CATAPULT
Connected Places

PASSENGER USER JOURNEY
A connected river-based journey between Wirral Waters and working in Liverpool

MOVING ON THE MERSEY

INTEGRATED & SUSTAINABLE TRANSPORT ECOSYSTEM

JUNE 2022

LETS GET STARTED

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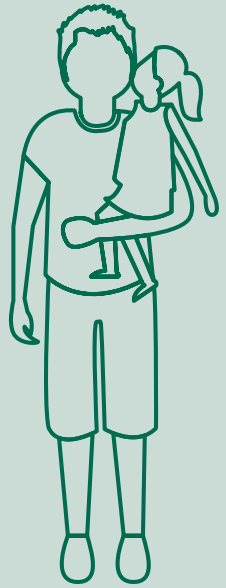

Produced by:

Royal HaskoningDHV
Enhancing Society Together

PROJECT INTRODUCTION

INTEGRATED & SUSTAINABLE TRANSPORT ECOSYSTEM ON THE MERSEY – PROJECT INTRODUCTION

The Integrated & Sustainable Transport Ecosystem on the Mersey is made up of a series of three user journeys which illustrate how with the changing policy and investment atmosphere, the time is ripe to re-explore the types of river centric user journeys (current or future) that could be unlocked through integration of marine transport with other modes of transport and the innovative use of existing and new technologies. These user journeys are developed and published by the Connected Places Catapult, in association with Royal HaskoningDHV and Mersey Maritime.

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THE USER JOURNEYS ARE BASED AROUND THREE DISTINCT POTENTIAL USER GROUPS:

Passengers

Tourists

Freight

The user journeys are informed by real-life challenges for current or future user groups and were selected together with a cross section of regional stakeholders consulted via a series of surveys, workshops and meetings to gather feedback on the developments planned within the region, links to ongoing technology developments and their views on the opportunities for solving locally relevant transport challenges.

While the user journey for each user group has been drafted as a separate case study, a key element is the interconnected and synergistic nature of journeys and how the deployment of new practices, infrastructure or technology on each area could help to unlock opportunities across the region.

The aim of these studies is to kick start further discussion and inspire collaboration, with local authorities, transport operators, investors, regulators and technology providers all working together to solve shared challenges with joined-up solutions, capturing opportunities to regenerate our transport ecosystem in the Liverpool City Region and beyond.

We would like to thank the stakeholders within the region for their contributions and discussions and hope you find the series both enjoyable and informative. We would also welcome you to reach out directly to us with your own ideas that link into the user journeys and the supportive ecosystem of technologies that will be needed.

User Group	Journey	Key Policy Links
Passenger	A connected river-based journey between Wirral Waters and working in Liverpool.	Build Back Better Net Zero Strategy Levelling Up
Tourist	Using the enclosed northern docks waterway as an attraction and sustainable transport asset for Liverpool, with a zero-emission passenger and cycle waterbus service.	Build Back Better Maritime 2050 Tourism Recovery Plan
Freight	Linking the North West to the rest of the world with the Liverpool City Region Freeport and the renaissance of its historic inland waterway assets in an age of energy transition and digitalisation.	Net Zero Strategy UK Freeports Maritime 2050

INTRODUCTION

Cities across the world are finding ways to better connect people and places using waterborne transport. Whilst Amsterdam and Venice may have conquered their canals, potential in port cities such as Liverpool remains comparatively untapped, until now...

THE PASSENGER JOURNEY

Liverpool has arguably one of the most famous river crossings in the world. Enshrined in popular culture, ferries across the Mersey have been running since the 13th century, along routes that are still in use to this day. Whilst land-based transport has evolved over time, waterborne transport and its integration with land-based transport have long been overlooked as a sustainable solution to support local growth and the economic vitality of the region.

All six Local Authorities in the Liverpool City Region have declared a Climate Emergency and are actively seeking ways to reduce carbon emissions. Transport produces ~27% of the UK's carbon emissions and, whilst investment in cycling, walking and low emission bus and rail continue to enhance local transport networks and attract passengers, over 50% of all short trips under 5km are made by car in Merseyside. Over 50% of all short trips under 5km are made by car in Merseyside. There are indications that car usage for travel to work is also growing, with ~66% of people travelling to work by car in the 2017 Liverpool City Region Household Travel Survey, compared with ~59% in the 2011 national census.

Waterfront towns and cities, including the Liverpool City Region have a golden opportunity to curb this trend, commemorate their heritage and reap the social, environmental and economic benefits of an enhanced, sustainable waterborne passenger transport system.

As well as freeing up capacity on the local road network, waterborne transport, supported by efficient and integrated land transport, could connect to new waterfront developments, enabling sustainable local growth and improved connectivity between residential and employment land.

The Liverpool City Region Growth Strategy (2016) sets out an ambitious plan for delivering 100,000 new jobs, 20,000 new businesses and more than £2bn additional gross value added (GVA) in the city region by 2040. As stated in the local journeys strategy, ***'An effective, affordable and sustainable transport system is critical to delivering the growth, employment and aspirations of the region'.***

The passenger transport journey aims to fulfil the needs of the local population, enabling them to conveniently and affordably:

- Access essential services, work, leisure and education.
- Contribute towards the economic vitality of the area.
- Live healthy and fulfilling lifestyles.
- Take pride in their local community.

To ensure that the future passenger transport network fulfils these needs and local aspirations for decarbonisation and sustainable growth, the following new concepts have been developed and pitched to local stakeholders:

1) **An integrated passenger experience** – Integrated multi-modal ticketing systems and journey planning platform which provides reliable real time scheduling information, ticketing, and information about the selected user journey, allowing the user to compare time, cost and carbon emissions and switch mode to make a saving with guided suggestions.
2) **Mersey fast electric ferry network expansion** – Upgrade of the existing ferry fleet with faster, low-impact craft, wider range of frequent services and fast and reliable wifi onboard. Expansion to multiple new terminals integrated to land-based transport hubs along the Mersey, and all supported by alternative low-carbon energy.
3) **Demand responsive 'hail and ride' vehicles** – Based at Pier Head, connecting to the ferry hub, providing a fleet of sustainably powered accessible vehicles connecting to key locations such as the Royal Liverpool Hospital, University, Knowledge Quarter, Lime Street station, Baltic Triangle and shopping centres, integrated with the expanded river transport network, with potential for transition to increased levels of automation at a later date subject to trials and public acceptance.

> The river is the lifeblood of the people of Liverpool and the Wirral; getting better use of this great asset for travelling around would be a boost for the communities along the Mersey. Having affordable, low-carbon and integrated transport upon the river would re-affirm our identity as a maritime city

Cllr Gill Wood
Climate Emergency & Renewable Energy, LCRCA

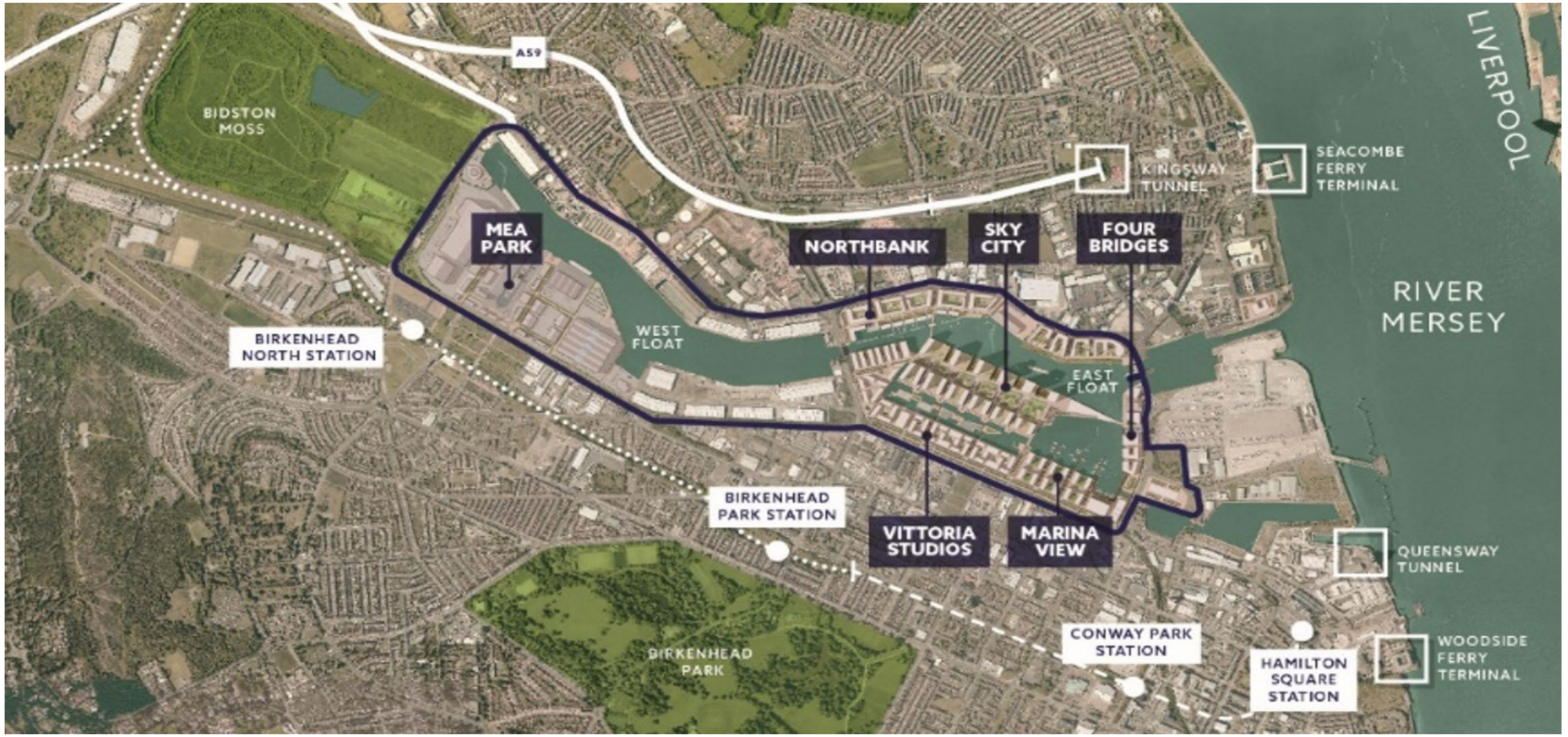
THE USER

This concept offers the maximum benefit for any passengers crossing the river to access work, education, essential services, healthcare or leisure and offers significant transport connectivity improvements within Birkenhead and between the Wirral and Liverpool, addressing some areas of the lowest levels of transport connectivity along the Mersey at present.

Extension to Runcorn, Widnes and the Airport may be included too.

THE USER CASE STUDY

To explore the potential offered by the passenger user journey concept, a user profile has been generated. While Kate is just one person, the Wirral Waters development is set to provide 13,500 homes, all of which stand to benefit from improved transport in the area, alongside the existing 35,000 people who already live within 1km of the development.



... the Wirral Waters development is set to provide

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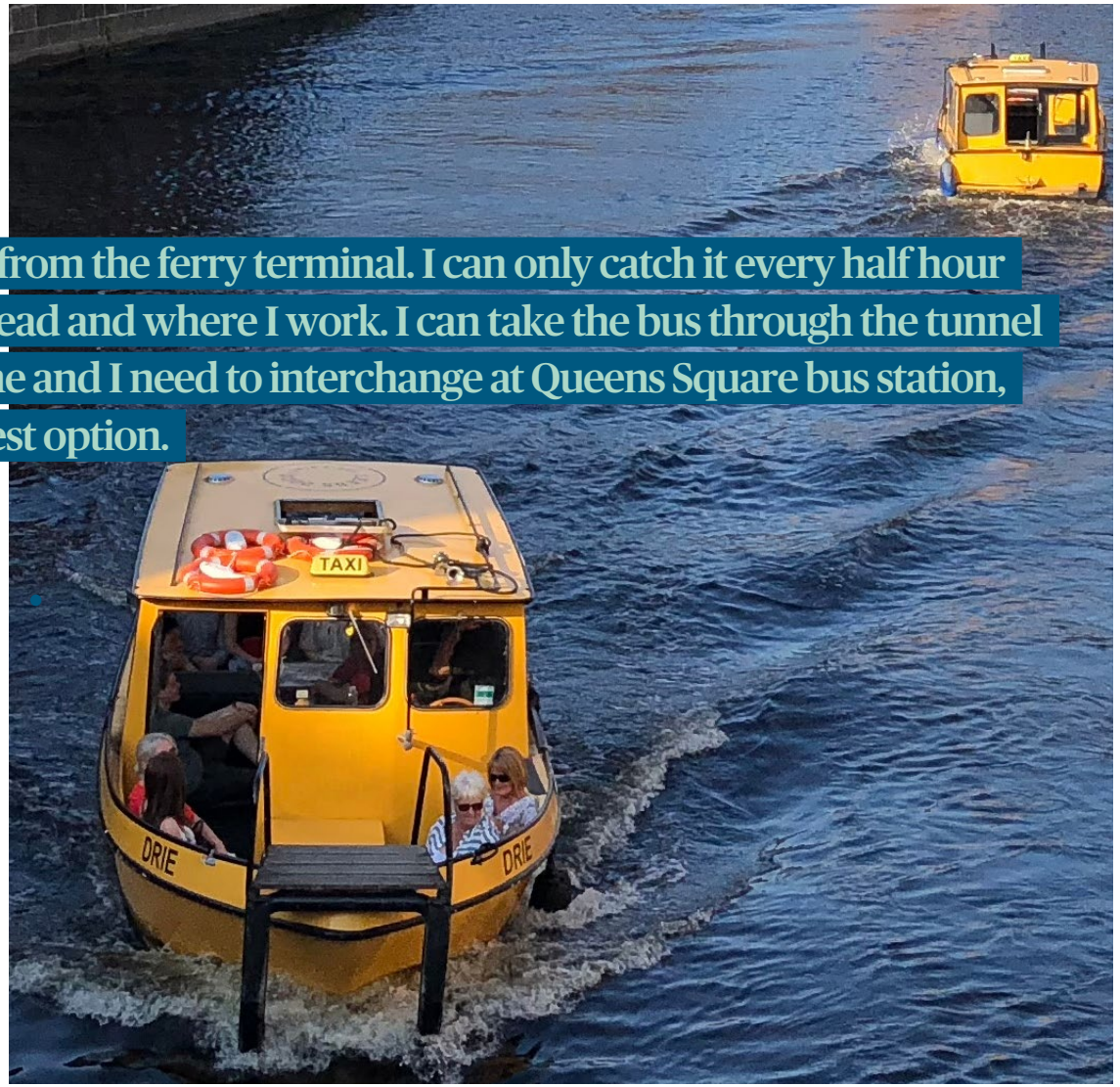
homes, all of which stand to benefit from impoved transport in the area

KATE'S JOURNEY

Kate is a young professional who lives in Birkenhead in the new Wirral Waters development, she works at Liverpool University Hospital. She is a 'tech savvy' millennial and cares about her impact on the environment.

> I could take a ferry, but my flat is a 15-minute walk from the ferry terminal. I can only catch it every half hour and there are limited connections between Pier Head and where I work. I can take the bus through the tunnel instead, but the stop is a 10-minute walk from home and I need to interchange at Queens Square bus station, which is not convenient for me. Driving is my easiest option.



Above all, Kate is seeking a transport solution that will::

- Get her to work on time, every day.
- Allow her to socialise after work.
- Support her childcare commitments (in terms of ticketing and destinations).

Kate's motivations for modal shift to a new journey are:

- Fast, reliable transport .
- A regular service that runs between early morning and evenin.
- Affordable through ticketing.
- Easy-to-understand multi-operator/multi-modal fare products.
- Connectivity on board and being able to make efficient use of her commute tim.
- Sustainability and a lower carbon footprint.

USER JOURNEY REIMAGINED

What if Kate could take the 'guess work' out of her journey and arrive on time, every time? A reimagined future version of Kate's journey, showcasing the potential for a full package of new and innovative transport services across the Mersey.

Richard Mawdsley, Director of Development at Peel L&P's Wirral Waters, commented:

> The development of Wirral Waters is of national significance, bringing life back to Birkenhead Docks and delivering a highly sustainable, mixed use project - one of the largest in the UK. To maximise its potential, transformational and appropriate public transport, to improve 'last-mile-connectivity' is vital. Having strong passenger links to Liverpool and the hinterland is also important for our new residents and workers, so a rejuvenated and integrated track-based pubic mass-transit system linked to cross-river ferry service directly from Wirral Waters would go a long way to maximising it's potential, and join together the two halves of our great maritime city, making better use of the river for which we are famous.

WHAT DOES THE REIMAGINED USER JOURNEY LOOK LIKE?

STEP 1 – Kate uses a ride hailing app to summon a Wirral Waters water taxi. She knows what time it will arrive, how much it will cost and how long her journey will take.

STEP 2 – Kate's water taxi arrives quickly to transport her to a new 12 Quays cross-river ferry terminal. The water taxi is sustainably powered, fast and cheap.

STEP 3 – She walks less than five minutes to reach the Mersey Ferry terminal. Her integrated transport app tells her the next ferry departs in 10 minutes and she purchases her ticket on route. She also has the option to purchase her digital ticket in-app whilst on route, or a combined ticket for transport at the other side.

STEP 4 – Kate boards the electric ferry service. On board she connects to the free wifi and checks her emails or listens to music. She can use this time productively. The ferry is faster, smoother, warmer and cleaner than the old service and more convenient.

STEP 5 – At Pier Head, after leaving the landing stage passenger bridge, Kate jumps in an electric ride-sharing vehicle. The vehicles are ready and waiting when the ferry arrives. On a busier day, she can request one via the app during her journey. One day, this part of her journey may be automated.

STEP 6 – The connected ride sharing vehicles automatically detect congestion and are able to advise the drivers to re-route ahead of schedule, always finding the fastest and most direct path to their destination. Kate is also notified of any delays likely to affect her journey through her app before she boards. She arrives at work on-time.

In this reimagined journey, Kate can be sure that she will arrive at work on time and plan ahead for any delays. This gives her the confidence to take a multi-modal journey. She is able to make cost and carbon savings as she no longer needs to pay for parking and can leave the car at home. She even earns badges through her app as a reward for travelling sustainably, which introduces a fun element to her commute.

Kate no longer has to rush to the bus or wait thirty minutes at the ferry terminal for the next launch. Her app and an improved service frequency take the stress out of the commute. As an added bonus, Kate is able to get more out of her day. Instead of focussing on driving and sitting in traffic, she could check her emails, start work on-the-go, listen to music or even learn a language with fast and free onboard wifi.

Kate's journey reflects the opportunities local stakeholders have identified for the future needs of an integrated transport system with:

- 'shore based transport connections for river transport'
- 'water taxis connecting new estates' (such as Wirral Waters)
- Improvements to 'social and work commuting' with ferries 'connecting the two sides of the river'
- Integrated ticketing with 'travel cards for cheaper, simpler, connected travel'.

Individual components of the package also benefit passengers undertaking journeys where the origin and destination are on the same side of the river, particularly the 'integrated passenger experience'.

All services would be designed to accommodate the needs of a diverse range of users, including those with physical and sensory disabilities and neurodiverse conditions, with additional measures in place to address digital exclusion.

BB GREEN – GREEN FAST FERRIES CASE STUDY

The Battery Boat Green (BB Green) prototype was a 2017 EU funded development project that resulted in the realisation and testing of the "AiriEl" vessel, which runs on an air cushion and uses 40 % less power than a traditional high-speed catamaran. The AiriEL aimed to transport 80 passengers at 28 knots while making limited wake wash and vessels were designed to be fully wheelchair accessible.

Together with the Stockholm Port Authority, a place to dock at the Old City of Stockholm was chosen, with a pontoon and an integrated charging station where the boat could charge between trips.

This is a typical commuter route where people travel into the city centre in the morning and back in the evening. Travel time is about 40 minutes, compared to 1 ½ hours by car or bus using a car ferry on the route.

Findings of the trial were that:

- Wake wash was recorded at a maximum of 16cm.
- The vessels had good manoeuvrability.
- Noise levels were between 5db and 87db, partly down to the hull shape. It is thought that noise levels could be reduced with design modifications.

Note – the suitability of particular craft for the Mersey requires further specific study, and this example of a hydrofoil is for illustration only

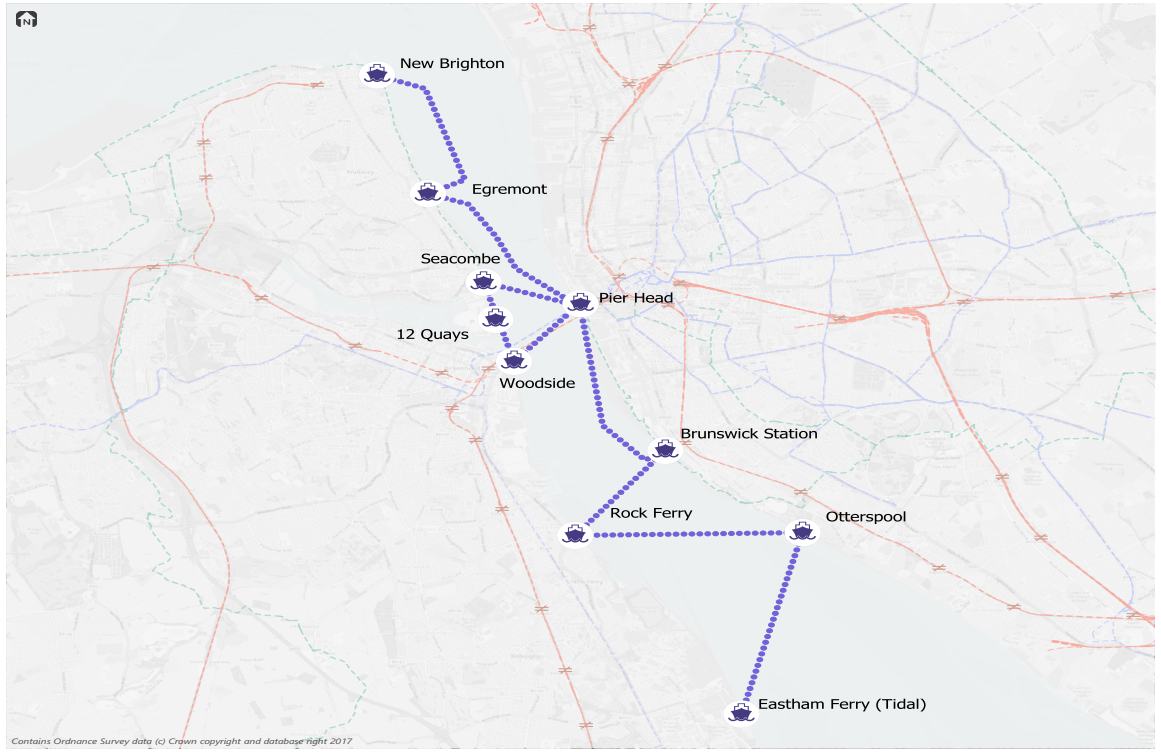
NEXT STEPS

Expanding the use of the Mersey for integrated, low-carbon passenger transport; bringing Kate's journey into reality.

CHALLENGES, OPPORTUNITIES AND NEXT STEPS

To deliver the change outlined in this concept, there are a number of technical, commercial, policy and community opportunities to address, to make the most of the opportunity.

Bringing back long-redundant ferry services across and along the Mersey would re-use river access channels and landside infrastructure to minimise new capital investment. An initial view is shown in the map below:



The Mersey has a very large tidal range (over 10 metres, second largest in the UK) and consequently a very rapid ebb and flood movement in the river, making this a particularly challenging river for ferry services and especially in winter weather. Swell can reach over 2-3 metres regularly, with wind over tide conditions creating vessel manoeuvring constraints.

Large volumes of sediment arriving into the Mersey make maintenance dredging a challenge in the upper reaches (south of the city, towards Runcorn) which may not be proportionate to the value added by a ferry service. Large areas of the river in this area dry out during low tide, so utilisation of available channels would partially dictate ferry terminal locations towards Otterspool, and on the Eastham bank. An airport connection would be welcome, but require either an air-cushion ride craft (a hovercraft) or significant landside engineering in a sensitive environmental area (Oglet Shore SSSI).

These challenges add complexity to the design of a future Mersey Ferry craft (one reason for the current vessels being now 60 years old) and new vessels will have to meet a range of design drivers for safe, fast and comfortable operations on the Mersey, including shallow draught, good seakeeping, and sufficient power and control for the significant tidal and environmental conditions faced both in river and when berthing alongside. Fortunately, a wealth of shipbuilding expertise exists in the Mersey region. Further upstream commuter destinations would add value, with Wigg Island in Runcorn and Spike Island, Widnes, presenting potential park & ride options.

For a zero-emission service, the ferry craft will need an alternate fuel source; this is perhaps best suited to electric battery power, with on shore power for recharging during downtime.

The existing Mersey Ferry, due to be replaced soon, could remain as a heritage tourist attraction only and the new fast service built around it.

The rise, fall and flow volume of the river require significant landside infrastructure, with floating pontoons and passenger access bridges to operate in the full range of river conditions; however, pre-existing foundations from earlier stations would be a good starting point to add to the three operating terminals at Seacombe, Woodside and Pier Head.

For a zero-emission service, the ferry craft would need an alternate fuel source; which might suit electric battery power, with on-shore power for recharging during downtime, but this would require further study. However, hydrogen, ammonia or new solid oxide battery solutions may prove more viable, particularly with the local HyNet project creating a potential marine hydrogen source at Stanlow.

For more details on the waterbus elements, please review the Tourist User Journey document.

A key opportunity for the integrated passenger journey is to facilitate accessibility for all users, including those with reduced mobility, such as disabled people, people travelling with young children or luggage and those using active transport modes, welcoming cyclists, scooterists or hikers onto the services. Vessel design and landside interchanges to onward transport modes should be step-free and navigable by all types of users, including those that are less digitally enabled for ticketing and scheduling.

The design of the new networks of ferry, water-taxi and hailing service require consultation and surveying to understand the needs of passengers for adopting a car-free travel lifestyle in the region.

A revived water-centric passenger transport network enables further benefits and tangential growth opportunities for the Mersey region, for example:

- Demonstrating innovative use of vessel technology and fuels for export of skills and knowledge.
- Reducing air quality impact in Liverpool and the Wirral by conversion from car or bus to zero-emissions transport modes.
- Levelling Up the disadvantaged areas of Birkenhead and the wider Wirral by a greatly improved connection to work and leisure in Liverpool.
- Opening up underused areas of industrial sites for new development by improved transport connections (within Wirral Waters, for example).
- Contributing to the Liverpool City Region's targets for net-zero and action to address the climate emergency.
- Attracting tourism and related-investment to the area by showcasing the best of the city beyond the centre.
- Supporting Government policies for Levelling Up, Build Back Better and transition to Net Zero with both active transport, low-carbon transport and city regeneration of community skills and industrial sites.

NEXT STEPS

1) Expansion and further development of existing digital ticketing initiatives on Merseyside, with commercial operators.

2) Development of route planning and scheduling application for bus, train and ferry services, with active transport and carbon-emissions elements, within LCR, building on the Smart Green app project.

3) Future passenger engagement survey to consider value for new services and ferry terminals, as basis for investment case, with origin/destination mapping.

4) Technical feasibility study for vessel design, power solution and supporting terminal infrastructure, to address constraints and consider capital investment.

5) Develop a phased deployment concept for growth of the river-centric travel services, to identify quick wins and scale-up opportunities for vessels, terminals and land-side facilities.

STAKEHOLDERS ENGAGED DURING THIS PROJECT

CRUISE LIVERPOOL

DENHOLM GLOBAL LOGISTICS

Everton 1878 NIL SATIS NISI OPTIMUM

(expleo)

ISLE OF MAN STEAM PACKET COMPANY

Hilton LIVERPOOL CITY CENTRE

Lancaster University

LIVERPOOL CITY REGION COMBINED AUTHORITY

METRO MAYOR LIVERPOOL CITY REGION

LIVERPOOL JOHN MOORES UNIVERSITY

LiverpoolJohn LennonAirport Faster. Easier. Friendlier.

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