical given the opportunity to optimise the design of both shore facilities and ships).
    - Two lay-up berths in Craignure, so that at quiet periods one vessel can operate to vacant linkspans at both ends of the route.
    - Hourly cadence (45 minute crossing and 15 minute turnaround)
    - Ability to operate between Colonsay and Oban/Craignure in 2 hours
    - Island-side bunkering

- **The paper concludes that the 2.5 vessel model is for all the reasons laid out above not just the best solution, but the only solution that is deliverable.**

Part One:

Vehicle Demand Projections and Capacities

Historic carryings

Total annual PCU (Passenger Car Unit) carryings for the route from 2000 to 2025 are shown in Figure 1 below, together with carryings for Lochaline – Fishnish from 2007[1]. Prior to the introduction of RET at the end of 2015, vehicle carryings showed a long-term annual growth trend of 1.4%. The introduction of RET was a strong incentive to travel, and generated an increase of just over 40%. It was at this time that a second vessel (MV Coruisk, PCU capacity 40) began working alongside the MV Isle of Mull (PCU capacity 60) from 2016.

Traffic collapsed in 2020 due to the Covid19 pandemic, but by 2022 total Mull traffic had returned to pre-pandemic levels[2].

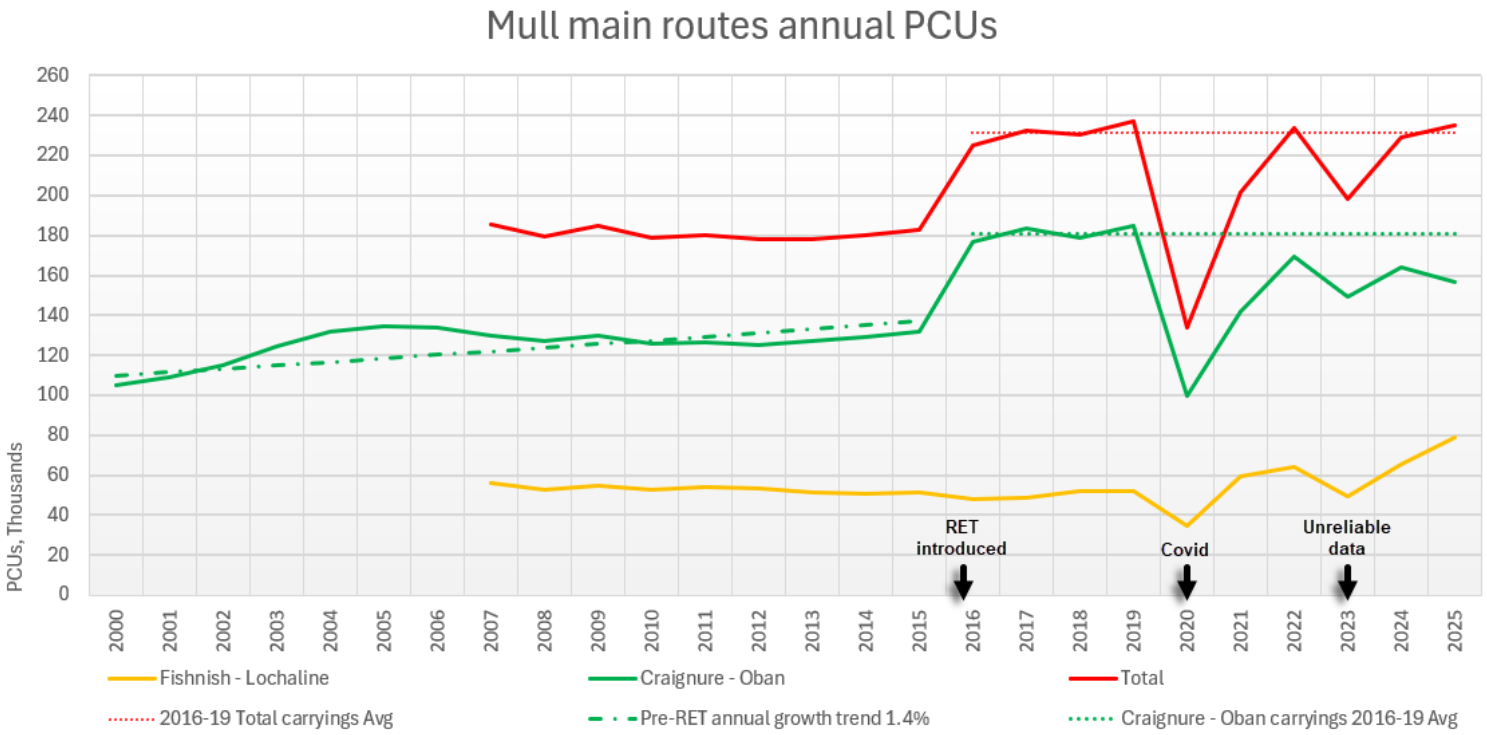


Figure 1 Historic vehicle carryings

Since 2022 there has also been very significant disruption of the service as a result of the 'Ferry Crisis'. Unscheduled cancellations, vessel substitutions and increased unreliability has not only physically impeded traffic to and from the islands, but the loss of confidence in the service has been a major deterrent to travel.

What is clear from figure 1 is that the impact of this chronic disruption has been a substantial shift in traffic from Craignure – Oban (C-O) to Fishnish – Lochaline (F-L), which for car drivers is a viable alternative in many circumstances. The ferry-crisis-related decline in carryings on the C-O route from 2022 to 2025 has been balanced by a strong increase on the F-L service. By

[1] All data in this report provided by CalMac
[2] 2023 data should be broadly discounted as inaccurate, due to recording inconsistencies resulting from CalMac's introduction of new ticketing systems.

2025, F-L carryings of 78,000 PCUs represent a 50% increase on the stable pre-pandemic average.

The net result is that despite the disruption, vehicle carryings to/from Mull as a whole have been at pre-pandemic levels since 2022 (excluding the suspicious 2023 numbers).

This shift in traffic from C-O to F-L was not captured by CalMac's demand analysis[3]. The CalMac analysis observed that "… deck space (PCU) … demand in 2024 during the peak summer months is typically 5% … lower compared to 2019 levels.". This perceived drop in demand appears to unreasonably colour the Transport Scotland perspective of the route. Rather than a softening of demand, what we see is remarkably robust demand, in the face of unprecedented obstacles to travel. Despite there having been strong deterrence to travel due to the ferry crisis, vehicle traffic to the island has remained strong. By 2025, 18% of C-O vehicle traffic had been displaced to F-L due to capacity constraints. If those constraints are lifted, it is reasonable to assume that traffic will revert to C-O.

Utilisation. A measure of 'unmet demand' - or more simply - congestion.

We have followed Transport Scotland[4] in our calculations of utilisation, but with important refinement to make it more relevant to the specific usage patterns of the C-O route. The TS methodology is to express ***vehicles carried*** as a percentage of ***vehicle spaces available*** over ***the entire day*** (averaged over the peak 9 week summer period).

The utilisation figure is a proxy for what transport professionals call 'unmet demand', or lay people would recognise as congestion. The higher the utilisation figure the greater the congestion. The higher the utilisation figure, the greater the likelihood that vehicle drivers who may have wanted to travel have been denied the opportunity. High utilisation figures translate as the inability to buy a ticket for one's preferred sailing (leading to travel on alternative routes or alternative sailings; or to not travel at all). Vehicles that cannot travel at their desired time have not had their ***demand met***. Unmet Demand is inconvenience, added cost, lost business, a suppressed economy and a stifled community.

People's travel needs are not uniform. Different types of passenger will need to travel at different times of day. This is particularly true on a route like Craignure - Oban, which is high-frequency, short-distance and runs over a relatively long operating day linking a major service centre (Oban) with its close island hinterland. Tradespeople and commuters will typically want to travel at the beginning and end of the working day. Couriers will prefer to start their day with the very earliest sailing, and return to their mainland base in the early afternoon. Tourists travelling long distance to reach Mull will typically wish to cross in the afternoon. Islanders making a business or shopping trip to the Central Belt will want to leave very early and return late in the evening. Patients attending an outpatient appointment must arrive on time. People making public transport connections (be it a flight or a train) cannot allow ferry congestion to delay them. And so on…

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[3] "New Mull Vessel – Data Analysis Update" - April '25 and November '25.

[4] Vessel car deck capacities in PCUs taken from CMAL website. Passenger Car Units = Cars + Trailers + Vans + Motorhomes +(Commercial Vehicle metres / 5) + (coach metres /5). Utilisation = sum of PCUs / car deck capacity, averaged over peak consecutive 9 weeks of summer. It is noteworthy that CalMac's calculations of utilisation do not always match our own, despite working with the same base data. The variances are small however, but it does indicate some differences in methodology.

Measuring utilisation against the whole day is more valid on a lower-frequency, longer-distance route, where the travel patterns are different and the sailing choices fewer. Whole day utilisation may be a valid measure for infrequent services like Castlebay - Oban, Coll/Tiree – Oban or the Little Minch, where day-tripping, commuting and short shopping trips do not feature. But on a route like Craignure – Oban, we need to consider the capacity available **at the times that people need it,** rather than aggregating it over the entire day.

A 'whole day' approach to utilisation on a route like Craignure – Oban assumes that a traveller whose first choice of departure is (say) 10am will be equally happy (and likely to travel) at 7am or 8pm. Those 7am or 8pm sailings may well have had spare capacity. But if they are not attractive to a large number of travellers and with other more popular sailings being full, it is misleading to include little-used sailings in calculation of a metric that is intended to measure how well capacity meets demand. If potential travellers have been deterred by lack of capacity **at the time they need to travel**, excess capacity **at times when they don't want to travel** is largely irrelevant to the question of 'how well does capacity meet demand?'.

Our approach to measuring the hourly demand profile

We have analysed vehicle traffic in the 'shoulder' of the 2019 summer season (our last 'normal' summer service). These are weeks when tourist travellers feature heavily in traffic, but demand has not reached the heights of the peak summer when there is clear unmet demand. We have taken the nine weeks from April 1st to May 15th and September 15th – 30th. 'Whole day' utilisation in these shoulder weeks averages 64%, as compared with the peak 9 weeks of summer (early June – mid August) when the average was 73%. With lower utilisation and therefore greater chance that travellers will be able to book the sailing of their choice, the hourly demand pattern is made apparent:

On the C-O route, more than 80% of traffic uses sailings in the daytime, between 08:30 and 18:30[5]. Earlier and later sailings are of great utility, but they are much less well travelled. A much more representative measure of utilisation is therefore ***Daytime Utilisation***, which considers only those sailings operating **between 08:30 and 18:30**.

	0 - 08:30	08:30 - 10:30	10:30 - 12:30	12:30 - 14:30	14:30 - 16:30	16:30 - 18:30	18:30 - 20:30	20:30 - 22:30	22:30 - 0	Total	Percentage of traffic between 08:30 and 18:30
Sunday	0.2	15.2	22.5	18.6	14.7	21.6	7.3	0.0	0.0	100	92.5
Saturday	9.0	22.2	18.7	16.4	12.2	14.1	7.5	0.0	0.0	100	83.6
Weekday	10.0	19.6	18.0	15.5	11.6	18.1	6.5	0.6	0.1	100	82.8

Figure 2 Hourly Demand Pattern

[5] Traffic has been aggregated into 2-hour blocks in order to make meaningful comparison across seasons, routes and timetables with differing sailing times. It also enables the aggregation of capacity on both legs of the route for easier analysis.

Historic Utilisation

Historic peak 9-week utilisation is shown below in figure 3, alongside total vehicle deck capacity. We have charted both on an All Day and Daytime basis.

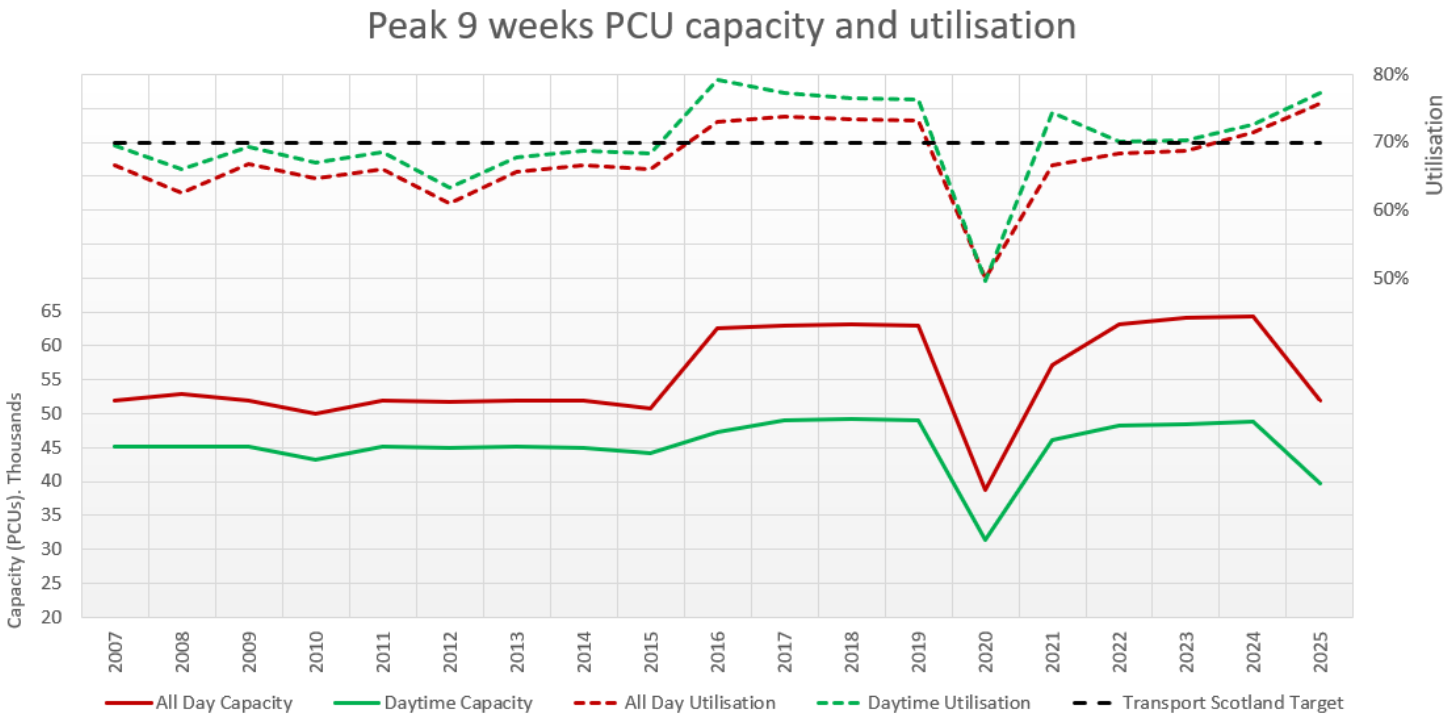


Figure 3 Historic utilisation and capacity

There are some instructive insights to draw from this graph –

- The additional capacity added to the route from 2016 did not match the growth in demand. 2016 was the first year in which utilisation exceeded the 70% Transport Scotland target, and outside of Covid it has remained at or above the target.
- With the introduction of the Coruisk in 2016, all-day capacity grew faster than daytime capacity. All-day capacity grew by around 20%, whereas daytime capacity grew by only 11%. This reflects the slower operating speed and longer turnaround of the Coruisk, in comparison to the MV Isle of Mull. Both ferries have to operate at the speed of the slower vessel, thus MV Isle of Mull sailing cadence was lengthened from 60 minutes (45 minutes crossing + 15 minutes turnaround) to around 70 minutes (50 minutes crossing + 20 minutes turnaround)[6]. Many of the additional sailings were occurring outside of the peak daytime demand period. This demonstrates the role of service cadence in meeting demand, in addition to vessel capacity.
- With the introduction of RET, Daytime Utilisation grew faster than All Day Utilisation, reflecting increased congestion in the peak daytime period resulting from slower service cadence.

[6] Worth also noting that although the addition of the Coruisk to the route increased vehicle deck space by 40 PCUs or 60%, actual daily route capacity grew by only 20%, because the number of return journeys achieved by the Isle of Mull dropped from a typical 6 per day to just 5 per day, due to the slower cadence.

- The introduction of the Loch Frisa from 2022 saw a slight increase in total daily capacity (despite its reduction in car deck capacity), but a small reduction in daytime capacity. Again, this is function of slower operating speed and service cadence.
- The collapse of the C-O service in 2025 that further accelerated the displacement of traffic to F-L, is sharp and obvious.

What utilisation level should we target?

This question has apparently (and somewhat unexpectedly) become more open in 2026, following publication of CalMac's Demand Projections. In those projections, the TS/CalMac proposed New Mull Vessels (a pair of 60 PCU vessels) were projected to achieve utilisation levels of **in excess of 80% in year one.** This did not meet TS's own target, yet had been summarised on public information boards thus: "two vessels meet the forecast demand model". This was despite the evidence of the demand model itself, represented below.

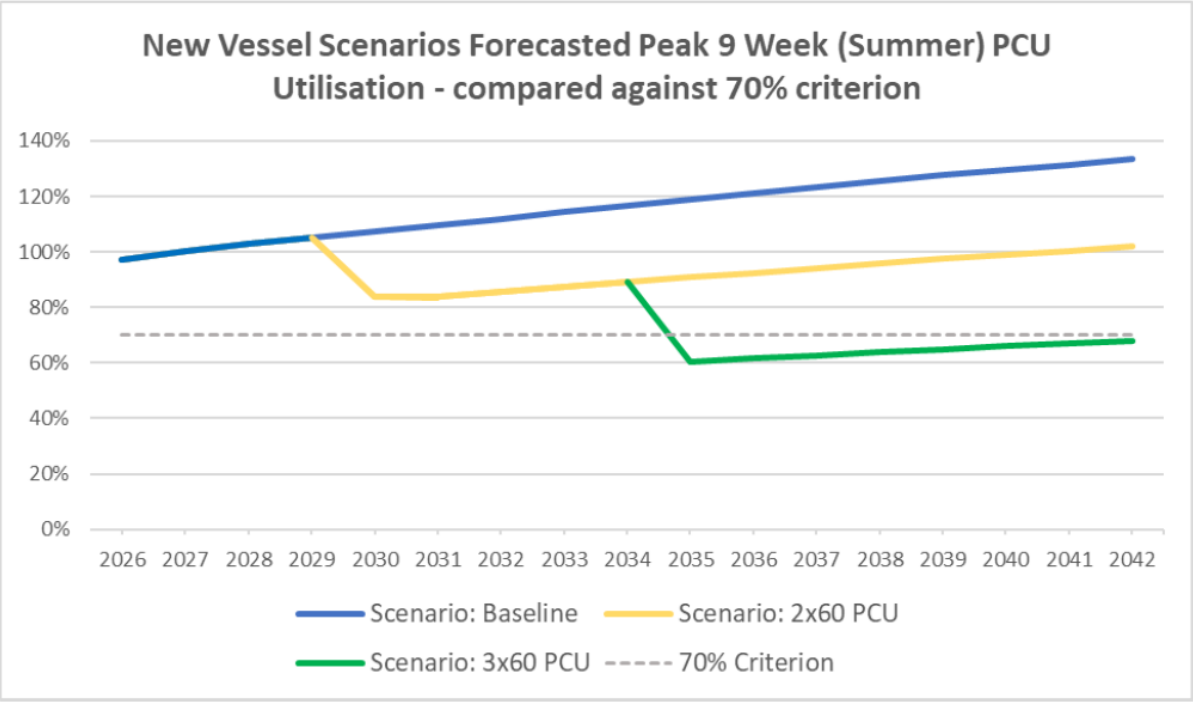


Figure 4 CalMac Demand Projections, November 2025

On questioning the New Mull Vessels Team[7], the 70% figure was re-characterised as an 'early warning indicator', and the discrepancy put down to language choices and presentation, rather than meaningfully addressing the issue.

We are clear however, that **the 70% utilisation target is an accepted, well-defined and long-standing metric** applied to multiple new vessel procurements. Below are two extracts from the 2018 Vessel Replacement and Deployment Plan that explain the detail and objective of the target:

[7] Email of June 9th '26

25. In developing the VRDP, the NSG agreed a number of assumptions which were to shape the analysis and outputs from the work. The key assumptions, which are kept under annual review, are as follows:-

a) The fundamental scope of the project is the Ferries Plan and End of Life / Use
b) Any recommendations will be based broadly on current (Summer 2017 and Winter 2017/18) timetables and will take into account future Ferries Plan enhancements
c) Demand in excess of 70% of the available weekly capacity is unsatisfied
d) New vessel capacities will be broadly based on average 70% weekly capacity utilisation (across busiest consecutive nine weeks) being achieved in year 11 of the vessel's deployment – based on forecast demand
e) Changes in fuel prices for road going vehicles will not have a significant bearing on demand
f) Average vehicle sizes and weights will be unchanged during the analysis period

46. As a guide to what the capacity utilisation figures mean the following can be considered as a rough guide:-

a) Less than 30% - customers are almost always able to travel on their first choice of sailing. Full sailings are infrequent and overall utilisation levels are not a barrier to travel
b) Between 30% and 50% - an increase in the number of full sailings will be evident, however, customers will almost certainly be accommodated on the next sailing if their first-choice sailing is full. Full sailings are more frequent, however, customers are not deterred from travelling as a result
c) Between 50% and 70% - Full sailings are even more frequent and some customers may find that their choice of available sailings is limited. Some customers may choose not to travel as a result, however, volumes are not considered significant
d) Above 70% - Full sailings are a regular occurrence and an increasingly significant number of customers choose not to travel as alternative sailing times are not suitable. In some cases customers may displace to another route if an alternative is available

The Islands Connectivity Plan is under development, but thus far only the Strategic Approach Paper and Vessels and Ports Plan has been published. Neither sets out any demand projections, nor sets targets for utilisation / unmet demand. The islands Plan Draft Strategic Approach Paper makes only a commitment to "work with operators and other stakeholders to develop updated forecasts…" in the future. **The VRDP therefore remains as the current statement of policy regarding demand utilisation targets. We agree with it, uphold it, and follow it throughout this report (with the route-specific refinement of narrowing it to the 08:30 – 18:30 period).**

Comparison with rest of network

Utilisation figures can sound esoteric. For users it might be difficult to translate what 70% utilisation actually feels like on the ground. The VRDP extract above is quite clear why the 70% figure was chosen – it is the point at which the service becomes so congested that sailings are regularly filled to capacity, and a significant number of passengers cannot travel. It is the effective 'full' level for the service. If you ask local users what their experience was of the summer peaks since 2016, they will say "the ferries were full".

It also helps to put the Mull figures alongside other CalMac services, to show how C-O fares.

Again using 2019 data (since this was the networks last 'normal' year), we have calculated utilisation on CalMac's main major vessel routes.

CalMac major vessel routes 2019 peak 9 weeks Utilisation[a]

	All day	Off-peak sailings omitted[b]
Craignure - Oban	73.2%	75.2%
Uig - Lochmaddy/ Tarbert	69.5%	71.6%
Islay - Kennacraig	65.5%	67.8%
Lochboisdale - Mallaig	65.3%	66.6%
Armadale - Mallaig	66.4%	66.4%
Brodick - Ardrossan	63.4%	64.3%
Stornoway - Ullapool	63.7%	63.2%
Coll/Tiree - Oban[c]	56.6%	57.4%
Wemyss Bay - Rothesay	46.8%	52.3%
Castlebay/Lochboisdale - Oban	40.7%	40.3%

a. Sum of PCU carryings for the period as a percentage of total PCU capacity.
b. Sailings carrying less than 3% of traffic ignored (these are typically late night, very early morning or repositioning sailings, with very little traffic. This is equivalent to 'daytime' on the C-O route, but adapted to allow comparison across routes with different useage profiles.
c. legs ending or originating in Oban only

Figure 5 Utilisation comparison

As can be seen, the Craignure – Oban service is the most congested in the entire CalMac network.

As well as comparing 2019 utilisation in isolation, we can also compare trends. Once the C-O route exceeded 70% utilisation in 2016 (see fig 3), further organic growth appears to have slowed to a stop.

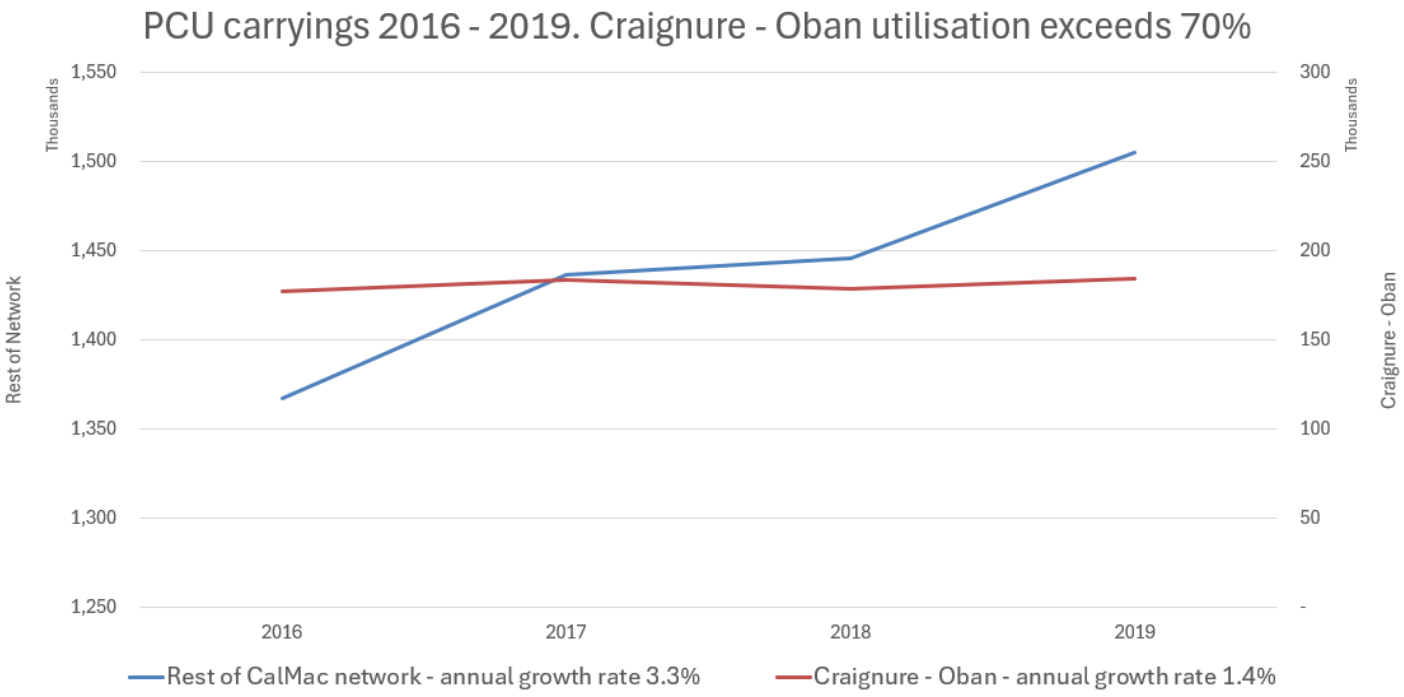


Figure 6 Traffic growth with C-O utilisation >70%

Organic growth across the rest of the network is strong during this period, averaging 3.3% per year. By contrast, Craignure – Oban growth was very weak at just 1.4%. This suggests that utilisation over 70% had stifled growth. In the rest of the network, lower utilisation (ie more spare capacity) enabled growing traffic demand to be satisfied. It suggests that had C-O been able to follow the growth trend of the rest of the network, PCU carryings by 2019 would have been some 10% higher at 195,000. Whilst this is a short sample period, the sample size is large (the entire network). It is at least noteworthy that the only route with utilisation firmly above 70% did not follow the same growth trajectory as the rest of the network, and validates 70% average utilisation as the critical threshold.

How much unmet demand is there?

Whilst there is strong evidence to demonstrate that there **is** unmet demand, it is more difficult to accurately quantify it. We do have some key indicators and guides however –

- Transport Scotland commissioned detailed route-by-route demand projections in 2013. The study by Reference Economics was the basis for subsequent VRDP demand projections. The exact methodology is unclear, but it appears to suggest that in the case of Craignure – Oban, there was unmet demand of 16% in 2019.
- Craignure – Oban is the most congested route in the CalMac network. This logically infers the highest levels of unmet demand.
- C-O's traffic essentially did not grow once it crossed the 70% utilisation threshold, despite the wider network (with lower utilisation) demonstrating strong growth. As shown in figure 6, this suggests unmet demand of 10% by 2019.

To reflect this uncertainty, in our demand projections we have used a lower and upper estimation of unmet demand. At the lower end, we have assumed just 5%. At the upper end, we

have adopted the VRDP / Reference Economics estimation of 16%. Our projections start in 2026 however, so we are deferring the unmet demand projection by a full seven years. Set against the pointers outlined above, we think this is a very conservative approach.

Future traffic growth projections

Below is a chart of historic and projected carryings. Our red line projection includes 16% unmet demand (deferred from 2019), and subsequent annual growth projections that match Reference Economic's central projection. We have overlaid the RE projections and trended the pre-RET growth, so that the trajectory can be seen in long-term context.

Important to note that Reference Economics did not account for RET in their projections. The lower fares of RET encouraged traffic to grow by 40%. In that context, these growth projections could be seen as very conservative, since they roughly track RE's upper band before any RET impact.

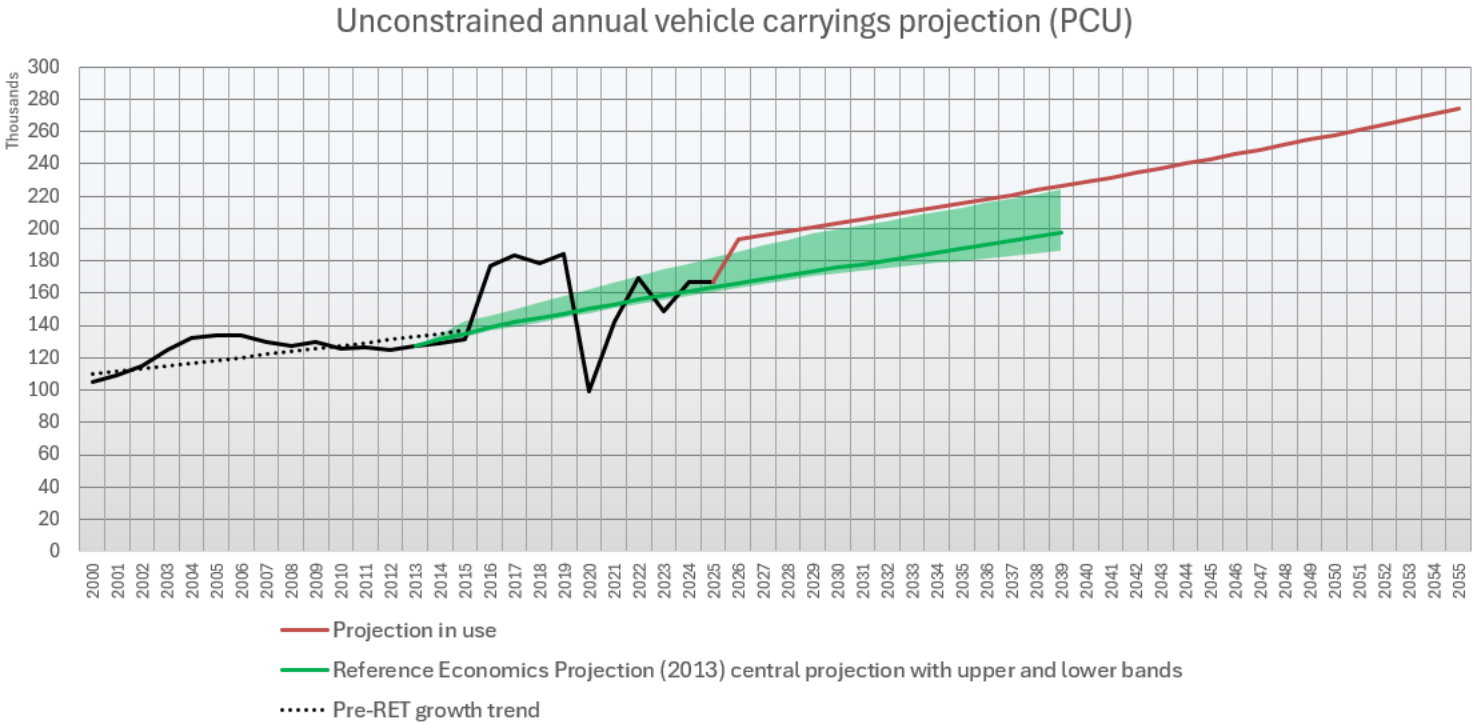


Figure 7 Annual carryings projection

Service models

Having established traffic growth projections and estimates of unmet demand, we can turn to modelling potential service patterns, and judge them on how well each meets demand.

Five long-term potential services have been modelled. They are informed by the community needs expressed in the 2021 Specification of User Requirements):

- Vessel capacity is 60 PCUs, in order to minimize size of vehicle convoys on Mull's predominantly single-track roads. A model with two higher capacity (80 PCU) vessels has also been included for comparison, although this solution is contrary to community consensus as expressed in the Specification of User Requirements.
- High frequency service with long operating day, to maximise travel options, convenience and inter-modal connections.
- Clock-face timetable with departures on the hour. One crossing and turnaround achieved within 60 minutes (as used to be the case for the MV Isle of Mull from 1989 – 2015).
- Vessels to be Craignure based, in order to deliver an 'Island Focused' service with first departure of the day ex Craignure and last departure ex Oban.

One important variable that is not fully addressed here is the crewing model. It is understood that CalMac's current assumption is that all vessels will be crewed on a 'live-aboard' model, as is common with all of CalMac's major vessel fleet. The alternative is shore-based crewing, similar to the MV Loch Frisa and the minor vessel fleet. We will not address the competing merits of each in full here, but the influence on service patterns needs to be kept in mind.

- We understand that the most likely live-aboard crewing regime would make each vessel available for approximately 14 hours per day. This could perhaps be moderately extended if some crew positions were doubled-up (TBC).
- We understand that a shore-based crewing model would make each vessel available for approximately 12 hours per day. With the addition of a second crew (as with the MV Loch Frisa), the vessel would be available for up to 18 hours per day.

Some of the models we include here utilize a 2-crew shore-based regime (at least in part), and have been assumed to operate for 16 hours per day. However, because we firmly believe the focus of capacity should be on the daytime hours of 08:30 – 18:30, the choice between shore-based and live-aboard crewing can be put to one side at this stage. Both regimes give the same cadence and capacity between these hours. Crewing model choice will influence a) operating and build costs; b) operational envelope c) length of operating day and off-peak sailing choices.

It should also be noted that our concentration on the peak hours should not devalue the importance of the longest operating day possible, with sailing options both early and late. Whilst comparatively less well used, they are very important to key users (for example carriers). They are of huge utility to islanders who may use them infrequently, but they are of great value and importance when they do. A longer operating day has a big positive impact on quality of island life. Our focus here is on 'right sizing' the service during peak times, so the length of operating day is not considered in these comparisons.

A. Three Vessels Hourly, each of 60 PCU.

All three vessels are Craignure-based. This is the 'maximalist' service model.

		0 - 07:30	07:30 - 08:30	08:30-09:30	09:30 - 10:30	10:30 - 11:30	11:30 - 12:30	12:30 - 13:30	13:30 - 14:30	14:30 - 15:30	15:30 - 16:30	16:30 - 17:30	17:30 - 18:30	18:30 - 19:30	19:30 - 20:30	20:30 - 21:30	21:30 - 22:30	22:30 - 23:30	23:30 - 00:30
BOAT 1	Dep Craig	1		1		1		1		1		1		1		1			
	Dep Oban		1		1		1		1		1		1		1		1		
BOAT 2	Dep Craig		1		1		1		1		1		1						
	Dep Oban			1		1		1		1		1		1					
BOAT 3	Dep Craig		1		1		1		1		1		1						
	Dep Oban			1		1		1		1		1		1					
Total daily PCU	2400		240		360		360		360		360		360		240		120		0

B. Two Vessels Hourly, both 60 PCU.

Both are Craignure-based.

		0 - 07:30	07:30 - 08:30	08:30-09:30	09:30 - 10:30	10:30 - 11:30	11:30 - 12:30	12:30 - 13:30	13:30 - 14:30	14:30 - 15:30	15:30 - 16:30	16:30 - 17:30	17:30 - 18:30	18:30 - 19:30	19:30 - 20:30	20:30 - 21:30	21:30 - 22:30	22:30 - 23:30	23:30 - 00_30
BOAT 1	Dep Craig	1		1		1		1		1		1		1					
	Dep Oban		1		1		1		1		1		1		1				
BOAT 2	Dep Craig		1		1		1		1		1		1			1			
	Dep Oban			1		1		1		1		1		1			1		
Total daily PCU	1680		180		240		240		240		240		240		180		120		0

C. The current Transport Scotland / CalMac proposal. Two Vessels, 70 minute cadence, both 60 PCU.

This model has two ferries, each is operating at the same cadence as the current MV Isle of Mull (50 mins crossing, 20 mins turnaround) = 70 mins. Each vessel achieves 5.5 returns on four days, 6 returns on 2 days, and 4 returns on Sundays.

		0 - 07:30	07:30 - 08:30	08:30-09:30	09:30 - 10:30	10:30 - 11:30	11:30 - 12:30	12:30 - 13:30	13:30 - 14:30	14:30 - 15:30	15:30 - 16:30	16:30 - 17:30	17:30 - 18:30	18:30 - 19:30	19:30 - 20:30	20:30 - 21:30	21:30 - 22:30	22:30 - 23:30	23:30 - 00:30
BOAT 1	Dep Craig		1		1			1		1		1				0.33			
	Dep Oban	1		1			1		1		1				1				
BOAT 2	Dep Craig	1		1		1		1				1			1				
	Dep Oban		1		1		1			1			1			0.33			
Total daily PCU	1360		240		240		180		180		180		180		120		40		0

D. 2.5 Vessels, Hourly, both 60 PCU.

In this model, a third vessel is shared with Colonsay. It operates to Craignure in the morning and afternoon (when demand is highest), and to Colonsay in-between. This offers significant benefits in the wider network – Colonsay benefits from a regular daily service, and vessels that currently serve Colonsay (Clansman, Islay vessels) are freed up.

			0 - 07:30	07:30 - 08:30	08:30-09:30	09:30 - 10:30	10:30 - 11:30	11:30 - 12:30	12:30 - 13:30	13:30 - 14:30	14:30 - 15:30	15:30 - 16:30	16:30 - 17:30	17:30 - 18:30	18:30 - 19:30	19:30 - 20:30	20:30 - 21:30	21:30 - 22:30	22:30 - 23:30	23:30 - 00:30
BOAT 1	Dep Craig		1		1		1		1		1		1							
	Dep Oban			1		1		1		1		1		1						
BOAT 2	Dep Craig			1		1		1		1		1		1						
	Dep Oban				1		1		1		1		1		1					
BOAT 3	Dep Craig				1		1							1		1				
	Dep Oban					1							1		1			1		
Total daily PCU		1920	180		360		300		240		240		360		180		60		0	

E. Two vessels Hourly, <u>80</u> PCU

This model looks at the option of increasing the capacity of a 2-vessel service. This is unlikely to meet with community support, because of the larger vehicle loads on full sailings. As expressed in the Specification of User Requirements, there is a strong preference for vessel frequency to increase before vessel capacity. 80 PCU is a lower capacity than many of CalMac's fleet, but is an increase on the MV IOM (PCU of 60). We include it here for comparison.

			0 - 07:30	07:30 - 08:30	08:30-09:30	09:30 - 10:30	10:30 - 11:30	11:30 - 12:30	12:30 - 13:30	13:30 - 14:30	14:30 - 15:30	15:30 - 16:30	16:30 - 17:30	17:30 - 18:30	18:30 - 19:30	19:30 - 20:30	20:30 - 21:30	21:30 - 22:30	22:30 - 23:30	23:30 - 00_30
BOAT 1	Dep Craig		1		1		1		1		1		1							
	Dep Oban			1		1		1		1		1		1						
BOAT 2	Dep Craig			1		1		1		1		1		1		1		1		
	Dep Oban				1		1		1		1		1		1		1		1	
Total daily PCU		2240	240		320		320		320		320		320		160		160		80	

Detailed assessment of each service model

Following the Transport Scotland methodology, we have mapped each of these service patterns against demand projections for the peak 9 weeks of the summer season over a 30 year forward projection.

- Our base year is 2025.
- We have added the 18% of traffic that has been displaced from C-O to F-L (see fig 1)
- We have applied a compound growth rate of 1.2%, which is in line with the Reference Economics central projection.
- We have applied a lower and upper unmet demand estimate, at 5% and 16% respectively, thus producing results as a range.

The first output is a table of demand across the peak 9 weeks, broken down into 2 hour blocks. This was repeated for every projected year and at both upper and lower unmet demand estimates. We reproduce year one below (Figure 8) as an example, graphically demonstrating how demand is focused by day and hour.

Each service model is then mapped against the 9 week matrix of demand, producing a utilization figure for each 2 hour block. Figure 9 below is an example of year one for model C (The current Transport Scotland proposal).

					Daytime Hours, accounting for over 80% of demand									
				0 - 08:30	08:30 - 10:30	10:30 - 12:30	12:30 - 14:30	14:30 - 16:30	16:30 - 18:30	18:30 - 20:30	20:30 - 22:30	22:30 - 0		Daily total
June	10	Monday	weekday	89	176	161	139	104	162	58	5	1		894
	11	Tuesday	weekday	97	191	176	151	113	176	63	6	1		974
	12	Wednesday	weekday	97	190	174	150	112	175	63	6	1		966
	13	Thursday	weekday	99	194	178	154	115	179	65	6	1		990
	14	Friday	weekday	90	177	163	140	105	163	59	5	1		903
	15	Saturday	Saturday	105	261	220	193	144	166	88	0	0		1176
	16	Sunday	Sunday	2	128	190	157	124	182	61	0	0		844
	17	Monday	weekday	96	188	172	148	111	173	62	5	1		956
	18	Tuesday	weekday	98	193	177	153	114	178	64	6	1		983
	19	Wednesday	weekday	80	158	145	125	93	145	52	5	0		803
	20	Thursday	weekday	96	189	173	149	111	174	63	6	1		961
	21	Friday	weekday	114	223	205	176	132	206	74	7	1		1137
	22	Saturday	Saturday	112	277	233	204	153	176	93	0	0		1248
	23	Sunday	Sunday	2	132	195	162	127	187	63	0	0		867
	24	Monday	weekday	90	176	162	139	104	162	58	5	1		897
	25	Tuesday	weekday	96	188	172	148	111	173	62	5	1		956
	26	Wednesday	weekday	80	158	145	125	93	145	52	5	0		803
	27	Thursday	weekday	79	155	142	122	91	143	51	5	0		789
	28	Friday	weekday	117	230	212	182	136	212	77	7	1		1174
	29	Saturday	Saturday	109	271	228	200	149	173	91	0	0		1221
	30	Sunday	Sunday	2	133	197	163	128	189	63	0	0		875
July	1	Monday	weekday	101	198	182	157	117	182	66	6	1		1009
	2	Tuesday	weekday	94	185	170	146	109	171	62	5	1		943
	3	Wednesday	weekday	96	189	174	149	111	174	63	6	1		963
	4	Thursday	weekday	95	186	171	147	110	171	62	5	1		946
	5	Friday	weekday	114	224	206	177	132	207	75	7	1		1143
	6	Saturday	Saturday	105	260	219	192	143	166	87	0	0		1172
	7	Sunday	Sunday	2	142	210	174	137	201	68	0	0		933
	8	Monday	weekday	93	182	167	144	107	168	60	5	1		927
	9	Tuesday	weekday	98	193	177	152	114	177	64	6	1		981
	10	Wednesday	weekday	105	206	189	163	121	189	68	6	1		1048
	11	Thursday	weekday	100	196	181	155	116	181	65	6	1		1001
	12	Friday	weekday	124	244	224	193	144	225	81	7	1		1244
	13	Saturday	Saturday	112	276	233	204	152	176	93	0	0		1246
	14	Sunday	Sunday	2	135	201	166	131	192	65	0	0		892
	15	Monday	weekday	93	182	167	144	107	168	60	5	1		927
	16	Tuesday	weekday	98	193	177	152	114	177	64	6	1		981
	17	Wednesday	weekday	94	185	170	146	109	170	61	5	1		940
	18	Thursday	weekday	100	196	181	155	116	181	65	6	1		1001
	19	Friday	weekday	124	244	224	193	144	225	81	7	1		1244
	20	Saturday	Saturday	112	276	233	204	152	176	93	0	0		1246
	21	Sunday	Sunday	2	142	210	174	137	202	68	0	0		935
	22	Monday	weekday	103	201	185	159	119	186	67	6	1		1026
	23	Tuesday	weekday	110	216	199	171	127	199	72	6	1		1101
	24	Wednesday	weekday	110	216	198	171	127	199	72	6	1		1099
	25	Thursday	weekday	110	215	198	170	127	198	71	6	1		1095
	26	Friday	weekday	122	239	220	189	141	220	79	7	1		1218
	27	Saturday	Saturday	117	288	243	213	159	184	97	0	0		1300
	28	Sunday	Sunday	2	147	218	181	142	209	70	0	0		968
	29	Monday	weekday	112	220	203	174	130	203	73	6	1		1123
	30	Tuesday	weekday	110	216	199	171	127	199	72	6	1		1101
	31	Wednesday	weekday	105	206	190	163	122	190	69	6	1		1051
August	1	Thursday	weekday	110	216	199	171	128	199	72	6	1		1103
	2	Friday	weekday	125	246	226	194	145	226	82	7	1		1251
	3	Saturday	Saturday	114	281	236	207	155	179	95	0	0		1266
	4	Sunday	Sunday	2	147	217	180	142	208	70	0	0		967
	5	Monday	weekday	107	210	193	166	124	193	70	6	1		1068
	6	Tuesday	weekday	112	219	201	173	129	202	73	6	1		1115
	7	Wednesday	weekday	108	211	194	167	125	195	70	6	1		1077
	8	Thursday	weekday	111	219	201	173	129	201	73	6	1		1113
	9	Friday	weekday	129	253	233	200	149	233	84	7	1		1290
	10	Saturday	Saturday	117	289	243	213	159	184	97	0	0		1304
	11	Sunday	Sunday	2	144	213	177	139	204	69	0	0		948

Figure 8 Demand matrix exemple, 5% unmet demand, 2030 (PCUs)

				0 - 08:30	08:30 - 10:30	10:30 - 12:30	12:30 - 14:30	14:30 - 16:30	16:30 - 18:30	18:30 - 20:30	20:30 - 22:30	22:30 - 0	Daily daytime average
				1	2	3	4	5	6	7	8	9	
June	10	Monday	weekday	37%	73%	90%	77%	58%	90%	49%	13%	0%	77.4%
	11	Tuesday	weekday	41%	80%	98%	84%	63%	98%	53%	14%	0%	84.3%
	12	Wednesday	weekday	40%	79%	97%	83%	62%	97%	53%	14%	0%	83.7%
	13	Thursday	weekday	41%	81%	99%	85%	64%	99%	54%	14%	0%	85.7%
	14	Friday	Friday	38%	74%	91%	78%	58%	91%	49%	13%	0%	78.2%
	15	Saturday	Saturday	44%	109%	122%	107%	80%	92%	73%	0%	0%	102.0%
	16	Sunday	Sunday	1%	53%	105%	87%	69%	101%	51%	0%	0%	83.3%
	17	Monday	weekday	40%	78%	96%	82%	62%	96%	52%	14%	0%	82.8%
	18	Tuesday	weekday	41%	80%	99%	85%	63%	99%	53%	14%	0%	85.1%
	19	Wednesday	weekday	33%	66%	81%	69%	52%	81%	44%	12%	0%	69.6%
	20	Thursday	weekday	40%	79%	96%	83%	62%	97%	52%	14%	0%	83.3%
	21	Friday	Friday	47%	93%	114%	98%	73%	114%	62%	16%	0%	98.5%
	22	Saturday	Saturday	47%	115%	129%	114%	85%	98%	78%	0%	0%	108.2%
	23	Sunday	Sunday	1%	55%	108%	90%	71%	104%	52%	0%	0%	85.5%
	24	Monday	weekday	37%	73%	90%	77%	58%	90%	49%	13%	0%	77.7%
	25	Tuesday	weekday	40%	78%	96%	82%	62%	96%	52%	14%	0%	82.8%
	26	Wednesday	weekday	33%	66%	80%	69%	52%	81%	44%	12%	0%	69.5%
	27	Thursday	weekday	33%	65%	79%	68%	51%	79%	43%	11%	0%	68.3%
	28	Friday	Friday	49%	96%	118%	101%	75%	118%	64%	17%	0%	101.6%
	29	Saturday	Saturday	46%	113%	127%	111%	83%	96%	76%	0%	0%	105.8%
	30	Sunday	Sunday	1%	55%	109%	91%	71%	105%	53%	0%	0%	86.3%
July	1	Monday	weekday	42%	83%	101%	87%	65%	101%	55%	15%	0%	87.4%
	2	Tuesday	weekday	39%	77%	95%	81%	61%	95%	51%	14%	0%	81.7%
	3	Wednesday	weekday	40%	79%	96%	83%	62%	97%	52%	14%	0%	83.4%
	4	Thursday	weekday	39%	77%	95%	82%	61%	95%	51%	14%	0%	82.0%
	5	Friday	Friday	48%	93%	114%	99%	73%	115%	62%	17%	0%	98.9%
	6	Saturday	Saturday	44%	108%	122%	107%	80%	92%	73%	0%	0%	101.6%
	7	Sunday	Sunday	1%	59%	117%	97%	76%	112%	56%	0%	0%	92.0%
	8	Monday	weekday	39%	76%	93%	80%	60%	93%	50%	13%	0%	80.3%
	9	Tuesday	weekday	41%	80%	98%	85%	63%	99%	53%	14%	0%	85.0%
	10	Wednesday	weekday	44%	86%	105%	90%	67%	105%	57%	15%	0%	90.7%
	11	Thursday	weekday	42%	82%	100%	86%	64%	101%	54%	14%	0%	86.7%
	12	Friday	Friday	52%	102%	125%	107%	80%	125%	68%	18%	0%	107.7%
	13	Saturday	Saturday	47%	115%	129%	113%	85%	98%	78%	0%	0%	108.0%
	14	Sunday	Sunday	1%	56%	111%	92%	73%	107%	54%	0%	0%	88.0%
	15	Monday	weekday	39%	76%	93%	80%	60%	93%	50%	13%	0%	80.3%
	16	Tuesday	weekday	41%	80%	98%	85%	63%	99%	53%	14%	0%	85.0%
	17	Wednesday	weekday	39%	77%	94%	81%	60%	94%	51%	14%	0%	81.4%
	18	Thursday	weekday	42%	82%	100%	86%	64%	101%	54%	14%	0%	86.7%
	19	Friday	Friday	52%	102%	125%	107%	80%	125%	68%	18%	0%	107.7%
	20	Saturday	Saturday	47%	115%	129%	113%	85%	98%	78%	0%	0%	108.0%
	21	Sunday	Sunday	1%	59%	117%	97%	76%	112%	57%	0%	0%	92.2%
	22	Monday	weekday	43%	84%	103%	88%	66%	103%	56%	15%	0%	88.9%
	23	Tuesday	weekday	46%	90%	110%	95%	71%	111%	60%	16%	0%	95.3%
	24	Wednesday	weekday	46%	90%	110%	95%	71%	110%	60%	16%	0%	95.2%
	25	Thursday	weekday	46%	90%	110%	94%	70%	110%	60%	16%	0%	94.9%
	26	Friday	Friday	51%	100%	122%	105%	78%	122%	66%	18%	0%	105.5%
	27	Saturday	Saturday	49%	120%	135%	118%	88%	102%	81%	0%	0%	112.7%
	28	Sunday	Sunday	1%	61%	121%	100%	79%	116%	59%	0%	0%	95.4%
	29	Monday	weekday	47%	92%	113%	97%	72%	113%	61%	16%	0%	97.2%
	30	Tuesday	weekday	46%	90%	110%	95%	71%	111%	60%	16%	0%	95.3%
	31	Wednesday	weekday	44%	86%	105%	91%	68%	106%	57%	15%	0%	91.0%
August	1	Thursday	weekday	46%	90%	111%	95%	71%	111%	60%	16%	0%	95.5%
	2	Friday	Friday	52%	102%	125%	108%	80%	126%	68%	18%	0%	108.3%
	3	Saturday	Saturday	47%	117%	131%	115%	86%	99%	79%	0%	0%	109.8%
	4	Sunday	Sunday	1%	61%	121%	100%	79%	116%	58%	0%	0%	95.4%
	5	Monday	weekday	45%	87%	107%	92%	69%	107%	58%	15%	0%	92.5%
	6	Tuesday	weekday	46%	91%	112%	96%	72%	112%	61%	16%	0%	96.6%
	7	Wednesday	weekday	45%	88%	108%	93%	69%	108%	59%	16%	0%	93.2%
	8	Thursday	weekday	46%	91%	112%	96%	72%	112%	61%	16%	0%	96.4%
	9	Friday	Friday	54%	106%	129%	111%	83%	130%	70%	19%	0%	111.7%
	10	Saturday	Saturday	49%	120%	135%	119%	89%	102%	81%	0%	0%	113.0%
	11	Sunday	Sunday	1%	60%	118%	98%	77%	114%	57%	0%	0%	93.5%

Figure 9 Utilisation matrix example, 16% unmet demand, service model C, 2030

After compiling the detailed projections for each service model, we can generate tabular performance summaries of each service model over the 30 year projection period, as below.

Low (5%) unmet demand

Frisa / IOM Baseline

	2025	2030	2035	2040	2045	2050	2055
PCUs/day	902	958	1016	1079	1145	1216	1290
All day (CalMac measure)	103%	109%	116%	123%	130%	138%	147%
Daytime	104%	110%	117%	124%	131%	139%	148%
Daytime Mon-Thurs	96%	102%	109%	115%	122%	130%	138%
Daytime Saturday	123%	130%	138%	147%	156%	165%	176%
Count of 2 hr instances Utilisation >70%	318	332	346	358	372	375	375
Count of full sailings >80%	832	872	903	923	975	1009	1055
Count of 2 hr instances utilisation >100%	172	202	237	274	296	313	318
Highest 2 hr utilisation	149%	158%	168%	178%	189%	201%	213%
% sailings full	67%	70%	73%	74%	78%	81%	85%

A - Three Vessels Hourly

	2025	2030	2035	2040	2045	2050	2055
PCUs/day	902	958	1016	1079	1145	1216	1290
All day (CalMac measure)	39%	42%	44%	47%	50%	53%	56%
Daytime	42%	45%	48%	50%	54%	57%	60%
Daytime Mon - Thurs	39%	42%	44%	47%	50%	53%	56%
Daytime Saturday	50%	53%	56%	60%	63%	67%	71%
Count of 2 hr instances Utilisation >70%	0	6	9	13	23	42	68
Count of full sailings >80%	0	0	0	16	38	54	103
Count of 2 hr instances utilisation >100%	0	0	0	0	0	0	0
Highest 2 hr utilisation	69%	74%	78%	83%	88%	94%	99%
% sailings full	0%	0%	0%	1%	2%	2%	4%

B - 2 Vessels Hourly

	2025	2030	2035	2040	2045	2050	2055
PCUs/day	902	958	1016	1079	1145	1216	1290
All day (CalMac measure)	56%	59%	63%	67%	71%	75%	80%
Daytime	63%	67%	71%	76%	80%	85%	91%
Daytime Mon - Thurs	59%	63%	67%	71%	75%	80%	85%
Daytime Saturday	75%	79%	84%	89%	95%	101%	107%
Count of 2 hr instances Utilisation >70%	97	130	178	208	228	267	295
Count of full sailings >80%	119	204	338	461	602	750	836
Count of 2 hr instances utilisation >100%	3	7	10	22	38	61	99
Highest 2 hr utilisation	104%	111%	117%	125%	132%	140%	149%
% sailings full	7%	12%	20%	27%	35%	44%	49%

High (16%) unmet demand

	2025	2030	2035	2040	2045	2050	2055
PCUs/day	983	1043	1107	1175	1248	1324	1406
All day (CalMac measure)	112%	119%	126%	134%	142%	151%	160%
Daytime	113%	120%	127%	135%	143%	152%	161%
Daytime Mon-Thurs	105%	111%	118%	126%	133%	141%	150%
Daytime Saturday	134%	142%	151%	160%	170%	180%	191%
Count of 2 hr instances Utilisation >70%	339	349	366	374	375	377	378
Count of full sailings >80%	892	906	955	989	1032	1060	1069
Count of 2 hr instances utilisation >100%	214	251	282	302	316	320	339
Highest 2 hr utilisation	163%	173%	183%	194%	206%	219%	233%
% sailings full	72%	73%	77%	80%	83%	85%	86%

	2025	2030	2035	2040	2045	2050	2055
PCUs/day	983	1043	1107	1175	1248	1324	1406
All day (CalMac measure)	43%	45%	48%	51%	54%	58%	61%
Daytime	46%	49%	52%	55%	58%	62%	66%
Daytime Mon - Thurs	43%	46%	48%	51%	55%	58%	62%
Daytime Saturday	54%	58%	61%	65%	69%	73%	78%
Count of 2 hr instances Utilisation >70%	7	10	16	31	52	87	124
Count of full sailings >80%	0	11	33	49	81	130	250
Count of 2 hr instances utilisation >100%	0	0	0	0	0	2	7
Highest 2 hr utilisation	76%	80%	85%	90%	96%	102%	108%
% sailings full	0%	0%	1%	2%	3%	5%	10%

	2025	2030	2035	2040	2045	2050	2055
PCUs/day	983	1043	1107	1175	1248	1324	1406
All day (CalMac measure)	61%	64%	68%	73%	77%	82%	87%
Daytime	69%	73%	78%	82%	88%	93%	99%
Daytime Mon - Thurs	65%	68%	73%	77%	82%	87%	92%
Daytime Saturday	81%	87%	92%	97%	103%	110%	117%
Count of 2 hr instances Utilisation >70%	145	190	216	245	284	300	332
Count of full sailings >80%	253	401	513	691	791	880	1025
Count of 2 hr instances utilisation >100%	9	15	25	48	77	116	145
Highest 2 hr utilisation	113%	120%	128%	136%	144%	153%	162%
% sailings full	15%	24%	30%	41%	47%	52%	60%

Figure 10 3 Baseline, Model A and Model B performance projections

Low (5%) unmet demand

High (16%) unmet demand

C - TS / CalMac Proposal

	2025	2030	2035	2040	2045	2050	2055
PCUs/day	902	958	1016	1079	1145	1216	1290
All day (CalMac measure)	69%	74%	78%	83%	88%	93%	99%
Daytime	79%	84%	90%	95%	101%	107%	114%
Daytime Mon - Thurs	74%	79%	84%	89%	94%	100%	106%
Daytime Saturday	93%	99%	105%	111%	118%	125%	133%
Count of 2 hr instances Utilisation >70%	218	255	270	287	300	320	340
Count of full sailings >80%	592	696	781	925	992	1055	1095
Count of 2 hr instances utilisation >100%	33	68	92	131	166	193	219
Highest 2 hr utilisation	117%	124%	132%	140%	148%	158%	167%
% sailings full	44%	51%	57%	68%	73%	78%	81%

	2025	2030	2035	2040	2045	2050	2055
PCUs/day	983	1043	1107	1175	1248	1324	1406
All day (CalMac measure)	75%	80%	85%	90%	96%	102%	108%
Daytime	87%	92%	98%	104%	110%	117%	124%
Daytime Mon - Thurs	81%	86%	91%	97%	103%	109%	116%
Daytime Saturday	101%	108%	114%	121%	129%	137%	145%
Count of 2 hr instances Utilisation >70%	261	280	293	306	330	345	365
Count of full sailings >80%	722	847	966	1010	1077	1125	1214
Count of 2 hr instances utilisation >100%	81	107	153	182	203	240	261
Highest 2 hr utilisation	127%	135%	144%	152%	162%	172%	182%
% sailings full	53%	62%	71%	74%	79%	83%	89%

D - 2.5 Vessels

	2025	2030	2035	2040	2045	2050	2055
PCUs/day	902	958	1016	1079	1145	1216	1290
All day (CalMac measure)	48%	51%	54%	58%	61%	65%	69%
Daytime	51%	54%	58%	61%	65%	69%	73%
Daytime Mon - Thurs	48%	51%	54%	57%	61%	64%	68%
Daytime Saturday	61%	64%	68%	73%	77%	82%	87%
Count of 2 hr instances Utilisation >70%	9	27	50	76	105	155	204
Count of full sailings >80%	0	9	36	108	185	306	455
Count of 2 hr instances utilisation >100%	0	0	0	0	0	3	11
Highest 2 hr utilisation	77%	82%	87%	92%	98%	104%	110%
% sailings full	0%	0%	2%	6%	9%	16%	23%

	2025	2030	2035	2040	2045	2050	2055
PCUs/day	983	1043	1107	1175	1248	1324	1406
All day (CalMac measure)	53%	56%	59%	63%	67%	71%	75%
Daytime	56%	59%	63%	67%	71%	75%	80%
Daytime Mon - Thurs	52%	55%	59%	62%	66%	70%	74%
Daytime Saturday	66%	70%	74%	79%	84%	89%	94%
Count of 2 hr instances Utilisation >70%	35	60	89	129	178	220	273
Count of full sailings >80%	27	72	131	252	360	522	752
Count of 2 hr instances utilisation >100%	0	0	0	1	6	19	35
Highest 2 hr utilisation	84%	89%	94%	100%	106%	113%	120%
% sailings full	1%	4%	7%	13%	18%	27%	38%

E - 2 vessels, 80 PCU

	2025	2030	2035	2040	2045	2050	2055
PCUs/day	902	958	1016	1079	1145	1216	1290
All day (CalMac measure)	42%	44%	47%	50%	53%	56%	60%
Daytime	47%	50%	53%	57%	60%	64%	68%
Daytime Mon - Thurs	44%	47%	50%	53%	56%	60%	64%
Daytime Saturday	56%	60%	63%	67%	71%	76%	80%
Count of 2 hr instances Utilisation >70%	9	13	23	41	66	110	143
Count of full sailings >80%	0	11	26	37	67	130	215
Count of 2 hr instances utilisation >100%	0	0	0	0	0	6	9
Highest 2 hr utilisation	78%	83%	88%	93%	99%	105%	112%
% sailings full	0%	1%	2%	2%	4%	8%	13%

	2025	2030	2035	2040	2045	2050	2055
PCUs/day	983	1043	1107	1175	1248	1324	1406
All day (CalMac measure)	46%	48%	51%	54%	58%	61%	65%
Daytime	52%	55%	58%	62%	66%	70%	74%
Daytime Mon - Thurs	48%	51%	55%	58%	61%	65%	69%
Daytime Saturday	61%	65%	69%	73%	78%	82%	87%
Count of 2 hr instances Utilisation >70%	16	31	52	84	125	163	208
Count of full sailings >80%	22	33	56	89	170	263	418
Count of 2 hr instances utilisation >100%	0	0	0	2	7	10	16
Highest 2 hr utilisation	85%	90%	96%	102%	108%	115%	122%
% sailings full	1%	2%	3%	5%	10%	15%	25%

Figure 11 Models C D & E performance projections

In order to make the comparison between each service model easier, we have graphed all service models against one another in a similar fashion to the CalMac presentation of fig 4. It is from these graphs that we can draw clear conclusions. See the following three pages.

For comparative purposes, the graphs include the Transport Scotland / VRDP target of 70%, and also the utilisation levels of other CalMac routes in 2019. Three of these routes have been chosen because they are currently in the process of receiving newly procured vessels. Utilisation is shown for their pre-procurement state in 2019, and what is achieved by the new vessels based on 2019 carrying figures. This gives us a 'before and after' impact of recent procurements with which to compare Craignure – Oban.

Figure 12 overleaf compares the performance of each service model using the standard Transport Scotland measure of utilisation over the entire day. But as discussed previously, this is not an appropriate measure for a route like Craignure – Oban. We include it here for comparative purposes.

What is very clear from this graph however is that the current TS / CalMac service model proposal fails **by a very wide margin** to meet Transport Scotland's own utilisation objective, using Transport Scotland's own methodology.

Following the TS/CalMac model performance are the **daytime** utilisation graphs of figures 13 and 14. It is from these that we draw for our conclusive comparisons.

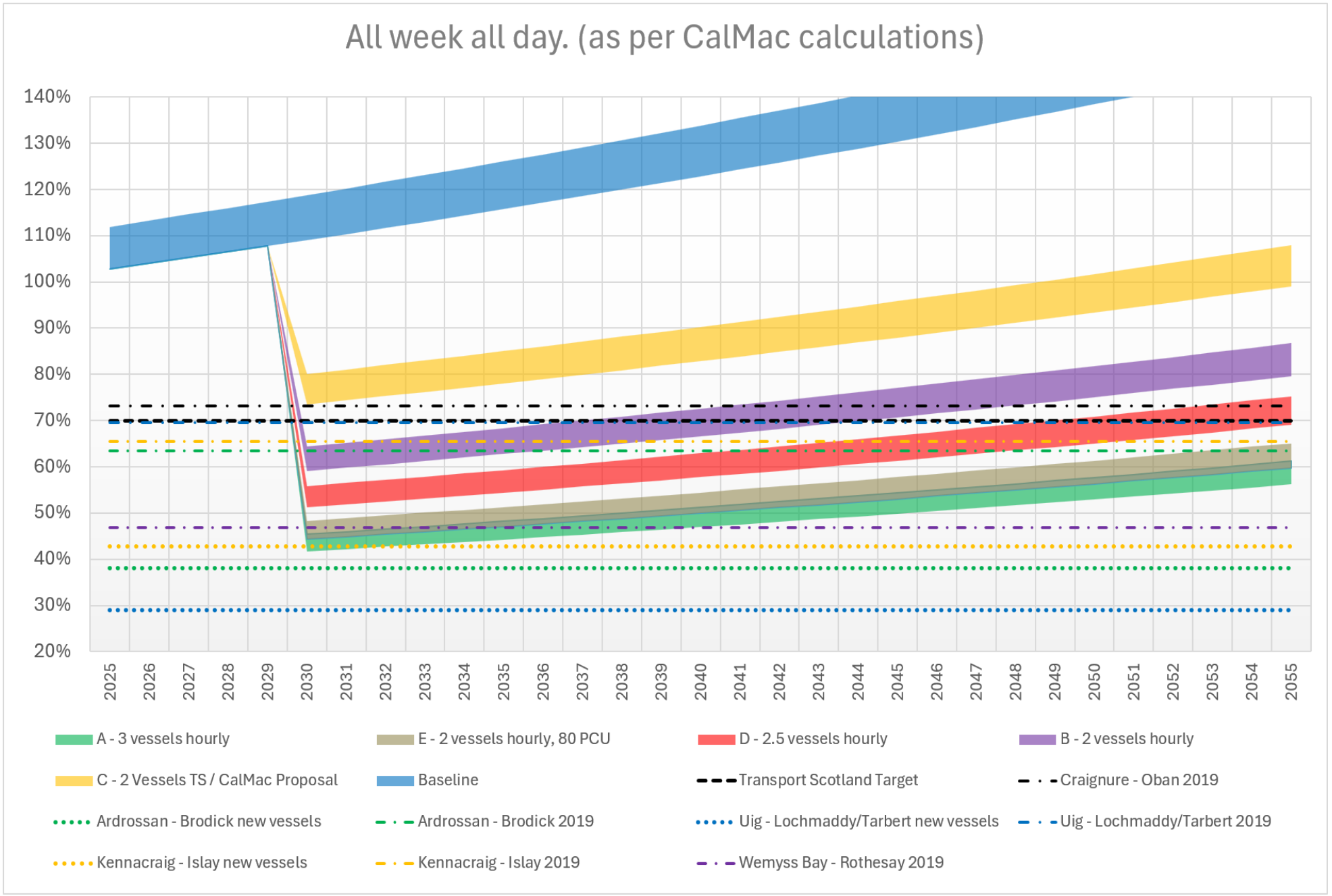


Figure 12 All Week All Day Utilisation projections

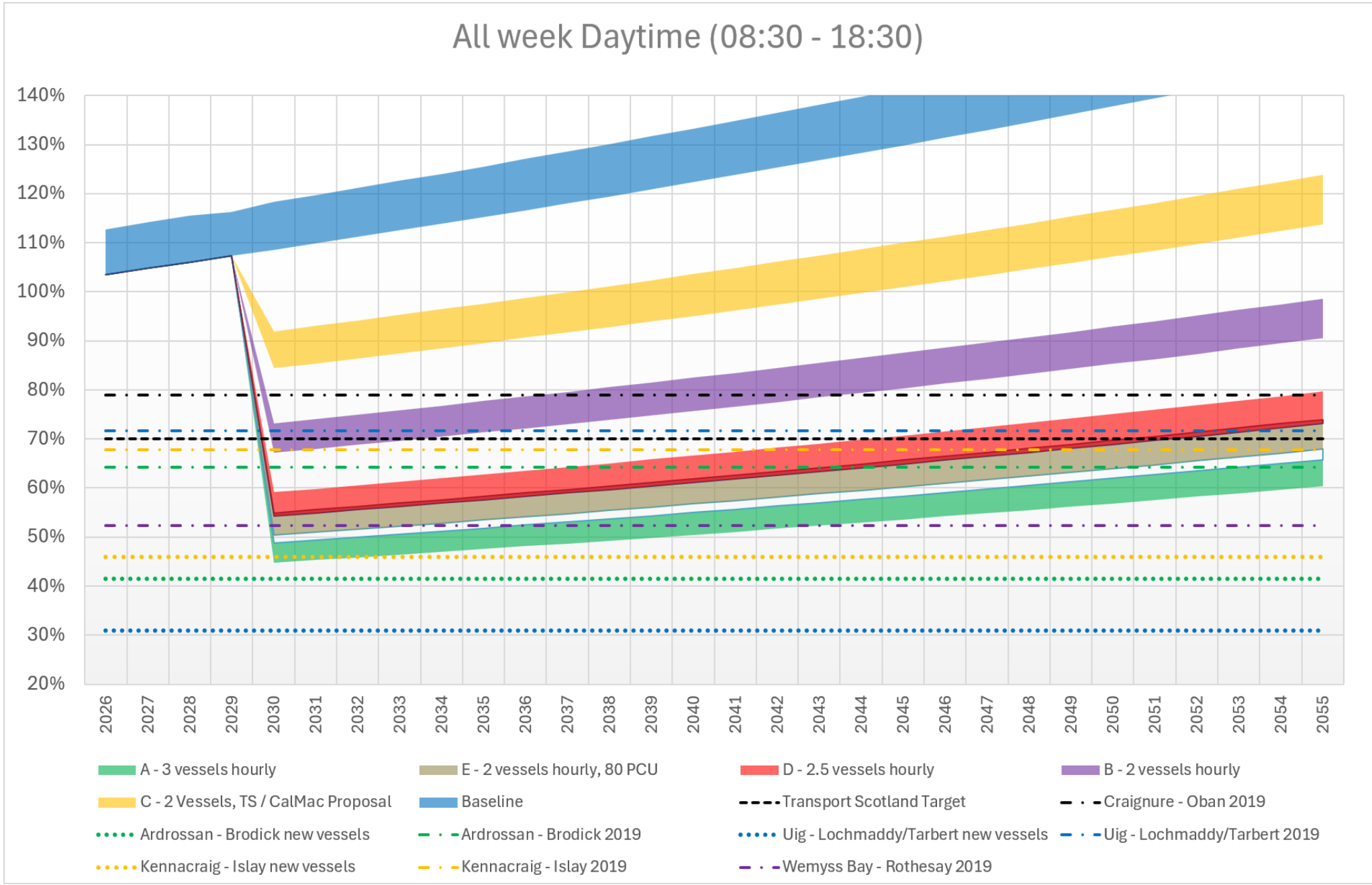


Figure 13 Daytime Utilisation projections

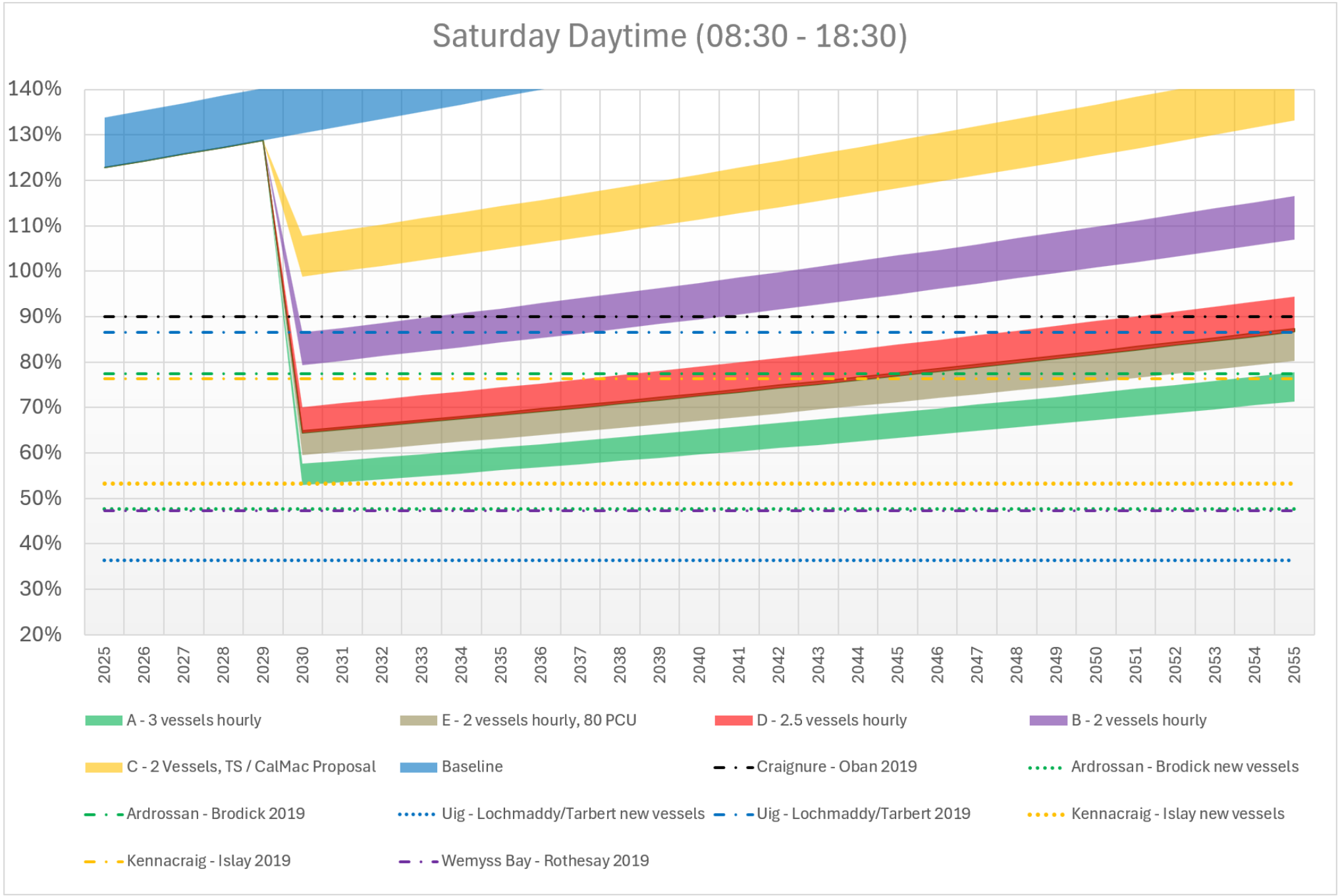


Figure 14 Saturday Daytime Utilisation Projections

Findings

Model C - the Transport Scotland / CalMac proposal

The current TS/CalMac proposal very badly fails to meet demand, and should be rejected outright. It is concerning that such a weak model that fails so dramatically to meet Transport Scotland's own policy objectives appears to be the current government proposal.

Model B – 2 vessels hourly

Whilst this model is markedly better, it badly fails to meet the TS/VRDP 70% all-week target. It brings utilisation below 70% for only 1 – 2 years in the lowest part of the projection band. Within around 8 years, congestion is predicted to return to 2019 levels. In comparison to other routes it leaves Mull at significant disadvantage, managing only to meet the congestion levels of Islay and the Little Minch **before** they were deemed to need new vessels. This model should therefore be rejected.

Model E

Model D meets utilisation targets, but is very likely to be contrary to community wishes as expressed in the Specification of User Requirements. Larger, less frequent vehicle convoys entering Mull's roads will lead to worsened congestion on our predominantly single-track road system. In addition, we share Transport Scotland's low confidence that Argyll and Bute Council will deliver a new pier in Caignure ahead of new vessels entering service. Without a larger pier, 60 PCUs is the effective per-vessel limit. This model should therefore be rejected.

Models A and D

Both of these models meet the TS / VRDP target. The three-vessel model A is the best-performing of all options, and is the only one that delivers utilisation levels broadly on-par with the comparator routes. Model D (2.5 vessels) brings very significant benefits to other parts of the network however, whilst still delivering adequate capacity to Mull. The business case for this option is likely to be stronger than A. It should be noted from fig 14 however, that utilisation on Saturday would be significantly higher for the 2.5 vessel model. If it did not compromise the Colonsay service therefore, it would be justified to adopt the three vessel model on summer Saturdays. An example timetable is included in part 2 that enables this by over-nighting the ferry on Colonsay on Friday and Saturday nights.

PART ONE CONCLUSION

This first section looks only at vehicle carryings, and on this assessment of how well each model meets future demand, only two models should be progressed for further assessment:

A – Three dedicated vessels of 60 PCU capacity departing hourly

D – Two dedicated vessels, plus a third shared with the neighbouring island of Colonsay. All three vessels with 60 PCU vehicle capacity, departing hourly.

Part Two:

Passenger Demand Projections and Capacities

Historic carryings

Historic passenger carryings across both major Mull – mainland routes are shown below.

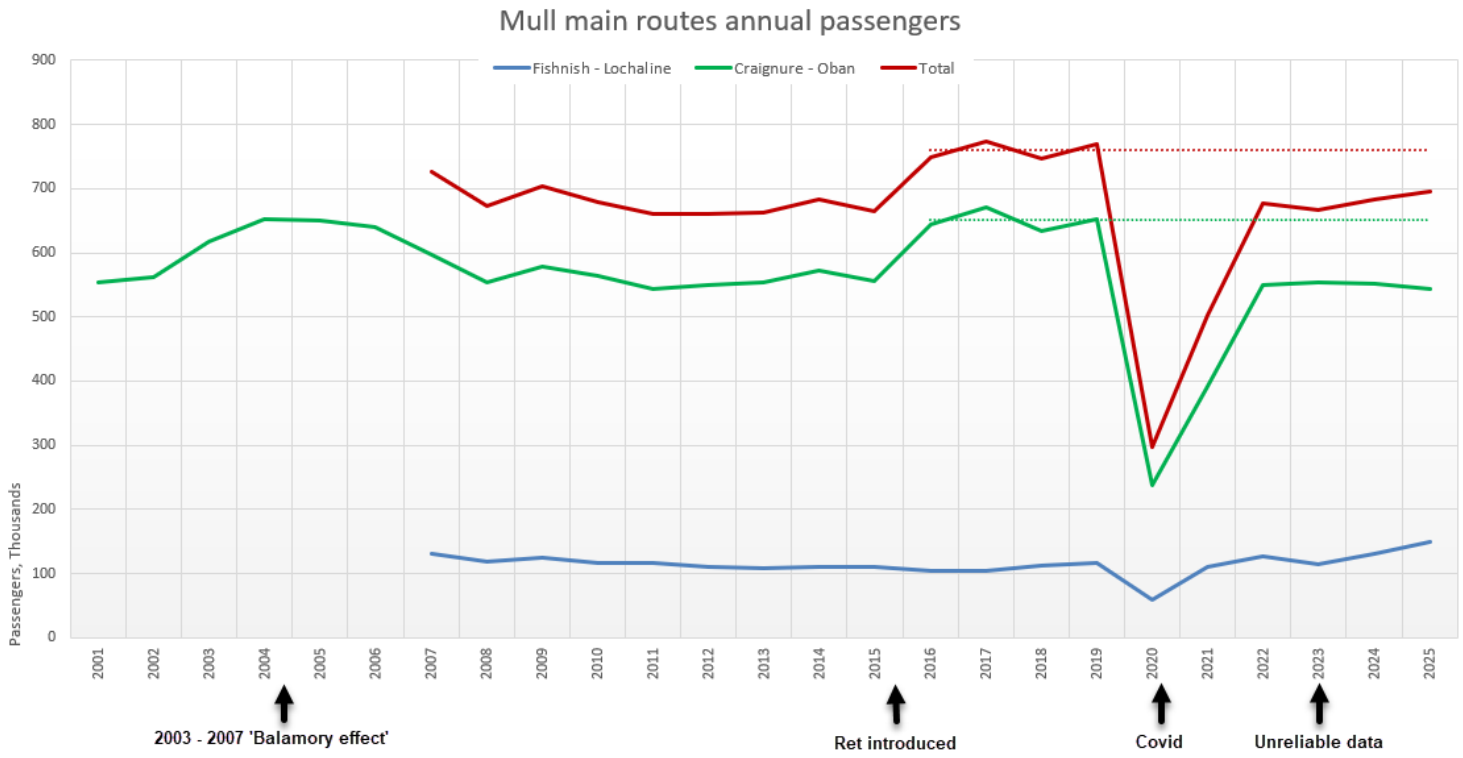


Figure 4 Historic passenger carryings

Whilst in the case of vehicle carryings (see part one), total traffic across both C-O and F-L combined had returned to pre-covid levels by 2022, recovery of passenger carryings has been much weaker.

The poor recovery in passenger traffic is mirrored by the performance of coach traffic – see figure 2 overleaf. Coach traffic in 2024 was 26% down on pre-pandemic levels, and has since worsened to be 41% lower in 2025. This is on-trend with the wider CalMac network.

Part of this trend is undeniably related to the long tail of tour operator collapses caused by Covid. However, at a national level coach tour passengers were just 10% below pre-pandemic levels by 2024[8]. So there appears to be an added issue layered on top of the national picture that is continuing to suppress coach traffic to the islands.

That issue is logically and anecdotally the 'ferry crisis'. Tour operators are not scheduling island visits in their itineraries, either due to the unavailability of space, or the general unreliability of the service, making it a risky option for a still-fragile sector.

[8] Confederation of Passenger Transport: Economic Impacts of Coach Services Report | CPT

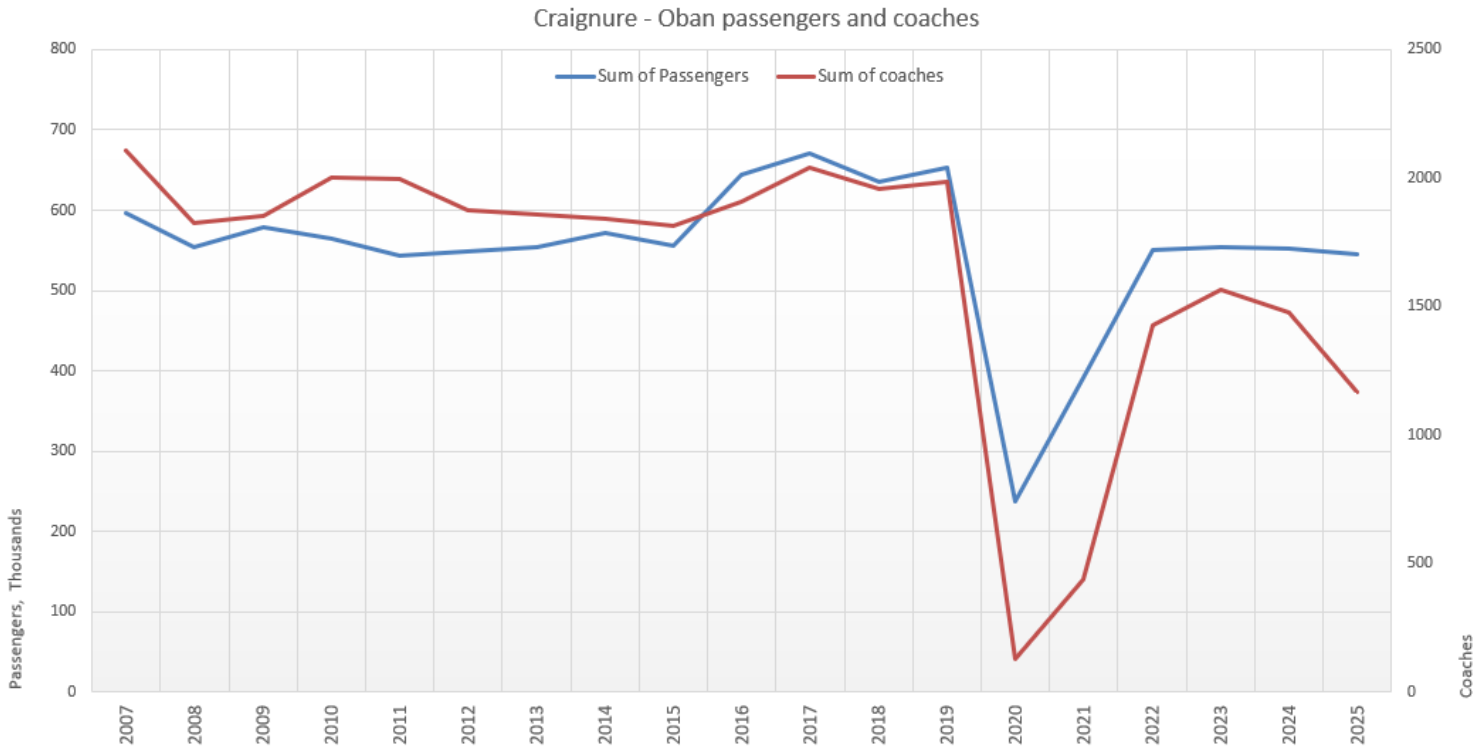


Figure 5 Coach and passenger carryings

Utilisation / Unmet Demand

In terms of simple capacity versus measured demand, there is no direct unmet demand on the route. Passenger capacity of the main vessel (MV Isle of Mull) at 962 passengers far exceeds the highest recorded carryings.

However there is undoubtedly unmet demand for coaches, and therefore *indirect* suppression of passenger carryings. Whilst it can be assumed that as confidence in the ferry system returns, coach tour operators will bring Mull and other islands back into their itineraries, it is difficult to

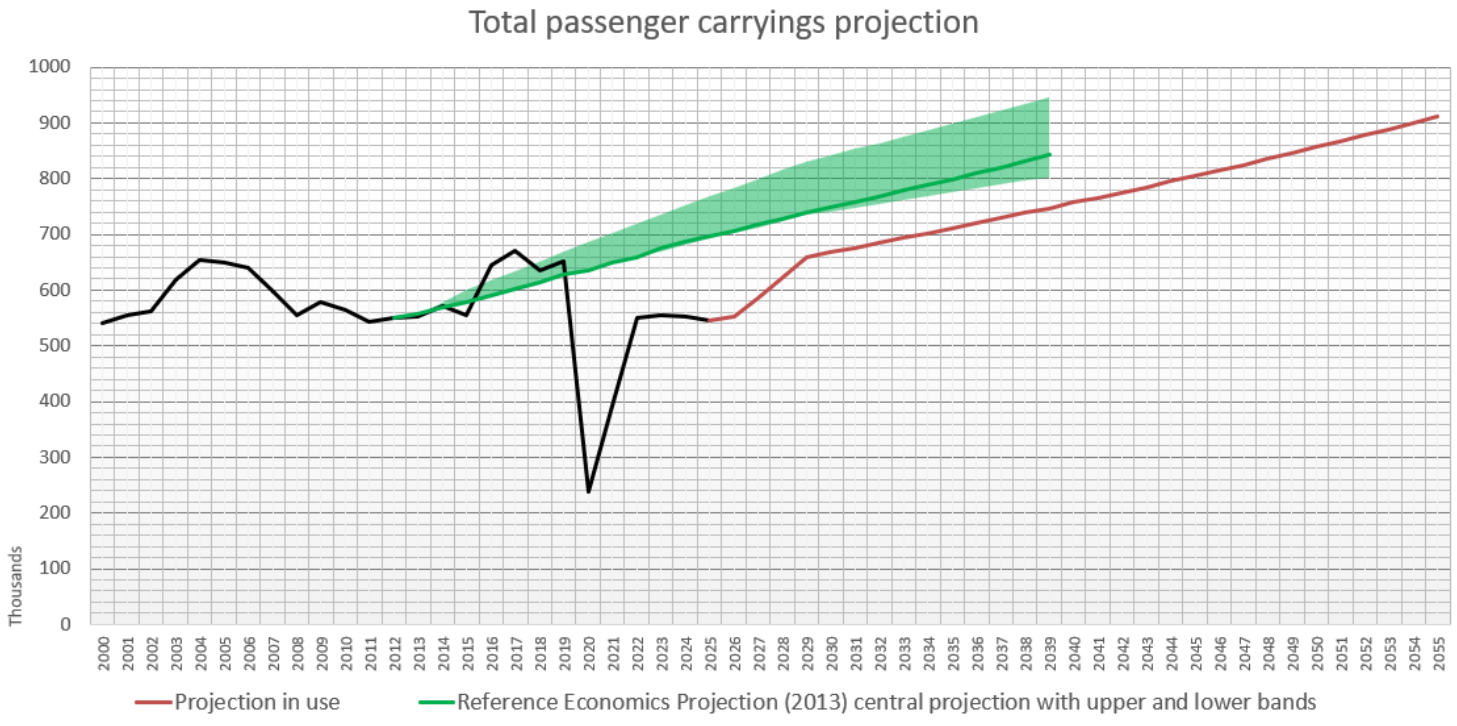


Figure 3 Passenger carryings projection

judge how elastic that relationship is. It is noteworthy for example, that in 2025 coach carryings dropped significantly relative to '24, but foot passenger numbers did not.

Future growth projections

With no direct unmet demand and an uncertain relationship between coach carryings and passenger carryings, we have taken a pragmatic and intuitive approach to estimates of future growth in passenger carryings:

- With the prospect of the ferry crisis abating and confidence returning, we have assumed that passenger carryings will return to pre-Covid levels by 2029. This represents just over 6% growth for three years.
- Thereafter, we track the Reference Economics central projection.

The result is shown in figure 3 above.

Hourly Demand Profile

Craignure – Oban carries large numbers of foot passengers during the summer months, with Mull & Iona (and their off-shore islands) being a popular and accessible day-trip from Oban. This results in strong concentration on departures from Oban at around 10am, and returns from Craignure at 5pm.

With such heavy concentration on these two departure times (and to a lesser extent, the 19:00 from Craignure), the challenge for the service is to meet these peaks. Connecting bus schedules in Mull and the practical considerations of a day trip to Staffa, Iona or Tobermory, mean that these peaks are quite rigidly timed. Most day-trippers want to leave Oban at 10am, and return at 5pm.

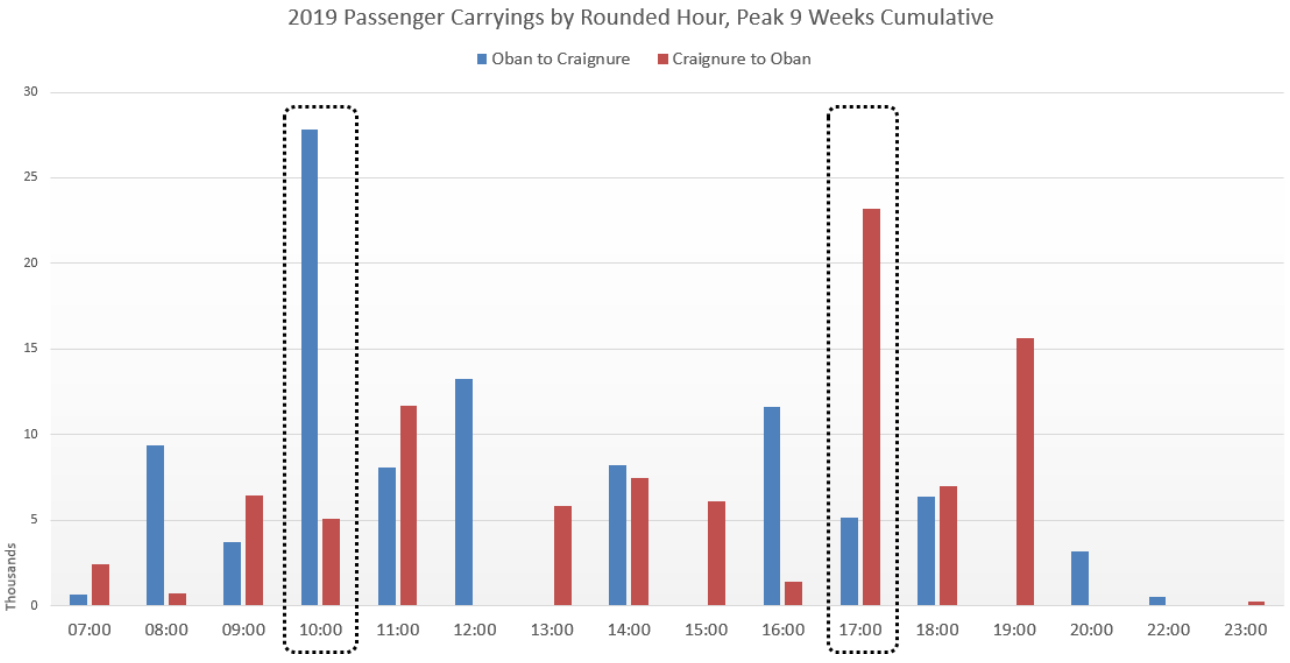


Figure 4 Hourly demand profile

Zero unmet demand is the benchmark

It is a characteristic of CalMac services that there is ample foot passenger capacity, such that it is exceptionally rare for foot passengers to be left uncarried due to capacity constraints. On the Craignure-Oban service this has occurred on only a handful of occasions in the last couple of years, when the Loch Frisa (pax capacity 199) has been operating on her own due to disruption. For passengers who are used to the absolute certainty of travel *at least* on foot, these incidents were very unwelcome and disruptive.

There is a strong argument that a **lifeline** service should **at least** guarantee travel as a foot passenger. This minimum service guarantee ensures that even at the peaks of demand, islanders can rely on access to lifeline public transport. This is important not just to ensure islanders can travel when they need to **by some means**, but to avoid the same loss of confidence by foot passengers as we see now in vehicular traffic. If the perception grew that **even as a foot passenger**, one had to book in advance to be sure of being carried, confidence in the system would be likely to decline, and free movement would be compromised. It would undermine islanders' confidence in island life, and act as a deterrent to visitor traffic.

It is also inherent to Mull's daytrip visitors that their ability to migrate to alternative sailings in the event of insufficient capacity is very limited. Bus connections and tour operator schedules are built around the 10am / 5pm cycle. If those key sailings became capacity constrained, there would be a direct negative impact on Mull's tourist economy.

Service model assessment

In assessing the performance of each potential service model, we will focus on how well it meets the 10am / 5pm peaks.

Following from part one of this study, we have identified two potential service patterns for further analysis. We will include the CalMac / TS proposal in addition for comparative purposes.

The CalMac / TS proposal

This proposal is for two vessels of 450 passenger capacity, operating to a timetable that somewhat maintains departures at the key 10am / 5pm times. It is acknowledged that this timetable is at an early stage and indicative only, but it should be noted that the departure times vary through the week, being variously 09:55 / 10:00 from Oban, and 16:30 / 16:50 from Craignure.

We have applied the growth forecast from figure 4 to sailing-by-sailing carrying figures, with 2019 as the baseline. The result is figure 5 below, which totals the number of passengers who would be denied travel in each forecast year, for a range of potential passenger capacities.

We have taken this approach, because broader-brush assessment that looks at the percentage of sailings where capacity meets demand; or the number of people carried as a percentage of the total, can tend to give an unduly positive picture. For example, we project that in 2040, 7,316 passenger journeys will be denied if using two ferries with a passenger capacity of 450. As a percentage of annual traffic, that is just 1%; as a percentage of peak 9-week demand however it is 3.6%.

Number of Passenger Journeys Denied, by Passenger Capacity

Year	450 pax	500 pax	550 pax	600 pax	650 pax	700 pax	750 pax	800 pax	850 pax	900 pax	950 pax	1000 pax
2030	3114	1497	801	435	193	84	34	0	0	0	0	0
2031	3413	1675	878	488	230	94	44	0	0	0	0	0
2032	3731	1875	961	541	272	104	54	4	0	0	0	0
2033	4075	2094	1054	596	318	122	64	14	0	0	0	0
2034	4450	2321	1166	665	365	146	75	25	0	0	0	0
2035	4847	2563	1282	738	412	180	86	36	0	0	0	0
2036	5263	2829	1416	817	460	218	97	47	0	0	0	0
2037	5709	3109	1582	897	516	257	108	58	8	0	0	0
2038	6215	3409	1769	983	574	306	124	69	19	0	0	0
2039	6754	3736	1978	1076	633	356	146	80	30	0	0	0
2040	7316	4079	2207	1180	703	406	179	91	41	0	0	0
2041	7908	4456	2451	1305	781	457	221	103	53	3	0	0
2042	8544	4863	2712	1438	868	513	263	115	65	15	0	0
2043	9195	5305	3001	1595	956	574	311	132	77	27	0	0
2044	9864	5767	3303	1784	1046	635	363	155	89	39	0	0
2045	10557	6254	3624	1993	1143	699	416	190	101	51	1	0
2046	11264	6801	3976	2228	1252	780	470	234	113	63	13	0
2047	12001	7396	4347	2485	1384	867	527	280	126	76	26	0
2048	12783	8024	4748	2754	1524	960	593	332	148	89	39	0
2049	13590	8672	5178	3041	1683	1053	659	388	177	102	52	2
2050	14427	9370	5649	3358	1882	1154	726	445	218	115	65	15
2051	15299	10094	6144	3694	2105	1262	806	502	264	128	78	28
2052	16194	10835	6668	4053	2355	1385	894	561	311	145	91	41
2053	17125	11606	7249	4444	2630	1530	993	631	370	171	105	55
2054	18090	12399	7889	4859	2921	1686	1095	703	431	210	119	69
2055	19071	13203	8562	5305	3228	1870	1199	775	492	260	133	83

Figure 5 Passenger Journeys Denied

Lost Visitor Spend Value by Passenger Capacity, 2025 values

	450 pax	500 pax	550 pax	600 pax	650 pax	700 pax	750 pax	800 pax	850 pax	900 pax	950 pax	1000 pax
2030	£176,025	£ 89,100	£ 50,175	£ 27,525	£ 13,125	£ 6,300	£ 2,550	£ -	£ -	£ -	£ -	£ -
2031	£191,550	£ 99,075	£ 54,750	£ 30,825	£ 15,225	£ 7,050	£ 3,300	£ -	£ -	£ -	£ -	£ -
2032	£207,675	£110,250	£ 59,775	£ 34,125	£ 17,700	£ 7,800	£ 4,050	£ 300	£ -	£ -	£ -	£ -
2033	£224,925	£122,550	£ 65,475	£ 37,575	£ 20,475	£ 9,150	£ 4,800	£ 1,050	£ -	£ -	£ -	£ -
2034	£243,525	£135,075	£ 71,700	£ 42,075	£ 23,325	£ 10,650	£ 5,625	£ 1,875	£ -	£ -	£ -	£ -
2035	£262,875	£148,200	£ 78,000	£ 46,725	£ 26,175	£ 12,525	£ 6,450	£ 2,700	£ -	£ -	£ -	£ -
2036	£282,750	£162,375	£ 85,200	£ 51,375	£ 29,100	£ 14,700	£ 7,275	£ 3,525	£ -	£ -	£ -	£ -
2037	£303,825	£177,300	£ 94,500	£ 56,100	£ 32,625	£ 16,950	£ 8,100	£ 4,350	£ 600	£ -	£ -	£ -
2038	£326,850	£193,050	£105,000	£ 61,200	£ 36,225	£ 19,875	£ 9,300	£ 5,175	£ 1,425	£ -	£ -	£ -
2039	£350,700	£210,075	£116,550	£ 66,825	£ 39,900	£ 22,875	£ 10,875	£ 6,000	£ 2,250	£ -	£ -	£ -
2040	£375,525	£227,400	£129,375	£ 73,125	£ 44,400	£ 25,875	£ 12,600	£ 6,825	£ 3,075	£ -	£ -	£ -
2041	£401,550	£246,450	£142,950	£ 80,025	£ 49,500	£ 28,950	£ 15,000	£ 7,725	£ 3,975	£ 225	£ -	£ -
2042	£428,325	£266,625	£157,200	£ 87,225	£ 54,675	£ 32,400	£ 17,400	£ 8,625	£ 4,875	£ 1,125	£ -	£ -
2043	£455,475	£288,300	£172,650	£ 95,775	£ 59,850	£ 36,225	£ 20,250	£ 9,900	£ 5,775	£ 2,025	£ -	£ -
2044	£482,850	£310,425	£188,775	£106,275	£ 65,175	£ 40,050	£ 23,400	£ 11,550	£ 6,675	£ 2,925	£ -	£ -
2045	£510,450	£333,525	£205,725	£117,975	£ 71,025	£ 44,100	£ 26,625	£ 13,425	£ 7,575	£ 3,825	£ 75	£ -
2046	£538,500	£358,725	£224,175	£131,100	£ 77,700	£ 49,350	£ 29,850	£ 15,900	£ 8,475	£ 4,725	£ 975	£ -
2047	£567,300	£385,275	£243,225	£145,575	£ 85,125	£ 54,825	£ 33,300	£ 18,525	£ 9,450	£ 5,700	£ 1,950	£ -
2048	£598,725	£412,950	£263,475	£160,350	£ 92,700	£ 60,300	£ 37,425	£ 21,600	£ 11,100	£ 6,675	£ 2,925	£ -
2049	£631,275	£441,525	£284,700	£175,875	£101,175	£ 65,775	£ 41,550	£ 24,975	£ 12,900	£ 7,650	£ 3,900	£ 150
2050	£665,325	£471,075	£307,950	£192,750	£112,275	£ 71,850	£ 45,750	£ 28,425	£ 15,150	£ 8,625	£ 4,875	£ 1,125
2051	£701,175	£501,150	£331,800	£210,600	£124,800	£ 78,450	£ 50,925	£ 31,875	£ 17,775	£ 9,600	£ 5,850	£ 2,100
2052	£737,925	£531,600	£356,775	£229,500	£138,675	£ 85,875	£ 56,700	£ 35,475	£ 20,475	£ 10,875	£ 6,825	£ 3,075
2053	£775,500	£562,350	£383,775	£249,900	£154,125	£ 93,750	£ 62,550	£ 39,825	£ 24,000	£ 12,825	£ 7,875	£ 4,125
2054	£814,125	£593,775	£412,650	£271,125	£170,325	£102,150	£ 68,550	£ 44,325	£ 27,675	£ 14,850	£ 8,925	£ 5,175
2055	£853,200	£625,275	£442,575	£293,625	£187,050	£112,275	£ 74,700	£ 48,825	£ 31,350	£ 17,700	£ 9,975	£ 6,225

Figure 6 Lost Visitor Spend

Number of Full Sailings by Passenger Capacity

Year	450 pax	500 pax	550 pax	600 pax	650 pax	700 pax	750 pax	800 pax	850 pax	900 pax	950 pax	1000 pax
2030	44	24	9	6	4	1	1					
2031	46	26	10	6	4	1	1					
2032	50	29	11	6	5	2	1	1				
2033	55	30	13	8	5	2	1	1				
2034	58	32	14	8	5	3	1	1				
2035	61	36	16	9	5	4	1	1				
2036	65	37	20	9	6	4	1	1				
2037	75	39	23	9	6	5	1	1	1			
2038	79	43	26	10	6	5	2	1	1			
2039	82	45	28	11	7	5	3	1	1			
2040	85	48	30	14	8	5	4	1	1			
2041	91	52	32	14	9	5	4	1	1	1		
2042	92	57	35	17	9	6	4	1	1	1		
2043	95	60	36	21	9	6	5	2	1	1		
2044	98	63	39	23	10	6	5	3	1	1		
2045	98	71	42	26	11	8	5	4	1	1	1	
2046	101	76	44	29	13	8	5	4	1	1	1	
2047	108	81	48	30	14	9	6	4	1	1	1	
2048	111	83	51	32	16	9	6	5	2	1	1	
2049	113	90	56	35	20	9	6	5	3	1	1	1
2050	117	92	58	37	23	10	6	5	4	1	1	1
2051	119	93	61	39	26	11	8	5	4	1	1	1
2052	124	96	67	43	28	14	9	6	5	2	1	1
2053	127	98	75	45	30	14	9	6	5	3	1	1
2054	128	99	80	48	32	17	9	6	5	4	1	1
2055	134	103	82	51	35	22	10	7	5	4	1	1

Figure 7 Number of Full Sailings

Outwardly these could appear to be 'acceptably low' figures, but the economic impact in particular is greater than these low percentages might suggest. Unlike vehicle traffic, we must assume that unmet demand at these rigid demand peaks will not transfer to other sailings (with the current 2 vessel timetable); and that each passenger denied travel is lost income to our visitor economy. Figure 6 takes an estimated daytrip visitor spend of £75[9], and applies it to the number of denied passenger journeys on the outward Oban to Craignure leg (since in all likelihood, these denied passengers would be day-trippers). For example therefore, we estimate that two vessels each of 450 passenger capacity would curtail visitor spending by £375k by 2040, and by £853k by 2055.

Figure 7 details how many sailings would be full under each passenger capacity scenario. All of these are peak 10am / 5pm sailings. So again drawing the sample example above, a vessel with a capacity of 450 will be full to capacity on 85 sailings in2040. **That is almost all weekday 10am sailings from Oban, and 5pm sailings from Craignure during the peak 9 weeks of the summer season.**

We can see from the above that a 2 vessel service will offer significant degradation over the current 'zero unmet demand' benchmark. Only if passenger capacity is 900 – double that currently offered by TS/CalMac – is all passenger demand likely to be met for the first 10 years of service life.

For any 2-vessel service to meet demand, passenger capacity will need to be increased **significantly** from the current 450 proposal.

Increasing passenger capacity has a cost. There are resulting compromises to vessel design that would have to be considered and balanced:

- Higher per-vessel build costs due to increased passenger spaces.
- Higher displacement, due to weight of added superstructure.
- Higher crewing costs. The muster list for 450 pax vessel has been professionally estimated[10] for us to be 13 – 16. CalMac's current assumption is 14. As passenger numbers increase, so does the muster list. As a rough rule of thumb, one crew member could be required for each additional 50 passengers above 450. A 650 pax capacity vessel might therefore require an additional 5 crew members. With each crew position costing approximately £178k[11] annually to fill, increasing passenger capacity from 450 to 650 may add in the region of £890k to annual operating costs.
- Increased windage. The high and slab-sided vessels that the MV Isle of Mull typify are vulnerable to high winds when berthing, and are a major contributor to Calmac's worsening weather reliability performance.
- Increased turn-around times.
- Higher energy / power requirement (primarily due to increased displacement), adding to both capital and operating costs.

[9] Estimate based on sum of typical lunch costs, and allowance for typical trip / entry fees.
[10] Professor Dracos Vassalos, University of Strathclyde
[11] Crew salary bands provided under FOI. Average crew salary including pension and Employer's NI £71,292. 2.5 crew required for each crew position. (2.5 x £71292 = £178,230)

The lowest passenger capacity that we could countenance for a 2-vessel service would be 650. We offer this figure in great part because we know it would be a significant design challenge to add more passenger capacity (and the additional crew space) to a vessel of 60 PCU capacity. But even at 650, this **will** result in occasional full sailings during the summer months and the denial of travel for a small, but significant number of people. This could be mitigated by demand management – in particular, the number of coach metres allowed onto peak sailings could be capped. This would help to ensure there is sufficient capacity reserved for foot passengers reliant on public transport (and on-island tour bus connections).

However, given that 2 vessels are inadequate from a vehicle capacity perspective (see part one), this question of 'what is the optimum passenger capacity for a 2 vessel service' is moot. We very much hope that it only arises as a short-term consideration, perhaps caused by delayed delivery of a third vessel as a result of the shore infrastructure not being completed in time for the new vessels.

Service Model A – Three dedicated vessels of 60 PCU

For this model we have assumed that departures will be evenly spaced at 40 minute intervals, as in fig 8.

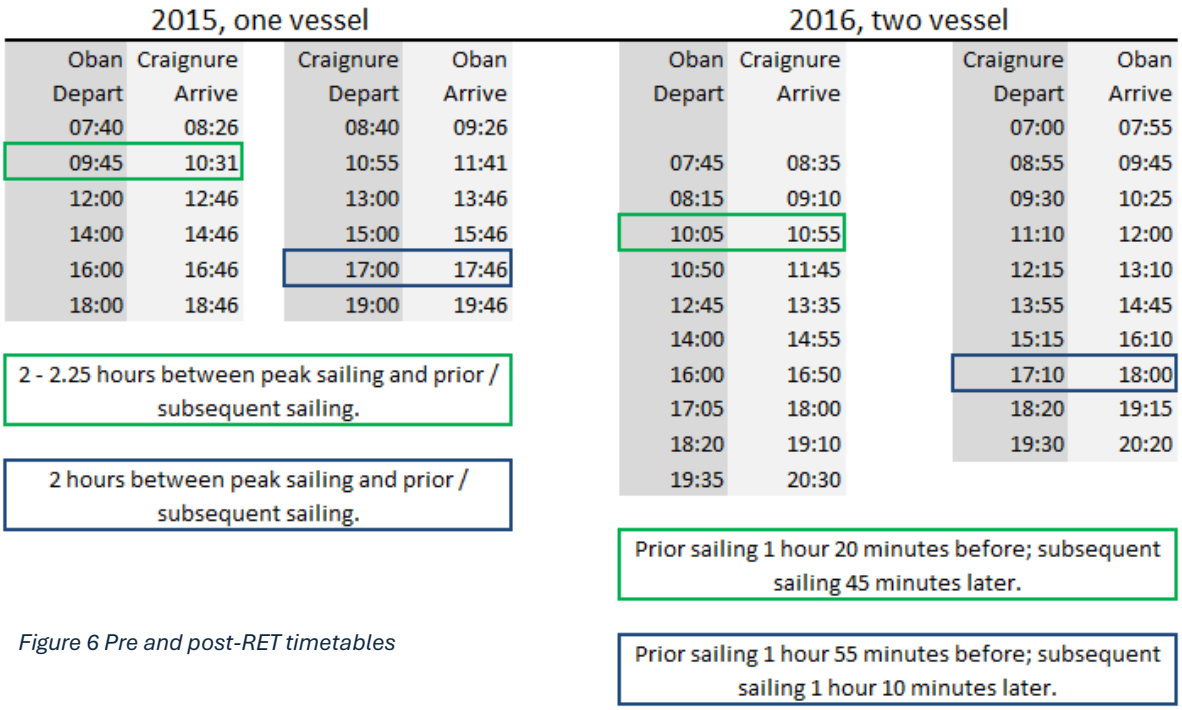
The critical unknown with this timetable is how it would affect passenger demand on peak sailings. How many passengers who would have chosen to depart Oban on the 10am sailing, will instead move to the 09:20 and 10:40; and at the other end of the day, how many passengers who would have chosen the 17:00 will transfer to the 16:20 or 17:40.

Some analysis of the introduction of a second vessel to the route in 2016, and the impact on peak sailing carryings is inciteful in helping to answer this question.

Boat 1		Boat 2	Boat 3
Dep Craig	Arr Oban	Dep Oban	Arr Craig
06:20	07:05	07:20	08:05
07:00	07:45	08:00	08:45
08:20	09:05	09:20	10:05
09:00	09:45	10:00	10:45
09:40	10:25	10:40	11:25
10:20	11:05	11:20	12:05
11:00	11:45	12:00	12:45
11:40	12:25	12:40	13:25
12:20	13:05	13:20	14:05
13:00	13:45	14:00	14:45
13:40	14:25	14:40	15:25
14:20	15:05	15:20	16:05
15:00	15:45	16:00	16:45
15:40	16:25	16:40	17:25
16:20	17:05	17:20	18:05
17:00	17:45	18:00	18:45
17:40	18:25	18:40	19:25
19:40	20:25	20:40	21:25
21:40	22:25	22:40	23:25

Figure 8 Proposed 3 vessel timetable

In 2016 the Coruisk was added to the service to work alongside the MV Isle of Mull, to add capacity that could satisfy the increased traffic encouraged by reduced RET fares. Figure 10 shows a typical weekday summer timetable from 2015 and 2016.



2015, one vessel

Oban Depart	Craignure Arrive	Craignure Depart	Oban Arrive
07:40	08:26	08:40	09:26
09:45	10:31	10:55	11:41
12:00	12:46	13:00	13:46
14:00	14:46	15:00	15:46
16:00	16:46	17:00	17:46
18:00	18:46	19:00	19:46

2 - 2.25 hours between peak sailing and prior / subsequent sailing.

2 hours between peak sailing and prior / subsequent sailing.

2016, two vessel

Oban Depart	Craignure Arrive	Craignure Depart	Oban Arrive
		07:00	07:55
07:45	08:35	08:55	09:45
08:15	09:10	09:30	10:25
10:05	10:55	11:10	12:00
10:50	11:45	12:15	13:10
12:45	13:35	13:55	14:45
14:00	14:55	15:15	16:10
16:00	16:50	17:10	18:00
17:05	18:00	18:20	19:15
18:20	19:10	19:30	20:20
19:35	20:30		

Prior sailing 1 hour 20 minutes before; subsequent sailing 45 minutes later.

Prior sailing 1 hour 55 minutes before; subsequent sailing 1 hour 10 minutes later.

Figure 6 Pre and post-RET timetables

Departure times in subsequent years have varied a little from the initial 2016 timetable, but the general pattern has remained the same. On the outward journey from Oban, the peak sailing at around 10am is now flanked by a sailing a little over an hour before and afterwards. On the return sailing from Craignure, there are alternatives 1 hr 55 previously and 1 hr 10 afterwards. The typical gap between sailings in the pre-RET timetable was 2 hours.

Intuitively, one would expect this increased sailing frequency to have resulted in reduced carryings on the peak sailings. Analysis of passenger carrying data however shows this has not occurred:

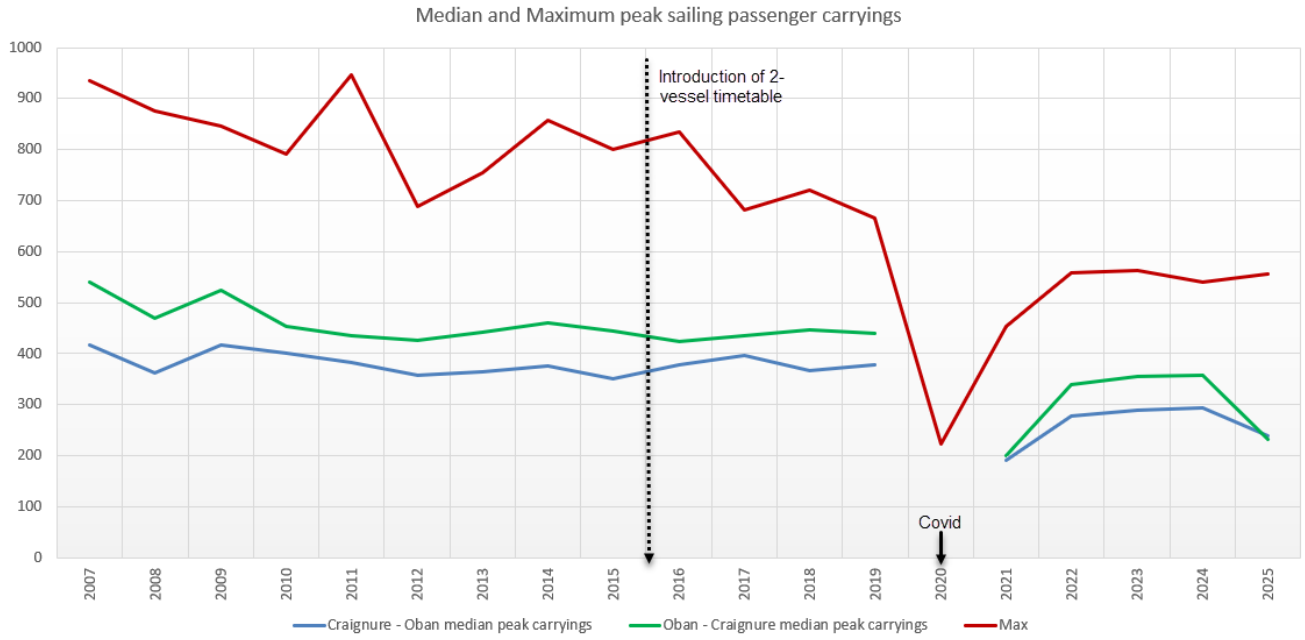


Figure 10 Peak 9 weeks; peak time sailings median and max carryings

Figure 10 charts the median passenger carryings on peak sailings in summer (those indicated in fig 9). **Looking at the median carryings, there appears to be no influence on peak sailing demand as a result of a higher frequency timetable.**

The Covid and ferry crisis impacts of 2020 onwards exert the strongest influence on passenger demand. In the undisturbed 4 years prior to 2020, the maximum passenger carryings (the highest load on a single sailing) has continued what appears to be a decade-long downward movement. Importantly however, this appears to be unrelated to the introduction of a second vessel – indeed, in the first year of 2-vessel service, the maximum carrying increased. It is more likely that other influences are reducing the demand on the very small number of exceptional-demand summer days that the maximum figure indicates. Individual events can cause the max to spike (Highland Games with a good weather forecast, or a clan gathering for example), and the tail-end of the 'Balamory effect' can be seen in 2007/8.

This appears to point to a very rigid peak demand pattern that shows little sign of being influenced by drawing alternative sailings closer with a higher-frequency timetable. There are important caveats to this – the second vessel (firstly Coruisk, latterly Loch Frisa) has much lower passenger capacity, However, neither have ever been filled to capacity when operating a 2-vessel service. They also carry half the number of vehicles, and therefore will carry fewer coaches.

It should also be noted that in the three-vessel model, sailings would be drawn even closer together than in the historic 2-vessel timetable. All sailings would be separated by just 40 minutes, and all vessels would be of the same capacity (passengers and coaches). However, what the analysis above shows is that **there is a great deal of uncertainty and risk in assuming that passenger demand will smooth out in response to a higher frequency timetable**.

Demand management may have to be adopted (caps on coaches metres on selected sailings for example), even with ferries departing every 40 minutes. The practical and commercial considerations of tour operators may also tend to focus demand on the 10am / 5pm sailings. It may not be commercially viable to meet every sailing with a bus on the Mull side, and the necessary co-ordination with private boat tour departures removes flexibility. Regardless of how many sailings are available, it is possible that tour operators will continue to favour the 10am / 5pm sailings.

When it comes to predicting passenger demand peaks and the necessary vessel capacity to meet them, there is a great deal of uncertainty and risk in the 3-vessel model. The same 650 passenger capacity that the 2-vessel model demands (at least) may also be needed on the 3-vessel service, therefore in great part undoing the efficiencies that could be gained from multi-vessel operation.

A three vessel service also has the issue of Oban harbour congestion to overcome. If equally separated, three vessels may only need one linkspan in Oban, but clashes with other services at the harbour entrance may require timetable compromises. The number of vessel movements would increase significantly. In contrast, the 2.5 vessel option not only requires fewer slots serving Mull, but will also cut down on the need for vessels from outside the operating area (namely Islay) to use the port.

Service Model D – 2.5 vessels

In this model, two vessels are dedicated to the Craignure – Oban service, and a third is shared with Colonsay. Prior to RET and the introduction of a 2-vessel service, the MV isle of Mull shared her time between services to Craignure and Colonsay (Although over time as traffic levels had grown, the balance had moved increasingly in favour of Mull). Colonsay has always been a 'difficult' service to operate, given its combination of low traffic (Colonsay has a population of around 130) and off-shore location (a crossing time of around 2 ¼ hours). The sea conditions and crossing time require a major vessel, but the low traffic volumes make it difficult to justify a dedicated ferry. The current solution is that Colonsay is served variously by the Clansman (who's main service is to Coll and Tiree) and the Finlaggan / Isle of Islay (main service to Islay).

When it comes to sharing a vessel however, Mull is the more natural partner, with mutually beneficial advantages to be had. There are several potential service patterns that could be developed, to a great extent dependent on shore facilities and vessel choice. In considering the options, the core objectives that need to be pursued are:

- Third vessel to add capacity to Mull with departure from Oban close to 10am each morning, and return from Craignure close to 5pm.
- Regular daily service operated to Colonsay outside of those times.
- Variations to be explored that maintain and enhance current inter-island services between Mull, Colonsay and Islay.

Below are example timetables that explore how the Colonsay and Mull services could be integrated in pursuit of these objectives:

Example 1 – Middle of the day to Colonsay.

This is the service pattern that we expect to operate on most days. It makes boat 3 available to Mull at the peak times, and operates a return to Colonsay in-between.

Colonsay Depart	Craignure Depart	Oban Arrive	Oban Depart	Craignure Arrive	Colonsay Arrive
	06:00	06:45	07:00	07:45	
	07:00	07:45	08:00	08:45	
	08:00	08:45	09:00	09:45	
	08:50	09:35	09:50	10:35	
	09:00	09:45	10:00	10:45	
	10:00	10:45	11:00	11:45	
	10:50	11:35	11:50		13:50
	11:00	11:45	12:00	12:45	
	12:00	12:45	13:00	13:45	
	13:00	13:45	14:00	14:45	
	14:00	14:45	15:00	15:45	
	15:00	15:45	16:00	16:45	
14:05		16:05	16:20	17:05	
	16:00	16:45	17:00	17:45	
	17:00	17:45	18:00	18:45	
	17:30	18:15	18:30	19:15	
	19:30	20:15	20:30	21:15	
	21:30	22:15	22:30	23:15	

Colonsay Depart	Craignure Depart	Oban Arrive	Oban Depart	Craignure Arrive	Colonsay Arrive
	07:00	07:45	08:00	08:45	
	08:00	08:45	09:00	09:45	
07:15		09:15	09:30	10:15	
	09:00	09:45	10:00	10:45	
	10:00	10:45	11:00	11:45	
	10:30	11:15	11:30	12:15	
	11:00	11:45	12:00	12:45	
	12:00	12:45	13:00	13:45	
	12:30	13:15	13:30	14:15	
	13:00	13:45	14:00	14:45	
	14:00	14:45	15:00	15:45	
	14:30	15:15	15:30	16:15	
	15:00	15:45	16:00	16:45	
	16:00	16:45	17:00	17:45	
	16:30	17:15	17:30	18:15	
	17:00	17:45	18:00	18:45	
	18:00	18:45	19:00	19:45	
	18:30	19:15	19:30		21:30
	19:00	19:45	20:00	20:45	
	20:00	20:45	21:00	21:45	

Boat 1
Boat 2
Boat 3

Needs to use second berth

Example 2 – Overnight on Colonsay.

If the third vessel was able to berth overnight on Colonsay (dependent on a combination of shore facilities and vessel size / type), an early departure from Colonsay and late return could offer a transformative service. An entire day on the mainland without an overnight stay becomes possible.
For Mull, this service could work well on summer Saturdays, when traffic is highest.
However, berth availability in Oban is likely to prevent services operating any closer together than shown here (and therefore passenger demand may not be met on peak sailings).

Example 3 – Inter-island connection.

In this example, vessel 3 operates a Mull – Colonsay – Islay – Mull service in-between working the Craignure – Oban peaks.

It could easily alternate its rotation, and operate Mull – Islay – Colonsay – Mull.

Port Askaig Arrive	Port Askaig Depart	Craignure Depart	Oban Arrive	Oban Depart	Craignure Arrive	Colonsay Arrive	Colonsay Depart
		06:00	06:45	07:00	07:45		
		07:00	07:45	08:00	08:45		
		08:00	08:45	09:00	09:45		
		08:50	09:35	09:50	10:35		
		09:00	09:45	10:00	10:45		
		10:00	10:45	11:00	11:45		
		10:50				12:50	13:05
		11:00	11:45	12:00	12:45		
		12:00	12:45	13:00	13:45		
		13:00	13:45	14:00	14:45		
		14:00	14:45	15:00	15:45		
		15:00	15:45	16:00	16:45		
14:10	14:25				16:55		
		16:00	16:45	17:00	17:45		
		17:00	17:45	18:00	18:45		
		17:30	18:15	18:30	19:15		
		19:30	20:15	20:30	21:15		
		21:30	22:15	22:30	23:15		

As covered in part one, the 2.5 vessel model is one of only two options that deliver adequate vehicle capacity to the route (the other being the 3 vessel model). Of these two, there are multiple clear advantages offered by the 2.5 vessel model:

1. Meets projected vehicle traffic demand at the times the route needs it
2. Does not over-provision the service un-necessarily
3. Much reduced likelihood of harbour or berth clashes in Oban
4. Can satisfy the rigid foot passenger peaks without burdening each individual vessel with excessive passenger capacity (and crewing). Pax capacity of 500 should be adequate, and by operating near-simultaneous services at peak times, effective capacity at those times will be 1,000. Maximum pax capacity that the three vessel service could deliver at peak times is 650 (on one vessel).
5. Relieves the Clansman and Isle of Islay of operating services to Colonsay, freeing them up to operate additional services to their primary islands.
6. Provides Colonsay with a reliable and consistent daily service
7. Facilitates inter-island travel between Mull, Colonsay and Islay
8. Adds flexibility and redundancy. In the event of unplanned breakdown in summer, two vessels could maintain service. During winter months, service could be reduced to 2 vessels, with each vessel taking it in turns to dry-dock. No need therefore to bring in vessels from other routes to cover. Relief could also be provided to other islands in winter (eg Coll and Tiree), outwith their own dry-dock periods.
9. This internal redundancy on the route opens the question of how often and in what circumstances it would be necessary to operate a larger relief vessel to Craignure; and therefore to re-examine the assumptions and cost-benefit assessment behind the current plan to make the new Craignure pier capable of accepting vessels up to the size of Glen Sannox and Glen Rosa.

(8 and 9 are also shared with the 3-vessel model)

What is needed to enable a 2.5 vessel service?

If we are to adopt the 2.5 vessel model to the Craignure – Oban service, there are some key design and specification requirements:

- **Two linkspans in Craignure.** A key operating principle is the ability to operate two sailings at peak times very close to each other. In our example timetables, we have placed peak sailings just 10 minutes apart (09:50 and 10:00 for example), thus effectively spreading the peak passenger loads across two vessels.
  Two linkspans are also needed to enable co-ordination with Colonsay services, in particular the potential inter-island services. Without two linkspans in Craignure, there will be insufficient flexibility in the system.
- **Select useage of the second berth in Oban.** Again to facilitate 'near simultaneous' sailings at peak times, both berths 1 and 2 in Oban will be required at times in the morning. This should not present a significant problem however, since both Barra and Coll / Tiree vessels are not in Oban at these times. It may be necessary however to move the arrival of the Barra ferry back by 15 minutes.

- **Auto-mooring or lock-on linkspans.** There are general productivity gains to be had from the use of lock-on linkspans or auto-mooring systems. They reduce the shore staff requirement, and relieve crew of rope-handling. They are useful here however because without them, it may be difficult to operate peak sailings so close to one another. For example, a vessel departing Oban at 09:50 will be able to do so without needing the assistance of shore staff who will at that time be busy loading the 10:00. They are not critical of course – the service could be delivered by just adding more shore staff. But given the opportunity we have to optimise the design of both shore facilities and ships, it is a prudent and logical option. Both berths in Craignure, and at least berth 1 in Oban should be lock-on or equipped with auto-mooring systems. Important to note that Lock-on linkspans are no less useable for traditional vessels.
- **Two lay-up berths in Craignure.** With three vessels, it must be possible (usually at the beginning and the end of the day) for two of them to be laid up whilst one remains active and has access to a linkspan at both ends of the service.
- **Hourly cadence.** Vessels must be able to complete a crossing and turnaround in 60 minutes. The most cost-effective way of achieving that is to minimise turnaround times, thereby placing a reduced demand on service speed. The target should be 45 minutes for crossing, and 15 minutes to turnaround. This was achieved by the MV Isle of Mull for several decades, with near-identical vehicle loads to those proposed here, and higher (up to 960) foot passenger loads. When designing the new berths in Oban and Craignure (as well as the ferries themselves), they should be optimised for fast turnaround. This should encompass vehicle ramp and linkspan width (able to disembark two lanes of traffic side-by side), mooring / manoeuvring capabilities, and the density of vehicles on the car deck (lower densities require less crew intervention and can load / unload faster).
- **17 - 18 knot service speed, or thereabouts.** In order for the Colonsay service to be integrated without unduly compromising the Mull service, the passage time from Oban or Craignure to Colonsay (identical distance) should be 2 hours. It is currently 2 ¼ hours. It would not be routinely necessary to operate at that speed between Craignure and Oban (particularly if turnaround time is optimised), but the ability to run faster when necessary would help to mitigate occasional summer delays.
- **Island-side bunkering.** In order to avoid disruption to the operating day, it would be best to bunker out of operational hours on the Craignure side where the vessels would be based. This could be achieved if bunkering by road, with the tanker travelling across on the last (and low-demand) sailing of the day. In any case, there is a requirement for the new vessels to be low-emission, most likely meaning that a large proportion of their energy storage and propulsion will be battery-electric. This will reduce the volume and frequency of fuel bunkering.

PART TWO CONCLUSION

It is our firm view that the 2.5 vessel model as described through this report is by far the preferrable solution for the Craignure – Oban service.

The only alternative is to have three vessels dedicated to the route. Not only would that be more expensive, but it would not meet the needs of the service. In particular, it is uncertain whether the passenger demand peaks could be met, and to do so would require vessels with significantly higher passenger capacity, with inflated capital and running costs.

Congestion in Oban harbour is also highly likely to lead to compromise of the three vessel timetable, and berth availability may also be an issue. A third Oban berth may become necessary. This is likely to be a very expensive solution and not deliverable in the near-term. By contrast, the marginal cost of a second linkspan on the new Craignure pier will be much lower (We are awaiting information to help quantify that).

Additional lay-up space and higher service speeds will impact capital and operating costs, but in comparison to the costs of a 3-vessel service these will be lower and proportionate. Adoption of lock-on linkspans or auto-mooring systems come at minimal or zero marginal capital cost, and will offer mitigating reductions to operating costs.

Detailed cost-benefit analysis and business case assessment is outside of the scope of this paper. However, we hope that the clear direction given here will inform subsequent work, particularly in vessel design and specification.

We will cover other aspects of the Service Requirements in subsequent parts of this paper, which we will issue as soon as possible.