

## Report to Partnership Meeting 8<sup>th</sup> April 2011

### STRATEGY DEVELOPMENT

#### Aberdeen to Inverness Rail Improvement

#### Project Update

#### PURPOSE OF REPORT

To provide Board Members with an update on Network Rail's work on Aberdeen to Inverness Rail Improvement (A2IRI)

#### GRIP 2 REPORT

Recently the GRIP 2 (Guide to Railway Investment Projects) report with appendices has been put on the Transport Scotland website. The summary appears below.

#### Executive Summary

As part of the Network Rail CP4 funding settlement the ORR has allocated a "Tier 3 Development Fund" to allow for the development of a number of rail enhancement projects that could be implemented during the course of CP5.

This desktop study has been undertaken utilising current records with the aim of developing options to create a timetable and supporting infrastructure between Aberdeen and Inverness, to enable the introduction of additional train services on the route (hourly between Aberdeen and Inverness and half hourly services at each end of the route). The requirement also includes the need to reduce the end to end journey time to around 2 hours from the current average of 2 hours 18 minutes.

The route is predominantly single track with passing loops and carries mainly passenger services, although some sections of the route were originally double track.

The study examines nine specific objectives. The first two are core objectives regarding journey time reduction and timetable requirements. The remaining seven objectives are concerned with station infrastructure requirements, the location of dynamic loops and options to improve the A96 road alignment at Inveramsay.

The methodology adopted for the study was to examine the timetable options to deliver an hourly end to end train service, identifying crossing locations, looking in the first instance at the use of existing loop facilities and then to the creation of new loop locations. An analysis of existing track geometry was carried out to determine potential linespeeds and initial Vision modelling has been used to develop the section running times as the basis for the GRIP Stage 2 timetable model.

Three options have been identified that meet the core project objectives. The hourly service pattern was considered in the first instance to identify the key crossing locations and then the half hourly service from Inverness to Elgin and Aberdeen to Inverurie were overlaid.

Option 1 utilises the existing double track section between Inch and Kennethmont as a dynamic loop and requires four new loops and results in an uneven half hourly train service pattern and inefficient use of rolling stock.

Option 2 requires four new loops and demonstrates an inefficient use of rolling stock.

At this stage Option 3, crossing the hourly service at Huntly and Elgin offers the best overall train service pattern and more efficient utilisation of existing and new infrastructure. New loops are required at Kintore and Dalcross for the hourly service to cross and a further two loops between Aberdeen and Dyce and at Forres for the half hourly service.

The timetable development was underpinned by a high level examination of the infrastructure constraints e.g. location of viaducts in relation to crossing locations. More detailed timetable modelling will be carried out through GRIP Stage 3 and will incorporate any updated requirements from GRIP Stage 2. Each objective was examined around the concept of the preferred timetable Option 3 and the requirement that all trains will stop at all stations. These options form the agenda for further examination in GRIP Stage 3.

From examination of the track infrastructure it is known that a key factor in delivering the reduced journey time is that approximately 20% of the plain line track system will require to be renewed because of the limitations of the particular track systems. Other track works will be required and these will be further examined in GRIP Stage 3.

The signalling design for the route assumes that a fundamental requirement will be the elimination of the key token sections between Forres and Nairn and Forres and Elgin as the cumbersome exchange process causes journey time delay and additional stops on the route. The signalling design may also include the design of new loops and extension of existing, new signals, alterations to existing points and lineside equipment. The requirements will be clarified in the next GRIP Stage.

The study included the examination of the options to renew the bridge at Inveramsay on the A96 trunk road. This is a notorious bottleneck on the road and is a known bridge strike location. Options to partially reconstruct the bridge on its existing alignment and replace completely with a new larger structure have been investigated. The options will require the input of Transport Scotland and the highway engineers through GRIP Stage 3, to evaluate the road alignment issues in relation to the structure requirements.

Other engineering disciplines have been examined to identify the key factors to be taken forward or constraints to be examined at the next stage of development. This is on the basis that the timetable will drive the preferred option and the engineering design will validate and underpin the preferred direction.

An initial programme has been developed indicating that GRIP Stage 3, Option Selection report development will be carried out in 2011 and implementation works can be complete in 2016. The estimated costs for delivering all objectives totals circa £203m and this is an all inclusive figure including a 35% contingency allowance and is to +/- 40% quality. The estimate has been prepared using appropriate rates within the Network Rail estimating database and this will be further refined in the next GRIP Stage. GRIP Stage 3, Single Option Selection will examine the range of options in greater depth. The complexity will be in examining the inter-relationships and dependencies between the options to satisfy the objectives.

## 1 Introduction

The project involves the development of a timetable and supporting infrastructure enhancements between Aberdeen and Inverness, to enable the introduction of additional train services on the route and a reduced end to end journey time. Aberdeen to Inverness is a Secondary route section of Route P Scotland East.

This route is predominantly single track and carries mainly passenger services, some seasonal and special charter trains and occasional freight traffic. A number of studies have previously been undertaken however the options identified have been considered either unaffordable or have failed to deliver acceptable solutions.

The Project has undertaken Governance for Railway Investment Projects (GRIP) Stage 2 study to identify the options to be further developed to meet the remit requirements. The proposal for the route is based on the Strategic Transport Projects Review (STPR) undertaken by Consultants on behalf of Transport Scotland to define the most appropriate strategic investments in Scotland's national transport network from 2012 onward. The investments are to support the Scottish Governments purpose of promoting sustainable economic growth by planning the next 20 years of transport enhancements for Scotland's rail and trunk road networks. The STPR includes recommendations on a portfolio of land based interventions which will establish the basis for the ongoing development of Scotland's transport infrastructure. Priorities were based on the outcomes of the National Transport Strategy and these are:

- Improving journey times and connections, to tackle congestion and the lack of integration and connections in transport that impact on the potential for continued economic growth
- Reducing emissions, to tackle the issues of climate change, air quality and health improvement
- Improving quality, accessibility and affordability, to give people a choice of public transport, where availability means better quality transport services and value for money or an alternative to the car.

This project falls within the category Targeted Infrastructure Improvements, New infrastructure projects – to add to the network and increase capacity to meet future needs. The existing train service fails to encourage significant modal shift and stifles opportunities for growth. To support modal shift to rail travel there are aspirations to open two new stations on the route. The lengthening of journey times incurred by the extra stops being offset by the introduction of Class 170 rolling stock to the route and higher line speeds.

### 1.1 History

The Aberdeen to Inverness line was built in three parts:-

- Inverness and Nairn Railway between Inverness and Nairn opened on 5<sup>th</sup> November 1855.
- Inverness and Aberdeen Junction Railway between Nairn and Keith in 1858
- Great North of Scotland Railway between Keith and Aberdeen on 19<sup>th</sup> September 1854, the southern portion (between Port Elphinstone and Aberdeen Waterloo) was built over the route of the Aberdeenshire Canal, the remains of which are now designated as an Ancient Monument.

The first two merged to form the Highland Railway. The Highland Railway operated the line from Inverness to Keith and the Great North operated the line from there to Aberdeen. The Highland was grouped with other railways into the London Midland and Scottish Railway and the Great North was grouped into the London and North Eastern Railway by the Railways Act 1921, before eventually becoming part of British Railways in 1948. Many intermediate stations were closed at various dates in the 1950s and 1960s to both passenger and goods traffic, however although the Beeching Report of 1963 recommended the closure of Inverurie and Insh stations these remain open. Dyce station, also closed in the mid 1960's was reopened in 1984 to serve Aberdeen Airport.

## 1.2 Geography

The Aberdeen to Inverness railway is approximately 108 miles (174 km) long between Aberdeen and Inverness Stations. The railway is mostly single track with passing loops and long single line sections. The current positioning of the loops with long single-line sections constrains the current timetable and future development opportunities. It generally follows the same corridor as the A96 trunk road over the western section of the route from Inverness to Lhanbryde, east of Elgin, but follows an alternative alignment from Lhanbryde to Aberdeen, with the exception of a 3.5 miles (5.5 km) section to the north of Inverurie where the railway is adjacent to the trunk road.

## 1.3 Current Traffic

This route is predominantly single track and carries mainly passenger services, timetabled seasonal and special charter train services and occasional freight traffic beyond Raiths Farm/Kittybrewster Freight Terminal on the northern outskirts of Aberdeen. The current passenger journey times and irregular service between Aberdeen and Inverness does not offer an attractive alternative to road travel. The journey times are presently in the range of 2 hours 12 minutes - 2 hours 28 minutes.

## 1.4 Assumptions

For this stage the following project assumptions have been made:

- Rolling stock to be used on the route will be Class 158 and 170 Diesel Multiple Units (DMU's)
- Class 170's are assumed to give marginally poorer performance and are therefore used to model the timetable in GRIP Stage 2 to illustrate the worst base case
  - All trains travelling between Inverness and Nairn will call at Dalcross
  - Timetable modelling assumes all trains stopping at Kintore to futureproof the evaluation of crossing locations and infrastructure considerations
  - The location proposed within previous studies for Dalcross station will not alter significantly
  - The location proposed within previous studies for Kintore station will not alter significantly
- Reasonable provision of freight capacity will be required but not during peak periods
- Seasonal Charter trains will continue to operate over the route
- No requirement to introduce longer trains/lengthen platforms other than specified
- Trains will call at all existing stations.

## 2 Project Objectives

This is based on robust analysis of the existing and proposed capabilities of the route and the proposed rolling stock on the route. Timetable modelling is required to ensure that infrastructure improvements collectively are the minimum required, least disruptive to implement and most affordable way to deliver the enhanced timetable while delivering a railway that is reliable and cost effective to maintain. This GRIP Stage 2 report does not specify detailed engineering requirements. These will be more accurately defined at GRIP Stage 3 when further timetable modelling work and validation indicates the scope and location of the infrastructure works required to further develop the proposal. The project development to date is based on the objectives outlined in the sections below.

### 2.1 Objective 1: Journey time reduction

Journey time reduction of circa 20 minutes over existing end to end timings: replacing current Class 158 trains with Class 170 trains and maintaining all stops service at the additional new stations. The target end to end journey time is circa 2 hours. If the modelling indicates the train

performance on the enhanced route cannot deliver the end to end journey time of 2 hours with the proposed stopping pattern, the project shall inform the sponsor as soon as is practicable. The project shall determine the line-speed and other infrastructure enhancements required to deliver the specified journey times with the proposed classes of passenger train and stopping pattern for the route, including new stations. The project must ensure slower freight services can operate without delaying the passenger services.

## **2.2 Objective 2: Timetable**

A timetable shall be produced which delivers the end to end journey times, pathing of specified train services and the specified frequency of trains on sections of the route using Class 170 trains in 3 car and 6 car formation. Robust iterative modelling against the proposed enhanced infrastructure will ensure the timetable is deliverable with pathing times and Rules of the Plan (RotP) agreed with the Train Operating Company (TOC). Sensitivity tests will be performed to ensure all infrastructure enhancements are required, with particular attention to flexing train departure times to minimise the requirement for additional passing loop provision.

The project shall ensure freight capacity is integrated into timetable modelling and that the route shall deliver the specified number of freight paths on the whole / part of route. The aspiration is to accommodate enhanced freight train capability c.500m trains. The route is used as a potential diversionary route for Highland Main Line during winter weather and is also used by summer specials and charter trains. The project should ensure that the route will continue to be able to accommodate this traffic with the new timetable.

## **2.3 Objective 3: Dalcross Station**

A new station will be provided at Dalcross. Previous work was carried out by consultants and is to be validated at this stage. The station must accommodate 6 car Class 170 trains. A useable platform length of 150 metres is required with the provision of 20 metre sight line to any platform starter signals. Timetable modelling will determine which option is required based on the following considerations:

- Dalcross Station - Single faced platform on North side of line
- Dalcross Station - Two opposing single faced platforms on a passing loop
- Proposed location for Dalcross Station is on ANI3 between:
  - o East limit at overbridge - 136 miles 850 yards (136.38 miles.chains)
  - o West limit - 136 miles 1014 yards (136.46 miles.chains)
  - o The western limit to any track loop at Dalcross is identified as the level crossing at Dalcross 137 miles 373 yards (137.17 miles.chains)
- Any proposed single platform option must preserve the twin track bed for passive provision or future provision of second line. The currently redundant trackbed is located to the south of the line.

## **2.4 Objective 4: Kintore Station**

Proposal for a new station on a greenfield site at Kintore. The station must accommodate 6 car Class 170 trains. A useable platform length of 150 metres is required with provision of 20 metre sight line to any platform starter signals. Timetable modelling will determine which option is required based on the following considerations:

- Kintore Station - Single faced platform on West (A96) side of railway (preserving twin track bed) or
- Kintore Station - Two opposing single faced platforms on a passing loop.
- Optimise potential for interchange with A96

- The project must take cognisance of proposed housing developments. The old station at Kintore is not to be reopened 116647 – Aberdeen to Inverness Rail Improvement
- Proposed location for station at Kintore is on the ANI1 between
  - o 13 miles 1297 yards (13.59 miles.chains) = north limit at overbridge
  - o 13 miles 1133 yards (13.51 miles.chains) = south limit
- The spare trackbed is located to the east of line for passive provision or future provision of a second line.

## **2.5 Objective 5: Forres layout**

Improve the track layout and signalling through Forres Station to combine dwell time at the platform with the crossing of trains if timetable modelling demonstrates that this is required. The current layout has a curved single faced platform on the reversible single and not on the adjacent passing loop at Forres.

The options considered are as follows:

- Extension of the existing passing loop through the existing curved platform with an additional second curved platform on the loop. Reinstate the original two platform layout on a curved passing loop with improved gauge clearance
- Evaluate the benefits of improving the track layout by removing the tight reverse curvature and 20mph speed restriction through the station and approaches. This may be beneficial for through freight traffic, route capacity and reduced maintenance
- Realignment of the single track with single faced platform on the South side of the straight freight bypass alignment, preserving twin track bed
- Realignment of the track with two opposing single faced platforms on a passing loop using straight freight bypass alignment.

## **2.6 Objective 6: Keith layout**

Improve the track layout and signalling through Keith Station to combine dwell time at the platform with the crossing of trains, if timetable modelling demonstrates that this is required.

The options considered are as below:

- Extension of a passing loop through single faced platform
- Extension of a passing loop through two opposing single faced platforms
- Relocation of the station with two opposing single faced platforms on the existing loop and partial demolition of the existing station. It should be noted that relocation of the station is an aspiration at this stage. Part of the station is used by the preserved Keith & Dufftown Railway, although it is not connected to the mainline.

## **2.7 Objective 7: Dynamic loops**

Consideration is to be given to the provision of dynamic passing loops as necessary and considers the following:

- The design of Switches & Crossings (S&C) are to be optimised to deliver the maximum linespeed achievable by Class 170/ 158 trains entering or leaving the loop, whichever speed is higher, on the route between stations, or including existing station loops, sufficient to enable robust timetable operation.
- Robust timetable modelling must prove the requirement for any dynamic loop or loop extension by demonstrating that flexing departure times will not enable trains to cross in any existing loop. It should be noted that the route between Aberdeen and Keith and also between Dalcross and Inverness were previously double track and the route between Keith and Dalcross was built as single track.

## 2.8 Objective 8: Inveramsay Bridge

Determine the feasibility and costs of providing an improved two lane carriageway to enable an improved A96 alignment underneath the railway. The minimum requirement is to provide improved clearance for HGV vehicles and the elimination of the road traffic lights and single file traffic. It should be noted that the existing masonry underbridge sustains bridge strikes from high vehicles and is a bottleneck on the A96

owing to the traffic lights and traffic chicane through tight bends. The proposed railway alignment should not be degraded and passive provision for twin tracking should be retained. The options to be considered are as follows:

- Provide a new single track bridge structure rated to 100 mph: Full RU loading (BS 5400, or successor Eurocode) with passive provision for future double tracking. The bridge will enable the A96 to be improved and achieve compliance with highway design requirements and railway design standards.
- Provide a new double track bridge structure rated to 100 mph: Full RU loading (BS 5400, or successor Eurocode). The bridge will enable the A96 to be improved and achieve compliance with highway design requirements and railway design standards.

## 2.9 Objective 9: Kittybrewster Ground Frame

Evaluate automation of the ground frame at Kittybrewster to control the turnouts at Kittybrewster Yard leading to the Waterloo branch.

The following options are to be considered:

- Evaluate whether the automation of the ground frame at Kittybrewster is necessary to deliver the route capability to support the proposed train service frequency, timetable and journey times on the Aberdeen to Dyce section of the route
- Develop signalling and control options should automation of the ground frame be necessary.

## RECOMMENDATIONS

1. Members are asked to note the report.
2. Members are asked to approve HITRANS' continued lobbying for funds to be made available to deliver these improvements.

Risk	impact	comment
RTS delivery	√	The Inverness Aberdeen Rail line is identified in the RTS as a priority link in need of improvement and has been subsequently included as an STPR Project
Policy	-	
Financial	-	
Equality	-	

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**Date:** 30<sup>th</sup> March 2011