Existing Station Facilities

Project:	Norway High Speed Rail	**To:**	Harald Sundlo
Subject:	Existing Station Facilities	**From:**	Liam McGrath
Date:	30.11.2010	**cc:**	Tom Stillesby, Michael Hayes, Warwick Lowe

1. Introduction

As part of the assessment of location and services of stations/terminals work (Subject 4 of the Market Analysis Contract) for high speed rail (HSR), we have undertaken a review of existing stations. We have looked at station connectivity with local transportation and works that may be required to meet the expectations of HSR. Existing sites will be considered to form part of a potential high speed network in the future. Therefore it is important to understand the works that would be necessary to ensure these stations have the capacity and facilities to meet the expectations of high speed passengers. This includes conditions within the station (an important part of the overall journey experience) and ease of transfer to other modes of transport (the onward journey experience). In order to assess the performance of existing stations, Atkins undertook surveys at the main stations and interviewed station managers on each proposed high speed corridor.

The following areas influencing the passenger experience were studied:

- Capacity and condition of existing station buildings / structures;
- Connectivity with other modes at stations;
- Security;
- Accessibility;
- Ticket purchase and enquiry facilities;
- Waiting facilities; and
- Live information quality.

The facilities on offer have been compared with those available at HSR stations across Europe in order to identify service quality gaps at the stations studied. Works have then been suggested which could address these gaps.

It is likely that the existing locations will represent the best location for high speed services as population and employment density tends to be very high around city centre rail stations, and in most cities intermodal connections are located around railway stations. However, we will also be looking at new locations as part of the separate station locations report. Our demand forecasting model will be set up to test the alternative station locations, which will be assessed in Phase 3 of the Norway High Speed Rail Assessment project.

2. Stations studied

Our modelling work and consideration of location for stations / terminals will recommend new station locations for the proposed HSR network, considering local needs. However, we have identified a number of existing stations on each corridor that will also be candidate sites for the proposed HSR stations. The thirty existing stations considered in this report have been selected based upon:

- Jernebaneverket (JBV) prioritisation of possible stations on corridors (21 October 2010[1]);
- Atkins' own GIS analysis of population and employment accessibility (first stage of analysis); and
- Recommendations from discussions with line managers.

The stations included are presented in Figure 2.1.

Figure 2.1 – Stations studied in this report grouped by corridor (only Norwegian stations studied)

3. High speed rail station expectations

The expectation of quality of station facilities for HSR stations is likely to be higher than exists at current stations. Expectation will be comparable to those of airports – air being the main competing market.

Atkins is currently studying Customer Satisfaction Survey data received 22/11/2010, which seeks to gather the specific expectations of Norwegian passengers. These expectations will inform the main Final Report we are producing regarding station location. Table 3.1 lists the general expectations of high speed rail stations considered in this note.

A matrix of station facility attributes has been created against which existing stations have been compared. The criteria were derived from the UK Passenger Demand Forecasting Handbook (PDFH) and Transport for

[1] Prioritising of possible stations.docx

London's (TfL's) Business Case Design Manual (BCDM) for stations. These attributes are applicable to station quality assessments anywhere in the world. This has enabled us to understand which passengers consider when deciding their mode of transport and are outlined in Table 3.1.

Table 3.1 – Typical features of HSR stations

Subject	Detail	Typical features of a high speed station
Facilities & Buildings	Location	Located within city centre, close to businesses, shops, public buildings and within reach of the maximum population possible. Or major parkway with access to regional road network.
	Platforms	Often multiple platforms with canopies and waiting facilities.
	Building condition	Modern building or restored heritage building in very good structural condition
	Building ambience	High standard of decor, high ceilings and modern appearance
	Shopping facilities	Multiple retailers, preferably serving travelling requirements
	Eating facilities	Multiple places to eat - offering a wide selection of food and refreshments
	Toilets	Multiple toilets with baby changing facilities
	Staff facilities	Staff canteen and accommodation
	Luggage facilities	Luggage lockers to meet demand and / or left luggage facility
Inter-modality	Cycle	Secure cycle parking, cycle paths linking with surrounding urban area
	Bus	High quality bus interchange at station, with heated waiting rooms and information screens
	Car	Large car park easily accessible from local and regional road network, with secure, sheltered facilities.
	Rail	Large number of classic rail services including long distance, regional and local.
	Tram	If tram exists - interchange should be adjacent to station
	Taxi	Taxi rank adjacent to station
	Walking environment	Excellent walking links to surrounding urban area
Security	Visibility of surveillance cameras	Present and visible
	Quality of lighting	Good lighting in all areas allowing high level of visibility
Accessibility	Step free access to platforms	Yes

Subject	Detail	Typical features of a high speed station
	Step free access to facilities	Yes
	WC disabled	Yes
	Information / help points	Information / help points or staff presence
Ticketing	Ticket Office	Ticket office of sufficient size for demand
	Self-service Machines	Ticket purchase and collection machines and ticket validation machines to meet demand
Waiting	Platforms	Platform canopies extend along length of platforms
	Air Quality	Good air quality
	Waiting Rooms	Heated waiting room with ample seats to meet demand
Information	Audibility of PA messages	Clear announcements
	Local information	Local maps and enquires desk
	Directional signing	Good signage throughout station - particularly to multi-modal interchange
	Clocks	Present in all areas
	Staffing	Staff available

4. Station reviews

The station assessments were conducted using data from the Norwegian Rail Network Statement[2], through site visits to the most important stations and through discussion with line managers[3].

Table 4.1 below presents station upgrade requirements by area of service experience, including facilities, inter-modality, accessibility, waiting conditions and ticket purchase.

[2] Norway rail network statement - http://www.comitato.com/V3/3-6-1-2.pdf
[3] Mr. Arne Jakobsen, Mr. Jan Terje Øglend, Mr. Henning Lirhus of NSB

Table 4.1 – Summary of station upgrade requirements

Station	Facilities/Buildings/Security	Inter-modality	Accessibility	Waiting Facilities	Ticketing/Information
Oslo S	Very high quality ambience and station buildings are well heated. High ceilings and high quality materials. Little work required if platform capacity is adequate.	Excellent connections with other modes already exist. Oslo S is the hub of the metro and tram systems connecting to all lines. Bus station adjacent to station. Paid short-term car parking already available – station adjacent to E18 motorway.	High accessibility around station already with travelators to platforms.	High quality waiting areas. However demand induced by high speed network will require more seating.	Currently 17 ticket machines and a small ticket/enquiry office. These will need to be expanded, however this will not require any serious station modification
Bergen	Station consists of a well heated but small waiting room with limited facilities. However most of the space is contained within the main train shed, which has open sides and is exposed to wind to some extent. Buildings date from 1913 and are protected from major alteration. Station shed will need to be enclosed properly to create a weatherproof space large enough for additional demand. Facilities such as toilets and lockers need to be expanded – there is space around the platforms. There is potential space to add platforms.	Major bus terminal adjacent to the station connected by an accessible ramp and lift. Buses provide local and regional connections. Bus station has a relatively poor ambience – could be refurbished as demand increases due to high speed connection. Car parking available at adjacent shopping centre easily accessed from E16. However, it is felt by station managers that car parking could be improved.	Good accessibility exists all around the station already. Compact size reduces walking distances.	Waiting conditions will need to be expanded and improved to provide the high quality experience required. One solution would be to enclose the train shed so that it is heated to a similar standard to Oslo S. More catering and retail facilitates should be provided within the train shed.	The small ticket office and 4 machines will need to be expanded. There is adequate space within the shed and along the edges of the platforms, where there is underutilised space.
Trondheim	Ticket hall and waiting areas are currently being refurbished to improve ambience and as part of a wider local regeneration. More space will be needed within the station structure to allow for expanded facilities. A single wide subway connects the platforms, and this may require augmentation/expansion as demand	Adjoining bus station provides excellent local transport links. However the tram is located ten minutes walk away. The tram line could be extended to the station as part of a wider expansion. Limited parking available. This area of Trondheim used to be difficult to reach but the new	Accessibility to platforms by ramps	Due to construction work waiting area size is reduced. There are no waiting facilities on platforms. HSR services will require more seating.	Inadequate size ticket office and number of machines for HSR demand. Expansion of ticketing facilities required.

Station	Facilities/Buildings/Security	Inter-modality	Accessibility	Waiting Facilities	Ticketing/Information
	increases.	Skansentunnelen link has improved accessibility dramatically improving the case for expanding parking.			
Stavanger	Station building consists of a modern waiting and ticketing hall with high ceilings and is well heated. Platforms have simple canopies and are slightly hidden under concrete superstructure associated with nearby roads and car parking. Space will need to be found for additional facilities accommodation to cater for higher demand. There is space outside currently used for benches that could be developed. Stavanger platforms are at capacity due to stabling of trains. Another location should be found for stabling although nearby the Paradis site is earmarked for development. Possible stabling at Eigersund could solve this problem.	Major bus terminal adjacent to the station, with separate waiting building located across bus entrance. Bus terminal waiting area should be expanded to cope with higher demand from rail passengers. Parking already available above station. Access to major local roads including the Bergelandstunnelen, which connects to the city centre ring road.	Good accessibility already exists.	Present waiting area is very pleasant and meets necessary standards, but may prove to be too small with the additional demand.	Small ticket office and number of ticket machines will need to be expanded. Presently there are ticket machines outside – ideally accommodation would be expanded to this area to provide facilities indoors.
Kristiansand	Currently the station building is too small to accommodate the current demand levels adequately. If HSR is to serve this location the present facilities should be expanded. There is ample space around the site for this expansion.	Very close to important ferry terminal. However, links to local buses are weak. A major bus terminal should be constructed adjacent to the station. Lots of car parking around station and nearby ferry terminal and excellent links exist to the local road network.	Step free access to platforms exists, but cramped ticket hall/waiting area needs expansion.	Waiting areas need significant expansion, including along the platforms.	Ticket hall requires expansion.
Voss	Small scale station – would require a new station building structure to accommodate expanded facilities. Café and kiosk already exist however, and given likely levels of demand	Bus and taxi lay-by outside station already. Just 75 car parking spaces – would need to be expanded to attract railheading.	Accessible platform	Small heated waiting room – would need to be expanded.	HSR demands more ticketing facilities as there is currently just one machine.

Station	Facilities/Buildings/Security	Inter-modality	Accessibility	Waiting Facilities	Ticketing/Information
	these should suffice.				
Hønefoss	Few facilities at this station. Cafe and kiosk facilities are needed and space for luggage lockers and ticket sales. There is ample space on the platform areas (which forms a triangle between two sets of track) to accommodate small scale structures	Nearby bus parking area but without shelters. Small car park – would need to be expanded to meet required demand	Station fully accessible	Small heated waiting room. Would need to be expanded.	Small ticket office – would need to be expanded.
Geilo	Facilities at station serve small tourist market adequately. There is a cafe and heated waiting facilities. The station would need major expansion to serve HSR market.	Bus and taxi stop present, but underdeveloped. Very limited car parking (40 spaces) needs to be expanded.	Station fully accessible	Small waiting room, would require expansion	No ticket machines – facilities require expansion.
Sandnes Sentrum	Sandnes Sentrum is a modern commuter station, which serves its present purpose well, but lacks some of the services required for long distance demand such as luggage facilities and café.	Local transport hub – with sufficient multi-modal facilities. Large bus station adjacent to rail station. Ample car parking.	Platforms fully accessible	Heated waiting room and canopies over platforms. Waiting areas would need to be expanded for HSR market.	Only three ticket machines – more would be required to meet high speed demand.
Arendal	Arendal station is sited at the end of the Arendalbanen branch line and has very limited facilities, driven by low demand (coach journey times are more favourable). Significant investment would be needed to bring this station up to HSR standards.	Taxi rank present. Nearest bus stop 10 minutes walk away. Small number of parking spaces (50).	Step-free access to platform	Small heated waiting room would require expansion.	One ticket vending machine – would require more.
Skien	Skien station has very limited facilities, and would require a major upgrade if it was to serve HSR. The station is located away from the town centre.	There are bus stops outside the station, but no facilities. Taxi rank and car park adjacent to station.	Necessary to cross tracks – accessible over-bridge would be required.	Small heated waiting room would need to be expanded. Platform canopies are not present at the station currently.	There is one ticket machine. A ticket hall would be required if this was to be the HSR station for the Portsgrunn-Skien conurbation.

Station	Facilities/Buildings/Security	Inter-modality	Accessibility	Waiting Facilities	Ticketing/Information
Porsgrunn	Very limited station structures, with new buildings required to host high speed station facilities	Bus stops are located outside station entrance but with limited facilities.	Platforms accessible	Small heated waiting area. No platform canopies so very little waiting space.	Ticket office and ticket machine available – would need significant expansion.
Ski	Small facilities exist to cater for the long distance and commuter trains, which currently serve this station. Toilets, cafe and luggage facilities would need to be expanded for high speed upgrade.	Good parking facilities (425 spaces) already. Bus stranding space available too. Walking links to the West of the station need to be improved	Wheelchair accessible	Heated waiting room and cafe. Also some platform shelter over outdoor benches.	4 ticket vending machines exist, and ticket office. These would need to be extended.
Moss	Station lacks quantity of buildings to host decent waiting accommodation. Platforms require some degree of shelter. Ample space for station development.	Good existing parking facilities and access to major local roads (19 to E6). Limited bus services – could be improved. The ferry link to Horten could be improved.	Outdoor steps used to access platforms 2 and 3. New accessible over-bridge required.	Heated waiting room, but facilities on platforms need to be developed – canopies are required.	Ticket office and 3 ticket machines – more machines would be needed.
Halden	Small waiting building exists but needs new structures to accommodate luggage facilities, café and expanded ticket office. Platforms presently unsheltered.	Limited car parking at present, but space to construct car park to the North of the station. Bus and taxi stop present.	Track crossing to platforms 2 and 3 may require over-bridge if line is to become busier	Small heated waiting room would need to be expanded. Platform canopies should be provided to accommodate more waiting space.	One ticket machine currently. More ticket machines and staffed ticket office required.
Fredrikstad	Modern station building already exists providing good quality waiting and ticket purchase facilities. Toilets and luggage boxes are provided. Some extension of this structure may be required if demand is forecast to increase substantially.	Bus and taxi rank outside station. Large car park available (400+ spaces) although parts of it should be resurfaced and upgraded	Good access to station building (including WC) but requires improved access to platform 2.	Small shelters on platforms should be extended.	Ticket office and ticket machines exist – would need some extension.
Sarpsborg	One platform fit for HSR services but the other would require significant upgrade. Limited facilities, platform	Larger quantity of car parking will probably be needed. Space outside station for bus and taxi	Level crossing to platform 2 will need to be	Expanded waiting room required.	Currently only one ticket machine – more

Station	Facilities/Buildings/Security	Inter-modality	Accessibility	Waiting Facilities	Ticketing/Information
	canopies required. Additional toilets and luggage facilities needed.	pickup. Walking connections to the west need to be improved as the railway siding forms a barrier to local permeability and access to residential areas to the west	replaced by accessible footbridge if traffic increases.		required.
Hamar	Historic station building of architectural significance built in 1896 augmented by modern station buildings - station was refurbished substantially in 1994. Some platform shelter and generally good quality (though small scale) facilities.	Large bus handling capacity (legacy from 1994 Winter Olympics). Fairly large, good quality car park.	Disabled access to all platforms	Small heated waiting area and platform canopies with benches	Two ticket machines and validators, in addition to ticket office would require some expansion
Lillehammer	Historic station building substantially redeveloped prior to 1994 Winter Olympics. Modern waiting areas, platform canopies and cafe. Luggage lockers and toilets provided.	Bus parking and taxi rank already at high standard. Good quality car parking, but of inadequate quantity if this was to attract wider regional demand. Walking access to the east needs to be developed.	High accessibility	Heated waiting room already present. Platform canopies provided already.	Two ticket machines and ticket office currently. More ticket machines required if station's role is to be expanded.
Gjøvik	Station is the terminus of Gjøvikbanen and has facilities on a small scale including cafe, kiosk and luggage boxes. However the station is on a very small scale and would need to have increased accommodation if it was to become a HSR stop.	Located adjacent to centre of Gjøvik with good road links. There is ample space for bus terminal development outside the station. There are presently 60 parking spaces – additional higher quality parking would need to be developed.	Step free access	Small heated waiting room – needs to be larger. Also platform canopies are required.	No ticket machines presently – these need to be provided and accommodated securely.
Gardermoen	Modern spacious platforms under terminal building with all required facilities already provided. As long as the platform capacity exists this station would perform well in its existing state.	Escalator connection to airport terminal and bus station exists	High accessibility	Provided in terminal building	Ticket purchase facilities already exist in sufficient quantity. Ticket barriers exist.
Kongsvinger	Very limited facilities, due to low station usage (9 trains per day). Toilet, small waiting room and kiosk available. Significant works required to bring up	Bus stop outside station. Central location within Kongsvinger – good access to road network. 100 space car	Level crossing to platform 2 may need to be replaced by	Limited sized waiting facilities need to be expanded. Also	No ticket machines presently – these need to be provided and accommodated

Station	Facilities/Buildings/Security	Inter-modality	Accessibility	Waiting Facilities	Ticketing/Information
	to HSR standards. Requires luggage lockers and platform canopies.	park may require expansion.	accessible over-bridge	platform canopies should be provided.	securely.
Lillestrøm	Modern station developed to serve existing HSR services to Gardermoen airport. Passageway underneath platforms contains all the necessary facilities for a HSR station, including cafe, shops and waiting areas.	Large bus station adjacent to the existing station provides very good interchange facility. No further works required	Excellent access via lifts to all areas	Waiting facilities provided and in adequate supply. Platforms are sheltered.	Ticket office and ample ticket machines provided.
Drammen	Station has necessary facilities including kiosk and luggage lockers as well as platform shelters and a waiting area. However the station building is overcrowded and needs to be expanded.	Bus station adjacent to ticket office currently being redeveloped (November 2010). Parking facilities need to be expanded. Large number of rail services form Drammen. There are local trains to Oslo, Kongsberg and Eidsvoll as well as intercity trains to Stavanger and Bergen. Flytoget HSR service to Gardermoen airport via Oslo S terminates here.	Good quality access except outside the station, which is being redeveloped	Main heated waiting area suffers from overcrowding today and will need to be expanded to accommodate greater levels of demand. Platforms are sheltered.	Ticket sales are currently conducted outside the front of the station, due to lack of space in the main building. A more permanent ticket office is required.
Lysaker	Very modern station recently redeveloped as part of the four tracking between Lysaker and Asker. Excellent facilities suitable for HSR expansion. One of the largest stations in Norway, this serves the Western Oslo suburbs and is a major interchange.	Major bus terminal, taxi facilities. Excellent multi-modal interchange.	Fully accessible station. However, curved platforms may present accessibility issue boarding trains.	Excellent waiting facilities and platform shelters.	High quality information and ticket purchase facilities.
Asker	Modern station with facilities expected of a HSR station and local interchange	Excellent local bus interchange adjacent to platforms. Location next to E18 makes this a perfect site for a major parkway station – so parking facilities could be expanded and land is available adjacent to existing parking.	Fully accessible.	Heated waiting areas, and sheltered platforms	Ample ticket facilities.
Heimdal	Most important Trondheim commuter	Bus and taxi facilities outside	Fully accessible	Small heated	No ticket machines

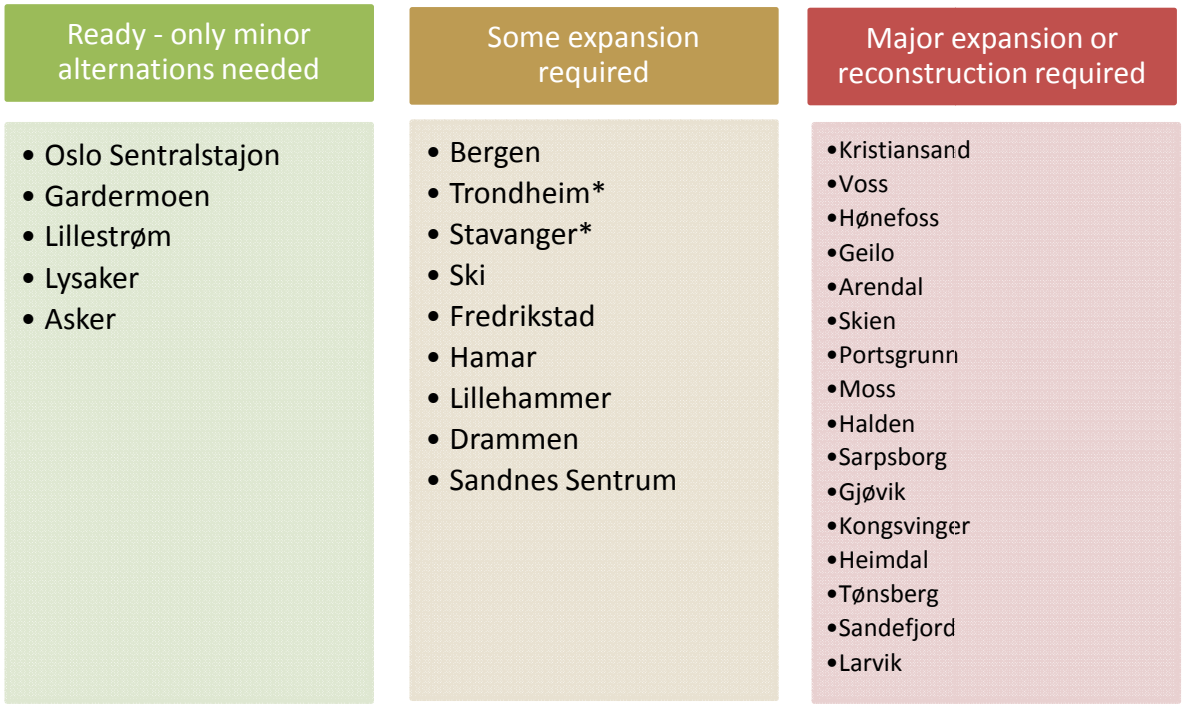
Station	Facilities/Buildings/Security	Inter-modality	Accessibility	Waiting Facilities	Ticketing/Information
	rail station, lacks the facilities that would be needed for a HSR interchange. However kiosk and toilets are present.	station. Bus stands would need to be improved to make this into a local transport hub. More parking is required around the station as there are currently only 50 spaces.		waiting area. No platform canopy.	presently – these need to be provided and accommodated securely.
Tønsberg	Station buildings are fairly modern and house the necessary facilities, albeit on a small scale, for a HSR station. Includes cafe and kiosk as well as luggage storage.	Bus and taxi rank adjacent to station. Large (200 spaces) good quality car park next to station.	Platforms accessible via lifts	Platform canopies and heated waiting room provided.	3 ticket machines – more would be needed if extra services called here.
Sandefjord	Basic facilities in small building: WC, kiosk and waiting room. Requires significant upgrade.	Taxi lay-by in front of station. Bus station across road. Ferry link 600m (to Strømstad, Sweden). Car parking around the station (200 spaces) is adequate.	Level crossing to platform 2 may need to be replaced by accessible over-bridge.	Limited, so new waiting room and platform canopies required.	Currently two ticket machines – more would be needed and would need space to be accommodated.
Larvik	Basic facilities in small building: WC, kiosk and waiting room. Requires significant upgrade.	Bus and taxi stop outside station. Some parking (50 spaces) – needs to be increased. Vacant land to the west of the station could be used.	Level crossing to platform 2 may need to be replaced by accessible over-bridge.	Limited – some platform shelters but upgrade needed.	Currently two ticket machines – more would be needed and would need space to be accommodated.

5. Conclusions

Thirty stations have been assessed to understand their state of readiness for the potential introduction of HSR services in terms of facilities and modal access. Some stations, generally in the Oslo area, already have the necessary facilities and capacity to accommodate an expanded HSR network. However, these facilities are currently not on a large enough scale to handle the additional demand anticipated (although this has not been quantitatively assessed as demand forecasts are not yet available).

Figure 5.1 categorises the stations studied into three classes according to the level of investment required to bring the station up to the standards expected for HSR demand. The stations considered to be ready (indicated in green), which are located exclusively on the Asker - Gardermoen route, have excellent station facilities and a multitude of intermodal connections. Typically they are local transport hubs, and have a number of retail facilities. The stations listed under the amber heading require some expansion and are typically at the centre of a local transport hub, but lack the high-end facilities needed for potential future HSR demand (e.g. retail variety, high quality waiting facilities, large ticket offices). These stations would require expansion to cope with the additional demand of HSR services. The stations listed in red require major expansion and are currently very minor stations.

Figure 5.1 – Conclusions on state of readiness for high speed rail demand



*Major development already planned at these stations

5.1 Next steps

This review of existing station facilities will help inform the HSR station options. Exisitng locations with well developed facilities, and in particular excellent intermodal connections, are likely to be strong candidates for HSR stations. For stations with poorer connections, and currently of smaller

scale it is probable that an entirely new station will be developed on a different site. Consideration of potential locations, as well as the impact on demand of intermediate stops will inform the need for upgrade of some or all of these stations.