

Annex A

SUBJECT	DOCUMENT SUBJECT
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1. Commentary and Review of Existing Line

The existing rail infrastructure between Alloa and Dunfermline Town was historically operated as a passenger service, and was closed due to decreased demand over 50 years ago. More recently, the line has operated as a freight route serving the Longannet Power Station, until this was decommissioned in 2016. Since then, the line sees sporadic freight traffic, and is still owned by Network Rail. The routing of the line between Alloa and Dunfermline Town is shown in Figure 1. Existing passenger services in the region include a service between Glasgow Queen Street and Alloa, which increased in frequency to two trains per hour (tph) in each direction from May 2022. Dunfermline Town is served by services operating on the Fife Circle Line with Edinburgh to Cowdenbeath services operating at a frequency of 1tph in each direction, and services between Edinburgh and Glenrothes with Thornton, also operating at a frequency of 1tph. These services follow a similar route, with the Glenrothes with Thornton service effectively an hourly extension of a 2tph service between Edinburgh and Cowdenbeath, albeit with some variations in stopping patterns. The reopening of the line between Alloa and Dunfermline Town for passenger services could potentially serve two purposes: a regional connection between Fife and Glasgow; or a local shuttle to compete with bus and road for those employed or residing along the line. This note will explore potential demand for both of these.

Figure 1: Existing Rail Infrastructure

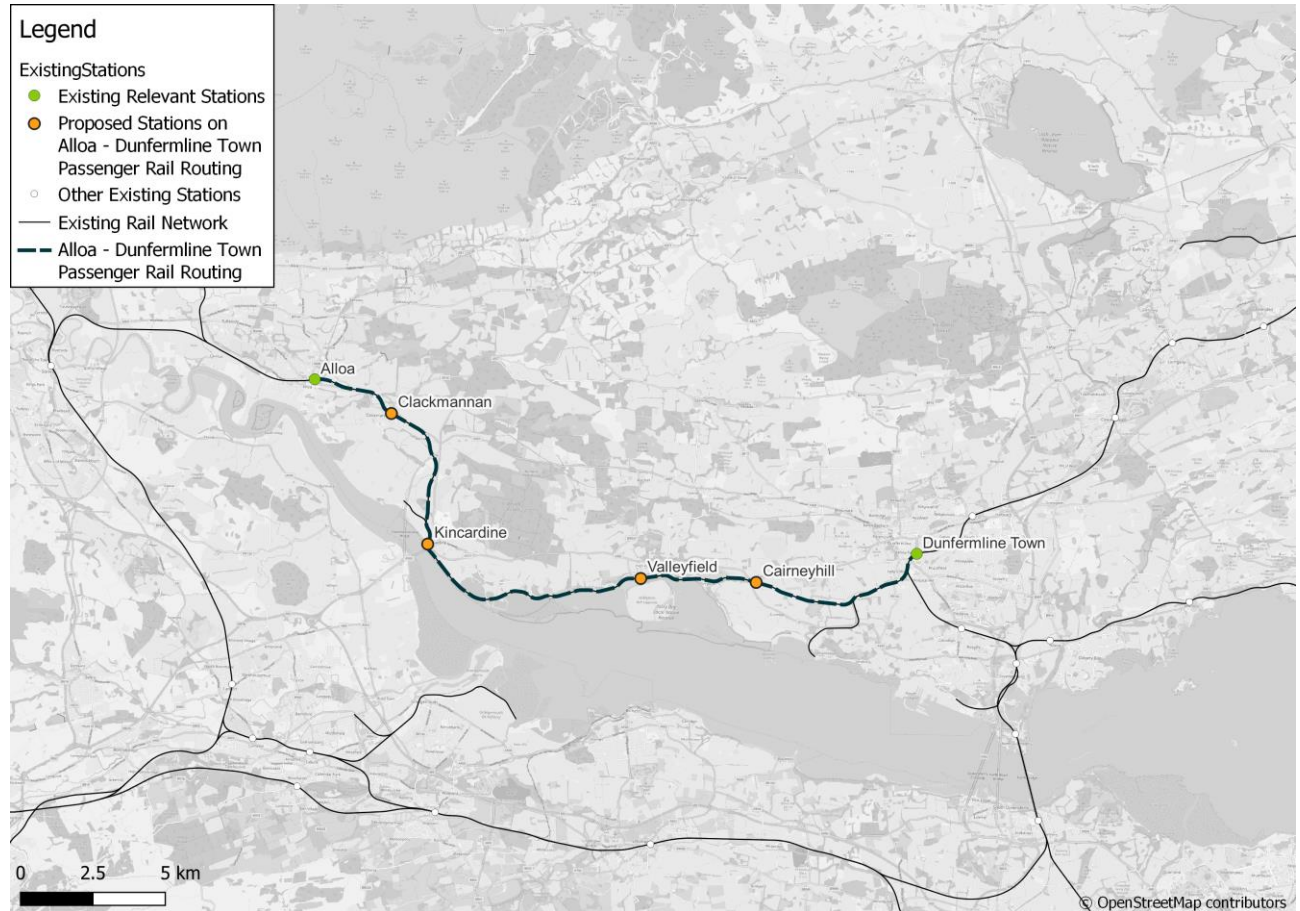


2. Options Considered

This note only considers one routing between Alloa and Dunfermline Town, which is that of the existing but rarely-used freight line. Re-opening the former railway alignment via Oakley is not under consideration.

At this stage, the indicative station locations have been assumed based on centres of population. These are shown in Figure 2.

Figure 2: Proposed Routing and Indicative Station Locations



For the purposes of this review it has been assumed that the service along the line would be an extension of one of the existing Glasgow Queen Street to Alloa services, terminating at Dunfermline Town.

It should be noted that any of the services considered would have to compete with an express bus service (X24 and X27) that operates through Dunfermline and Kincardine to Glasgow, with a journey time of 1hr 11mins from Dunfermline to Glasgow. This is 15 minutes quicker than the indicative journey time by rail from Dunfermline Town to Alloa to Glasgow Queen Street. There is also a greater frequency of buses operating on the Dunfermline – Kincardine – Glasgow route, with services operating every half an hour, in addition to direct connectivity in the opposite direction to Kirkcaldy, St. Andrews and Dundee.

3. Demand & Revenue Analysis

To estimate potential demand at the new stations, a trip-rate approach was used, where demand per population at comparable stations was derived, shown below in Table 1. This was completed using a combination of postcode point data, available from the Office for National Statistics (ONS)¹, and 2011 Census data, obtained from NOMIS². However, the 2011 Census data is now somewhat outdated, meaning that additional factors had to be applied to account for population growth. This was done using National Trip End Model (NTEM) factors to grow from 2011 population to 2021 population, based on the average growth within each LSOA (Lower layer Super Output Area).

1

<https://geoportal.statistics.gov.uk/datasets/1951e70c3cc3483c9e643902d858355b/about>

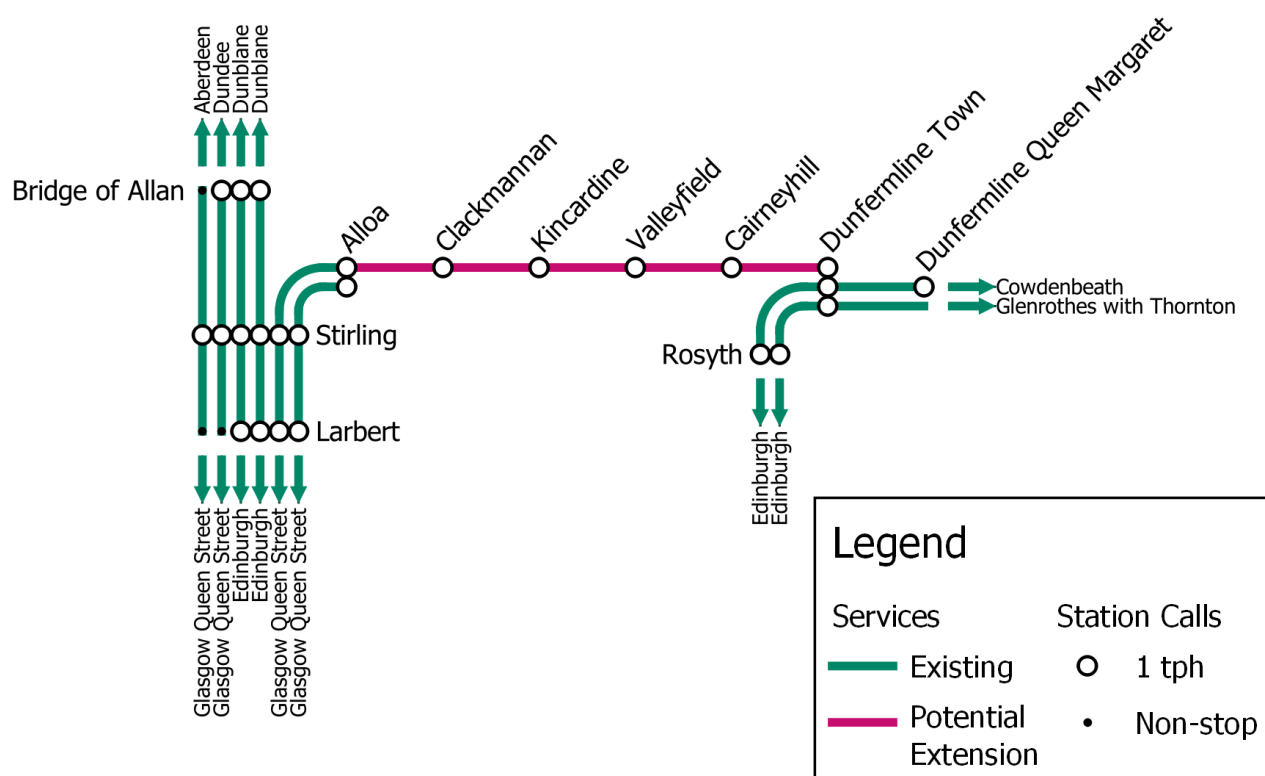
2

<https://www.nomisweb.co.uk/query/construct/summary.asp?mode=construct&version=0&dataset=144>

Following this, a 2km catchment was drawn around comparable existing stations and the proposed station locations. 2km was selected to reflect typical rural station catchment, which is considered proportionate for this stage of appraisal and in line with Scottish Transport Appraisal Guidance. Population falling within two station catchments are assumed to be within the catchment of the closest station, reflecting an assumption that people will use the closest station to their residence. Demand at existing stations was taken from data held within the December 2019 ScotRail version of the MOIRA demand data and forecasting tool. This was modified to reflect the May 2022 level of service between Glasgow Queen Street and Alloa (2tph throughout the day). The May 2022 timetable service provision with the potential Alloa – Dunfermline extension is shown in Figure 3.

Figure 3: Scheme Schematic

May 2022 Timetable plus Potential Alloa-Dunfermline Service



The combination of station demand and population data allowed for the derivation of an estimated trip rate per population within a 2km catchment of each existing comparable station, summarised below in Table 1. A 1tph service is assumed to operate on the re-opened section, hence the trip rate for Alloa in Table 1, below, reflects the demand generated by the December 2019 1tph level of service.

Table 1: Trip Rate for Existing Comparable Stations

Station	Catchment Population	Annual Demand	Trip Rate
Alloa	19,794	380,211	19.21
Cardenden	5,919	46,839	7.91
Cowdenbeath	11,210	149,000	13.29
Dunfermline Town	23,563	604,063	25.64
Glenrothes with Thornton	3,808	76,375	20.06
Lochgelly	8,141	59,907	7.36

Stations in areas local to the proposed line were initially chosen based on their level of service to major regional centres (either Edinburgh or Glasgow). Following this, further evaluation of each station was made based on the journey time to major regional centres and the local catchment population. This exercise demonstrated that the existing station that would likely be most similar to the proposed new stations was Cardenden.

Using a similar method to the trip rate derivation, the average yield (i.e average cost to passenger) for a journey at each station was calculated by dividing the total revenue by the total number of journeys. This average yield, combined with the trip rate, allowed for an estimated revenue impact for each of the proposed stations associated with the reopening of the Alloa – Dunfermline line to passenger traffic. However, this would not account for any abstraction of demand from existing stations, which could lead to double counting of benefits. To account for this abstraction, a reduction in journeys was applied to each station taking high level estimates from previous studies (such as Borders Line), leading to the impacts shown in Table 2 below.

Table 2: New Stations Journeys and Revenue (2010 prices)

Station	Catchment Population	Existing Station Used	Trip Rate	Abstraction Factor	Net Revenue (£000s)	Net New Journeys (000s)
Clackmannan	3,752	Cardenden	7.9	20%	£ Regulation 10(5)(f)	23.8
Kincardine	2,986	Cardenden	7.9	0%	£ Regulation 10(5)(f) -	23.6
Valleyfield	2,849	Cardenden	7.9	0%	£ Regulation 10(5)(f) -	22.5
Cairneyhill	3,517	Cardenden	7.9	0%	£ Regulation 10(5)(f) -	27.8

A high-level exercise was undertaken to determine journey time along the routing, to arrive at indicative timings for this section of track. Using broad assumptions of an average train speed of 40mph, plus an additional 3 minutes added for each stop, a time of 38 minutes from Alloa to Dunfermline Town was derived.

The generation of the journeys and revenue for individual stations, in conjunction with MOIRA runs to estimate revenue impacts to existing stations, allowed for the calculation of the economic impact of the option discussed in **Section 2**, shown below in **Table 3**.

Table 3: Total Revenue Impact (2010 prices)

Option	Total Additional Revenue
Alloa – Dunfermline Town	£ Regulation 10(5)(f)

4. Capital Costs

The existing freight line is currently operational, but only sees sporadic traffic utilising this branch as a diversionary route. Currently, there are no plans for freight usage on this line, however, this could depend on the future land use development of the Longannet Power Station site, which is owned by Scottish Enterprise and Scottish Power. Initial plans were made in December 2019 to convert the site to a train factory³, however, the long-term development of this project has stalled.

There are several areas that must be considered if the line was to be upgraded for passenger services, including:

³ <https://www.bbc.co.uk/news/uk-scotland-scotland-business-50829294>

- The maximum current line speed between Alloa and Dunfermline is 35mph, with much of the line being subject to further speed restrictions due to poor track quality;
- Legacy, basic signalling equipment;
- Lack of passing facilities;
- Lack of intermediate stations;
- Potential re-routing of existing freight services currently running via Stirling, as an upgraded Alloa-Dunfermline line becomes a more viable option for freight; and
- The junction south of Dunfermline Town (Charlestown Junction) only allows trains to change onto the southbound (up) track, with no other crossing points at Dunfermline Town.

A high-level estimate of the capital costs of the work needed to bring the line up to passenger standards has been derived from the consultant's database of similar recent projects such as the Northumberland Line and MetroWest, with a value (in 2010 prices in line with appraisal guidance) of around £Redacted m per platform (4 required – 1 per station) and around £Redacted m per route km. These costs include electrification⁴ as it would be expected any re-opened line would be electrified from the outset, as set out in the Rail Services Decarbonisation Action Plan⁵. This leads to the capital costs presented in Table 4, rounded to the nearest million pounds. These costs do not include optimism bias, which would mean a 60% upscale in estimated capital expenditure at this stage of appraisal.

Table 4: Estimated Capital Costs (£000s, 2010 prices)

Option	Length (km)	New Stations	Estimated Capex
Alloa – Dunfermline Town	27	4	£ Regulation 10(5)(f)

5. Operational Considerations

It is assumed that one of the two trains per hour between Glasgow Queen Street and Alloa would be extended to Dunfermline Town, with any additional services between Glasgow and Alloa terminating at Alloa. The route between Alloa and Dunfermline is primarily single track, therefore an hourly service extension in each direction may require the installation of passing facilities.

Operating costs for the existing Borders Railway line from Edinburgh to Tweedbank were provided by ScotRail, and these were used as a benchmark for the calculation of operating costs along the proposed extension, by calculating the average cost per vehicle kilometre. A summary of the indicative operating costs is provided below in Table 5, with an assumption of 1tph for the extension of services between Alloa and Dunfermline. Network Rail costs have been estimated on a simple route mileage basis.

Table 5: Estimated Operating Costs per annum (£000s, 2010 prices)

Option	Length (km)	Services per day	Estimated Opex
Alloa – Dunfermline Town	27	34	£ Regulation 10(5)(f)

6. Summary

The initial estimate for the operating position of the Alloa – Dunfermline Town reopening is shown below in Table 6. At this stage, it is estimated that an annual subsidy of around £Redacted m (2010 prices) would be required to operate an hourly extension to Dunfermline Town of the existing Glasgow Queen Street – Alloa service. This is in addition to capital costs of over £Redacted m (2010 prices) for investment in line speed and signalling improvements, station infrastructure and electrification. This

⁴

https://www.riagb.org.uk/RIA/Newsroom/Stories/Electrification_Cost_Challenge_Report.aspx

⁵ <https://www.transport.gov.scot/media/47906/rail-services-decarbonisation-action-plan.pdf>

figure does not include optimism bias, which would increase the estimated capital expenditure at this stage of appraisal by 60%.

Table 6: Net TOC operating costs per annum (2010 prices)

Option	Incremental Opex	Incremental Revenue	Subsidy
Alloa – Dunfermline Town	£ Regulation 10(5)(f)	£ Regulation 10(5)(f)	£ Regulation 10(5)(f)