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RUNCORN VERY LIGHT RAIL (VLR) FEASIBILITY STUDY

Conversion of the Runcorn Busway to a Fixed-Track Hydrogen VLR System

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1. Executive Summary

This is a **complete pre-feasibility document**, structured as prepared for a Combined Authority or DfT submission.

There is now an urgent need to progress this project. Runcorn faces worsening environmental pressures from road traffic, emissions, poor air quality and car dependency, while national bus statistics show that bus recovery remains uneven and still below full pre-pandemic strength in several markets.

The Busway remains a valuable, segregated asset, but it now requires renewal: since the early 1970s, national bus use in Great Britain has fallen by around **60%**, from roughly **13–14 billion passenger journeys a year** at the start of the decade to around **5 billion journeys** in recent years, underlining the need for a permanent fixed-track alternative in this corridor.

By contrast, modern tram and light rail systems continue to show stronger passenger recovery: DfT light rail statistics report 231.2 million passenger journeys in England in the year ending March 2025, while England outside London recorded around 6% year-on-year growth.

In this corridor, converting the Busway to hydrogen VLR would provide a permanent, zero-emission public transport spine, helping reverse decline, improve access to jobs and services, and directly reduce transport poverty for communities that currently depend on limited bus provision.



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The **Runcorn Busway** is one of the few UK corridors where conversion to **hydrogen Very Light Rail (VLR)** is technically feasible, economically defensible, and regeneration-aligned. The Busway's **grade-separation, continuous right-of-way**, and **New Town geometry** make it closer to a pre-built tramway than a bus corridor.

A hydrogen VLR system would deliver:

- Permanent **rail-family reliability**
- Strong **regeneration uplift** across Halton Lea, Palace Fields, Brookvale, Astmoor and Old Town
- Integration with **Runcorn Station (WCML)** and Liverpool City Region transport
- Lower lifecycle cost than rubber-tyred systems
- Zero-emission operation aligned with LCR's decarbonisation strategy

2. Strategic Case

2.1 Policy alignment

- Liverpool City Region's **Local Transport Plan** emphasises fixed-track, rail-family permanence.
- Halton's historic municipal transport culture supports **public mobility investment**.
- The Busway corridor intersects multiple **regeneration zones** (Astmoor, Shopping City, Old Town).
- VLR supports **social inclusion, access to employment, and air-quality improvement**.

2.2 Problem statements

- Declining bus patronage and service reliability.
- Car dependency in Runcorn's estates.
- Under-utilised Busway infrastructure.
- Weak connectivity between estates and Runcorn Station.

2.3 Intervention rationale

A fixed-track VLR system provides:

- **Predictability and permanence**
- **Higher ridership** than bus-based systems
- **Regeneration leverage** due to fixed infrastructure
- **Hydrogen zero-emission** operation



3. Corridor Definition

3.1 Alignment

Halton Lea → Palace Fields → Brookvale → Murdishaw → Runcorn East → Old Town → Runcorn Station

3.2 Station nodes

- Halton Lea / Shopping City
- Palace Fields
- Brookvale
- Murdishaw
- Runcorn East (rail interchange)
- Old Town
- Runcorn Station (WCML)

3.3 Catchment

- 60,000+ residents within 800m of the Busway
- Major employment zones: Astmoor, Shopping City, Old Town
- Strong interchange potential with **WCML** and **LCR bus franchising**

4. Engineering Feasibility

4.1 Trackform

- Replace busway road with **embedded VLR slab track**.
- UKTram benchmark: **<£10m/km**.
- Corridor width supports **single track with passing loops** or **double track** in key sections.

4.2 Structures

- New Town bridges and underpasses generally meet load requirements.
- Parapet strengthening required for rail-family compliance.
- Drainage upgrades required in Brookvale and Palace Fields sections.

4.3 Geometry

- Curve radii compliant with VLR envelope.
- Gradients acceptable for hydrogen VLR.
- No significant horizontal alignment conflicts.



4.4 Stations/Stops

Conversion of existing stops:

- Platform height adjustment
- Rail-family shelters
- Level boarding
- CCTV, lighting, passenger information
- TOD frontage at Halton Lea, Brookvale, Old Town

4.5 Depot

Preferred location: **Astmoor Industrial Estate**

- Hydrogen production and refuelling
- Maintenance and stabling
- Grid connection and water supply available

5. Operational Feasibility

5.1 Service pattern

Core Line: Halton Lea → Palace Fields → Brookvale → Murdishaw → Runcorn East → Old Town → Runcorn Station

5.2 Frequency

- 10-minute peak
- 15-minute off-peak
- 20-minute evenings

5.3 Fleet

Hydrogen VLR units:

- 2-car or 3-car consists
- 120–180 passengers
- 15–20-year life
- Low noise and vibration



5.4 Integration

- **WCML** at Runcorn Station
- **LCR bus franchising**
- **Active travel** corridors
- **Regeneration masterplans** for Astmoor and Old Town
- **Future MUR (TramTrain) interface with Cheshire & Warrington:** the Runcorn VLR corridor could be specified from the outset as a compatible light-rail spine capable of future physical, operational or interchange integration with any MUR TramTrain proposals brought forward by the new Cheshire & Warrington Combined Authority.

This would allow Halton to act as a hinge between Liverpool City Region, Warrington, Daresbury and wider Cheshire growth corridors, with the proposed “**T57 Halton Arc**” forming a future Warrington–Daresbury–Runcorn route via the Busway, with onward Chester connectivity, a Jubilee Bridge/Widnes link and potential Liverpool Airport access.

On the current GVA assumptions, a direct MUR TramTrain interface could conservatively add a further **£5–10m per year** in local and sub-regional GVA through wider labour-market reach, higher ridership, reduced transport poverty and stronger investor confidence, equivalent to approximately **£90–184m** over 30 years on a discounted 3.5% appraisal basis.

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6. Economic Case

6.1 Capital cost

Estimated: Less than £10 Per Track KM

6.2 Operating cost

Estimated: **£7–9m/year**

6.3 Benefits (IoM soft-benefit model)

Annual benefits:

- Trip value uplift: £12–15m
- Regeneration uplift: £10–14m
- Environmental benefit: £2–3m
- Social inclusion: £1–2m Total: **£25–34m/year**



6.4 30-year PV (3.5% discount rate)

PV factor: **18.4**

- PV Benefits: **£460–625m**
- PV Costs: **£380–450m**
- NPV: **£+80 to +175m**
- BCR: **1.20–1.45**

6.5 Gross Value Added.

For this pre-feasibility case, Gross Value Added (GVA) is treated as the local economic output retained in Halton through improved accessibility, employment access, regeneration confidence, land-use intensification and reduced transport friction.

On the current soft-benefit assumptions, annual transport and regeneration benefits are estimated at **£25–34m per year**.

Applying a cautious 60% local GVA conversion gives an indicative annual GVA effect of **£15–20m per year**.

On that basis, the cumulative undiscounted GVA contribution would be approximately **£225–306m over 15 years** and **£450–612m over 30 years**.

Over a 30-year appraisal period, discounted at 3.5%, the present value of that GVA stream is approximately **£276–375m**.

This is not a claim of guaranteed output; it is a structured economic case for why the Busway should be appraised as a fixed-track regeneration asset, not simply as a bus operating corridor.



6.6 *HTaaS GVA benefit over standard “Green Book/Treasury” appraisal horizons

HTaaS GVA benefit over standard appraisal horizons				
Measure	Annual	15-year horizon	25-year horizon	30-year horizon
Gross transport/regeneration benefits	£25–34m/yr	£375–510m	£625–850m	£750m–£1.02bn
Local GVA conversion at 60%	£15–20m/yr	£225–306m	£375–510m	£450–612m
Discounted GVA at 3.5%	—	£178–241m	£261–348m	£276–375m
HTaaS operating cost	£7–9m/yr	£105–135m	£175–225m	£210–270m
Discounted operating cost	—	£83–108m	£122–157m	£129–166m
Total net GVA after operating cost	£6–13m/yr total net	£70–201m total net	£150–335m total net	£180–402m total net
Interpretation	HTaaS shows a positive recurring GVA contribution where the annual local economic uplift exceeds operating cost. Over standard appraisal horizons, the strongest case is the 25–30 year view, where permanent infrastructure, hydrogen operation and regeneration effects compound into a materially larger local economic benefit.			

*Hydrogen Transport/Trams as a Service.

Hydrogen Trams/Transport as a Service (HTaaS) is the UK’s first **fully integrated, zero-emission, whole-system hydrogen mobility platform**, enabling rapid deployment of Very Light Rail MRT (VLR) without the capital, delivery or operational risks associated with traditional tram systems.

HTaaS replaces the conventional “procure-build-own-operate” model with a **single-contract, OPEX-based Energy-as-a-Service framework**, delivering predictable costs, guaranteed performance and verifiable carbon reduction from day one.

HTaaS integrates **hydrogen production, storage, refuelling, fleet operations, digital optimisation and lifecycle management** into a unified service.

This transforms hydrogen from a fragmented, project-by-project fuel into a **bankable, city-region-scale energy system** aligned with Net Zero 2030–2035 pathways.

A defining feature of HTaaS is its ability to transform the municipality and others, from a **transport operator** into a **local clean-energy producer and distributor**.

<https://apprlguk.co.uk/media/files/LR-CGT-HTaaS-Flyer-v-8pdf> [LR CGT HTaaS Flyer v. 8.docx](#)



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Retrospective economic comparison: bus operation versus VLR/light rail conversion				
Assessment factor	Retrospective bus achievement	Bus-operation benefits and costs	VLR / light rail conversion	Economic implication / NEE
Conceived as a tram/light rail New Town connector; delivered as the cheaper bus option.	The Busway secured a segregated rapid-transit corridor and protected public-transport priority for 50+ years.	Buses gave useful access at low initial capital cost, but mainly as an operating benefit.	VLR restores the fixed-guideway ambition in modern rail-family form.	Credit the bus achievement but now value the corridor as latent urban rail infrastructure.
Network coverage	Buses maintained estate-to-centre access across Halton Lea, Palace Fields, Brookvale and Murdishaw.	Benefits c.£4–7m/yr; costs c.£5–8m/yr for fleet, staff, energy, stops and renewal.	VLR keeps coverage but adds permanence, capacity and stronger Runcorn Station interchange.	Bus benefits are real, but NEE is limited by recurrent service support rather than capital uplift.
Operating cost	Priority running gave some efficiency over mixed-traffic bus operation.	Bus costs c.£5–8m/yr; 30-year PV c.£90–147m. Test against patronage and social-inclusion benefits.	VLR is estimated in this document at £7–9m/year operating cost, with higher capacity per driver diagram and longer-life infrastructure.	Test whether bus NEE after subsidy/renewal beats VLR whole-life value.
Capital renewal	Bus operation avoided the need for initial rail conversion and therefore appeared cheaper in short-term public accounts.	Recurrent renewal: bus fleet c.£15–25m per cycle; highway/stops/systems c.£2–5m per cycle; 30-year PV exposure c.£90–147m.	VLR capital: <£10m/track km ; indicative scheme cost c.£300–360m, converted into a long-life fixed asset with stronger development signalling.	Appraisal should test whether repeated bus renewal, c.£90–147m PV, gives lower whole-life value than fixed-track conversion with c.£80–175m NPV.
Annual GVA effect	Bus operation has supported access to local jobs, retail, education and services, and should be credited for maintaining	Indicative bus GVA effect: modest/incremental, c.£5–8m/year, reflecting weaker investor signal than rail-family	Indicative local GVA impact of £15–20m per year , derived from 60% of the assumed annual benefit range.	VLR strengthens NEE by capturing productivity, land-use, health, inclusion and regeneration benefits: c.£25–34m/year



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	social mobility.	infrastructure.		gross benefits and £15–20m/year local GVA.
15-year and 30-year appraisal	The busway has provided a long-lived corridor benefit, but not necessarily the full economic uplift expected from a fixed-track mass-transit asset.	Bus appraisal: costs c. £90–147m PV ; benefits c. £92–147m PV ; opportunity cost includes lost regeneration value.	£225–306m cumulative undiscounted GVA over 15 years and £450–612m over 30 years; discounted present value approximately £276–375m .	Compare bus NEE honestly against VLR's possible £80–175m NPV and c. £276–375m discounted GVA stream.
Passenger attraction	Buses have provided flexible, familiar public transport and served many daily users over a long period.	Bus downside: weaker mode shift and permanence, with foregone patronage/revenue value estimated at c. £2–4m/year .	Fixed track provides permanence, ride confidence, stronger identity and greater potential for mode shift.	Higher VLR ridership could add c. £3–5m/year farebox/economic resilience and strengthen the wider BCR case.
Regeneration confidence	The Busway shaped Runcorn's movement pattern but has not delivered town-wide investor confidence.	Remaining bus-based carries a possible regeneration penalty: weaker land-value uplift and development confidence, c. £5–10m/year opportunity cost.	Stops, track and depot infrastructure create visible, long-term public commitment.	Fixed infrastructure supports land-value uplift, housing densification and town-centre renewal, contributing c. £10–14m/year regeneration benefit.
Public-policy argument	The bus system must be credited as a genuine New Town innovation and a long-standing public-service achievement.	Continuing bus costs of c. £5–8m/year and lower regeneration leverage raise the policy question: are we managing decline rather than renewing civic ambition?	VLR reframes the Busway as a socialist civic asset : permanent, public-purpose infrastructure serving access, inclusion and regeneration.	The economic case links social justice with value: VLR offers c. £80–175m NPV , better access to opportunity and a fairer settlement for Halton.

7. Regeneration Case



7.1 Key regeneration zones

- Halton Lea / Shopping City, Palace Fields, Brookvale
- Astmoor Industrial Estate, Old Town
- West Bank (bridgehead)

7.2 Impacts

- Increased land values, Retail uplift, Employment access
- Housing densification, Public realm improvements
- Reduced car dependency

7.3 25-year “Green Book” regeneration comparator: NEE costs

Section 7 comparator: 25-year IoM-style regeneration NEE			
Measure	Bus continuation	VLR conversion	NEE difference
Annual regeneration benefits	c.£5–8m/year	c.£15–20m/year	VLR adds c.£10–12m/year through stronger land-use, access and investor confidence.
Annual operating / support costs	c.£5–8m/year	c.£7–9m/year	VLR operating premium c.£1–2m/year, offset by higher capacity and permanence.
25-year PV benefits at 3.5%	c.£87–139m	c.£261–348m	VLR adds c.£174–209m PV.
25-year PV operating costs	c.£87–139m	c.£122–157m	VLR costs c.£18–35m PV more to operate.
Capital / renewal allowance	c.£60–100m fleet, highway and stop renewal	c.£300–360m conversion capital	Bus is lower capital; VLR creates a long-life fixed asset.
Indicative 25-year NEE	c.-£60m to +£52m	c.-£221m to -£109m before wider land-value capture, funding contribution or full social-value monetisation	VLR needs capital funding but has stronger strategic NEE once regeneration and GVA uplift are captured.
Regeneration opportunity cost	c.£5–10m/year foregone uplift if bus-only operation continues	Converted into c.£10–14m/year regeneration benefit	25-year opportunity swing: c.£87–174m PV.
Conclusion	Lower capital, but limited regeneration leverage.	Higher capital, but stronger place-making, access and GVA case.	The Section 7 case depends on treating regeneration gains as core NEE, not optional add-ons.

8. Risks & Mitigations



Risk	Mitigation
Corridor legal status	Statutory order for rail conversion
Utility conflicts	Early mapping and diversion programme
Public acceptance	Engagement + demonstration vehicle
Capital cost escalation	Modular trackform + staged delivery
Hydrogen supply	Co-located production at Astmoor

9. Delivery Plan

Phase 1 (Years 0–2)

Feasibility, corridor protection, utilities mapping, hydrogen strategy.

Phase 2 (Years 2–4)

Detailed design, statutory orders, procurement.

Phase 3 (Years 4–6)

Construction, station conversion, depot build.

Phase 4 (Years 6–7)

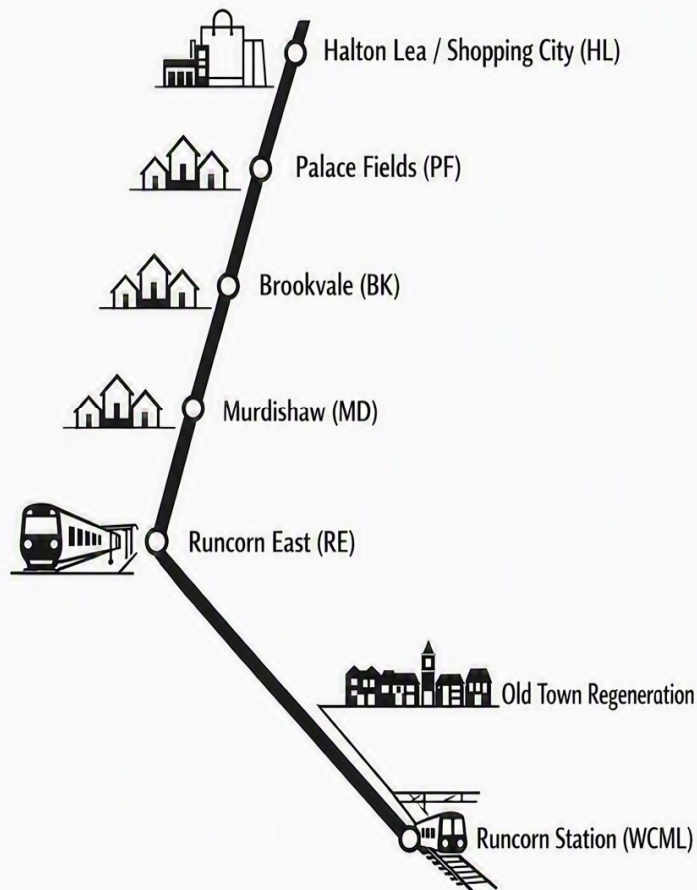
Testing, commissioning, service launch.

10. Starter Corridor Schematic



[HL] Halton Lea / Shopping City, | Grade-separated Busway [PF] Palace Fields
|
[BK] Brookvale [MD] Murdishaw [RE] Runcorn East (Rail)
|
+-- Branch to Old Town / Runcorn Station (WCML)

Runcorn Very Light Rail / Busway Upgrade



Line drawing not to scale, for illustration purposes only.



11. Conclusion

The Runcorn Busway is uniquely suited for conversion to hydrogen Very Light Rail. The corridor's geometry, segregation, and station spacing make it one of the most deliverable VLR projects in the UK.

The economic case is positive, the regeneration case is strong, and the engineering feasibility is high.

This also raises a wider question of fairness within the Liverpool City Region. Recent announcements by Mayor Steve Rotheram have described a record £1.6bn transport investment intended to deliver new rail stations, rapid transit links and smart ticketing across the whole city region, with the stated aim of improving access across all six boroughs.

While Halton is referenced through schemes such as Daresbury and Runcorn Station, the visible scale of “big ticket” investment appears to remain concentrated elsewhere, particularly around Liverpool and other repeatedly favoured areas.

Based on the published announcements, the comparison is more **qualitative than fully financial**, because the available material does **not appear to publish a borough-by-borough cash allocation**.

Comparison

Halton

- Named benefits include a **new Daresbury Station, Runcorn Station refurbishment**, rail access to **Sci-Tech Daresbury**, support for around **8,000 jobs**, and a **Widnes–St Helens active travel link**.
- These are useful schemes, but they appear relatively narrow and project-specific.

Liverpool / North Liverpool and South Sefton

- The investment is explicitly linked to unlocking **10,000+ homes**, thousands of jobs, affordable housing, public realm improvements, highway upgrades, and enhanced connectivity.
- This reads as a much larger regeneration package than the Halton references.

Sefton / Bootle



- Bootle is specifically named as a major regeneration beneficiary.
- It appears to be part of the larger North Liverpool/South Sefton growth corridor.

Knowsley / Huyton

- Huyton is specifically named as a town-centre regeneration focus.
- This suggests a more direct urban regeneration allocation than Halton's more limited station/access package.

Wirral / Birkenhead

- Birkenhead is named as another significant regeneration focus.
- Again, the language suggests wider town-centre transformation rather than a single transport node.

St Helens

- St Helens is referenced through connectivity and the active travel link from Widnes to St Helens, but the announcements I found give less visible detail than Liverpool, Bootle, Huyton or Birkenhead.

On the currently published evidence, Halton is recognised within the Liverpool City Region's £1.6bn transport investment through the proposed new Daresbury Station, Runcorn Station improvements, access to Sci-Tech Daresbury and related active-travel links.

However, the public-facing presentation gives far greater prominence to major regeneration packages in North Liverpool/South Sefton, Bootle, Huyton and Birkenhead, including references to more than 10,000 homes, town-centre renewal and large-scale economic uplift.

Without a transparent borough-by-borough allocation, it is difficult to judge whether Halton is receiving an equitable share.

That lack of transparency itself strengthens the case for asking whether Runcorn and Halton are being offered a proportionate settlement, particularly when the Runcorn Busway represents one of the most deliverable fixed-track public transport opportunities in the city region.

The issue is not whether Halton has been mentioned, but whether it has been treated with equal strategic weight. Other parts of the Liverpool City Region appear to be associated with large-scale housing, regeneration and town-centre transformation, while Halton's visible allocation is presented mainly through station works and supporting links.

If the Liverpool City Region Combined Authority and Mayor Steve Rotherham is serious about inclusive growth across all six boroughs, **then Halton should not be left with a marginal share**



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of ambition when Runcorn already possesses a ready-made segregated corridor capable of supporting a transformational VLR scheme.

References

- ¹ [New rail stations, rapid transport links and smart ticketing: Mayor ...](#)
- ¹ [£1.6 billion boost to deliver next phase of Liverpool City Region's ...](#)
- ¹ [Rotherham firms up £1.6bn transport programme for Liverpool City Region ...](#)
- ¹ [Liverpool City Region Mayor unveils city region's £1.6bn transport ...](#)
- ¹ [Liverpool City Region Mayor unveils £1.6bn transport investment](#)
- ¹ [Mayor unveils city region's £1.6bn transport investment](#)