

The Far North Line

A performance study

For Friends of the Far North Line

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Between the parallel lines of indecision and inactivity
drop the stakeholders' aims and resources.



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Purpose of this study

The Friends of the Far North Line, FoFNL, is a voluntary body which seeks to represent the views of users of the line and provide a focus for discussion with stakeholders to contribute to the success of the line for its users and funders. Their website is <http://www.fofnl.org.uk/>

FoFNL have had a long-running concern that the passenger train services provided on the 168 route miles of line have become woefully sub-optimal, being overly slow, infrequent, inadequately serving diverse markets, having an unworkable timetable and experiencing continual severe disruption.

They invited me to look at the existing situation on FNL from a completely independent viewpoint and make recommendations for improvement.

Process adopted

- Pre-meetings were held with key FoFNL and HITRANS officials.
- A wide range of relevant literature was procured and studied.
- A Cab ride was made on an Inverness to Thurso service train.
- Meetings were held with key ScotRail operational and engineering staff.
- The multitudinous findings were studied and considered.
- Post-visit clarifications were obtained as necessary.
- This report was produced.

Disclaimer

The words in this report are mine, based on my interpretation of what I heard in the relatively limited time available. Therefore, any errors are mine and no fault or blame should be attached to any of the named people herein.



Executive summary

This route is important for the local population over a huge area, as well as for tourists.

It is seen as a 'lifeline'.

Its services are subject to continual severe disruption due to significant long-running issues.

The existing timetable is unworkable.

Journey times have become progressively and unattractively extended.

Service usage is declining.

Trains are overstressed and unreliable.

Critical infrastructure improvements are very expensive and long overdue.

Lineside vegetation is out of control.

Practical improvement actions have been identified at local and regional level, but their progression has been continually thwarted.

The FoFNL asked me to do this study as a result of their exasperation at the sheer volume of chronic problems that seem to be not only intractable but are actually getting worse.

The study aims to illustrate the principal issues and the associated actions already intended.

It also includes some suggested actions for further improvement or for greater economy.





The FNL route



The FNL itself runs for 161 miles from Inverness to Wick, with a 7 mile spur at the North end from Georgemas Junction to Thurso. Intermediately, at Dingwall there is a junction with the 64 mile “Kyle” line to Kyle of Lochalsh. The FNL is single track throughout, with passing loops at 9 intermediate stations. The loops are unequally spaced, generally between 5 miles and 13 miles apart. However, the route sections between the passing loops at Helmsdale and Forsinard, and between Forsinard and Georgemas are 24 miles and 22 miles apart, respectively. These route characteristics make for exceptionally difficult timetabling and can cause grossly disproportionate delays when even just one train runs only a few minutes late.

Of the 26 FNL stations, 8 are request stops - at Culrain, Invershin, Rogart, Dunrobin Castle, Kildonan, Kinbrace, Altnabreac and Scotscaider. The random nature of their use, both for alighting and boarding, causes timetable problems. All trains have to drastically reduce speed in case someone wishes to board, regardless of actual need. Whilst those alighting pre-warn the train Conductor, there is no such information available regarding boarders. This also constrains opportunities for disruption minimisation.



The trains



All passenger trains are operated by 2-car Class 158 Diesel Multiple Units (DMUs). Those used on FNL are powered by two 350 HP engines, are air-conditioned, have seats as 4's at tables and 2's in airline style aligned with windows and are provided with phone/laptop charging sockets. A trolley service of drinks and snacks is provided daily.

The timetable, 8 August to 10 December 2016

The end-to-end journey time from Inverness to Thurso is typically 3hours 50mins and to Wick 4hrs 22mins.

Weekdays in the 2016 timetable have:

1. 4 full-route FNL train services each way
2. 5 Southbound partial-route FNL train services from Invergordon to Inverness, 4 from Tain, 3 from Ardgay and 1 from Lairg
3. 4 Northbound partial-route train services from Inverness to Invergordon, 3 to Tain and 1 to Ardgay.
4. This makes a total of 9 Southbound and 8 Northbound full-route or partial-route FNL trains on weekdays.

Sundays in the 2016 timetable have:

- a. 1 full-route train service each way
- b. 4 Southbound partial-route train services Invergordon to Inverness, and 3 from Tain
- c. 4 Northbound partial-route train services Inverness to Invergordon, and 3 to Tain
- d. This makes a total of 5 Southbound and 5 Northbound full-route or partial-route FNL trains on Sundays.

The Kyle line has 4 through trains each way weekdays and 2 on Sundays; these share the Southern part of the FNL route from Inverness to Dingwall.

Briefing pre - meetings held

Mike Lunan, Edinburgh, 22 Sept 2016 – general prepositioning and commissioning meeting.
John Yellowlees & Frank Roach, Edinburgh, 22 Sept 2016 - detailed prepositioning meeting.

Literature studied

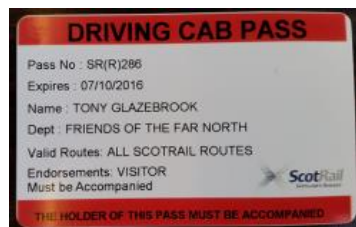
A wide range of literature was studied prior to my week of visits and meetings. This came from a variety of sources and is listed in Annex 1 to this study.



Cab ride, 14:00 Inverness to Thurso train, 3 Oct 2016

With Ronnie Payne, Driver Team Manager, Inverness, ScotRail

These are my observations, in chronological order:



1. The Driver Aid System (DAS) has been fitted to assist the driver, but will be of little use on FNL where, in order to have even the slightest hope of achieving the timetable, full linespeed has to be driven throughout.
2. The non-signed Permanent Speed Restrictions (PSRs) were an experiment but have been left unsigned. This could be a risk increase, which does not 'square' with the rigorous application of risk assessment applied to other route infrastructure (e.g. level crossings). It does not help trainee drivers either.
3. Auto sanders are provided for slip, manual for slide (limited by the sand box capacity). Timetable risk arises from slip, but safety risk arises from slide.
4. No spare Class 158 DMU available for the Wick-Thurso shuttle proposed by HITRANS
5. Trees and other vegetation encroach on line to a very significant extent, such that it has been shaved to the shape of the train – in some cases into a complete arch.



6. This unconstrained vegetation is the principal cause of the extensive Autumnal leaf fall problems on the line, which lead to train delays, wheel flats and increased safety risk. It has also caused smashed driver windows when heavy rain or snow coincides with new leaf growth. And it damages the train paintwork (actually vinyl coatings).
7. Noted that Class 170 DMUs are unsuitable for the line because their bogie wheel spacing is longer than on Class 158, which would lead to lower speed restrictions.
8. Noted that the 04:41 empty stock positioning train from Inverness to Lairg splits at Ardgay and provides the sets for the two associated first Southbound trains. The timetable produces a conflict at the Dingwall passing loop which frequently causes delay to both trains.
9. Presently, the Inverness Signalling Centre (SC) RETB signaller deals with all trains at all crossing points on both FNL and Kyle lines. This causes radio channel queueing delays for practically every train at every RETB token exchange. The proposed Invergordon control desk split point will drastically reduce this, but has allegedly



- been objected to on the grounds of cross-RETB desk delays for the Invergordon token exchange. However, its absence causes delays to every train at every other passing loop and the equipment for the improved system lies idle at Inverness SC.
10. The introduction of “RETB2” digital radio has vastly improved radio reception and hence reduced RETB token exchange problems.
 11. Much had been made to me before my visit of token exchange times having been extended from 60secs to 90secs because of a risk-reducing change to the RETB voice protocols. I saw no evidence of this at all. The prime delay cause is radio queueing time, not voice protocol.
 12. The route section between Inverness and Dingwall is intensively used and has only one passing loop at Muir of Ord. This loop is located 12 ½ miles from the Inverness end of double track section and is 5 ½ miles to Dingwall loop. This unequal spacing produces daily problems and has led to the Network Rail (NR) Scotland Route Study including items for a new passing loop on this section and also for conventional resignalling throughout the section between Inverness and Dingwall. These would be carried out during Control Period 6 (i.e. 1 April 2019 and 31 March 2024).



13. Muir of Ord loop is long. The loop entry speed is constrained to 15 mph because of the limitations of the hydro-pneumatic operated points. This low loop-entry speed is bad enough, but is compounded by the requirement to run through the entire loop at that speed, even though a higher speed could be achieved. It is unclear whether this arises from a track limitation (less likely) or an overly simple Train Protection & Warning System (TPWS) application (much more likely). But, whatever the reason, it is another “every little hinders” factor in facilitating disruption minimisation and timetable optimisation.



14. Chapelton Farm User Worked Crossing (UWC) and the immediately adjacent Balvaird Farm footpath UWC presently have insufficient available sighting time required to cross on foot safely, thus making these crossings non-compliant with the National standard and hence both requiring additional mitigation in the form of Miniature Stop Lights (MSL). The new system chosen for this MSL ‘overlay’ – EBIgate - has only just gone through the product acceptance process, reached the required safety integrity level and been awarded its acceptance certificate. Once the MSL overlay has been commissioned at both sites the line speed can be raised. The project is in the process of being delivered.



15. Sandite adhesion improvement applicators exist at various points on the line but have a number of associated issues. Their action can neither be assured nor indicated to the driver. Their locations do not coincide early enough with train braking requirements. Hence, they are largely ineffective and cause delay to every train when low adhesion conditions apply. In view of the prolific lineside vegetation issue this is unacceptable in both risk and performance terms. A prime example is to be seen on the northbound approach to Conon Bridge station where the line runs downhill, through copious vegetation, yet with one Sandite applicator located almost at the station stop itself.
16. As the journey progressed it became abundantly clear that the timetable can only be achieved with a top-performing DMU (i.e. both engines working), no leaf fall, no RETB queueing delays, no request stops, slick station working and no Temporary Speed Restrictions (TSRs). This conjunction rarely occurs in practice.



17. Evanton Token Exchange Point (TEP) has copious vegetation on approach yet has no Sandite applicator.
18. Invergordon is another very long passing loop, again with low speed throughout.
19. Delny is an Automatic Open Crossing Locally monitored (AOCL). The statutory requirements and risk profile for this crossing restrict linespeed to 35mph maximum. But this is on the longest stretch of straight track in Scotland, where the linespeed is otherwise 65mph! Fortunately, there is a plan to upgrade this crossing to an Automatic Barrier Crossing Locally monitored (ABCL) whence the linespeed can be raised to 55mph.
20. Local train services around Inverness are referred to and signed as being within "Invernet". This reflects the fact that the FNL serves multiple passenger markets, one being those who traverse the full route length, which includes the tourists who appear for maybe only 3 months of the year. The other being between Inverness and Tain, reflecting the local needs where frequency and reliability are absolutely paramount. Inverness is a thriving and expanding City and commuting needs should not be underestimated. FNL also attracts the wider Caithness and Sutherland population from the very far North downwards, including Orcadians who use the sea ferry service from Stromness on Orkney to Scrabster on the mainland and then board the FNL at Thurso.
21. Because of the consistently appalling delay problems on FNL, many connections are missed at Inverness, as well as station stops elsewhere being skipped in an attempt to 'recover' the timetable. This produces a presently unquantified cost that should be identified and perhaps used to justify financially some improvements on the line.



22. Ardgay is another very long passing loop, again with low speed throughout.
23. Invershin request stop is a classic example where vegetation growth further restricts the driver's view of whether a boarder requires the train to stop.
24. Rovie ABCL is most unfortunately sited very close to the A839. Consequently the risk of stationary traffic 'blocking back' whilst waiting to join the A839 has so affected the risk profile that the linespeed is reduced from 75mph to just 10mph here.
Unfortunately there is no economical solution to this; it is a consequence of history.
25. At Golspie, in a singularly ironic 'Act of God', a tree has fallen and demolished the Sandite applicator! Rather than replace it, an equally singular decision has been made to employ manual Sandite application using 2 contractor's staff; unfortunately, they are not trained in RETB possession procedures and require additional staff to protect them. This is a striking example of uneconomic practice.
26. Brora is another very long passing loop, again with low speed throughout.
27. Kildonan Open Crossing (OC) is located immediately adjacent to a request stop and so the effect of the Stop Boards for the crossing is largely masked by the speed reduction for the request stop. But, if this stop is closed as is proposed, this crossing should be considered for upgrade to produce a worthwhile timetable improvement.
28. The HITRANS-funded dot matrix, GSM-fed train information display is an excellent example of what can be achieved at the exceptionally low cost of £8k per site. The nature of its simplistic system design is such that delayed trains can sometimes disappear from the display. Nevertheless it illustrates graphically how innovative thinking can give "much for little".



29. It is especially disappointing that the very best stretches of track on the entire route exist where not all trains can take advantage of the high speeds theoretically possible. Lengthy stretches of up to 90mph Continuously Welded Rail (CWR) track have been installed to reduce track maintenance costs, but uphill (predominantly Northbound) trains are underpowered for the route and always fall short by at least 20mph. Also, on one of these stretches lies the request stop of Altnabreac!
30. Whilst some structure-specific PSRs exist on the route, it is not evident that their impact on journey time is of sufficient significance to warrant their elimination.
31. Noted that sometimes coach parties turn up unannounced at rural locations which cause boarding and seating problems.



Thurso station and ticket office, 4 Oct 2016

1. Sometimes TRUST info is not updated promptly when disruption arises, so the first that station staff gets to know is when a rail replacement coach appears outside. Taxis and minibuses are provided if train services are disrupted causing the Thurso stop to be missed. That transport then waits at Georgemas (or other suitable nominated station stop) until the train has arrived, so that passengers are not abandoned to chance.
2. Left luggage lockers were out of order, but unlocked. A possible safety hazard.



3. Schoolboy noted at 12:55 on the line by the overbridge leading to the adjacent Secondary school.

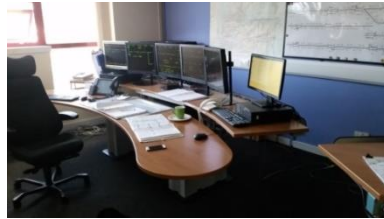
Train meeting Kinbrace to Culrain, 4 Oct 2016

With Frank Roach, HITRANS, who travelled with me from Ardgay to Inverness

- a. 13:06 train used from Thurso. Both engines working. Clean windows. 240v ac charging outlet working. Air conditioning working, catering trolley well stocked and operational, and travelled through the train multiple times, and the operator also cleared rubbish several times.
Dep Thurso 2' late (largely due to 20mph TSR Georgemas to Thurso both directions)
Dep Georgemas 6' late.
Dep Forsinard 12' late (awaiting late Northbound train).
Dep Helmsdale 12' late.
Dep Brora 12' late.
Dep Rogart 12' late.
Dep Lairg 11' late
Dep Ardgay 10' late
Dep Tain 10' late
Dep Invergordon 10' late
Dep Dingwall 8' late
Dep Muir of Ord 7' late
Arr Inverness 7' late.
- b. Noted that Schedule 4 and Schedule 8 payments have risen. These are the compensation payments that train operators receive for the financial impact of planned and unplanned rail service disruption attributable to NR or other train operators.



- c. The RETB Invergordon split is due to go ahead, but ScotRail has objected because of the extra time that it will introduce for the token exchange at that passing loop.



- d. RETB voice protocols are thought to have increased token exchange time from 60 secs to 90 secs.
- e. The baseline (i.e. critical) need for FNL is train service reliability.
- f. Even without service disruption, the very long shifts for Wick traincrew (i.e: 4 ½ hours Southbound, 1 hour break at Inverness, 4 ½ hours Northbound) was a key reason for HITRANS proposing a revised FNL timetable that introduced a Wick-Thurso shuttle service and a traincrew changeover point at Lairg. This timetable proposal has been rejected because ScotRail timetablers say that it cannot be achieved due to the extended RETB token exchange times and the non-availability of a 'spare' Class 158 DMU to operate the shuttle.
- g. A passing loop at Lentrane would cost approx £10M, based on current industry-standard Signalling Equivalent Unit (SEU) figures. As well as for this, CP6 includes an item for replacing the existing RETB signalling between Inverness & Dingwall with conventional multiple aspect signalling (MAS).
- h. CWR has been introduced beneficially at several places by making use of available financial opportunities, rather than it having been necessarily part of an overall route strategy.
- i. Delny level crossing would be replaced with a bridge were the Eastern side 'Mohammed Al Fayed' property development to proceed.
- j. Kinbrace "Branchliner" siding proposal includes passive RETB provision for upgrade to a full passing loop.
- k. The forthcoming 'ReRefurbishment' initiative for Class 158 DMUs will introduce an additional wheelchair space. There is unclarity as to whether that will affect the number of bicycles that can be prebooked on FNL trains.
- l. Vivarail has embarked on a programme to convert ex LUL D-stock trains into DMUs. Such trains would be ideal for the Wick-Thurso shuttle, where their top speed of 60mph would not be a constraint. An add-on order to the production run would be an economical way to provide such.

Inverness Signalling Centre (SC) visit, 5 Oct 2016

With Alex Campbell, Mobile Ops Manager, Network Rail

1. The change to 'RETB2', i.e. digital radio, will take place on FNL on 23 October 2016. The RETB voice protocols will not change.
2. The RETB split at Invergordon will indeed add 1 minute (as controlled tests showed) to the token exchange time at that passing loop. However, it will immediately significantly reduce the channel waiting time at all other token exchange locations throughout FNL and the Kyle line. Furthermore, it will provide an extra 5 maintenance tokens to the system, thereby improving operational capability and



flexibility. Hence, its benefits significantly outweigh its alleged disadvantages and it is difficult to understand why anyone would object to its introduction.

3. The costs quoted for providing Kinbrace siding were £1.5M.
4. Simultaneous dispatch from passing loops cannot be achieved because of RETB limitations (i.e. aside from the RETB system itself only allowing one token issue or release at a time, only one token exchange voice protocol can be done at a time). This adds pressure to timetable achievement. Also, it is evident that the single RETB signaller at Inverness already is working virtually to capacity. However, as noted in point 2, immediately above, the introduction of the RETB system split at Invergordon will allow token exchange to be achieved at each desk simultaneously.
5. At Georgemas a SPAD followed by TPWS intervention occurred due to a driver receiving the wrong token from the signaller and both parties failing to recognise this through the voice protocol, resulting in the train setting off the 'wrong' way. Demonstrated the value of TPWS.



6. The timetable allows only one actual stop at a request stop per section between passing loops. This can cause an immediate problem on the two longest single line sections, i.e. between Helmsdale and Forsinard, and between Forsinard and Georgemas, each of which include two request stops, albeit in unpopulous country.
7. The staffing arrangements on FNL already provide for one spare traincrew; this is how the proposed Wick-Thurso shuttle would have been staffed.
8. Train reliability is stressed by virtue of the high duty cycle required on a daily basis.
9. Contrary to other opinions, joining trains at Dingwall is allowed by the RETB system.



10. Clunes, between Muir of Ord and Inverness, is presently a bidirectional Token Exchange Point (TEP). A loop there would not require an RETB data change. The solum is wide enough for double track at that location, as at Lentrán.
11. Monthly management meetings are held at Inverness to examine FNL performance.
12. Alex is trained in chainsaw use and can tackle minor vegetation infringements.



13. When service disruption occurs, the Inverness signallers pass their train regulation suggestions up the chain to NR's Train Running Control. They in turn pass their considered opinions onwards to Abellio's Train Running Control – who sometimes veto the locally generated recommendations, to what is considered local detriment.
14. There is a palpable air of frustration in the SC due to the long-running and seemingly intractable FNL operating problems.

Inverness train depot visit, 5 Oct 2016

With Derek Glasgow, Abellio ScotRail Train Maintenance Depot Manager

- a. Derek attended a timetabling meeting in Perth very recently, with Frank Roach from HITRANS. The outcome was inconclusive.
- b. The Class 158 DMUs used on FNL endure long shifts (high duty cycle), frequently run into large beasts – principally deer – which can cause significant damage, have problematic power-operated plug doors, and are underpowered (i.e. 350 HP engines vice 400HP engines available elsewhere in Scotland). All of these problems reduce set availability.
- c. Theoretically a set could be made available for a Wick-Thurso shuttle service, but because the sets already are so highly stressed this would reduce contingency cover virtually to zero. A compensatory initiative would be to increase the fitter complement by two, with one possibly being a 'roving' fitter, to allow minor repairs and fault rectification to be performed 'on the road' and at Thurso and Wick.
- d. Noted that Tain to Inverness is the FNL's 'core' market.
- e. It is believed that the present timetable assumes a 90s token exchange time.
- f. The recorded instances of delay causation being due to "Unexplained delay" include many instances of delayed RETB token exchange. It is a valid question to ask whether RETB is still the optimal signalling solution for the line in view of its inherent delays.
- g. The Class 158 DMUs used on FNL are fitted with engine-cooling radiators whose design is fit for purpose only up to an ambient temperature of 23°C. Above that temperature failure is almost inevitable!



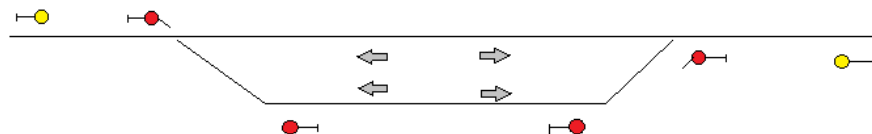
- h. The next "All party" management review meeting has been set up for Platform 4 at Perth station on 9 November 2016. I was duly invited to attend.

Meeting with Stephen Muirhead, Route Asset Manager (Signalling), and Michelle Mullen, Route Asset Manager (Track), NR ScotRail, Glasgow 6 Oct 2016

1. Kinbrace Level Crossing complicates the possible loop signalling design.
2. Kinbrace siding can be implemented signalling-wise without an RETB data change.



3. Some Class 158 DMUs used on FNL have not yet been fitted with the RETB2 digital radio sets, but the operational requirement starts on 23 October 2016!
4. For the Invergordon RETB split, the Alliance Board has agreed to a 1 week trial in January 2017. NR will enact this vice Telent, due to Telent quoting excessive charges for the work. The Solid State Interlocking (SSI) used for the second RETB workstation was formerly used on the East Suffolk line – an good example of economic reuse.
5. Delny AOCL with its current 35mph PSR will be changed to an ABCL in summer 2017. This will enable an immediate PSR improvement to 55mph. The risk issues associated with this particular site preclude a higher PSR. Whilst a change to full Automatic Half Barrier system would have permitted the PSR to be eliminated entirely such that the full 65mph linespeed in this route section could be achieved, this has been ruled out of NR policy because of its significantly adverse effect on the economic case for a possible bridge replacement, which would be the infinitely preferable solution.
6. If the proposed full resignalling between Inverness and Dingwall proves to be uneconomic, then the loop at Lentrán, or thereabouts, could be implemented as an 'island' of automatic conventional signalling. This would permit passing for one of the trains at line speed, unlike the other loops presently on the route. For economy, but with maximum possible operational expediency, this could use a "Westrace" electronic ladder logic interlocking, conventional signals, TPWS, train detection and motorised points. It could use an RETB 'TRCM' device (presently used only to drive the RETB TPWS system) as the means of achieving the non-vital route request input for loop departure, with train detection being used to set incoming routes. Hence, it would need no other modification to the existing RETB signalling system between those two points other than the renaming of the existing adjacent Clunes TEP on the Inverness SC RETB screen. For further economy the signalling arrangements could follow the so-called "Aviemore" solution used on the single line passing loops controlled by Aviemore SC at Slochd, Tomatin and Moy. This provides for the first train arriving to enter the loop and wait, with the subsequent (passing) train proceeding at full line speed. A simplified sketch of the "Aviemore" solution is:



7. Noted that Sandite applicators on FNL are dealt with by an Operations person called the "Sandite season specialist". Michelle will determine this person's identity to enable appropriate questions to be raised arising from my cab ride.
8. The CWR installations around Altnabreac were implemented because track maintenance access is extremely difficult due to the restrictive nature of the "Flow Country" there, and the sparse provision of road access. This initiative was funded from OPEX because that's where the consequent saving was made.
9. Michelle will check on the cause of the excessive 'kick' noted during my cab ride North of Kildonan (which causes drivers to reduce speed by at least 5mph).



10. CP5 track expenditure tackles the existing 'jigsaw' of condition/speed issues between Inverness and Dingwall.
11. Noted that new track costs around £1M per kilometre, and £0.5M per point end. These figures would be used for approximate estimating purposes for any new passing loop or line doubling proposals.



Meeting with Gerry Scott, Area Manager (North), Abellio ScotRail, Glasgow 6 Oct 2016

- a. We discussed the arising issues, especially the possibility of introducing any form of temporary (or "Emergency") FNL timetable that would bring predictability to the service. On the basis that the existing timetable is consistently unworkable, any workable alternative could bring only plaudits, not brickbats. It would demonstrate immediately that there was recognition of the problem by ScotRail, and arrest further expenditure wasted on dealing with the consequences of daily timetable failure.

Discussion on findings *and arising recommendations*

- i. Train availability, reliability and provision
 - a. Engines & cooling system:

Just as on the newly-opened Borders rail link, the 25-year old Class 158 DMUs powered by 350HP engines struggle to maintain time on these hilly rural routes. This struggle results in overheated engines and set failure, and is compounded by a cooling system of demonstrably inadequate design. This problem will not go away without investment and action, either by modifying the current sets or by drafting in replacement, or new, types of DMU that are matched to the task required.

Recommendation: For uprating the FNL Class 158 DMUs with 400HP engines and better radiators to be assessed for viability.
 - b. Plug doors:

The design of the plug doors on the Class 158 DMUs makes them excessively prone to failure, especially in adverse weather conditions.

Recommendation: For this to be further investigated to find a consistent fix.



- c. New trains e.g. Vivarail D-train 'add-on' order:
These trains have been developed by converting ex-London Underground District Line D-stock trains from electric to diesel traction, retaining the existing exceptionally reliable electric traction motors and using modern control systems (e.g. using stop/start technology to control emissions) and radically upgrading the train interiors. They are being manufactured by Vivarail in Warwickshire as 2, 3 or 4 car sets. An optimally economic way to procure these could be to add orders on to the production runs for other operators.

Recommendation: For this possibility to be critically examined.



- d. Release of set for Thurso-Wick shuttle:
The existing Class 158 DMUs allocation at Inverness depot just allows the possibility of drafting one set to the far North to provide a Wick-Thurso shuttle service, as proposed by HITRANS. However, based upon current set reliability, were this to be done, it would be necessary to provide 2 additional train maintenance fitters to ensure that train services over the entire FNL route were not compromised any further by train failures in remote locations.

Recommendation: For the HITRANS proposed improved timetable to be re-examined as soon as possible for feasibility, on the basis of a shuttle DMU set being released from Inverness, together with compensatory mobile or Wick based fitter. This requires a critical re-validation of service assumptions.

ii. RETB system:

a. Invergordon split

The equipment is already in place to provide for this improvement to RETB operation. Its introduction will reduce radio queueing problems, provide greater resilience in signaller workload and double the present line possession capability. However, the addition of 1 minute in the token exchange time at just one location, Invergordon, has been portrayed as an insurmountable problem. It is impossible to understand how one lengthened token exchange time can be seen to outweigh all the benefits overall and especially at the other 18 token exchange locations on the FNL route plus the 6 on the Kyle route!

Recommendation: For the Invergordon RETB split to be introduced permanently without further delay.



b. Digital radios:

The provision of these is referred to as “RET2” and provides GSM-R digital cab radios to replace the analogue “NRN” radios that use a part of the radio frequency spectrum that has to be relinquished by 31 December 2016. The nature of the RET2 radio technology and the associated radio signal coverage arrangements (i.e. transmitter location, power and digital electronic design) means that previous radio ‘black spots’, or borderline radio reception areas have been eliminated, to the consequent benefit of train service reliability. Their introduction is virtually complete.



c. Voice protocols for token exchange:

Before my study, much had been made of each of these having been increased from 60 to 90 seconds, thereby producing a timetabling limitation that could be surmounted neither by the existing timetable nor by the HITRANS proposal. However, I saw no evidence that this was the case, and everyone I spoke to confirmed that it is not a problem in practice. All protocols were followed correctly during my study and there was no case witnessed or related of short cuts being made.

d. Dingwall joining and splitting of trains

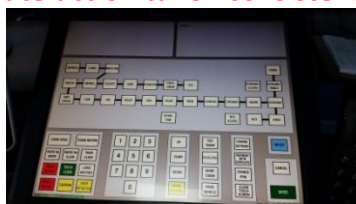
The Sectional Appendix dated 3 September 2016 includes instructions for the joining and splitting of trains at Georgemas. However, for Dingwall it only includes for splitting. Service delay recovery would be improved were joining of trains to be permitted at Dingwall. Opinions vary as to RETB system capability and the legitimacy of this operational procedure at Dingwall.

Recommendation: For this to be clarified and, if not permissible, an examination to be made of the economic benefit of its introduction.

e. Reliability:

The overall system reliability appears to be good, although the delay causation records show that RETB failures are occurring regularly. On the basis that RET2 will improve system performance, and the Invergordon split will reduce system congestion, I believe that these failures will reduce and will not impact on train service reliability significantly.

Recommendation: For RETB system failures to be better monitored, trends identified and appropriate action taken consistently.





iii. Level crossings

a. Chapelton UWC:

This crossing and the immediately adjacent Balvaird Farm footpath UWC will both receive additional risk mitigation in the form of Miniature Stop Lights (MSL). The new system chosen for this MSL 'overlay' – EBIgate – having now been awarded its acceptance certificate will allow the conversion project to proceed. Once the MSL overlay has been commissioned at both sites the line speed can be raised.

Recommendation: For Chapelton and Balvaird Farm UWCs MSL overlay project to be completed asap to enable the valuable linespeed improvement to be made, to the benefit of FNL performance.

b. Delny AOCL:

The present AOCL introduces a 35mph PSR on a 65mph route section. However, the currently planned conversion to ABCL in summer 2017 will reduce that timetable effect significantly by requiring just a 55mph PSR.

Recommendation: For Delny AOCL to ABCL upgrade to proceed to current schedule to enable the valuable linespeed improvement to be made, to the benefit of FNL performance.



c. Kildonan OC:

The immediately adjacent Kildonan request stop is being considered for closure. If that happens, the "STOP" requirement at the crossing will become pivotally restrictive for timetable improvement.

Recommendation: For a plan to be prepared for its upgrade, to permit the highest linespeed economically viable.

d. Borrobol UWC:

This crossing has been fitted with solar-powered, user operated, gate-closers to reduce the likelihood of gates being left open negligently. The crossing is equipped with an astonishing array of signs that might suggest a high probability of confusion in the user's mind!

Recommendation: For this signage arrangement to be re-examined.

iv. Long loop speeds:

The very long passing loops at Muir of Ord, Invergordon, Ardgay and Brora add avoidable journey time, because the loop entry speed – caused by the nature of the hydro-pneumatic points – of 15mph has not to be exceeded throughout the loop.



This appears to be limited not by track condition but by the simplistic application of the TPWS to these loops. Some other rural lines (e.g. Cambrian Coast) have a more comprehensive TPWS application design that allows a higher speed to be reached on these long loops.

Recommendation: For the economic viability of such an upgrade to be considered.

Location	Mileage M Ch	Running lines & speed restrictions		Signalling & Remarks
		15X TRAINS ONLY	OTHER THAN 15X TRAINS	RET B 113 Inverness SC (I)
	56 06 *	80	50	
Ardchornie LC (UWC)	56 40	T	T	
Kincardine Mains LC (UWC)	56 75	T	T	
McNicol's LC (UWC)	57 32	T	T	
Sdg GF		① PP(A) ② sdg	① PP(A) ② sdg	
ARDGAY TEP	57 70	T	T	CL 1430f (435m) (69 SLUs)
	58 03 *	70		① = 15 mph through loop points, in both directions, and over loop lines ② = Permissive arrangements in RETB territory. PP(A) - detaching, for booked movements only

v. Request stops - early warning of boarders:

Presently there is no means to warn train drivers that people wish to board at request stops. So the driver always reduces speed in case he needs to stop and he watches for boarders waving to indicate their wish to board. Dependent upon passenger usage at these stops there are options to provide early warning to drivers. Two examples are:

- For an intending boarder to use the existing "Press to call" telephone a number of minutes before the next train's timetabled arrival time such that the person receiving the call could arrange to notify the driver by radio. Different signage could be displayed to explain this. However, it is highly likely that anything more than very occasional use would not be acceptable because it could interfere with existing duties of the staff involved.
- For an advanced warning light to be displayed to the driver at braking distance each side of the station, to indicate the need to stop. This could take the form of compact, pole-mounted, solar-powered equipment at each advanced warning point, comprising a retro-reflective sign and associated suitably coloured LED light which was approach lit (detected either by rail-mounted treadle or by a traffic-light type radar sensor on the pole for example) showing a steady light for "No stop", and flashing for "Prepare to stop" (and if unlit – due to equipment or power failure – also meaning "Prepare to stop"). The request stop itself would be equipped with suitable signage, a "Request" plunger and an indicator driven from the remote equipment to show that the stop request had been 'accepted' and the advanced warning triggered for the driver. The driver's approach warning LED and the platform indicator would both be extinguished after sufficient time had elapsed for the train to have come to a stand at the platform.

Recommendation: For the procedure for request stop boarders to be improved by e.g. adopting one of the examples above.



vi. TRUST system and CIS:

- a. I was advised by the THURSO station staff that TRUST does not always notify late running sufficiently early to enable passengers to be advised. Yet, the operators of replacement transport during severe disruption get to know much earlier!

Recommendation: For the reasons for this to be investigated and remedied.



- b. The HITRANS-sponsored Customer Information System (CIS) has been introduced at a number of stations. It is entirely self-contained with solar-power and energy storage, GSM radio signal receiver and a strikingly clear magnetic dot-matrix display. It suffers from the limitation that very late trains can cause the display to show “No trains due” or to be blanked.

Recommendation: For a viable way to be found to remove this limitation to an otherwise exemplary and remarkably cost-effective system.

vii. Track:

- a. Unsigned PSRs exist at a considerable number of locations. These add to the route knowledge requirements for drivers and are an additional burden on driver training programmes. They result from earlier trials of this methodology and ‘custom and practice’ appears to have accepted this status. Nevertheless, the fact that this has been raised suggests that it should be re-examined for appropriateness.

Recommendation: For the issue of unsigned PSRs to be further investigated to identify any performance impact that could be viably designed out.

- b. The Kildonan track defect ‘kick’ experienced during my cab ride was surprisingly violent. Indeed, in anticipation of it, the driver felt it necessary to reduce speed. It is unclear why it has been allowed to remain when adjacent recently marked track faults were almost undetectable in ride-quality terms.

Recommendation: For this long-standing defect to be rectified asap.

- c. The provision of the lengthy CWR stretches on the Northerly parts of the route provide exceptional ride quality and at 90mph provide the highest linespeed on the otherwise 75mph, or less, route.

Recommendation: For this progressive track improvement to be continued.

viii. Trespass:

Schoolboy noted at 12:55 on the line by the Janet Street overbridge leading to the adjacent Thurso High school.

Recommendation: For this school to be notified asap and recommended to get a teacher on the bridge from say 10 mins before the lunchtime train arrives and



until just after it has departed. It is said to be a very frequent problem and is an unacceptable hazard.

ix. Vegetation, leaf fall and sanders:

- a. Vegetation proliferation has been allowed to occur to a notable degree. On the basis that farmers use machines attached to their tractors to cut and control the growth of their hedge boundaries it is surprising that such a rail-mounted device has not been suggested for the FNL. Whilst it would not eliminate the leaf fall issue, it would at the very least provide a means to improve visibility and reduce cab window breakages.

Recommendation: For lineside vegetation to be brought under effective control, possibly by providing and using a rail-mounted lineside vegetation cutter.

- b. Sandite applicator positioning does not match the full length of slip-slide incidence locations, especially on downhill sections approaching stopping points. One applicator was said to have been removed to equip a 'higher priority' site on another route, and the one at Golspie was seen to have been demolished by the tree whose very leaves it had been 'protecting' against. In addition, the driver has no indication that these applicators are in operational order and are actually dispensing Sandite. This leads to drivers reducing speed when that might not actually be necessary. It is a fundamentally flawed system.

Recommendation: For the Sandite applicator design to be improved and for them to be placed throughout FNL where they are actually needed to control wheel slide.



x. The "Branchliner" proposal and the Kinbrace passing loop:

The proposed Kinbrace siding for timber loading (the so-called "Branchliner" project) could be augmented to include a passing loop to break up the existing 24 mile section between Helmsdale and Forsinard into 17 and 7 mile sections – not an ideal division, but a significant perceived operational benefit at optimal cost. The adjacent level crossing would require modification to its controls to accommodate the loop.

Recommendation: For the stakeholders to determine the value of introducing a passing loop at Kinbrace.



- xi. Inverness to Muir of Ord route section passing loop:
- a. There has been much discussion on this over many years, with studies conducted and reports issued, with the favoured outcome being a loop at Lentrán. Indeed, the following entries exist in the July 2016 NR Scotland Route Study that include items in this area:

Enhancement of the line between Inverness and Wick/Thurso	
Summary	<p>The following interventions are proposed:</p> <ul style="list-style-type: none">• Inverness to Dingwall - additional loop to provide greater flexibility to pass trains• Dingwall to Invergordon - additional track to provide greater flexibility to pass trains• Re-signalling from Inverness to Dingwall - to replace the existing radio based system with a conventional signalling system arrangement• Georgemas Chord - to create new connection to facilitate a direct service to Thurso without the need to reverse at Georgemas Station. <p>Reconfiguration of Inverness platforms 5-7 may be required to facilitate more frequent services on this section of route. Consideration of these potential changes will need to be factored in to any modifications made to the fuelling facility at Inverness to accommodate new rolling.</p>
Benefits	<p>To meet the forecast 2043 Conditional Outputs, between Inverness and Invergordon, and Inverness and Wick/Thurso. These interventions could also improve the resilience and performance of the network.</p>
Outputs	<p>Contributes towards CC04, CC09, RC01, RC02, RC03 and 1 class 4 or 1 class 6 freight path per hour.</p>

Whilst this shows that two items are currently proposed, i.e. an additional loop in this route section and conventional (meaning non-RETB) resignalling throughout, on grounds of economy I suggest that an alternative approach along the lines I have outlined above at item 6 on page 15 be examined also.

Recommendations:

- ***For an estimate to be produced for introducing an automatically signalled passing loop between Inverness and Muir of Ord, as outlined in point 6 on page 15.***
- ***For the stakeholders to determine which of the following options delivers best value:***
 - i. Resignalling from Inverness to Dingwall with a loop at e.g. Lentrán.***
 - ii. Leaving RETB as is and just introducing a passing loop at e.g. Lentrán***

- xii. Timetable:

- a. On the basis that the existing timetable is consistently unworkable, any workable alternative is urgently needed. It would demonstrate immediately that there was recognition of the problem by ScotRail, and arrest further expenditure wasted on dealing with the consequences of daily timetable failure. Annex 3 is a small sample of the appalling daily service performance.
- Recommendation: For consideration to be given to introducing a trial timetable asap that is more predictable than the existing one, using current resources.***



- b. Coach parties can arrive unannounced at stations and cause train delays whilst they board and find seats. Whilst this is not a frequent problem, it does occur and needs some organisation for forward planning with coach tour operators.

Recommendation: For a method to be determined and enacted that, as far as is reasonably practicable, provides early warning of coach party rail travel requirements.

- c. The assumptions used in the compilation of the present timetable are unclear and appear to need revalidation.

Recommendation: For timetable assumptions to be reviewed for validity, e.g. token exchange times; Wick, Georgemas and Thurso turnback times.

Monday to Saturday		A														P30
		d	-	0710	0710	0710	1010	1010	1010	1341b	1341b	1507	1741b	1941b		
Glasgow Queen Street	d	-	-	0630b	0630b	0630b	0930b	0930b	1010	1336	1336	1437c	1741e	1944		
Edinburgh	d	-	-	0614	0819	0819	0819	1013	1013	1200	1338	1527	1822	2014		
Aberdeen	d	0702	0855	1038	1100	1142	1335	1400	1450	1712	1754	1828	2106	2313		
Inverness	d	0717	0910	1053	1115	1157	1350	1415	1505	1727	1809	1843	2121	2348		
Beaulieu	d	0725	0916	1059	1121	1206	1356	1423	1511	1733	1815	1849	2127	2354		
Muir of Ord	d	0732	0923	1106	-	1213	1403	1431	1518	1741	1823	1857	2134	0001		
Canon Bridge	d	0732	0923	1106	-	1213	1403	1431	1518	1741	1823	1857	2134	0001		
Dingwall	d	0740	0929	1112	1132	1218a	1411	1437	1524	1747	1829	1905	2140	0007		
Garve	d	-	0952	-	1155	-	1433	-	-	-	1853	-	-	-		
Lochfichart	d	-	1000x	-	1203x	-	1442x	-	-	-	1902x	-	-	-		
Achanalt	d	-	1007x	-	1210x	-	1448x	-	-	-	1908x	-	-	-		
Achnashen	d	-	1018	-	1221	-	1500	-	-	-	1920	-	-	-		
Achnashellach	d	-	1037x	-	1240x	-	1518x	-	-	-	1938x	-	-	-		
Strathcarron	d	-	1048	-	1253	-	1530	-	-	-	1949	-	-	-		
Attadale	d	-	1052x	-	1257x	-	1534x	-	-	-	1953x	-	-	-		
Stromeferry	d	-	1105	-	1310	-	1547	-	-	-	2006	-	-	-		
Duncraig	d	-	1113x	-	1318x	-	1555x	-	-	-	2014x	-	-	-		
Plockton	d	-	1117	-	1322	-	1559	-	-	-	2018	-	-	-		
Durfnish	d	-	1121x	-	1326x	-	1603x	-	-	-	2022x	-	-	-		
Kyle of Lochalsh	a	-	1130	-	1335	-	1612	-	-	-	2031	-	-	-		
Alness	d	0752	-	1124	-	-	1449	1536	1759	-	1917	2152	0019			
Invergordon	d	0758	-	1130	-	-	1454	1541a	1804	-	1926	2157	0024			
Fearn	d	0811	-	1142	-	-	1507	-	1817	-	1939	2210	0037			
Tain	d	0817	-	1149	-	-	1513	-	1824	-	1945	2216a	0043a			
Ardgry	d	0833	-	1205	-	-	1529	-	1839a	-	1951	-	-			
Culrain	d	0838x	-	1210x	-	-	1534x	-	-	-	2006x	-	-			
Invershin	d	0839x	-	1211x	-	-	1535x	-	-	-	2007x	-	-			
Lairg	d	0853	-	1221	-	-	1545	-	-	-	2017	-	-			
Rogart	d	0907x	-	1235x	-	-	1559x	-	-	-	2031x	-	-			
Golsple	d	0918	-	1246	-	-	1610	-	-	-	2042	-	-			
Dunrobin Castle	d	0921x	-	1249x	-	-	1613x	-	-	-	-	-	-			
Brora	d	0929	-	1257	-	-	1621	-	-	-	2053	-	-			
Helmsdale	d	0947	-	1312	-	-	1636	-	-	-	2108	-	-			
Kildonan	d	1000x	-	1325x	-	-	1649x	-	-	-	2121x	-	-			
Kinbrace	d	1010x	-	1335x	-	-	1659x	-	-	-	2131x	-	-			
Forinard	d	1021	-	1346	-	-	1712	-	-	-	2142	-	-			
Altnabreac	d	1030x	-	1355x	-	-	1721x	-	-	-	2151x	-	-			
Scotsdale	d	1039x	-	1404x	-	-	1730x	-	-	-	2200x	-	-			
Georgemas Junction	a	1045	-	1410	-	-	1736	-	-	-	2206	-	-			
Georgemas Junction	d	1049	-	1414	-	-	1740	-	-	-	2210	-	-			
Thurso	a	1059	-	1424	-	-	1750	-	-	-	2220	-	-			
Thurso	d	1102	-	1427	-	-	1753	-	-	-	2223	-	-			
Georgemas Junction	a	1112	-	1437	-	-	1803	-	-	-	2233	-	-			
Georgemas Junction	d	1114	-	1439	-	-	1805	-	-	-	2235	-	-			
Wick	a	1131	-	1456	-	-	1822	-	-	-	2252	-	-			

Stations	A														P30
	d	-	-	1110	1438	1438	1438	1645f							
Glasgow Queen Street	d	-	-	1037f	1356	1356	1352	1601							
Edinburgh	d	-	-	1000	1300	1522	1522	1822	1822						
Aberdeen	d	0940	1059	1253	1533	1754	1754	2108							
Inverness	d	0955	1115	1308	1548	1809	1809	2123							
Beaulieu	d	1001	1121	1314	1556	1815	1815	2129							
Muir of Ord	d	1008	1128	1321	1603	1822	1822	2136							
Canon Bridge	d	1014	1134	1327	1609	1831	1833	2142							
Dingwall	d	-	1158	-	-	-	1855	-							
Garve	d	-	1207x	-	-	-	1904x	-							
Lochfichart	d	-	1213x	-	-	-	1910x	-							
Achanalt	d	-	1229	-	-	-	1922	-							
Achnashen	d	-	1247x	-	-	-	1940x	-							
Achnashellach	d	-	1258	-	-	-	1951	-							
Strathcarron	d	-	1302x	-	-	-	1955x	-							
Duncraig	d	-	1315	-	-	-	2008	-							
Plockton	d	-	1323x	-	-	-	2016x	-							
Stromeferry	d	-	1327	-	-	-	2020	-							
Attadale	d	-	1331x	-	-	-	2023x	-							
Kyle of Lochalsh	a	-	1340	-	-	-	2033	-							
Alness	d	1026	-	1339	1621	1843	-	1843	2154						
Invergordon	d	1032	-	1345	1626a	1848	-	1848	2200						
Fearn	d	1044	-	1357	-	1901	-	1901	2212						
Tain	d	1050a	-	1403a	-	1907	-	1907	2218a						
Ardgry	d	-	-	-	-	1923	-	1923	-						
Culrain	d	-	-	-	-	1928x	-	1928x	-						
Invershin	d	-	-	-	-	1929x	-	1929x	-						
Lairg	d	-	-	-	-	1942	-	1942	-						
Golsple	d	-	-	-	-	1956x	-	1956x	-						
Dunrobin Castle	d	-	-	-	-	2007	-	2007	-						
Brora	d	-	-	-	-	2018	-	2018	-						
Helmsdale	d	-	-	-	-	2033	-	2033	-						
Kildonan	d	-	-	-	-	2046x	-	2046x	-						
Kinbrace	d	-	-	-	-	2056x	-	2056x	-						
Forinard	d	-	-	-	-	2107	-	2107	-						
Altnabreac	d	-	-	-	-	2116x	-	2116x	-						
Scotsdale	d	-	-	-	-	2125x	-	2125x	-						
Georgemas Junction	a	-	-	-	-	2131	-	2131	-						
Georgemas Junction	d	-	-	-	-	2135	-	2135	-						
Thurso	a	-	-	-	-	2145	-	2145	-						
Thurso	d	-	-	-	-	2148	-	2148	-						
Georgemas Junction	a	-	-	-	-	2158	-	2158	-						
Georgemas Junction	d	-	-	-	-	2200	-	2200	-						
Wick	a	-	-	-	-	2217	-	2217	-						

Stations	F	A		A	
	d	-	-	1158	-
Glasgow Queen Street	d	-	-	1215 <td>-</td>	-
Edinburgh	d	-	-	1216 <td>-</td>	-
Aberdeen	d	-	-	1226 <td>-</td>	-
Inverness	d	-	-	1230 <td>-</td>	-
Beaulieu	d	-	-	1240 <td>-</td>	-
Muir of Ord	d	-	-	1243 <td>-</td>	-
Canon Bridge	d	-	-	1249x <td>-</td>	-
Dingwall	d	-	-	1259x <td>-</td>	-
Garve	d	-	-	1309 <td>-</td>	-
Lochfichart	d	-	-	1319x <td>-</td>	-
Achanalt	d	-	-	1325x <td>-</td>	-
Achnashen	d	-	-	1332 <td>-</td>	-
Achnashellach	d	-	-	1358 <td>-</td>	-
Strathcarron	d	-	-	1404x <td>-</td>	-
Duncraig	d	-	-	1408 <td>-</td>	-
Plockton	d	-	-	1418x <td>-</td>	-
Stromeferry	d	-	-	1433 <td>-</td>	-
Attadale	d	-	-	1442x <td>-</td>	-
Kyle of Lochalsh	d	-	-	1443x <td>-</td>	-
Alness	d	-	-	1459 <td>-</td>	-
Invergordon	d	1055	-	1408	1505
Fearn	d	1101	-	1414	1511
Tain	d	1114	-	1427	1524
Ardgry	d	1119	-	1432	1530
Culrain	d	-	1020	-	1512
Invershin	d	-	1029x	-	1521x
Lairg	d	-	1031	-	1525
Golsple	d	-	1036x	-	1528x
Dunrobin Castle	d	-	1045	-	1537
Brora	d	-	1057x	-	1549x
Helmsdale	d	-	1103	-	1556
Kildonan	d	-	1112x	-	1605x
Kinbrace	d	-	1131	-	1624
Forinard	d	-	1141x	-	1634x
Altnabreac	d	-	1147x	-	1643x
Scotsdale	d	-	1157	-	1651
Georgemas Junction	d	1135	1220	1445	1543
Georgemas Junction	d	1140	1225	1450	1548
Thurso	d	1148	1232	1457	1555
Thurso	d	1153	1237	1502	1601
Wick	d	1208	1252	1517	1616
Wick	d	1446	1739	1739	1928
Wick	d	1645	1645	1836	1836
Wick	d	1558	1713a	1808a	1941
Wick	d	-	-	-	2218
Wick	d	-	-	-	2219

Stations	Days	D				A				E				Notes
		d	-	-	-	-	-	-	-	-	-	-	-	
Wick	d	-	-	-	-	0618	0802	-	-	-	1234	1600	-	-
Georgemas Junction	a	-	-	-	-	0635	0819	-	-	-	1251	1617	-	-
Georgemas Junction	d	-	-	-	-	0636	0820	-	-	-	1252	1618	-	-
Thurso	a	-	-	-	-	0646	0830	-	-	-	1302	1628	-	-
Thurso	d	-	-	-	-	0650	0834	-	-	-	1306	1632	-	-
Georgemas Junction	a	-	-	-	-	0700	0844	-	-	-	1316	1642	-	-
Georgemas Junction	d	-	-	-	-	0703	0847	-	-	-	1319	1645	-	-
Scotsdale	a	-	-	-	-	0853x	-	-	-	-	1328x	1651x	-	-
Altnabreac	d	-	-	-	-	0903x	-	-	-	-	1339x	1701x	-	-
Forsnhard	d	-	-	-	-	0727	0913	-	-	-	1347	1711	-	-
Kinbrae	d	-	-	-	-	0923x	-	-	-	-	1357x	1721x	-	-
Kildonan	d	-	-	-	-	0933x	-	-	-	-	1407x	1731x	-	-
Helmsdale	d	-	-	-	-	0800	0946	-	-	-	1421	1744	-	-
Bora	d	-	-	-	-	0816	1002	-	-	-	1436	1800	-	-
Dunrobin Castle	d	-	-	-	-	0908	-	-	-	-	1443x	1806x	-	-
Golspie	d	-	-	-	-	0825	1010	-	-	-	1447	1810	-	-
Rogart	d	-	-	-	-	0835x	1022x	-	-	-	1457x	1820x	-	-
Lairg	d	-	0628	-	-	0852	1038	-	-	-	1512	1836	-	-
Invershin	d	-	0637x	-	-	1047x	-	-	-	-	1521x	1845x	-	-
Culrain	d	-	0639x	-	-	1048x	-	-	-	-	1522x	1846x	-	-
Auldgirth	d	0616	0645	-	-	0907	1054	-	-	-	1530	-	1852	1928
Edinburgh	d	0632	0701	-	-	0927	1110	-	-	-	1538	-	1908	1946
Fearn	d	0638	0707	-	-	0929	1116	-	-	-	1553	-	1922	2227
Invergordon	d	0651	0720	-	-	0942	1131	-	-	1550	1606	1925	2005	2244
Altness	d	0657	0726	-	-	0948	1136	-	-	1555	1611	-	2011	2245
Kyle of Lochalsh	d	-	-	-	-	0612	-	-	1208	1346	-	1713	-	-
Dunfirminh	d	-	-	-	-	0624x	-	-	1217x	1355x	-	1722x	-	-
Plockton	d	-	-	-	-	0628	-	-	1221	1359	-	1726	-	-
Bonaweil	d	-	-	-	-	0632x	-	-	1246x	1402x	-	1729x	-	-
Stronaferry	d	-	-	-	-	0640	-	-	1233	1411	-	1738	-	-
Attadale	d	-	-	-	-	0652x	-	-	1245x	1423x	-	1750x	-	-
Strathcarron	d	-	-	-	-	0659	-	-	1252	1430	-	1757	-	-
Achnashellach	d	-	-	-	-	0708x	-	-	1301x	1439x	-	1806x	-	-
Achnashen	d	-	-	-	-	0727	-	-	1320	1501	-	1835	-	-
Achnaft	d	-	-	-	-	0737x	-	-	1330x	1511x	-	1852x	-	-
Lochfichart	d	-	-	-	-	0744x	-	-	1337x	1517x	-	1842x	-	-
Edinburgh	d	-	-	-	-	0754	-	-	1347	1527	-	1852	-	-
Dingwall	d	0710	0739	0817	1001	1153	1245	1410	1550	1610	1626	1919	1941	2024
Canon Bridge	d	0716	0745	0822	1006	1158	1250	1415	1555	1615	1631	1924	-	2029
Muir of Ord	d	0724	0752	0830	1014	1205	1258	1422	1603	1624	1638	1931	1952	2037
Beauly	d	0729	0758	0835	1019	1210	1303	1427	1608	1629	1644	1936	-	2042
Inverness	a	0744	0813	0850	1034	1225	1318	1442	1623	1646	1701	2000	2010	2057
Aberdeen	a	1125	1225	1125	1215	1415	1645	1746	1940	1940	2040	2343	2343	2343
Edinburgh	a	1117	1222	1124	1214	1414	1644	1739	1939	1939	2139	2143	2043	2043
Glasgow Queen Street	a	11150	1213	11151	1418	16180	1810	1910	2045	2045	2045	2343	2343	2343



- d. Unrecorded delays are not being rigorously analysed. This could lead to beneficial remedial action being missed.

Recommendation: For a method to be determined and enacted that analyses presently “unrecorded delays” and permits remedial action to be targeted.

- e. FNL has a significantly diverse palette of users. The present timetable aims to address that with its additional trains that focus on the “Invernet” market. Once the overall FNL service has been brought into a reliable state it is to be expected that usage will rise. The opportunity should be taken to review user needs regularly to optimise community and financial nett benefit.

Recommendation: For a determination to be made of the FNL’s user needs and whether an alternative approach to timetabling would serve them better.

- f. It is disadvantageous to FNL economics that end-to-end journey times in the current timetable are some 30 minutes longer than in around 2000! The train from Inverness to Thurso takes between 3¾ and 4 hours, and to Wick between 4¾ and 4½ hours. Even with 11 stops, the X99 bus service takes only 3 hours from Inverness to Thurso or Wick, whilst driving the same route takes only 2½ hours to Thurso or 2¼ to Wick.

Recommendation: For a single individual to be charged with the task of leading the drive for route improvements that aims, at the very least, within the next 5 years to restore end-to-end FNL journey times to their level in the year 2000.

xiii. Costs of failure:

It is unclear whether, and how, the costs of the consequences of failure are recorded. An analysis of them and of their historical level and trend would enable better targeting and justification of investment.

Recommendation: For the costs of delays and their directly identifiable consequences to be investigated and tabulated for the past 5 years, to be used to assess investment viability better.

xiv. Management:

There is no clarity on who has the authority to make things actually happen. Indeed, despite the frequent discussions on everything that already is known to cause the never-ending FNL problems, there is very little to show for it. If anything, performance is declining still further. There is a lot of good work and analysis ongoing but no apparent focus to bring the system under control, let alone to improve it. This needs urgent attention.

Recommendation: For clarity to be brought to the identity of the action leader at least at local level and for that role to be afforded the necessary authority.

xv. NR philosophy & costs:

- a. The linkage between the current Scotland Route Study and local, and indeed Regional, opinion is unclear. Whilst the bold aspirations within the Scotland



Route Study are most encouraging, there could well be a gap between aspiration and affordability. It is for that reason that alternative proposals and solutions should be considered, such as those within this study.

- b. The reason for the apparently high costs for railway infrastructure changes and investment is worthy of examination and justification, especially in areas where the 'fare box' revenue cannot cover those costs. It is unclear how the costs are built up and only a critical examination of such would enable a reasonable balance to be achieved between cost and available resource.

Recommendation: For NR to choose a sample project from each of the Signalling and Track disciplines and provide a breakdown showing how the apparently high costs are derived.

- c. Several times I heard the phrase "We only do what the Politicians tell us to do". I believe that undue belief in this mantra could lead to local and regional initiative being stifled. Whilst it is undoubtedly true that funds flow according to Parliamentary policy decisions, that fact should not prevent the Industry itself investing time and resource to find more ways to get the same functional outputs for less cost.

Recommendation: For managers at all levels to be encouraged, and provided with the necessary authority, to enable economic incremental improvements to be achieved on FNL within agreed budgets without always waiting for the next major investment that is 'just around the corner'.

Observations

Whilst FNL is an apparently small piece of the National rail network, it is a microcosm of the greater picture, with all of its needs and complexities. However, the Regional and National focus appears to have allowed this rural lifeline to recede into blurred obscurity.

Everyone at local level has a good feel for what could be achieved, were actions identified already to be followed through. They are frustrated at inactivity, the crumbling edge of 'quality' and the avoidable waste of resource daily witnessed.

People at Regional level seem also to be frustrated at the organisational complexity of the Industry, which obscures clarity. That, together with the perceived invisibility of blockers and decision makers (however well-intentioned they may feel themselves to be), means that, at least on FNL, paralysis is rife and regression has overwhelmed progression.

Tony Glazebrook. BSc, CEng, FIET, FIRSE

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Annex 1 – Literature studied

FoFNL Newsletter No 69, September 2016
NR's Scotland Route Study, July 2016
"John Yellowlees List" of salient points in email to me, August 2016
HITRANS "Points North Update", August 2016
HITRANS "Branchliner" project summary
HITRANS "FoFNL Tain" summary PowerPoint
HITRANS "Far North TT+" summary PowerPoint
HITRANS "Scottish Internal Sleeper" project summary
HITRANS "Inverness station masterplan – Platform 4 change" summary PowerPoint
AEATechnology "Sectional running times report", February 2006
Scott Wilson's "Inverness-Dingwall resignalling pre-feasibility report", October 2008
Scott Wilson's "RETB lines S&C upgrade" report, August 2010
"FNL journey times review" spreadsheet from local management meetings, September 2015
"Railway Track Diagrams – Scotland", Trackmaps/Quail
TAP Ltd 2010 Maintenance Drawings, V1.8, Route 203: Inverness-Wick signalling schematics
Radio Electronic Token Block (RETB) Train signalling regs, Issue 3, Jan 2016
RETB voice protocol, Issue 5, Jan 2016
Park Signalling Ltd TRCM brochure - TPWS 'driven' from RETB
Park Signalling Ltd publication PS/BAB-11-001/RPT/013, Draft D, dated 2012 - proposal for RETB module to drive power points et al
Portec Rail (UK) brochure on Traction Gel (i.e. Sandite U5) Applicator
NR's Scotland Sectional Appendix
Alex Campbell's "Weekly on Time working group report"
Action notes from Derek Glasgow's most recent FNL improvement meeting
"Scotsman" article ref 117305218, 21 Sept 2016 on FNL – a "Shambolic" railway

Annex 2 - Acknowledgements (in order of first contact)

Ian Budd for the initial discussion that led to the commissioning of this study
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John Yellowlees for insightful prepositioning based on comprehensive knowledge
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Alex Campbell for warm Highland welcome and thoroughly practical suggestions
Derek Glasgow for wide-ranging discussion and radical suggestions
Steve Muirhead for profound signalling knowledge and enthusiasm for success
Michelle Mullen for profound track knowledge and enthusiasm for success

An intensely positive attitude, unparalleled commitment and boundless patience were very evident qualities in everyone that I was fortunate to meet. The FNL exists because of them.



Annex 3 – Representative “Weekly on Time working group report” extracts

The dates are unimportant - because the results are virtually the same every week

Worst Trains - Rolling 28 Days

Originate

Train	Total Run	Right Time	% Right Time
2H77 21:06 Inverness - Tain	19	3	16%
1A62 21:33 Inverness - Aberdeen	19	8	42%
2H63 10:38 Inverness - Wick	19	9	47%
2H65 18:28 Inverness - Wick	18	9	50%
1T56 20:15 Inverness - Glasgow Queen Street	14	8	57%

Terminate

Train	Total Run	Right Time	% Right Time
1H15 15:07 Glasgow Queen Street - Inverness	19	1	5%
2H62 12:34 Wick - Inverness	19	1	5%
2H74 19:28 Ardgay - Inverness	19	1	5%
2H64 16:00 Wick - Inverness	18	1	6%
2H84 13:46 Kyle Of Lochalsh - Inverness	18	1	6%

Originating Services

Rank	Train Details	Operator	Previous 4 Weeks			Weekly Results			
			Trains	OnTime	%OT	P05_W3	P05_W4	P06_W1	P06_W2
1	2H77 21:06 Inverness - Tain	HA	19	3	16%	20%	20%	0%	25%
2	1A62 21:33 Inverness - Aberdeen	HA	19	8	42%	40%	40%	40%	50%
3	2H63 10:38 Inverness - Wick	HA	19	9	47%	40%	20%	80%	50%
4	2H65 18:28 Inverness - Wick	HA	18	9	50%	60%	100%	20%	25%
5	1T56 20:15 Inverness - Glasgow Queen Street	HA	14	8	57%	#ERROR	80%	40%	50%
6	1B22 10:45 Inverness - Edinburgh	HA	19	11	58%	60%	20%	80%	75%
6	1T99 14:47 Inverness - Glasgow Queen Street	HA	19	11	58%	40%	80%	20%	100%
6	2H73 14:50 Inverness - Invergordon	HA	19	11	58%	40%	60%	60%	75%
9	2H75 17:12 Inverness - Ardgay	HA	19	12	63%	60%	60%	40%	100%
10	2H81 08:55 Inverness - Kyle Of Lochalsh	HA	19	15	79%	80%	80%	60%	100%

Departures

Rank	Train Details	Operator	Previous 4 Weeks			Weekly Results			
			Trains	OnTime	%OT	P05_W3	P05_W4	P06_W1	P06_W2
1	2H86 17:13 Kyle Of Lochalsh - Elgin	HA	16	13	81%	80%	100%	50%	100%

Terminating & Arrivals

Rank	Train Details	Operator	Previous 4 Weeks			Weekly Results			
			Trains	OnTime	%OT	P05_W3	P05_W4	P06_W1	P06_W2
1	1H15 15:07 Glasgow Queen Street - Inverness	HA	19	1	5%	0%	0%	0%	25%
1	2H62 12:34 Wick - Inverness	HA	19	1	5%	0%	0%	20%	0%
1	2H74 19:28 Ardgay - Inverness	HA	19	1	5%	0%	0%	20%	0%
4	2H64 16:00 Wick - Inverness	HA	18	1	6%	0%	0%	20%	0%
4	2H84 13:46 Kyle Of Lochalsh - Inverness	HA	18	1	6%	0%	0%	0%	25%
6	1H53 18:11 Glasgow Queen Street - Inverness	HA	19	2	11%	20%	0%	0%	25%
7	1H13 13:36 Edinburgh - Inverness	HA	19	4	21%	20%	0%	20%	50%
7	2H82 12:08 Kyle Of Lochalsh - Inverness	HA	19	4	21%	0%	40%	0%	50%
9	1A88 19:28 Edinburgh - Inverness	HA	15	4	27%	25%	25%	25%	33%
10	1H11 10:36 Edinburgh - Inverness	HA	19	6	32%	20%	20%	20%	75%
10	1H19 19:44 Edinburgh - Inverness	HA	19	6	32%	40%	20%	0%	75%
10	1H29 10:13 Aberdeen - Inverness	HA	19	6	32%	0%	20%	60%	50%
10	2H76 22:21 Tain - Inverness	HA	19	6	32%	80%	20%	20%	0%