



TOURIST USER JOURNEY
Using the enclosed docks waterway as an attraction and sustainable transport asset for Liverpool, with a zero-emission passenger and cycle waterbus service.

MOVING ON THE MERSEY

INTEGRATED & SUSTAINABLE TRANSPORT ECOSYSTEM

JUNE 2022

LETS GET STARTED

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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.



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.

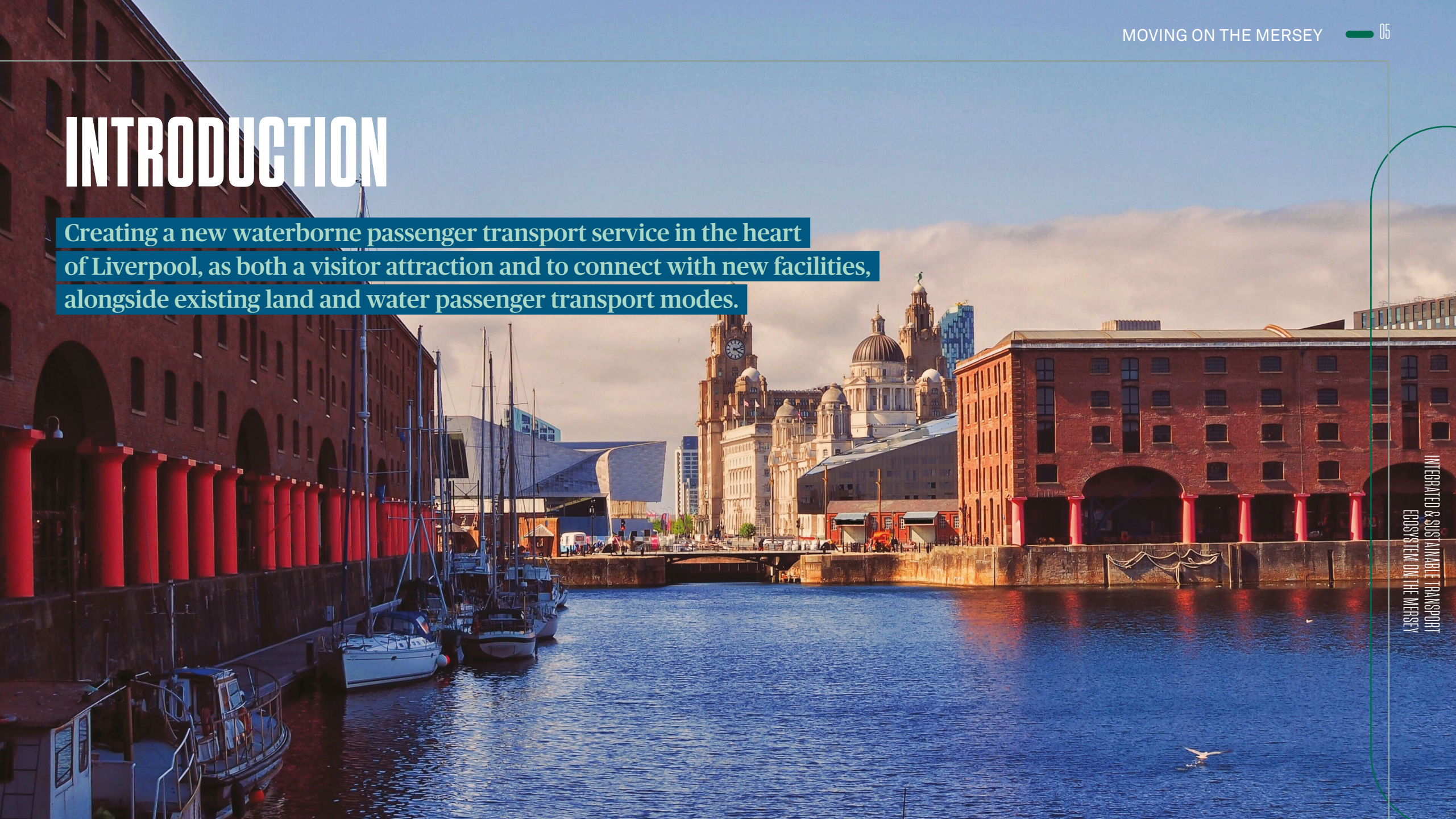
The aim of these studies is to kick start further discussion and inspire collaboration, with local authorities, transport operators, investors, regulators and technology providers all working together to solve shared challenges with joined-up solutions, capturing opportunities to regenerate our transport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

Creating a new waterborne passenger transport service in the heart of Liverpool, as both a visitor attraction and to connect with new facilities, alongside existing land and water passenger transport modes.





Copyright Peel Land & Property – Liverpool Waters

THE TOURIST JOURNEY



The tourist heart of Liverpool is around the water, with Royal Albert Dock and the Pier Head; but this will continue to grow northwards with the new Everton Stadium at Bramley Moore, hotels and shopping in Stanley Dock, the new Isle of Man Steam Packet Terminal, and residential developments of Liverpool Waters. The enclosed docks form a historical backdrop to these facilities but can be further used as a thoroughfare to bring visitors and residents onto the water as a more active, integrated, and low-impact element of the local transport network.

This area of city, long neglected, has multi-faceted plans to create a dockside renaissance, including:

Everton Football Club Stadium: bringing a new stadium to Bramley Moore dock with a £650 million regeneration plan for the area, with groundworks already underway.

New Isle of Man Steam Packet Terminal: moving to a new home in late 2023 at the north end of Prince's Dock, with the ferry service handling around 600,000 passengers annually.

Liverpool Waters: the largest single development opportunity in Liverpool, managed by Peel Land and Property; with an estimated value of £5bn and 20 million sq. ft of residential and commercial space planned, along 2km of northern docks in the city.

This includes the Stanley Dock Tobacco Warehouse apartments and leisure facilities, shown in the image with a southerly view of the future Liverpool Waters development.

Liverpool Tourism: the established tourist centres around the Pier Head and Albert Dock receive many of the 1.1M visitors that stay overnight in the city each year (2021) as part of the city's £1.4bn tourism industry, with over 78 hotels and 24,000 people employed in the sector. In a peak year of 2016, Albert Dock saw 6.3M visitor footfall, and the National Museums in Liverpool record over 3M visitors each year, with two major cultural attractions in this part of the city, alongside Tate Liverpool with 0.6M visitors alone each year.

Ten Streets Spatial Regeneration Framework: inland from the northern docks is a neglected area of the city, with Liverpool City Region having an ambitious plan to create cultural, innovation and working facilities, with public spaces and active transport connections to the city.

Existing Infrastructure & Services: tourist-centric boat services already ply the southern docks through and around Albert and Salthouse Docks, with floating restaurants, party boats, private canal boat visitors from the Leeds-Liverpool Canal and water-based sport activities.

The southern docks are separated after the channel through Pier Head, at the south end of Prince's Dock with a small lock as the northern docks operate at a higher level. To access the southern docks boats must also negotiate locks at Canning Dock and Half-Tide to access Albert Dock and beyond. The northern docks are used as a transit for leisure craft to the Leeds-Liverpool Canal through the eastern end of Stanley Dock.

With the culmination of planned developments and the strong foundations of the existing tourism sector the tourist user journey aims to weave these threads together.

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

- 1) **Dock system autonomous water taxi** – Passenger, commuter, cyclist and light freight water taxi network within Birkenhead Docks to support the Wirral Waters development and e-ferry network.
- 2) **Liverpool Waters semi-autonomous waterbus** – Automated, zero-emission, passenger boat transit from Princes Dock and Isle of Man (IoM) terminal to new Everton Stadium (Liverpool Waters).



“

Liverpool Waters is a vital development for the regeneration of the city's northern docks, with a mix of residential, commercial, and cultural space alongside new green spaces, attracting a range of residents and visitors alike. A sustainable, innovative and reliable water-based transport link to the city would add value to the development. Making more use of the waterways is essential for the future of Liverpool Waters.

Peel Land & Property

THE USER

Foot passengers, cyclists and public transport tourists visiting Liverpool from the Isle of Man or other mainland UK origins, are seeking new ways to access the city's amenities.



THE USER CASE STUDY

To explore the potential offered by the tourist user journey concept, a user profile has been generated, to illustrate an example of the new proposed transport mode.

RACHEL & SIMON'S JOURNEY

Rachel and Simon Jones are a retired couple living in Douglas, on the Isle of Man, and love to visit Liverpool for shopping weekends, to make the best of the big city entertainments. They like to make the most of the trip and, being also keen cruisers, enjoy the luxury experience of using the Steam Packet to Liverpool.

When in Liverpool they stay over in a city-centre hotel and mostly walk around the city for museums, shops, and restaurants as everything is so close together, with no need to use the train or bus networks.

They have heard the ferry terminal is moving a little further away from the city centre, so hope to still be able to walk to the city, although as Simon is now awaiting a hip replacement, he is nervous about having to walk too far. They are not worried about this, as they know the ferry company will be able to provide a bus service to the city.

“

We love coming to Liverpool for shopping and restaurants, staying in the city for a couple of nights. It's our luxury treat, and we really like the Steam Packet service and easy connection to the city; it is so much more enjoyable than flying.

As Rachel and Simon have heard that the Steam Packet terminal is moving to a new site a little further from the city, they are interested in:

- Reduced walking distance to reach the hotels & restaurants on the waterfront.
- An easy access and readily available transfer to the city.
- A low carbon transport mode.
- An interesting addition to their city breaks, making the most of the port's heritage.



copyright – Isle of Man Government

USER JOURNEY REIMAGINED

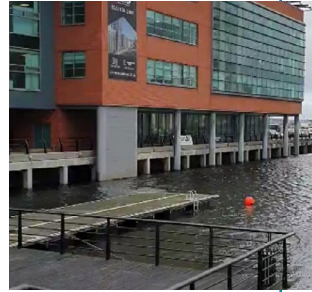
Provision of a semi-automated, zero-emission, passenger waterbus service between Princes Dock and the northern dock facilities for tourists, commuters, and cyclists, using the existing waterways to provide a new transport mode linked to bus, ferry, and rail networks.



WHAT DOES THE REIMAGINED USER JOURNEY LOOK LIKE

When Rachel and Simon arrive at the new IoM Steam Packet terminal, they can use an innovative option to transfer into the city, to their hotel or other entertainment and attractions. After a long crossing, a quick and easily accessible transfer is welcomed. The waterbus user journey is outlined below.

STEP 1 – Disembark the ferry and exit through the terminal. Walk down the short no-step ramp onto the waterbus pontoon within Prince’s Dock, easily accessible for wheelchairs, bikes, and roller luggage.



STEP 4 – Arrive at the Prince’s Dock south end terminus after after 10 minutes waterbus trip and disembark the waterbus. An easy walk to nearby hotels or further towards Pier Head.



STEP 2 – Wait for the next southbound waterbus service (less than 15 minutes). Swipe into the digital interface with debit card or phone app for ticketless travel, while boarding.



STEP 5 – A synchronised low-carbon bus services [see Passenger Journey] connects to the terminal for onward travel into the city. Further boat services can be picked up after a short walk, at Mann Island and through the southern docks to Brunswick Docks for a joined-up tourist journey. Cross-river links from Pier Head also easily available.



STEP 3 – The crew member unmoors and then engages the semi-autonomous navigation system to the next station stop. Electric (or hybrid zero-emission) propulsion provides a smooth and quiet cruise to enjoy the bright lights of Liverpool Waters.



STEP 6 – The waterbus terminates at Prince’s Dock or Bramley Moore at end of service, for charging with green electricity.



In this reimagined journey, Rachel & Simon are examples of how this underused waterway can become again a transport artery for the city. The journey responds to the needs of the user by:

- Providing easy connectivity to the ferry terminal, with services to the city and northward to hotels or future facilities at Liverpool Waters, expanding the tourist experience in Liverpool.
- Providing a low-hassle ticketing experience and accessible craft for passengers with luggage or limited mobility.
- Embracing net zero with a zero-emission transport mode, reducing noise and air quality impacts for the city centre.
- Creates links to new leisure cruise and water-based entertainments in the north and south docks.



Proud Liverpool people love the river, and the old docks are in our blood - using this in a modern way would be great!

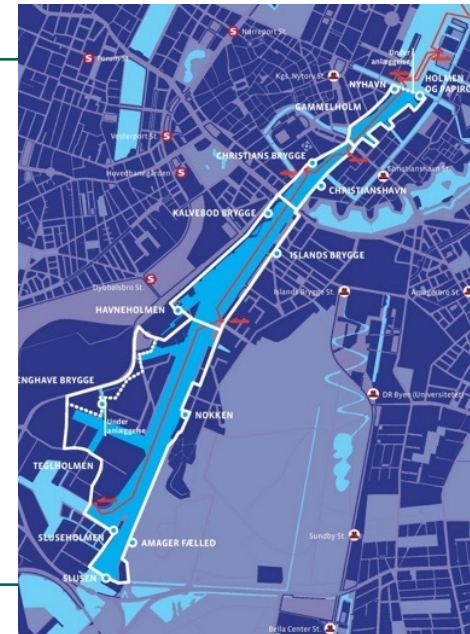
This new service could provide a connection between currently neglected areas of Liverpool's heritage port, avoiding the congestion of personal car transport and the lack of safe walking routes north of Prince's Dock, with a supervised and zero-emission waterbus service. This creates an enabling transport link to boost the city's Ten Streets regeneration project with an innovative demonstrator project for maritime and automation technology, creating a useful link to the city, alongside the planned highway improvements for walking and cycling. The Ten Street's plans include public spaces, cultural facilities, working environments based around road (bus) and active transport. A waterborne link would add a new dimension, that is currently missing from this plan. Within the Passenger Journey, an extended cross-river ferry service linking to 12 Quays terminal for foot passengers arriving from Dublin and Belfast creates a similar waterborne experience for transit to Liverpool leisure facilities or onward transport inland.

COPENHAGEN ALL ELECTRIC HARBOUR BUS SERVICE

In another great historical maritime city, a waterbus service in Copenhagen serves key routes around the waterways for passengers and tourists, operated by Arriva on a 30-year contract.

In 2020, the city invested €1.3m in electrification of the fleet with charging connectivity.

The fleet of seven vessels each have capacity for 80 passengers, with bikes and wheelchair accessibility, each serving eight stops on two services which run every 30 minutes.



Copyright – Arriva Denmark

NEXT STEPS

The waterbus project showcases cutting-edge technology and boosts public transport usage, bringing new life to redundant infrastructure in the city.

CHALLENGES, OPPORTUNITIES AND NEXT STEPS

The waterbus could be a demonstrator project for both zero-emission power and autonomous technology, achievable within this controlled space that has low-levels of traffic conflict.

The boats should be geo-located with GPS, differentiated with a correction signal for sub-5cm precision accuracy. Each craft would follow a set course, monitored in real-time by a fleet control system to coordinate safe navigation between the craft in the fleet. Onboard video systems and anti-collision lasers would enable automated avoidance actions and crew interventions. These systems would reduce the need for onboard crew, with only one crew per boat to manage precision movements for mooring and rope handling, and would also provide confidence for passenger security. A land-based control room could be used to manage fleet navigation and safety communications. Maritime & Coastguard Agency (MCA) approval would be required for this new operating concept in the UK.

In this difficult working environment, network connectivity for the reliable, low-latency and high bandwidth needs for the waterbus fleet control could be provided by a private 5G cellular network for low-impact infrastructure. All craft would need a manually operated mode, for crew to take control in case of system outages, and back-up radio to communicate with other craft that occasionally use the dock system.



The waterbus could be a demonstrator project for both zero-emission power and autonomous technology, achievable within this controlled space that has low-levels of traffic conflict.

"Movitz" city-ferry, fast-charging in Stockholm. c.Vattenfall Network Solutions

The existing water depths and air-draft restrictions (bridges) would dictate a low-profile vessel design: Bridges at Prince's Dock and Stanley Dock have an 8 feet air draft (2.43m). The narrow channel alongside the infilled Victoria & Trafalgar Docks is limited to 1.5m draft on a sloping-profile channel. Some additional bottom dredge for profiling may be needed to accommodate vessel passage, depending on the vessel design. Two passing places may need to be cut into the channel, or widened along the length, to allow timely movement of two-way traffic (coordinated by the navigational control system).

Pontoons with access ramps could be installed at each waterbus station, for easy cycling and wheelchair access. With a dock wall freeboard of 1 - 3 metres and a limited rise and fall of dock level (+/- 1m) the pontoon infrastructure would be relatively straightforward to install and the dock level can be easily managed by existing pumping equipment

Estimates suggest a fleet of ~8 waterbus craft to provide a 15-minute service frequency to serve an hourly transit with eight stops from Prince's to Bramley Moore, but this aspect would require further study as part of a feasibility study. Express services, for example when a ferry disembarks, or Everton play at home, may be important to optimise the service for 'surges' in passenger demand, with a target capacity of ~50 passengers per craft. Frequency, service hours and stop rotation could be evolved as demand grows alongside the surrounding developments.

The low-profile vessel structure presents challenges for cycle storage and wheelchair access, but accessibility for all users is vital for the success of the waterbus concept and vehicle designs would need to be adapted to accommodate a diverse user base.

The waterbus craft could be electrically powered and require charging. Superchargers at a level of 150kW are already available for marine leisure facilities (similar to a Tesla Supercharger), enabling a fast charge of a waterbus in less than an hour. Various battery technologies can enable faster charging, such as "Movitz" ferry serving Stockholm since 2014, which recharges in 10 minutes with lithium titanium oxide batteries. However other zero-emission fuel options exist, based around hydrogen, and are developing quickly, so a solution design can be carried out alongside vessel structural considerations.

This project presents opportunities to:

- Improve air quality in the city centre.
- Boost active transport and public transport use.

- Support the development of this neglected city area.
- Create a new tourist attraction in itself.
- Demonstrate exportable technology skills and services from the region.
- Support Government policies for Levelling Up, Maritime 2050 and transition to Net Zero, in addition to Liverpool City Region regeneration strategies.
- Establish a water-centric, zero-emission integrated public transport solution that can demonstrate what is achievable and can be exported around the world.



NEXT STEPS

- 1) Feasibility study for vessel design, infrastructure access and power/fuel solution, with cost estimations.
- 2) Passenger demand study to evaluate revenue for a strong business case, combined with key landowners and investors for Ten Streets, Liverpool Waters, hotels, and leisure facilities.
- 3) Regulatory consideration and navigational risk assessment for approval of low-crew semi-autonomous vessel operations in UK.
- 4) Safety and risk assessment review for passenger transport within a semi-autonomous vessel environment.

STAKEHOLDERS ENGAGED DURING THIS PROJECT





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