

North Somerset Joint Spatial Plan & Local Plan 2036

An Alternative Solution - A Different Perspective

Meeting the housing requirements in North Somerset

1. INTRODUCTION

- 1.1. **Is North Somerset missing a unique opportunity?** A forward-thinking, innovative and sustainable solution to North Somerset's house-building requirement is possible. It would bring prosperity to the region and a greater quality of life for everyone through the growth in highly skilled employment in strategic locations and an advanced transport system. Together these ideas could transform North Somerset into a highly desirable and prosperous place to live and work.
- 1.2. North Somerset's current JSP proposals are, in the words of North Somerset Council, 'the least worst option'. The JSP is not set in stone, it can be changed. A positive and exciting JSP is completely possible and will gather the support of residents across this special area of Somerset.
- 1.3. Building houses and major roads in the middle of beautiful countryside simply to hit Government targets, with no realistic strategic consideration for jobs growth, public transport, pollution and the environment in those locations, is not what is expected from a progressive council.

2. SUMMARY

- 2.1. North Somerset has a port, an airport, a major European city on its doorstep, a budding university and is a stone's throw away from the acknowledged tech hub of Europe (Bristol/Bath corridor) together with a relatively unskilled work force in Weston waiting to get going; it has a well-established farming community, an unparalleled, free, recreation facility in the Mendip Hills AONB and 25 miles of beautiful coastline and good links to the M5. Many Local Authorities have very few of these assets so North Somerset DOES have incredible potential to be unlocked and released from past prejudices and publically stated fears.
- 2.2. *Cities are the engine of the economy. The benefits of living and working in cities, along with the growing importance of the clustered, knowledge-intensive jobs located in them, have seen them recover and grow. For the UK's cities to succeed, they need effective infrastructure, including high-quality urban and intercity transport systems, integrated with wider strategies for housing and economic development. ("Congestion, Capacity, Carbon: Priorities for National Infrastructure Commission")*
- 2.3. Is a 20th century solution of road building to provide houses appropriate to solve a 21st century problem? We³ think not. Houses need to be built close to jobs; Public transport needs to be innovative, efficient and environmentally sustainable. Roads as a potential solution should give way to rail such as the Maglev explained (Summarised No 4, page 6 below) in the context of North Somerset and in this excellent link <https://www.youtube.com/watch?v=l-U7s6KpKwg>
- 2.4. In 21st Century Britain, prosperity in weaker communities comes through developing strong, efficient economic and sustainable transport links with

larger prosperous cities, whilst maintaining the individual characters of their own communities.

- 2.5. Through the JSP, we believe that there is a huge opportunity for North Somerset to turn a past, perceived disadvantage of being situation so close to a thriving city, into a huge advantage. New houses and a Technology Park should be built on the outskirts of Bristol, but in North Somerset. The Tech Park would attract industry leaders, the best engineers, programmers, researchers and business people with significant incomes to match. Many would choose to live here where they could walk or cycle to work. A twinned Tech Park would also be built in Weston-S-Mare. The two would be linked via Bristol Airport, by an innovative public transport (Summarised No 4, page 6 below). Such systems operate successfully elsewhere in the world.
- 2.6. Inspiration was supported by the following note written by a NSC Officer (not signed) "Amendments to the Draft Schedule – North Somerset Council Site Allocations Plan" (p10), following examination by Planning Inspector Wendy Burden. *"At the same time the influence of Bristol must be recognised as a major economic centre, and the choice, and mobility of residents and the labour force within the West of England sub-region. So, whilst North Somerset operates in the context of a wider functional economic market characterised by clear and long established commuting patterns, there is a need to ensure development in North Somerset is sustainable and that residents have access to a range of local employment, and local businesses have opportunities to set-up, and expand whilst protecting the valued natural environment."* Put this into the context of John Penrose's explanation regarding changes to government funding, where Local Authorities will get to keep the funding from their business rates which *ought* [John Penrose stars] to mean the same or more money in total (**depending on local business growth**).
- 2.7. Put together with the 'Strategic Aims and Objectives' regarding competitive Businesses as set out in the North Somerset Economic Plan and the message is clear – innovation is needed and **needed NOW**. We believe that this innovation is absent from the JSP proposals.
- 2.8. **It is time to unlock the gates between North Somerset and Bristol**, and show the West of England Combined Authority (WECA) that N Somerset is no longer the underdog.

2.9. **Green Belt:**

- 2.9.1. **Green Belt was initiated to prevent 'urban sprawl'**. We recognise how important this is to some, but by no means all residents and politicians. However, it must also be recognised that it is because of Bristol's success over the past two decades in the creation of new jobs that more houses and greater infrastructure is now needed to support it. Inevitably this impacts upon the air quality in Bristol.
- 2.9.2. A recent report by the [World Health Organization](https://www.sustrans.org.uk/news/new-world-health-organization-air-pollution-data-our-response)¹ highlights successful policies in transport and urban planning that reduce air pollution, including prioritizing rapid urban transit, walking and cycling networks in cities as well as rail inter-urban freight. Bristol is already at the 10 micrograms per cubic metre limit. Highways England estimates an average of 5 daily car

¹ From <<https://www.sustrans.org.uk/news/new-world-health-organization-air-pollution-data-our-response>>

trips per household. This would mean an additional 23,500 car trips per day from 4,700 homes planned between Churchill & Langford and Banwell potentially into Bristol.

- 2.9.3. Bristol needs houses and North Somerset needs to provide some of them, but Bristol is committed to delivering a Clean Air Plan and will not want this increase in car journeys as it will diminish the city's air quality beyond the 10 micrograms per cubic metre limit. For this reason, all major cities, including Bristol, have or are preparing plans to restrict traffic movement and to increase active travel through greater walking and cycling interventions and public transport options. Reduction in congestion improves air quality, but also contributes to meeting the Government targets to increase levels of activity to reduce obesity and meets the Cycling and Walking Investment Strategy target to double cycling and walking by 2025². The forward of the National Infrastructure Commission report "Congestion, capacity, carbon: Priorities for National Infrastructure" states "*We need to invest more in alternatives to the private car, upgrading and expanding rail and metro systems, better facilities for cycling and walking and improved bus networks.*"
- 2.9.4. **Should Green Belt be used as an excuse to isolate North Somerset from Bristol's prosperity? No.** Under current JSP proposals North Somerset, in attempting to mitigate against the housing numbers necessitated by Bristol's success, is intending to create dormitory towns that will effectively leap-frog over the areas of poor grade agricultural land currently classed as Green Belt. It will thus give rise to the very urban sprawl that the Green Belt was designed to prevent by decimating the character of rural villages, increasing pollution in Bristol as commuter numbers inevitably rise.
- 2.9.5. The Green Belt review for the JSP 2015/16 looked at only 5 points. It did not look at the bigger picture of finding joined up solutions to the overall housing and infrastructure problems of the 21st century.
- 2.9.6. Access to the countryside is hugely important to health and wellbeing for all. We believe that the GB review terms of reference should themselves be reviewed to look at the overall prosperity, health and wellbeing of all. We note that Siobhain McDonagh MP is now calling for certain poor quality Green Belt to be reviewed.

2.10. **Environment.** The importance of the environment cannot be overestimated. **Under the existing plans an average of 14,000 daily car trips will be made into Bristol.** Innovative Public transport with houses built where there are jobs within walking/cycling/public transport is the best alternative to building roads, and future-proofs sustainable travel for decades to come.

2.11. The building of Junction 21a M5/A38 major road and the proposed new town of 2,800 houses at Churchill and Langford is contrary to all

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/603527/cycling-walking-investment-strategy.pdf

Government policies.

3. THE ALTERNATIVE PROPOSAL - A DIFFERENT PERSPECTIVE

- 3.1. How can North Somerset benefit from the economic growth in Bristol? New housing should be employment-led. Bristol has a thriving economy and strong employment growth, and there are job vacancies in Bristol that cannot be filled.
- 3.2. Employment in Weston-S-Mare is also growing but sluggishly, there is plenty of empty office space in the town, and more importantly the highly skilled jobs are going to Bristol, not Weston.
- 3.3. EDF has chosen to locate its head office in Bristol rather than Weston although this is another 20 miles further on from Hinkley Point, meanwhile Lidl has moved its regional distribution centre from Weston to Avonmouth. We recognise that this is a problem and that North Somerset has been working to address it by building four Enterprise Zones, the arrival of the new university UCW and the North Somerset Enterprise & Technology College. With all of this in place what we are suggesting is the logical next step, to attract more highly-skilled workers and to transform Weston into a more thriving coastal town.
- 3.4. We have been looking at the employment problem from a completely different perspective and, in fact, see huge opportunities in North Somerset just waiting to happen. For years Bristol has been seen as a threat to North Somerset, we think that this proximity is a huge advantage. We should not be fearful of Bristol on our boarder but positively celebrate it. What we suggest could certainly put North Somerset on the map of innovative, forward-looking Local Authorities.
- 3.5. Bristol could be the key to unlocking Weston's potential, our proximity to Bristol is immensely valuable.
- 3.6. How can North Somerset turn this to its advantage? The answer is; build **TWO Tech Parks**, one on the outskirts of Bristol, The Vale [or elsewhere – we will refer to this as The Vale for this document] and one in Weston-S-Mare.
- 3.7. **The Vale Tech Park would be a conduit for skilled jobs in Weston, improving productivity in North Somerset and with a highly attractive speed of implementation which cannot be ignored.** This renewed focus will improve living standards for everyone in North Somerset, in line with the goal of the Council's Economic Plan.
- 3.8. **A Twin Tech Park approach is KEY - Tech Park in Weston-S-Mare.** Both must be built at the same time. Businesses would be encouraged to move to or set up their prestigious head offices in The Vale and when they need more space and a skilled workforce then the natural progression would be to locate it at the Tech Park, Weston. Competitive business rates in Weston as well as government financial incentives could develop this second site.
- 3.9. **Can Weston grow its business base in isolation?** We think not. In time, with a progressively higher skilled workforce in Weston, competitive business rates, an attractive hub of tech businesses and university links, new businesses would choose to locate in Weston on its merits alone. This positive

step is not likely to happen if Weston attempts to grow its business base in isolation. In tandem with The Vale it could happen with relative speed.

- 3.10. **Raising skills levels:** The dual location approach is key to raising skills levels and employment in Weston. It is not uncommon for businesses to choose a two-site approach. It could be that the Weston Tech Park site would also be an ideal location for UCW (University Centre Weston) and that tailored courses could be offered to students to meet employers' direct needs. The university is already offering courses in digital & technology solutions, computing, applied computing and business management and so a close relationship could be invaluable.
- 3.11. **A satellite Campus for UCW:** Dr Paul Phillips has transformed Weston College, it now has a national reputation, so a natural progression for UCW could be to have a satellite campus at The Vale.
- 3.12. **The Tech Park at The Vale** should be built so close to Bristol that businesses, clients and employees believe that they are in the rather leafy outskirts of Bristol. They will actually be in The Vale, North Somerset, but to these businesses it simply doesn't matter which authority they are in, what matters is that employees want to work there, that they want to live and work at The Vale so much that it would take an earthquake to make them move jobs. Businesses put a great deal of value on job retention in the tech industry.
- 3.13. **Bristol Airport:** Another advantage is that Bristol Airport would be a few minutes away, an attractive proposition for global technology businesses and a benefit that no other tech or science park around Bristol or Bath can offer.
- 3.14. **Business rates to Benefit North Somerset:** Vitally importantly for North Somerset in the future is that it would benefit from the business rates.
- 3.15. **How will two tech parks be funded?** Both Tech Parks could be built by the housing developer, as dependent on delivering planning consent for the houses, Section 106 or CIL (Community Infrastructure Levy).
- 3.16. **University and Temple Quarter Enterprise Zone.** The Vale would also be linked by the MetroBus to the new University of Bristol - Temple Quarter Enterprise Zone (centre for digital & business research, skills & innovation). People living at The Vale might also work in Bristol, it doesn't matter, everyone would enjoy the quality of life, cycling and walking to work or jumping on the MetroBus, being close to a choice of theatres or good cultural entertainment in the city. Businesses would want to locate their head offices here as a serious alternative to Bristol.
- 3.17. **Let's create a place for North Somerset to benefit from the success of the Bristol/Bath digital tech which is the lead in Europe.** You will be aware that the UK is the digital capital of Europe, and that the Bristol/Bath area is a centre for digital tech, in fact, according to Tech Nation 2017, Bristol/Bath has the second highest density (not quantity) of digital tech companies in the UK. Geographic concentration matters because:
 - 3.17.1. Smaller businesses group together and attract new businesses
 - 3.17.2. It benefits the local community
 - 3.17.3. It is good for highly skilled workforce
 - 3.17.4. It creates higher paid employment

- 3.18. **Opportunity for North Somerset to capitalise on this growth business area.** In Bristol, Engine Shed 1 by Temple Meads is a hub for startups. It opened in 2013 and was filled within 3 weeks and since then it has created over 700 jobs and contributed more than £8 million GVA (goods and services) to the Bristol/Bath economy. Engine Shed 2 will open in 2020 and will be twice the size. Supply is struggling to keep up with demand in Bristol. In Weston, The Hive, by last June was 90% let, this took almost 3 years to achieve but is still a success story and evidence for the demand for more, similar space. We suggest a tech hub (or a Hive 2 and Hive 3) at each Tech Park to respond to this demonstrable demand.
- 3.19. Tech Nation 2017, - a Government supported agency - in a summary of the UK's digital tech industry, considers the tech sector growth potential to be 88%. In a survey of start-ups in the Bristol/Bath area it found:
- 3.19.1. **92%** of startups said that this regional area is good for '**Overall quality of life**' however:
- 3.19.2. **70%** of startups say that there is a '**Lack of supply of highly skilled workers**'
- 3.19.3. **42%** of startups say that there is a '**Limited supply of appropriate property on competitive terms**'
- 3.20. This scenario, however, could only be achieved by releasing a very small amount, just 2%, of North Somerset's Green Belt, (poor quality land, now with a ring road, an industrial park and a refuse tip) to allow new house building and the Tech Park development in The Vale.

4. A 21st Century Transport System is central to improving connectivity and productivity in North Somerset and is vital to enhancing the environment. It is conspicuous by its absence in the JSP/JTS.

- 4.1. A modern public transport system, incorporating the latest technology, could revolutionise travel between Weston-S-Mare, Clevedon and Nailsea together with Bristol Airport, the Tech Park in The Vale and Bristol itself. This would take cars off the roads, make commuting to work or travelling around the region simple and attractive and eliminate the need for new roads across beautiful countryside, primarily for commuters.
- 4.2. To build major new roads across Mendip Vale would be a retrograde step, one that belongs to the last century and one from which Mendip Vale would never recover.
- 4.3. **A dedicated light rail system such as a magnetically levitated (MAGLEV) system free of wheels.** This would be well suited to the passenger traffic patterns already established across North Somerset. This is a system of tracked vehicles driven electrically by a linear induction motor and supplying a magnetic drive which combines propulsion, lift and guidance along a track provided with electromagnets. This would offer the following benefits:
- 4.3.1. **The MAGLEV system is quiet and generally unobtrusive.**
- 4.3.2. **It can be raised above ground, at ground level, or below ground,** as local conditions dictate.

- 4.3.3. **Scheduling can be flexible and driven by demand** (under automatic control).
- 4.3.4. **Several thousand passengers per hour** could travel on the system.
- 4.3.5. **The vehicles would be highly energy-efficient** and light in weight. Most of the mass of the motor-drive system lies in the track, not in the moving vehicles and during braking, electric energy is returned to the system, not wasted as heat.
- 4.3.6. **The result is that this MAGLEV system would generate much less CO2 and other pollution whilst offering very rapid transit.** (Pages 9-15)
- 4.4. **We have the potential to change the way we move around North Somerset**, making living in Weston-S-Mare, or The Vale conveniently close to employment, culture and leisure wherever we live. To understand our excitement at the possibilities offered to North Somerset visit <https://www.youtube.com/watch?v=l-U7s6KpKwg> whilst remembering that technology has further advanced since this was constructed.
- 4.5. **Imagine the North Somerset MAGLEV timetable:** Weston-S-Mare Tech Park –Bristol Airport – The Vale - Temple Meads – probably a 25-30-minute journey with trains leaving every few minutes similar to the London Underground, no delays, no missed flights, there is always another train just arriving at the station.
- 4.6. **Connectivity raises productivity:** There would be direct access by the MAGLEV between Tech Parks, an attractive and immediate link between business locations. A couple of stops away from The Vale would be the University of Bristol at Temple Meads or UCW in Weston.
- 4.7. Dr. Robin Jeacocke's full paper on the MAGLEV is attached.

5. CONCLUSION

- 5.1. This document, '**An alternative solution - a Different Perspective**' captures the potential to transform North Somerset into a forward-looking, progressive Local Authority that would attract highly sought-after businesses with its high capacity, flexible transport system, its enviable proximity to Bristol, an international airport a port, the Mendip Hills AONB and 25 miles of beautiful coastline.
- 5.2. **Twin Tech Parks in The Vale/Weston-S-Mare, new houses just a short walk away** from both and the two locations linked by a world-leading, rapid transit MAGLEV public transport system (pages 9-15), could form the basis of an exciting future for North Somerset.
- 5.3. **The building of Junction 21a M5/A38 major road and the proposed new town of 2,800 houses at Churchill and Langford is not a 21st century solution to meeting the housing requirements in North Somerset.**
- 5.4. **The current JSP proposals for Churchill and Langford ignore the Government NPPF and JSP's and North Somerset's own planning policies.** They further ignore the West of England Combined Authority

(WECA) independent reports by Atkins, JNP Paribas, Highways England and AONB Partnership.

- 5.5. **The JSP proposals go against the National Infrastructure Commission** *"Congestion, Capacity, Carbon: Priorities for National Infrastructure"* For the UK's cities to succeed, they need effective infrastructure, including high-quality urban and intercity transport systems, integrated with wider strategies for housing and economic development. ⁴
page 13
- 5.6. **The JSP proposals for Churchill and Langford are unsustainable,** detrimental to the environment and not an appropriate 21st century solution.
- 5.7. **Under current JSP proposals, North Somerset will create dormitory towns** in the countryside because of the refusal to consider building in just 2% of North Somerset's Green Belt, on the outskirts of Bristol to support Bristol's growth. This effectively will cause urban sprawl, the very purpose for which Green Belt land was created, to leap-frog over poor quality agricultural land and place that urban sprawl in the middle of the beautiful countryside adjacent to the Mendip Hills AONB thus decimating the character of the surrounding villages.
- 5.8. **This 'Alternative Solution – a Different Perspective' offers prosperity, health, harmony and well-being for all and thus creates the 'exceptional circumstances' needed to enable North Somerset Council to review their approach to Green Belt and redraw the JSP and Local Plan 2036 proposals for the Mendip Vale villages.**
- 5.9. The time has come to look again and unlock this opportunity for future generations

⁴ [https://www.nic.org.uk/wp-content/uploads/Congestion-Capacity-Carbon -Priorities-for-national-infrastructure.pdf](https://www.nic.org.uk/wp-content/uploads/Congestion-Capacity-Carbon-Priorities-for-national-infrastructure.pdf)

Churchill and Langford Residents Action Group (CALRAG)³

Jan Lyons
Jan Murray
Dr. Robin Jeacocke
Sarah Jarman
09 May 2018

Notes

³ Churchill and Langford Residents Action Group (CALRAG) is a team of some 40+ residents across a broad demographic including professionals in engineering (all relevant branches), surveying, the environment, archaeology, planning, accountancy, law, IT, events organisation and many more who have come forward to offer assistance. We have 651 individual local supporters who have actively requested to be kept informed. Petitions to North Somerset Council received 4,221 online signatures with 550 signatures on paper.

Rapid Transit, Weston-Super-Mare to Bristol.

Dr. R Jeacocke

Using a novel electromagnetic drive for a public transport system.

1. Why?

- 1.1. As a result of recent historic pressures within the housing market, Weston-Super-Mare has assumed a major role as a dormitory town for an expanding Bristol. This has had various unfortunate consequences of which a major element is congestion on all the road routes between the two centres. Commuting flows are thousands per day.
- 1.2. Improvements in the passenger-carrying capacity of the conventional rail connection are highly constrained and I suggest that the time has come to acknowledge that conventional road and rail connections derived from (sound but archaic) nineteenth century engineering principles now need to be supplemented in the twenty-first century by solutions offered by twenty-first century engineering.
- 1.3. **All the necessary engineering expertise already exists within Britain.**
- 1.4. **Road transport capacity is reaching saturation**, especially in and around our towns and cities. Despite improvements in engine efficiency, overall fuel economy is falling as ever more time is spent in traffic hold-ups.
- 1.5. **Thermodynamics also sets an upper limit on the efficiency of heat engines**, whilst our concern regarding carbon dioxide emissions and the production of many other pollutants within engine exhaust is, and is likely to remain, an ever-increasing preoccupation.
- 1.6. **Electric-traction, using modern electronic and mechanical engineering, has recently begun to offer major potential improvements in public transport.**
- 1.7. **The linear induction motor, combined with magnetic levitation**, allows us to realise a tracked vehicle system with various highly desirable qualities, permitting propulsion, support without wheels, and stable guidance all to be implemented simultaneously to achieve very quiet, and highly energy-efficient transport of large numbers of people on a track with a small footprint (which is indeed tiny by comparison with a road).
- 1.8. Most of the mass of the electric motor is in the track wherein electromagnets supply a rippling magnetic field which Professor Eric Laithwaite vividly and very aptly described as a "magnetic river".
- 1.9. **The track width is perhaps 3m or so and can be raised above ground, at ground level, or below ground**, as local conditions dictate. It can be very unobtrusive and accommodating of local conditions. Several such

magnetically levitated (MAGLEV) public transport systems already exist worldwide.

- 1.10. The use of regenerative braking (particularly important on a suburban stopping route) allows **electric energy to be conserved during braking rather than simply dissipated as heat.**
- 1.11. The linear motor principle coupled with magnetic levitation permits the forces of acceleration or deceleration to be exerted on the passenger vehicles in a widely-distributed fashion without the stress concentration associated with conventional railway rolling stock. Amongst many other benefits, this **permits very light-weight construction using modern fibre-reinforced materials** which reduces greatly the mass which needs to be accelerated.
- 1.12. Since a (variable) passenger load is now a substantial part of the mass to be accelerated, **the energy expended when lightly loaded is substantially reduced.**
- 1.13. **Maintenance costs are also greatly diminished** in such a system which has neither mechanical point contact with the track nor any need for conventional wheel bearings.
- 1.14. The use of "high temperature" superconductors, cooled with liquid nitrogen rather than liquid helium, results in major improvements in ease of operation and in achieving the engineering requirements placed upon the relevant magnetic circuits. Modern semiconductor power devices permit the reliable control and switching of the high currents within the track itself.
- 1.15. We should also note that, although most MAGLEV systems in operation at present across the world emphasise maximum speed, very high rates of acceleration are also possible. This must be tempered by practicality – we are not all astronauts or fighter pilots – but even the modest 0.1g adopted below (which is generally regarded as very practical) permits impressively high throughput and short journey times on appropriate commuter routes. I suggest that the route between Weston-super-Mare and Bristol is just such a route.

2. A MAGLEV route for passenger traffic between W-s-M and Bristol.

- 2.1. The proposal I envisage here is based on a single track with double-track passing points at stations along the line. Very high peak operating densities are possible with modern control systems employing computer control of the current steering and switching regimes which operate the driving electromagnets along the track. The actual transit times (limited by a 0.1g ceiling set here for the acceleration) are small (see below) but the waiting plus embarking and disembarking times must be added to this. Certainly, several thousand passenger movements per hour would be achievable with suitable vehicle systems. Moreover, if sufficient land were available, and funding permitted it, a dual track system throughout might be

contemplated, thereby increasing throughput and operating flexibility and also dispensing with the need for “points” to permit vehicles to be switched from track to track near stations.

- 2.2. I offer here another suggested route, but detailed planning would be needed to examine this. I suggest that, apart from a route which runs between the two centres via Clevedon and Nailsea, a second spur route, arising around The Vale area SW of Bristol, would permit the realisation of an unobtrusive but very high capacity public passenger transport route to Bristol Airport from the centre of Bristol (with onward public transport links to destinations elsewhere). Improved access to the Airport via public transport is a major preoccupation at present. **Relatively steep gradients, as encountered on the airport route, are no problem for a Maglev system.**
- 2.3. This proposal (with rather frequent stops) envisages a system, constrained by such a need for relatively frequent halts, where the moving vehicles are always either accelerating or decelerating.
- 2.4. The journey schematic offered below is, of course, highly provisional. In practice, one would not apply uniform acceleration but would probably blunt both the onset and the offset of the accelerating or decelerating forces. In compensation, one might apply slightly more than 0.1g in the middle of the accelerating and decelerating phases or perhaps restrain acceleration on a long leg to restrict the maximum speed attained. At high speed, air resistance is the principle opposing force, rising as the cube of the speed.
- 2.5.** We should recognise that substantial time should be added to the journey for passing, embarking and disembarking. Of particular benefit, however, in any automatic-vehicle control system such as this, is the fact that timing of **the service can respond flexibly to high demand.**
- 2.6. Two journey profiles are presented here: Weston-super-Mare to Bristol Temple Meads and Bristol Temple Meads to Bristol International Airport. These are depicted below as Figure 1 and Figure 2 respectively.
- 2.7. These profiles break the journey into legs, each of which is defined by a station stop. These stops also provide (on a largely single-track regime) the potential passing places. Also included is a speed versus distance profile (Figure 3) for the longest leg (10km) with and without slight blunting of the transition from acceleration to deceleration. The maximum speed achieved on this longest leg is slightly more than 200mph.

Text Figures:

Figure 1 The journey from Weston-super-Mare to Bristol Temple Meads

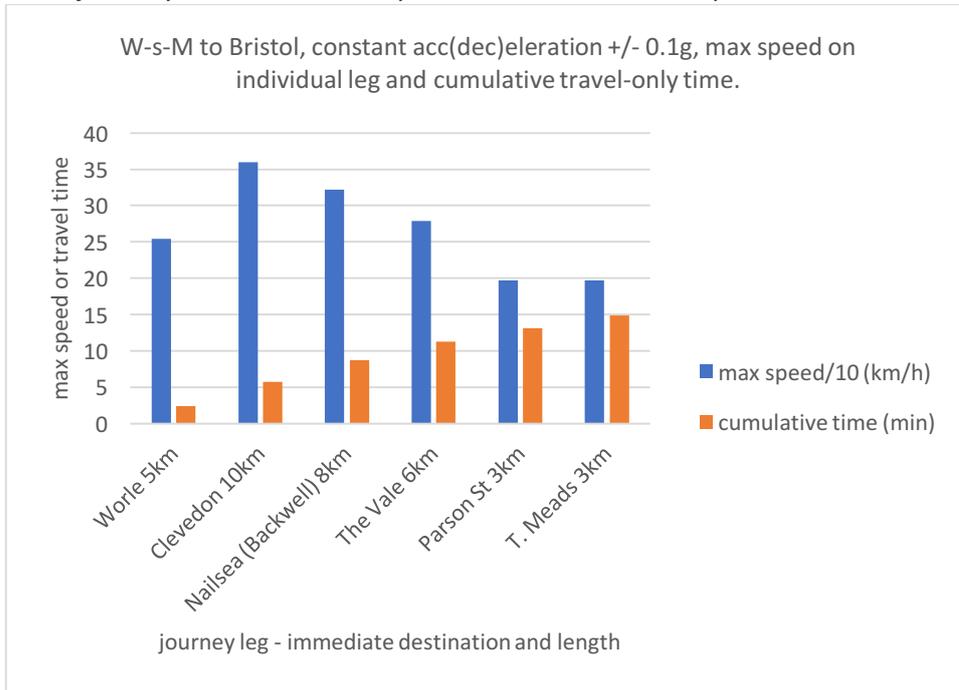


Figure 2 The journey from Bristol Temple Meads to Bristol International Airport

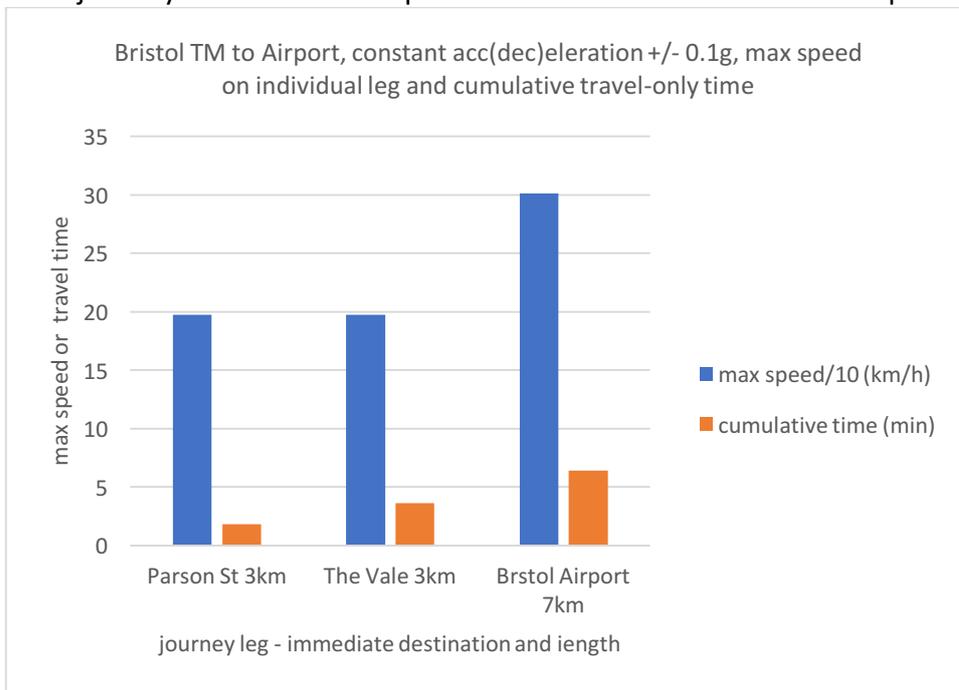
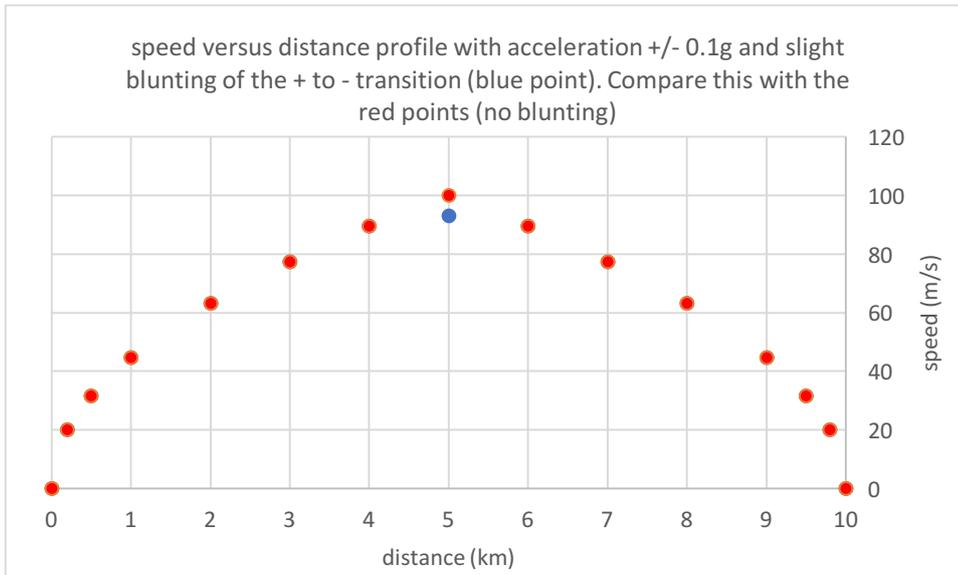


Figure 3 A speed profile along the 10km leg from Worle to Clevedon



3. Implementation

This proposal implies a very large construction project. It would first require a substantial feasibility study and a decision about whether to build in stages. An obvious first stage would be a link from Bristol City (or perhaps from the The Vale) to the Airport. The precise route taken would also require careful planning, but a particular virtue of such a system is its very small footprint and its flexibility: thus it is able to meld rather unobtrusively into the landscape, whilst being able also to negotiate intensively built-up areas either on comparatively lightweight support pylons or in tunnels. Rather steep gradients would pose no particular problem. Costing such a project at this early stage would be an unrealistic effort.

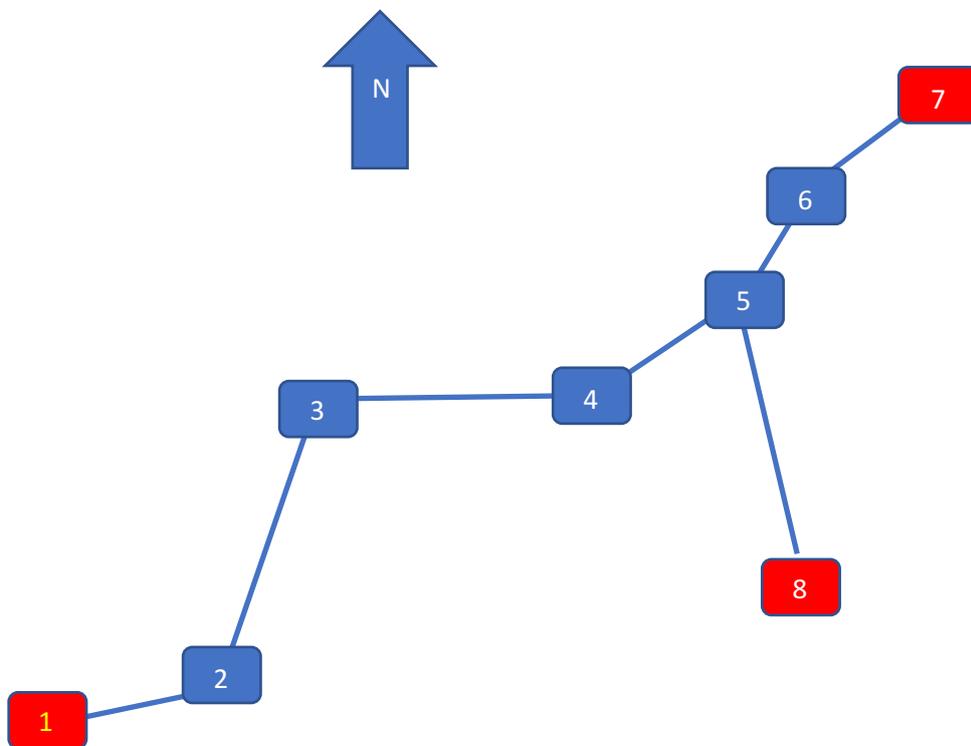
Robin Jeacocke April 2018

A proposed light rail passenger link from W-s-M to Bristol and to Bristol Airport

Using linear induction motor propulsion plus MAGLEV

Stations (T) is a terminus:

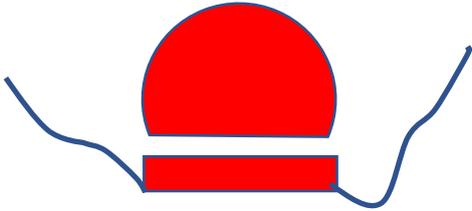
1. Weston-super-Mare (T)
2. Worle
3. Clevedon
4. Nailsea (Backwell)
5. The Vale
6. Parson Street
7. Bristol Temple Meads (T)
8. Bristol International Airport (T)



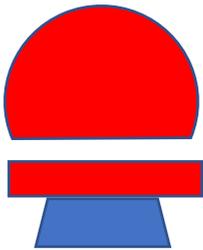
Terminus stations are in red

MAGLEV configurations in transverse section

In a cutting



Close to the ground



Raised on a pillar

