



Cumbria County Council  
New Windermere Ferry

# Introductions

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## Agenda

- Background
- Requirements
- Options considered
- Proposed Ferry
- Timeline
- Q&A

## Background

Cumbria County Council's Windermere Ferry Service is developing plans to replace the current car ferry, the 'Mallard' with a brand-new electric ferry.

The Mallard is more than 30 years old, having first been introduced in 1991. The age of the ferry has led to reduced reliability and increased repair costs in recent years.

The council intends to replace the Mallard with a new electric car ferry, to provide an improved service with reduced emissions. Like the Mallard, the new ferry will be a cable ferry that pulls herself across the lake on two wire cables.

Alongside the design and build of a new ferry, the access road and slipway to the ferry will be looked at. The current access and slipway floods on a regular basis which leads to the ferry being inoperable.

## New Ferry - Requirements

- High level of safety, reliability and redundancy
- Reduced downtime due to weather and high lake levels
- Increased vehicle capacity
- Improved emergency evacuation and more space between cars
- Electric propulsion for zero/low emissions
- Better facilities for passengers and crew
- 30-year service life
- Capable of local assembly and launch into lake
- Capable of removal from lake for inspection and maintenance

# Battery Powered Electric Ferries

- Many examples (100+ globally and number increasing rapidly)
- Large and small ferries (current largest is 120m and carries 200 cars)
- Technology is now well proven

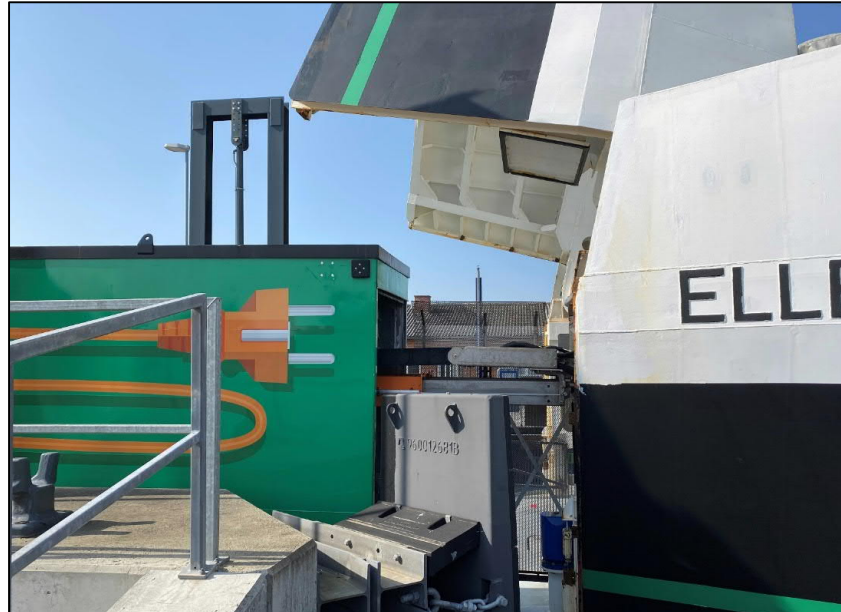


## Ampere, Norway

- Battery Electric Ferry
- Loa 52m
- 120 cars
- 34 x 4-mile crossing/day
- Overnight plus fast charge
- In service since 2015

# Battery Powered Electric Ferries

- All charge overnight, and generally a fast charge at one or both berths
- Most have no diesel generator onboard

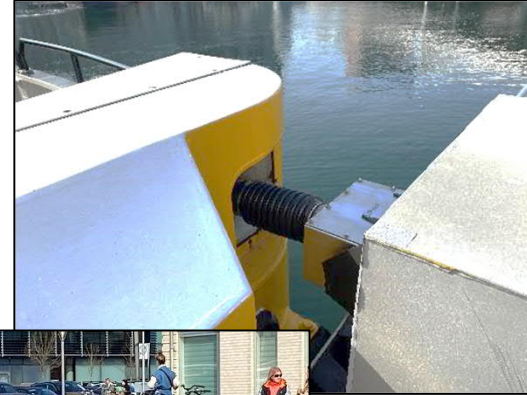


## Ellen, Denmark

- Battery Electric Ferry
- Loa 60m
- 31 cars
- 22nm round trip between charges
- 6 trips/day
- In service since 2019

# Battery Powered Electric Ferries

- Charging by automatic or semi-automatic connection



## Water Buses, Denmark

- 7 x Battery Electric Passenger Ferries
- Loa 23m
- 80 passengers
- 11 stops between charges
- Charge overnight and 8 mins at each end of route
- In service since 2020



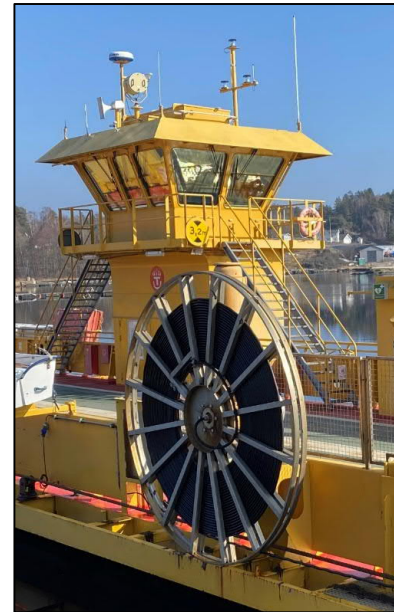
# Battery Powered Electric Ferries

- Propulsion by electric motors
- Battery banks within dedicated compartments



# Grid-Connected Electric Cable Ferries

- Electric cable attached to side of ferry that spools out and reels back in as ferry crosses
- Sweden have a number of ferries like this, but shorter distance than Mallard's crossing
- Not a feasible solution for Windermere



## Maj, Sweden

- grid-connected electric cable ferry
- Loa 54m
- 21 cars
- 230m crossing
- Built in 2000

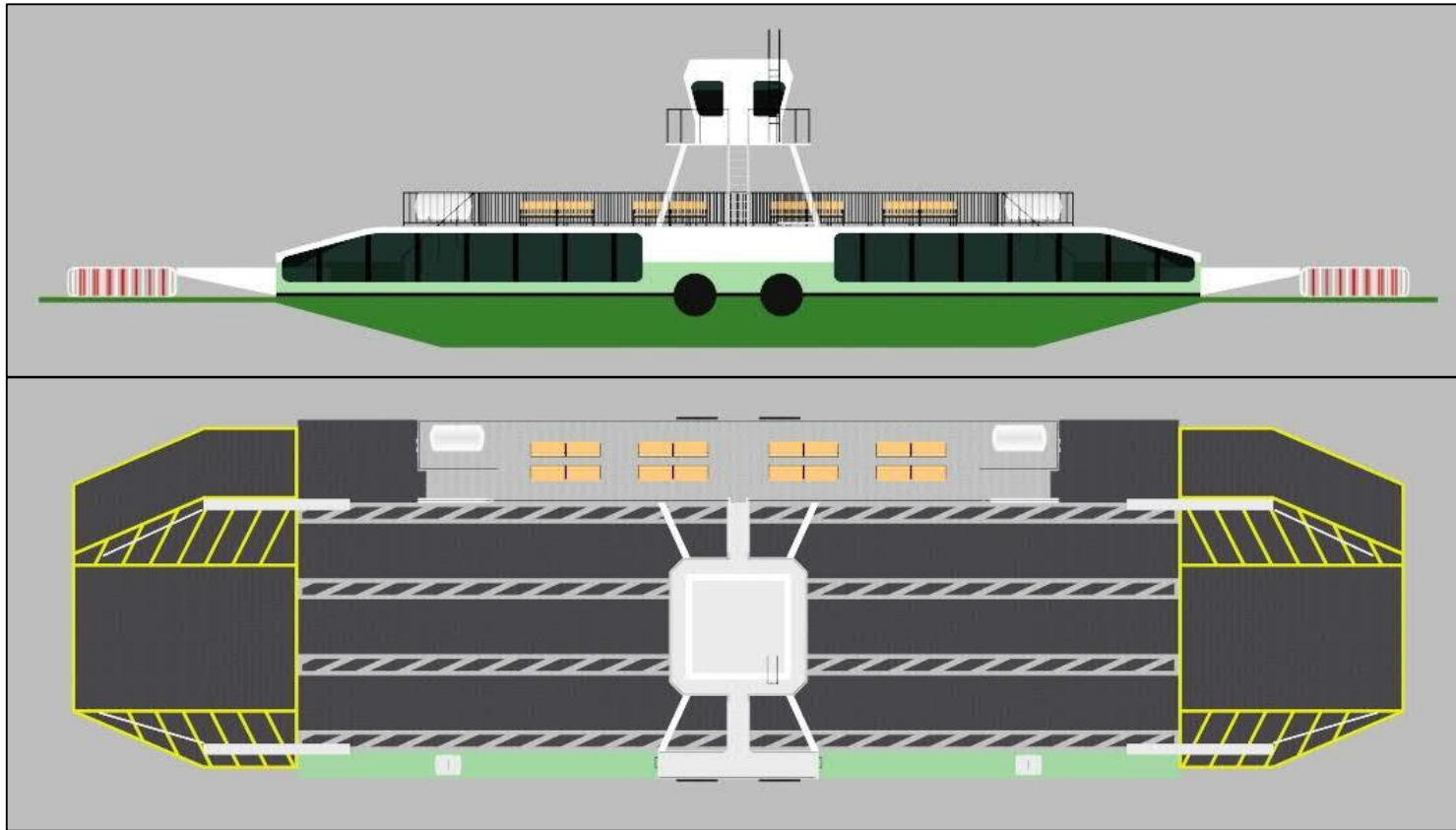
# Concept Design Development



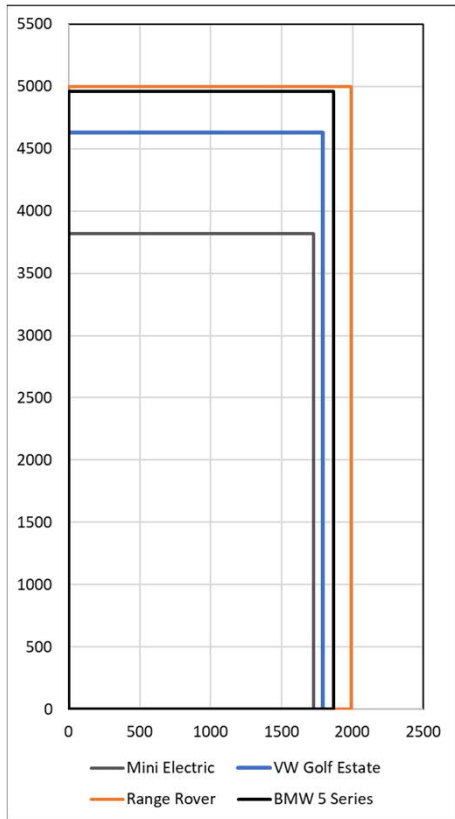
# Concept Design 15 Cars



## Concept Design 15 Cars



# Car Size



MINI Electric  
211 dm<sup>3</sup>



BMW 5 Series Touring



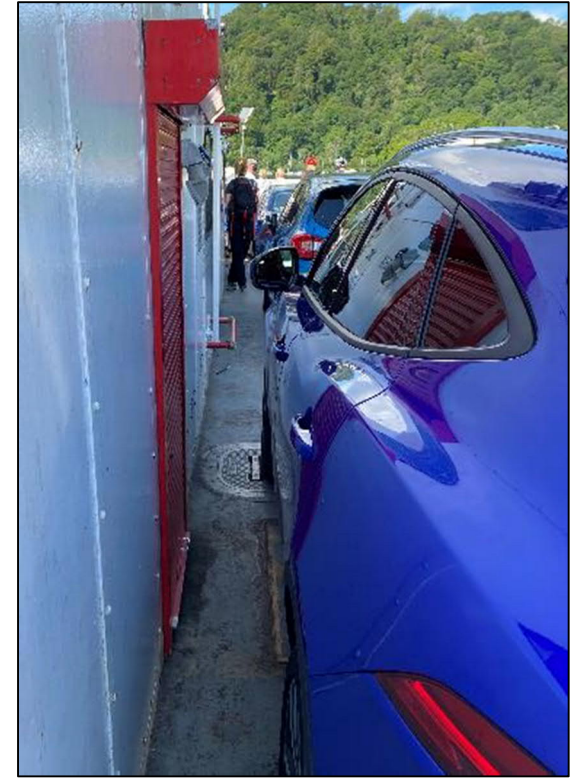
Range Rover



- Opening car door fully adds 1.0m to 1.1m
- Opening car door to ¾ position adds ≈0.75m

# Mallard

- Car deck width 7.74m minus  $\approx 300\text{mm}$  north side and  $\approx 200\text{mm}$  south
- Useable car deck width 7.24m
- 3 car lanes 2.41m wide
- If all cars 2.0m wide, then only 0.31m between them



# New Windermere Ferry

- Current Vessel Lane Widths
  - Cowes Ferry (2016) 2.55m
  - Catriona (2016) 2.75m
  - Mallard (1990) 2.41m
  - Loch Striven (1986) 2.30m
- New Ferry
  - 3 lanes of 5 cars
  - 3 x 2.0m lanes plus 2.5m = 8.5m
  - If all cars 2.0m wide, then 0.65m between
  - If all cars 1.8m wide, then 0.80m between
  - **Average lane width 2.83m**
  - Length 5.0m per car plus 350mm space = 5.35m/car [Mallard 5.29m/car]
  - **New ferry car deck 27.1m x 8.50m [Mallard 26.45m x 7.24m]**
  - **New ferry car deck (exc. Ramps) 2% longer and 17% wider than Mallard**





## Mallard's Car Rate

- 12 cars at 6 crossings per hour = 72 cars per hour
- 6 x 10 min crossing cycles (4 mins unloading/loading and 6 mins crossing)
- 6 min average crossing speed = 2.4 knot (440m in 360 sec)
- **lf** speed increased to 3.5 knots, crossing time = 4 mins
- Then cycle time = 8 mins = 7.5 crossings per hour
- = 90 cars per hour
- Cars/hour rate is a function of car capacity and ferry speed

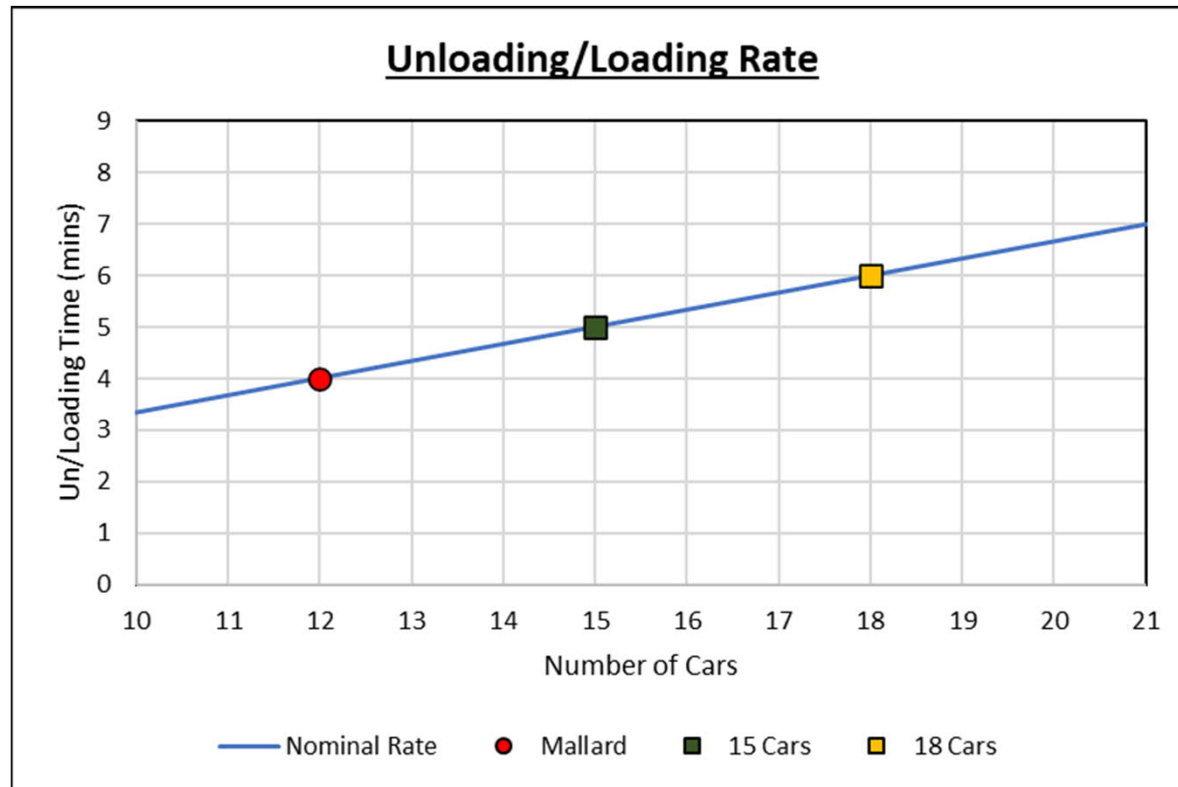


# Car Capacity/Crossing Speed

## Mallard – with a higher crossing speed

		Mallard	Mallard+	Mallard++
Car Capacity		12	12	12
Crossing Distance	m	440	440	440
Crossing Time	mins	6	5	4
Av. Crossing Speed	m/s	1.22	1.47	1.83
Av. Cross. Speed	knots	2.38	2.85	3.56
Un/Loading Time	mins	4	4	4
Crossing Cycle Time	mins	10	9	8
Crossings/hour		6	6.7	7.5
Cars/hour		72	80	90
Un/Loading Time/Car	sec/car	20	20	20

# Car Unloading/Loading Rate



- More cars take longer to unload and load
- Increasing car capacity is not the only answer

# Car Capacity/Crossing Speed

Mallard – with a higher crossing speed and quicker un/loading

		Mallard 12	Mallard+ 12	Mallard++ 12
Car Capacity				
Crossing Distance	m	440	440	440
Crossing Time	mins	6	5	4
Av. Crossing Speed	m/s	1.22	1.47	1.83
Av. Cross. Speed	knots	2.38	2.85	3.56
Un/Loading Time	mins	4	3	3
Crossing Cycle Time	mins	10	8	7
Crossings/hour		6	7.5	8.6
Cars/hour		72	90	103
Un/Loading Time/Car	sec/car	20	15	15

# Car Capacity/Crossing Speed New Ferry

		New A 15	New A 15	New A 15	New A 15	New B 18	New B 18	New B 18	New B 18
Car Capacity									
Crossing Distance	m	440	440	440	440	440	440	440	440
Crossing Time	mins	6	5	6	5	6	5	6	5
Av. Crossing Speed	m/s	1.22	1.47	1.22	1.47	1.22	1.47	1.22	1.47
Av. Cross. Speed	knots	2.38	2.85	2.38	2.85	2.38	2.85	2.38	2.85
Un/Loading Time	mins	5	5	4	4	6	6	4	4
Crossing Cycle Time	mins	11	10	10	9	12	11	10	9
Crossings/hour		5.5	6.0	6	6.7	5.0	5.5	6.0	6.7
Cars/hour		82	90	90	100	90	98	108	120
Un/Loading Time/Car	sec/car	20	20	16	16	20	20	13	13
Feasibility		As Mallard		Possible		As Mallard		Unlikely	

## Conclusion

- In Summer, the most important factor is cars/hour
- This depends on car capacity, crossing speed and un/loading rate
- Mallard achieves 72 cars/hour (6 crossings/hour with 12 cars/crossing)
- 4 min un/loading should be achievable with 15 cars, but not with 18 cars
- 15 car capacity with 20% faster un/loading and 20% higher crossing speed will deliver 100 cars/hour
- 18 Or 21 car capacity unlikely to deliver more cars/hour
- And a larger ferry makes ferry assembly, launch and lift out more difficult
- And a larger ferry is more under-utilized in Winter

# Comparison of Mallard and New Ferry

	Mallard	New Ferry
Overall Length	43.0m	≈44.5m
Overall Width	10.6m	≈12.7m
Number of Cars	12	15
Car Deck Length	26.5m	≈27.0m
Car Deck Clear Width	7.2m	≈8.5m



# Assembly and Launch Concept





# Timeline

## Procurement

- Started last week for the procurement of a shipyard for the Design and Build
- This will last for 12 weeks ending in August
- Will then need to be presented to Cabinet & Shadow Cabinet for approval Autumn 2022

## Design & Build

- Design to begin Autumn 2022 and be completed Spring 2023
- Build to begin Spring 2023 and be completed early 2024
- New ferry to be launched and operational by Summer 2024

## Questions?

If you have any further questions after this session, please email [windermere.ferry@cumbria.gov.uk](mailto:windermere.ferry@cumbria.gov.uk)

Further information on the Windermere Ferry project can be found on our website at:

<https://cumbria.gov.uk/roads-transport/highways-pavements/windermereferry.asp>