



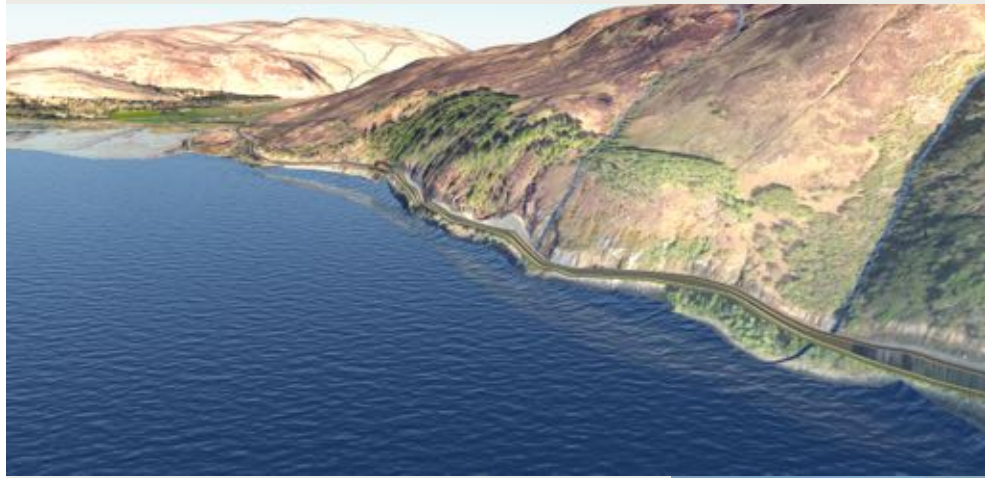
Skyefall

Road Rail Solum Sharing on the Kyle Line

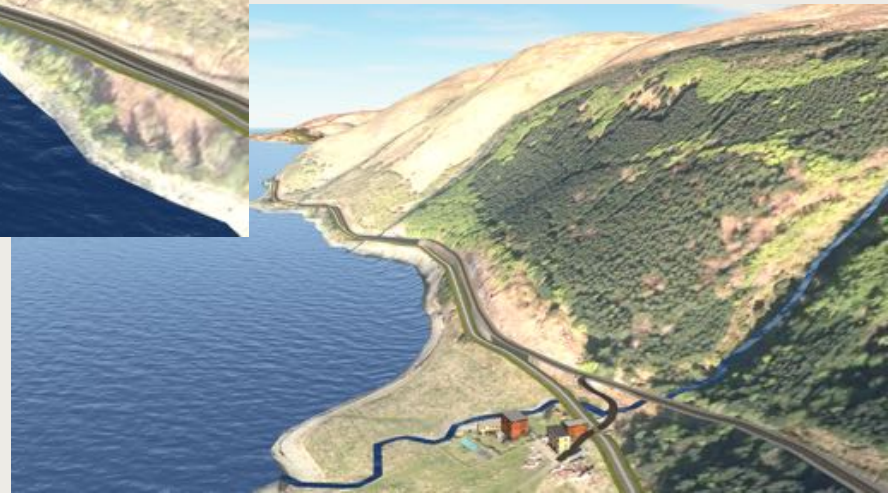
Presentation agenda

- Introduction
- Background
- Option Development
- Rolling Stock
- Control Systems
- Option Assessments
- Legal & Approvals
- Conclusions
- Next steps





Existing



BACKGROUND

1. Rock falls close the highway; long detour and impact on local economy.
2. Single track railway and single track road (with passing places).
3. Route constrained by mountain and loch.
4. Rock tunnel.

Temporary Shared
Solum 2011



BACKGROUND

A pre-feasibility study was undertaken by HiTrans which presented 7 options.

Of these, options 5, 6 and 7 were chosen by HiTrans and Major Stakeholders as worthy of further consideration in a Feasibility Report Study.

Option Development

1. For all 3 options the road is shared with the single track railway.
2. Option 5 – retains the existing rail operation, road vehicles held whilst train passes through shared section
3. Option 6 – railway vehicles that can operate as trams on the shared section and as trains on the non shared sections.
4. Option 7 – convert whole of railway (Dingwall to Kyle) to a tramway.



Option Development

Developed option 5. Permanent version of 2011 temporary track sharing arrangement

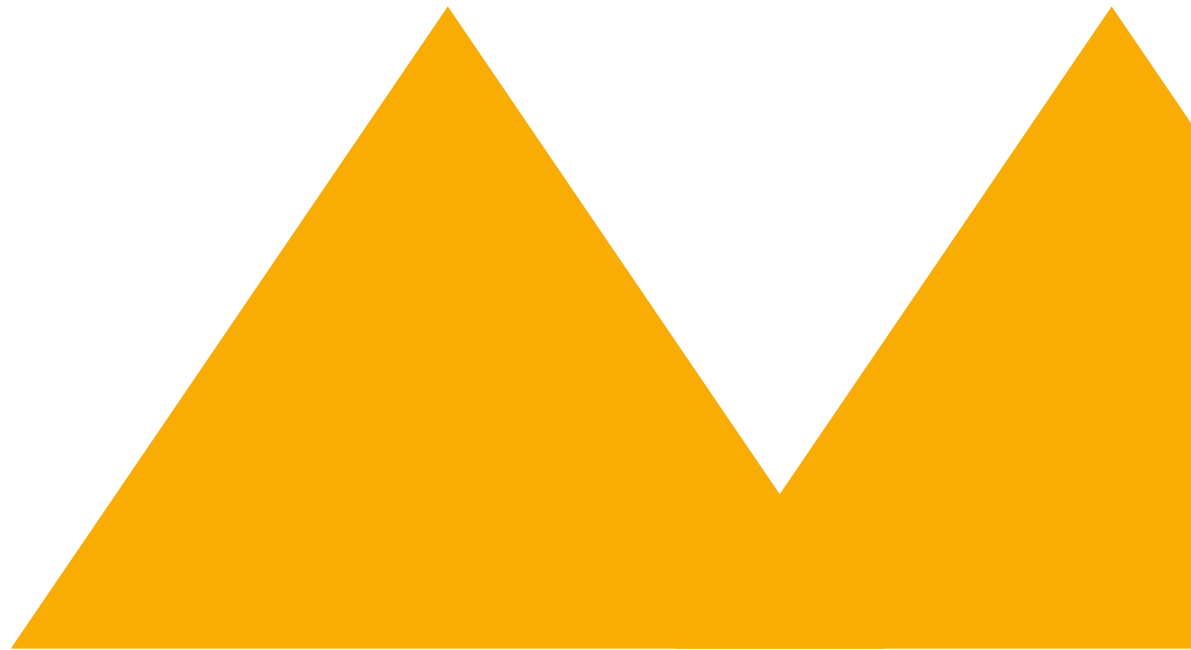
- a) Single track option
- b) For a 3.5km length
- c) Requires the means to close the shared route to road traffic so that a train can pass through
- d) Passing places where topography allows.
- e) Requires a control system that allows the shared section to be controlled from Inverness Control Centre
- f) Segregation for non-motorised users (NMU's)
- g) Requires barriers at either end with the use of modified signalling to replace COSS



Option Development

Developed option 6. Convert shared section to a tramway where trains are converted to operate as trams share then route with road vehicles

- a) Single track option
- b) For a 3.5km length
- c) Passing places where topography allows.
- d) Segregation for non-motorised users (NMU's)
- e) Requires barriers at either end with the use of modified signalling to replace COSS

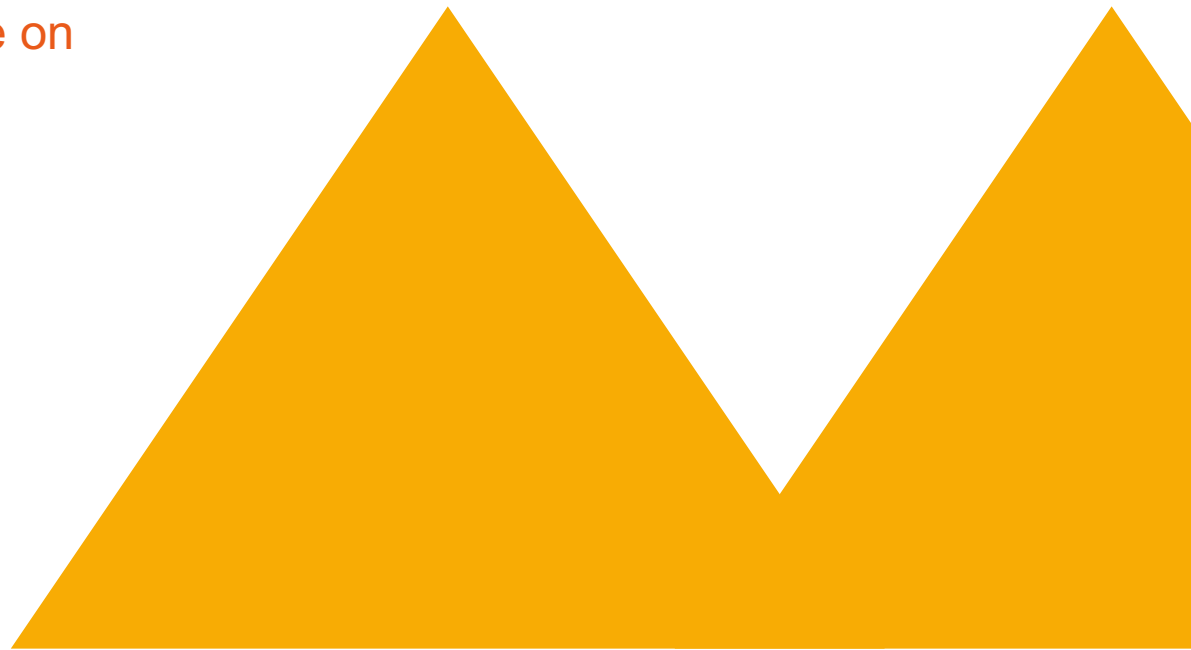


Option Development

Developed option 7. Convert shared section to a tramway where trains are converted to operate as trams share then route with road vehicles

This is where trams or tram-trains operate on the line. Both can share the share section with road vehicles..

- a) Single track option
- b) For a 3.5km length
- c) Passing places where topography allows.
- d) Segregation for non-motorised users (NMU's)
- e) Requires barriers at either end with the use of modified signalling to replace COSS



Option Assessment Overview

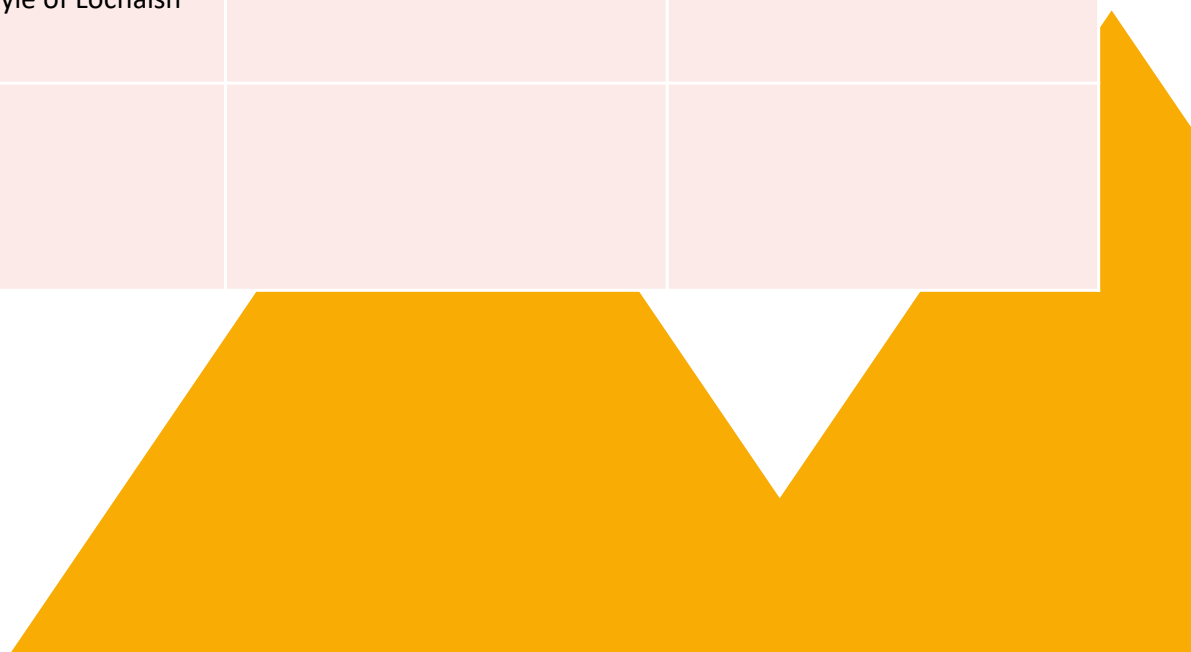
Issue	Option			Comments
	5	6	7	
Single or twin track solution	Single	Single	Single	Twin track is not an option due to topographical constraints and impact on loch Carron. Single track option required.
Single track option	Trains and traffic use the shared space alternatively and one direction at a time. Still needs RETB to detect train position.	Using Line of Sight operation Trams and road traffic travelling in the same direction, can use the shared space together; control needed at the entry points. still needs RETB to detect train position Traffic heading in the opposite direction to be held while trains pass the section.	Whole route from Dingwall to be tram operation so using Line Of Sight operation but still needs RETB to detect train position. Trams and traffic travelling in the same direction, can use the shared space together; control needed at the entry points. Traffic heading in the opposite direction to be held while trains pass through the section.	
Train or tram and train	Train	Tram and train	Tram and train	Options 6 and 7 still require an operating solution that allows trains to use the shared section.

Option Assessment Overview

Issue	Option			Comments
	5	6	7	
Length of shared section	Sufficient to bypass all potential rockfall sites.	Sufficient to bypass all potential rockfall sites.	Sufficient to bypass all potential rockfall sites.	The longer the length the greater the operational complexity (sight lines, poor visibility, delay to traffic, impatient drivers, breakdowns and recovery.
Local power supply and back up (UPS).	Local power supply required to power control and information systems.	Local power supply required to power control and information systems.	Local power supply required to power control and information systems.	Site is relatively remote - <ul style="list-style-type: none"> Power supplies
Safety	<ol style="list-style-type: none"> Cannot have trains and road traffic sharing the same space at the same time NMU's to fully segregated. Need to guarantee that the previous mode in the shared section has completely cleared. 	<ol style="list-style-type: none"> NMU's to fully segregated. Need to guarantee that the previous mode in the shared section has completely cleared. 	<ol style="list-style-type: none"> NMU's to fully segregated. Need to guarantee that the previous mode in the shared section has completely cleared. 	

Option Assessment Overview

Issue	Option			Comments
	5	6	7	
Control Centre Location	Robust reliable connection to Inverness Control Centre	Robust reliable connection to Inverness Control Centre	Robust reliable connection to Inverness Control Centre	
Tram vehicle maintenance	N/A	Maintenance Depot – possible location at Kyle of Lochalsh	Maintenance Depot – possible location at Kyle of Lochalsh	Area available at Kyle



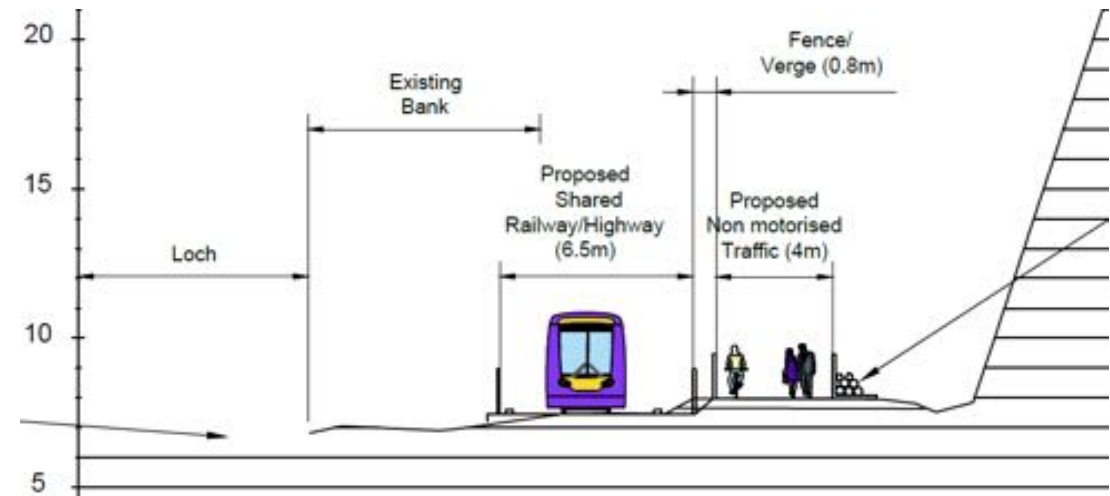
Safety Issues

1. Robust reliable control systems for road vehicle and rail vehicles
2. Delays and breakdowns – need to know who is where and when.
3. Ongoing rockfalls – rock trench and maintenance
4. Loch – edge protection; consider maintenance.
5. NMU's – fully segregated



Operational Issues

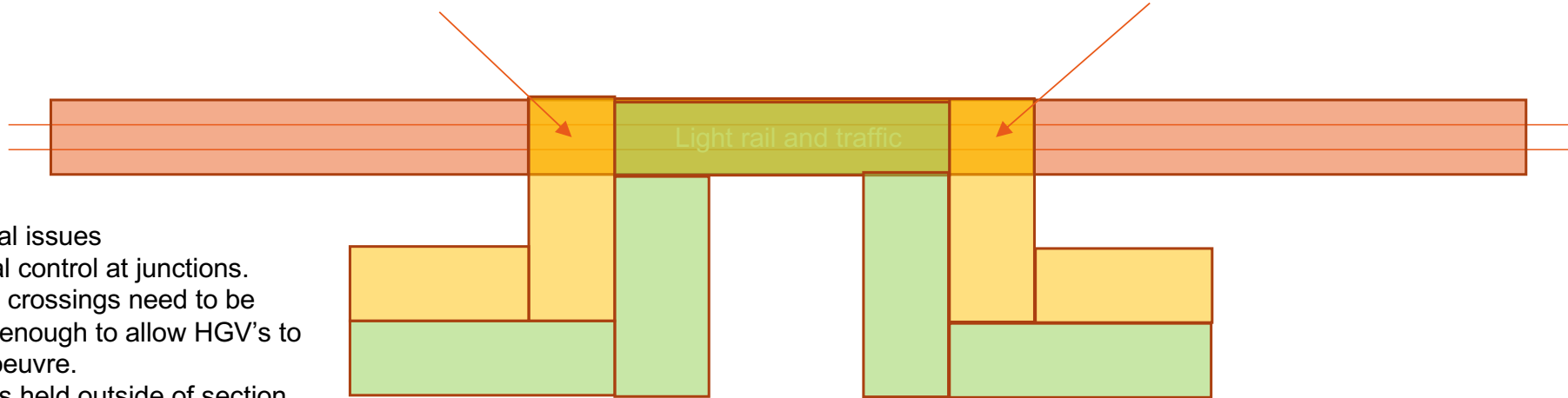
1. Single track
2. NMU segregation
3. Length of shared section and location of passing places for vehicular traffic
4. Trains trams and traffic
5. Means of control – detection, monitoring, barriers, signals, help points,
6. ORR approval.
5. Location of control centre
6. Local power supply



Traffic and Train – Shared Space. Based on option 5 only.

Junctions

Junctions



PLAN

- Spatial issues
- Signal control at junctions.
- Level crossings need to be wide enough to allow HGV's to manoeuvre.
- Trams held outside of section until clear of traffic.
- Traffic detection system to check that traffic has left the allowing train through controlled area before. And vice versa.
- Long length so provision of passing places Long length, divide into sub-sections to allow traffic and trams to pass safely.

Tram /
Traffic



SECTION

Rolling Stock

1. Upgrade Class 158's nearing end of service. Possible use of LUL class D7 trains. **Ruled out**
2. Opportunity for new rolling stock that meets Skyefall requirements for operating on Mainline and Shared section.
3. Braking system – operating on line of sight, trains do not have track brakes, trams do.
4. Power Supply – OLE; On Board power supply
5. Mixed operation – passenger, freight scenic and steam.
6. Tracking system back to Control Centre



Control Systems

1. Existing is RETB controlled from Inverness. RETB cannot be replaced by a Line Of Sight on a bi-directional single track line.
2. Certainty that the route is free of road vehicles before train enters the share section. Possible requiring a physical link (fibre optic cable)
3. Guaranteed power supply
4. Failure of equipment to detect all vehicles
5. Rogue impatient drivers!!



Depot Maintenance Issues

Train Option

- Use existing depot for maintenance and stabling.

Tram Options

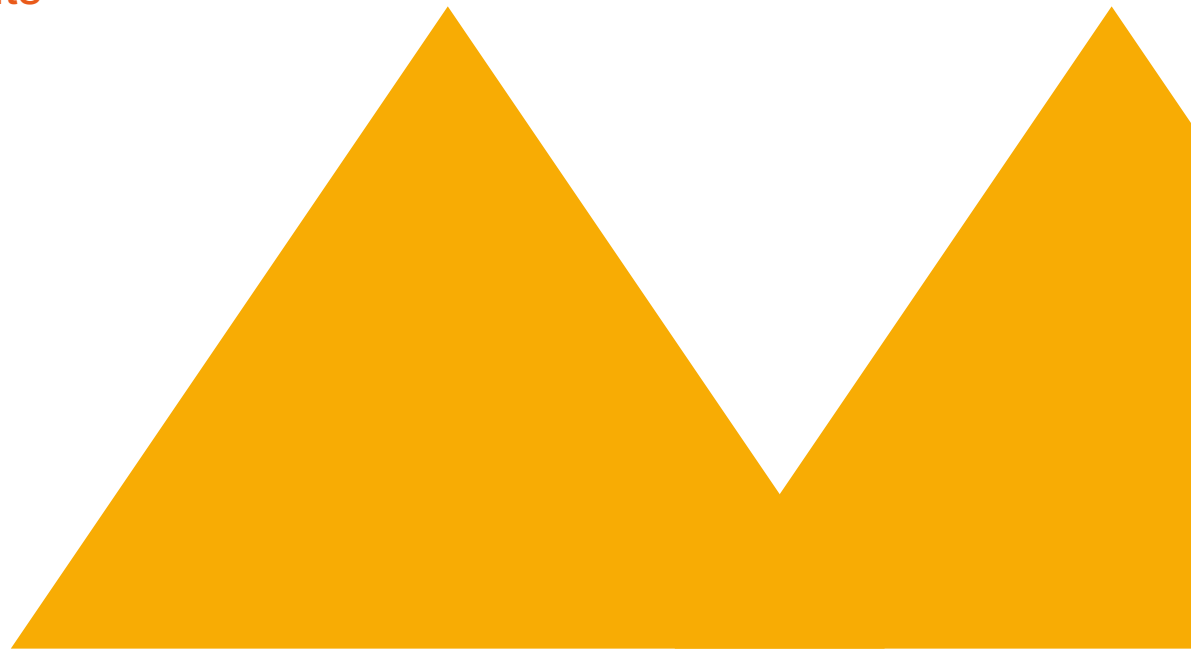
1. Location of depot
2. Access to depot
3. Suitability of current equipment to maintain tram fleet.
4. Wheel lathe
5. Spares



Assessment

Consideration has been given to:

1. Operating safely
2. Impact on the user – significant benefits for all users , including residents, businesses and emergency services.
3. Maintenance of the shared space



Legal Issues & Approvals

1. Powers


Who will own, operate and maintain the asset?
May require legal advise?

2. ORR Approval

At preferred option stage present to
ORR for their consideration

3. Asset Management

It is recommended that one party should take
control of the asset.

A large, solid orange geometric shape is positioned in the bottom right corner of the slide. It consists of two triangles pointing upwards towards each other, forming a larger, irregular shape with a central V-shaped notch.

Conclusion

1. Option 5 - requires highly technical rail operation with traffic held when train runs through. However it removes safety issue/concerns to an more acceptable level.
Suggest further development of this option
2. Option 6 - requires conversion of existing rail vehicles (considered impracticable) or procurement of new, to operate as trams. Allowing road vehicles to share section with Tram-Trains.
Tram-Train a more realistic option, need to further investigate on-board power.

Conclusion - continued

3. Option 7 - convert whole route to Tramway (avoids need for highly technical control systems) or just the shared section. Operating on Line of Sight only however this is impracticable for a bi-directional single track so requires a RETB system to detect trams/Tram-Train, as movements are on single track
Interchange at Dingwall to transfer from trams to Trains and visa versa.
Investigate on-board power supply for Trams-Train vehicles
4. Occasional Trains - safe system of work
With trained operatives required to close the shared section to road vehicles





THANK YOU

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