OPDC
OLD OAK AND PARK ROYAL DEVELOPMENT CORPORATION

North Acton Station Feasibility Study

LOCAL PLAN SUPPORTING STUDY

2017

MAYOR OF LONDON

29. North Acton Station Feasibility Study

Document Title	North Acton Station Feasibility Study
Lead Author	Steer Davies Gleave
Purpose of the Study	This study investigates the options for enhancing the capacity and accessibility of North Acton station and the options for improving the permeability of the site.
Key outputs	• A phased delivery plan which includes making the station DDA compliant, increasing the capacity of the station and providing a connection to the station from the north.
Key recommendations	• North Acton station is expected to be subject to significant additional demand due to the large scale development that will surround the station. • The existing station is already straining under current demand. As such reconfiguration to provide both additional capacity and step free access is key. • Providing access to the station from the north is fundamental as development comes forward.
Relations to other studies	Interfaces with the Old Oak Strategic Transport Study and the Park Royal Transport Strategy
Relevant Local Plan Policies and Chapters	• Interfaces with the Old Oak Strategic Transport Study and the Park Royal Transport Strategy

steer davies gleave

Gensler

gardiner theobald

North Acton Interchange

Final Report

Transport for London

January 2016

1 Introduction

1 Introduction

Introduction

Steer Davies Gleave have been commissioned by Transport for London (TfL) to lead a project team with Gensler (Architects) and Gardiner and Theobald (Quantity Surveyors) to assist TfL, London Borough of Ealing (LBE), the Old Oak and Park Royal Development Corporation (OPDC) and the Greater London Authority (GLA) in identifying the most effective solution for upgrading North Acton Station.

The client group are keen to understand the potential options for upgrading and/or rebuilding the London Underground North Acton station in the west of London. The location of the station within the Old Oak and Park Royal Opportunity Area means that the station is expected to be subject to a significant and rapid increase in demand in the forthcoming years. Potentially three to four times as many passengers are predicted to use the station. Its upgrading is key to unlocking the permeability of the area and optimising interchange with other nearby services including the proposed High Speed 2/Crossrail and Overground stations as well as local bus services, and walking and cycling.

Scope

The study therefore includes a number of elements to address those challenges as detailed below:

- Identifying and assessing a range of options to improve:
  - Capacity;
  - Step free access;
  - Operations; and
  - Ensure that the station adds to the wider permeability of the OPDC area, including infrastructure interventions to the north to the HS2 'sword' site.
- Assess the benefits of moving the station (including moving the ticket hall / entrance, creating new entrances or relocating both ticket hall and platforms) to unlock the permeability and enhance the role as a development catalyst;
- Assess high quality public realm options that integrate with local open spaces and the environmental aspirations for the area; and
- Assess potential commercial opportunities and over site developments (OSD) within, over and near the station premises.

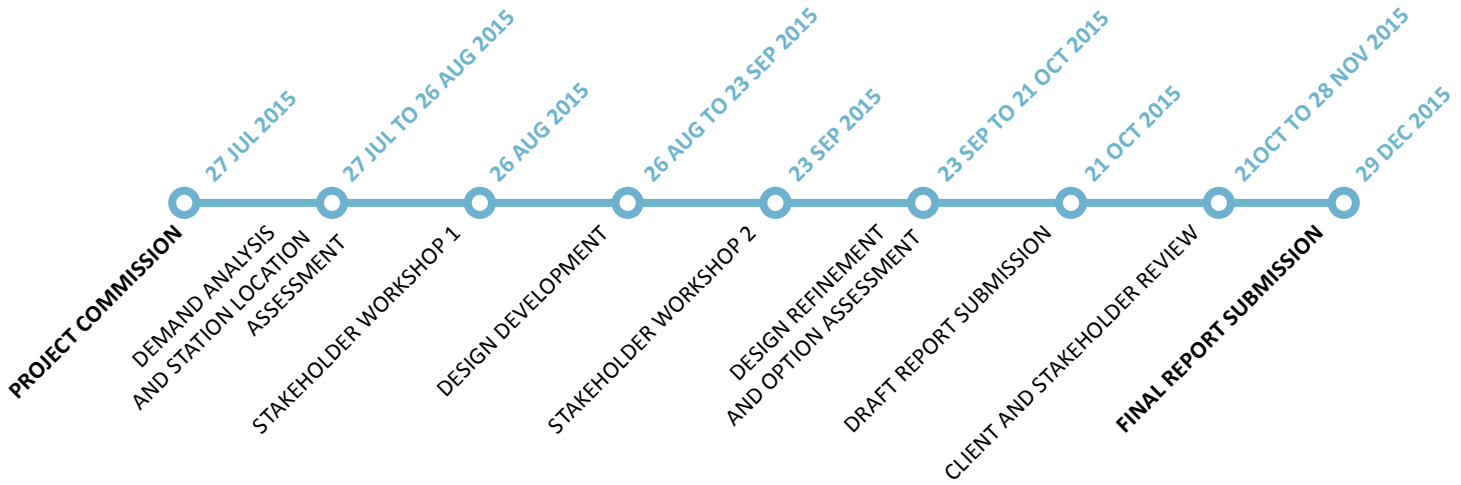
This study has therefore addressed these elements which are presented within this report.

Previous Studies

Providing step free access (SFA) at North Acton station has been investigated in two previous studies with slightly different briefs, looking at how to introduce SFA (2007 SFA & upgrade study) and quick wins to improve the station (2012 SFA & upgrade study). These were both valuable at the time and for this project, however the briefs for the previous studies were focused on the station itself and less so on how it interacts with the wider area, particularly to best support and unlock future development. A focus of this study is to combine both the external factors and accommodating passenger demand within the internal station configuration.

Timescales

The project has a five month programme to develop pre-feasibility designs and indicative costings. To ensure that advice and comments from stakeholders have been incorporated into the design proposals, two stakeholder workshops were held. These are shown within the programme.



2 Strategic Transport Context

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Policy Context

North Acton is situated within the London Borough of Ealing. This section presents the local planning policies in the context of the proposals for North Acton station.

Old Oak and Park Royal Development Corporation (OPDC)

The area of Old Oak and Park Royal is set to be transformed through the creation of a transport super-hub at Old Oak Common, linking Crossrail, High Speed 2 and London Overground services. The station, which will be the size of London Waterloo, will have unprecedented connections – just 10 minutes from Central London and Heathrow Airport and 40 minutes from Birmingham.

Launched in April 2015, the OPDC's purpose is to use the once-in-a-lifetime opportunity of investment in HS2 and Crossrail to develop an exemplar community and new centre in north-west London, creating opportunities for local people and driving innovation and growth in London and the UK.

The OPDC is the local planning authority for the area around and including Old Oak and Park Royal, and is responsible for the preparation of planning policy, including the production of the Development Plan (including the Local Plan) and setting and charging Community Infrastructure Levy (CIL).

Old Oak and Park Royal Opportunity Area Planning Framework (2015)

The Old Oak and Park Royal Opportunity Area Planning Framework (OAPF) sets out a proactive strategy to capitalise on the future step change in transport accessibility to redevelop Old Oak and regenerate Park Royal. The document:

- provides guidance on desired land uses, infrastructure requirements and urban design measures necessary to deliver a quality new neighbourhood;
- looks at ways to maximise the considerable investment presented by the delivery of a significant new HS2/Crossrail interchange, to facilitate large scale regeneration of this area (25,500 homes and 65,000 jobs);
- explores how the Old Oak Common High Speed 2 station and surrounding development could be properly integrated with surrounding neighbourhoods, communities and town centres; and
- helps to foster new and improved partnership working between the Mayor, local Councils, transport providers, central Government, land owners, local residents and businesses and potential investors to ensure the preparation of a robust and deliverable plan.

Ealing: Core Strategy (2012)

The Development Strategy 2026 (also known as the Core Strategy DPD) sets out a vision for the future development of the borough and covers a 15-year plan period up to 2026. It considers how the borough fits into the 'bigger London picture' as well as what will deliver the borough's vision. It will affect how, where and when the Council will:

- enable new housing;
- create new jobs;
- protect green spaces and our heritage;
- provide community facilities; and
- ensure transport services are as they should be.

Policy 3.4 of the Core Strategy refers directly to the Southern Gateway area of Park Royal encompassing North Acton station. The Southern Gateway is a mixed-use development area including high-density housing. The policy seeks to transform the area into a lively and liveable place – recognisable, attractive and providing the facilities, services and high quality environment the area currently lacks. The key aims of Policy 3.4 are illustrated below:

- To create an improved southern gateway to Park Royal, with efficient movement to and from the strategic industrial location and clear, safe routes between the tube, buses, heavy goods vehicles and the surrounding area and an important focal point for business in its own right, with up to 2,000 potential office jobs. This could lead to 1,500 residential units in a place where residents choose to live, because it is convenient and has good facilities and a decent environment.

- To redevelop North Acton station and environs with a mix of commercial development and in a setting at Victoria Road with shops, restaurants, cafes and leisure to support the gateway and the wider Park Royal area, and improved bus, cycle and pedestrian facilities and access routes.
- To create a network of green space, with safe, attractive footpaths and featuring at least two new public open spaces.

LB Ealing: Corporate Plan (2014-18)

LB Ealing's Corporate Plan sets priorities for the borough, including Priority 6 as 'an accessible borough'. Here it specifies that LB Ealing will work with TfL, Crossrail and Network Rail to improve all stations within the borough, including North Acton, to make them more accessible to the public with higher frequencies throughout the week. It is intended to provide a cycle hub at North Acton to enhance the number of linked sustainable trips.

LB Ealing: Local Implementation Plan (LIP): Transport Delivery (2014-17)

LB Ealing's LIP identifies North Acton to be located within Corridor 3 that covers the Acton north-south corridor. Schemes within Corridor 3 will be funded by S106, Regeneration and Crossrail funding between 2015-17 that will improve the street scene and will link with initiatives for North Acton and Acton Mainline stations.

TfL: Old Oak Common: Strategic Transport Study (2015)

TfL published the Old Oak Common Transport Strategy in February 2015. It highlights the poor access to the station due to a lack of safe and appropriate routes. Currently North Acton is the least busy station in the ODPC area in terms of footfall, in comparison to Willesden Junction and Kensal Green, with 2,600 passengers on average currently passing through the station between 07:00 – 10:00 on an average weekday. However, this number will significantly rise in the future with projected population growth and the level of nearby committed developments. Issues related to platform overcrowding will therefore need to be addressed, with recommended initiatives suggested as part of the Transport Study. The study notes that North Acton is a popular interchange point for passengers from TfL bus services onto LU Central Line services.

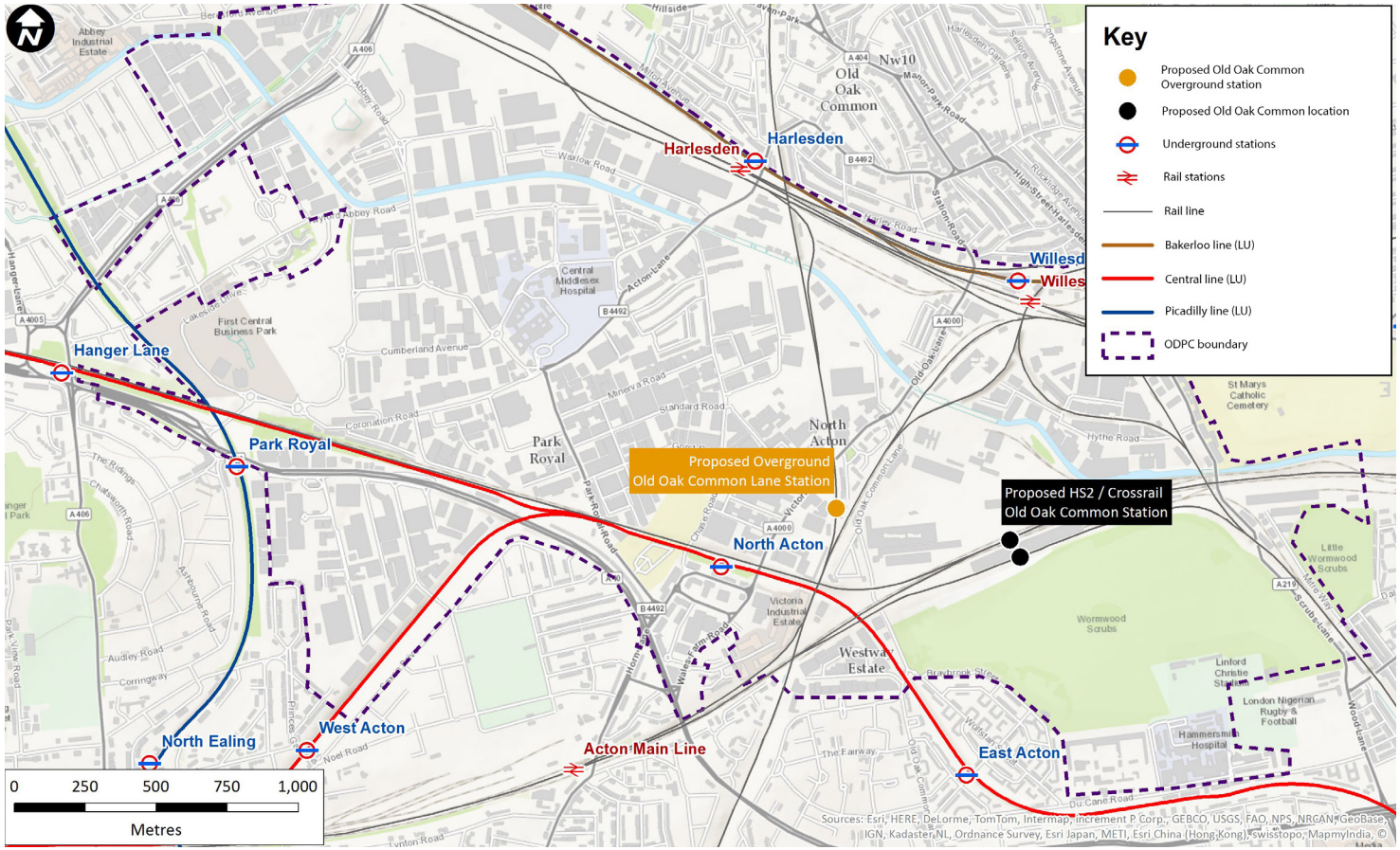


Figure 2.1: North Acton Strategic Transport Context

Existing public transport in the area

North Acton Station provides services on the Central line and is one of the stations to be part of the proposed Night tube programme with 24 hour running on Friday and Saturday nights. It is the westernmost Central line station before the service divides, with services northwest to West Ruislip and services southwest to Ealing Broadway.

The area around North Acton has a number of different public transport services as shown in Figure 2.1 and Tables 2.1 and 2.2.

In addition, the indicative future masterplan is provided in Figure 2.2.

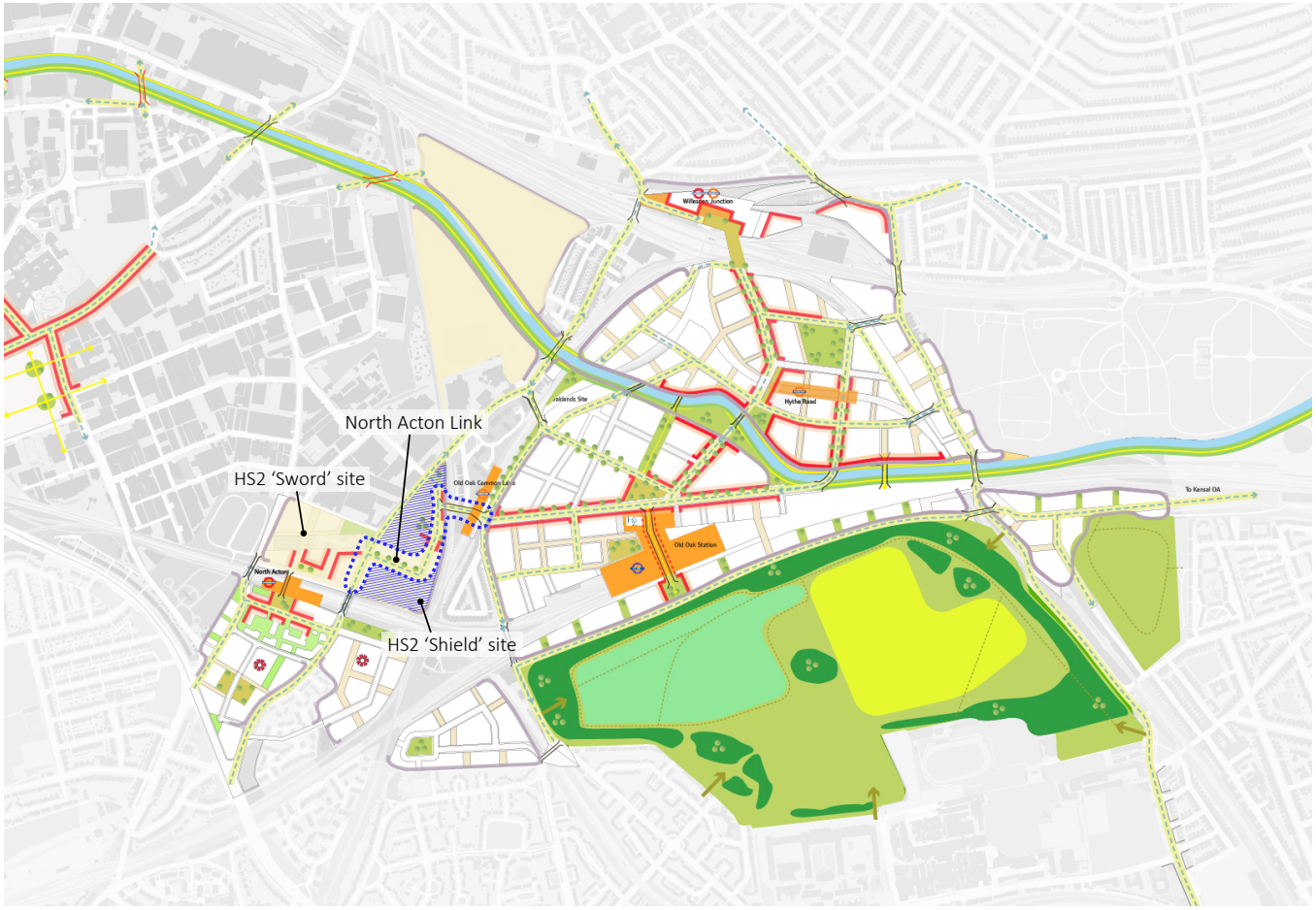


Figure 2.2: Indicative OPDC masterplan

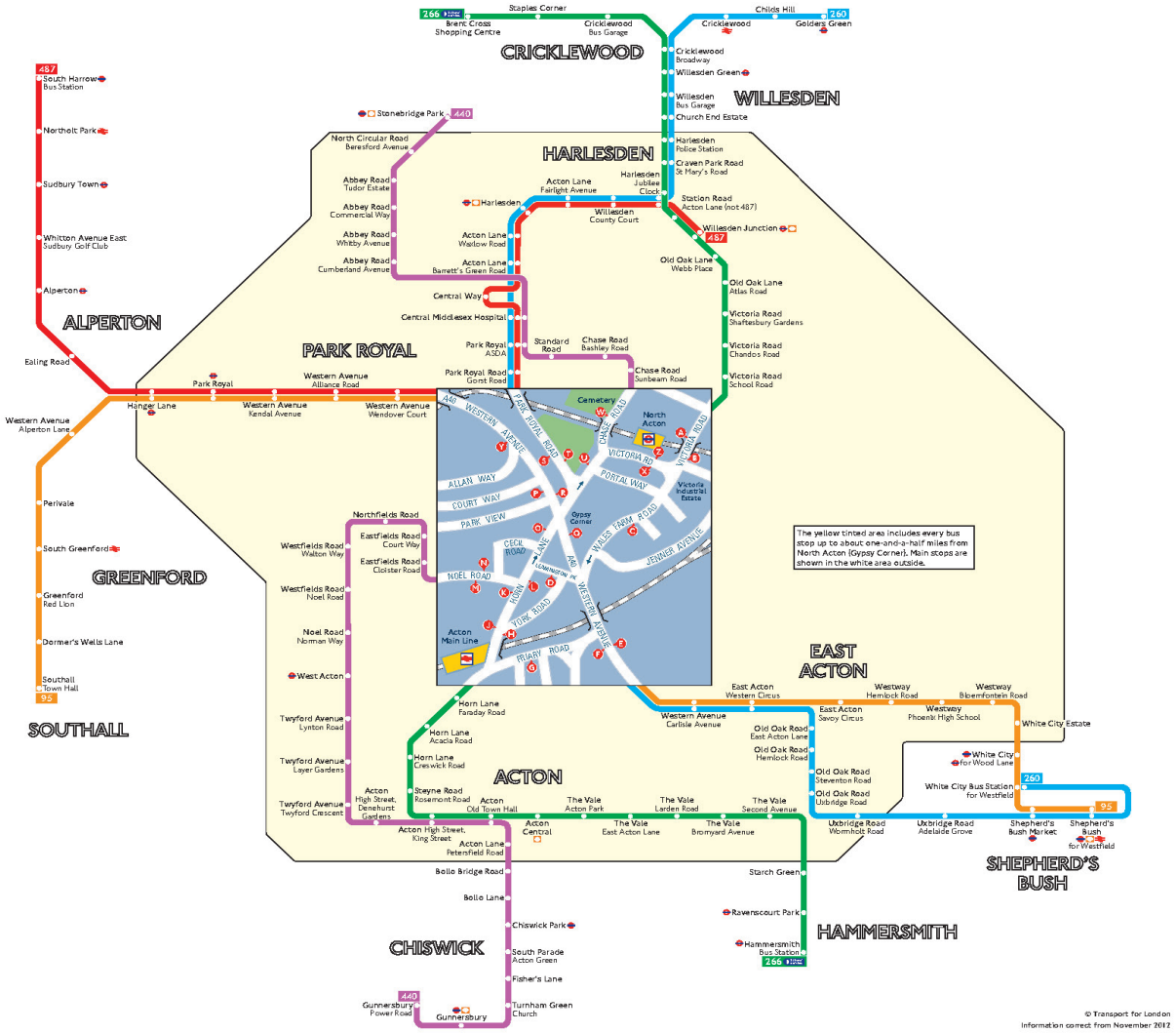
Table 2.1: Public Transport Services within vicinity of North Acton Station

Station	Daily Station Footfall	Walk Distance from North Acton Station	Service	Frequency (per hour)
Acton Main Line	-	800m (10 minute walk)	London Paddington	2
			Greenford	2
Willesden Junction	33152	1.5km (20 minute walk)	Watford Junction (London Overground)	3
			Euston (London Overground)	3
			Richmond (London Overground)	4
			Stratford (London Overground)	6
			Clapham Junction (London Overground)	4
			Harrow and Wealdstone/Stonebridge Park - Elephant and Castle (Bakerloo line)	10
Harlesden	9422	1.8km (22 minute walk)	Harrow and Wealdstone/Stonebridge Park - Elephant and Castle (Bakerloo line)	10
Park Royal	6481	2km (25 minute walk)	Uxbridge/Rayners Lane (Piccadilly Line)	12
North Acton	20266	N/A	Ealing Broadway (Central Line)	10
			West Ruislip (Central Line)	8
			Epping/Hainault (Central Line)	24

Table 2.2: Bus Services Within 400m of North Acton Station

Route	Walk Distance from North Acton station	Service	Frequency (per hour)
95	400m (5 minutes walk)	Southhall - Shepherd's Bush	6
260	150m (2 minutes walk)	Golders Green – White City	5
266	150m (2 minutes walk)	Brent Cross – Hammersmith	8
440	150m (2 minutes walk)	Stonebridge Park – Turnham Green	4
487	150m (2 minutes walk)	South Harrow – Willesden Junction	4

Buses from North Acton (Gypsy Corner)



Key

- Connections with London Underground
- Connections with London Overground
- Connections with National Rail

Red discs show the bus stop you need for your chosen bus service. The disc A appears on the top of the bus stop in the street (see map of town centre in centre of diagram).

Route finder

Day buses including 24-hour services

Bus route	Towards	Bus stops
95	Shepherd's Bush	E O R
	Southall	P Y
260	Golders Green	F G J K O S
	White City	C E I U Z
266 (24 hour service)	Brent Cross	A J K O U Z
	Hammersmith	B C D H L
440	Gunnersbury	C D M Z
	Stonebridge Park	N O W X
487	South Harrow	C P T U Y Z
	Willesden Junction	R S

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Future transport improvement schemes

The area of North Acton, Old Oak and Park Royal is poised to benefit from a number of future transport improvement schemes as detailed below.

Crossrail

Crossrail services are scheduled to commence from 2018, with the closest station at Acton Main Line, however a further station at Old Oak is expected to open in 2026. Crossrail will deliver a high frequency, high capacity service to a total of 40 stations linking Reading and Heathrow in the west, to Shenfield and Abbey Wood in the east via 21 km of new twin-bore tunnels under central London. It will bring an additional 1.5 million people within 45 minutes commuting distance of London's key business districts.

Crossrail will provide a 10% increase to rail capacity in the capital and will be a catalyst to unlocking development in the Old Oak Common area.

HS2 & Old Oak Common Proposals

High Speed 2 (HS2) is a proposed high-speed railway network between London and the Midlands/North. The scheme would be developed in two Phases, with Phase 1 operating between London Euston and Birmingham opening in 2026. Phase 2 would comprise two branches operating north of Birmingham to Manchester and Leeds and is due to open in 2033.

The Government has announced proposals for a new HS2 and Crossrail station at Old Oak by 2026, potentially making it one of the best connected railway stations in the UK. This could give rise to significant potential for economic development jobs growth and new homes. The Mayor of London also sees this as an opportunity to regenerate the wider area.

A new pedestrian and cycle link is planned to increase the permeability and access between the new Old Oak station and North Acton area, linking also to Old Oak Common Lane Overground Station. This is shown in Figure 2.2.

Park Royal Transport Strategy

The Park Royal Transport Strategy is to support the aims of the OAPF to capitalise on future transport improvements and drive transformative change at Old Oak and the regeneration of Park Royal, which is one of London's largest industrial estates and a key Strategic Industrial Location (SIL).

Central to the transformation of Park Royal will be to expand upon the findings from the Park Royal Atlas (2014), by engaging with businesses, residents, local business groups and other stakeholders to develop a detailed understanding of the business needs and transport requirements in Park Royal.

Transport provision will be fundamental to the successful delivery of growth in the area, both in the short term during construction and the long term as occupation begins. This study team has been liaising closely with another team within Steer Davies Gleave currently working with TfL on the Park Royal Transport Strategy to address both these issues. This has been particularly helpful to understand the current issues for public transport interchange within the Park Royal area.

Night Tube

From 2016, a 24-hour Night Tube service will operate on Friday and Saturday nights on selected London Underground lines. On the Central line, the service will operate between Ealing Broadway in the west and Hainault and Loughton in the east. The service frequency at North Acton will consist of trains operating every 20 minutes. The night tube would reduce access to the area during engineering hours and therefore this will need to be factored into proposals at feasibility design stage.

Chiltern Railway services at North Acton

A Chiltern Railways 'parliamentary' rail service currently runs once daily between South Ruislip and London Paddington, passing North Acton to the north of the Central line. There is a long-standing aspiration to provide a station stop for Chiltern Railways services at North Acton, considering the future level of development coming forward in the vicinity. There would be potential for an interchange with the Central line at North Acton.

Other local improvements

North Acton Station Square

North Acton Station Square is a new public space currently under construction directly to the south of North Acton station on Victoria Road, on the site of a former Esso Petrol Filling Station. The Station Square is critical to delivering the vision outlined in the Park Royal OAPF and Ealing Council's Park Royal Southern Gateway Position Statement. In particular, the new Station Square will improve local access to high quality public realm and open space, and address capacity constraints in terms of interchange and improve access to North Acton station. It will also facilitate stronger links with the development sites to the south of North Acton station. Station Square provides a step free link from Victoria Road to the south to the lower station ticket hall building. There is a further aspiration from LB Ealing to make the pedestrian ramp linking the station to the side of Victoria Road a suitable gradient to facilitate wheelchair access. The ramp currently has an average gradient of 1:17 with only occasional flat areas along the 6m vertical drop.

Alterations to the design of the ramp to improve its accessibility are being investigated by LB Ealing and will need to be considered during the feasibility stage of the station design.

Station Square also provides for a relocated cycle hub due to open in summer 2016, with the Station Square works due to be completed in 2017. Despite these extensive works, space remains to the South of the station that could be used to facilitate construction of a new station.

Figure 2.3: Artist Impression of Station Square public realm scheme

3 Growth Areas and Demand

3 Growth Areas and Demand

Introduction

In order to understand the future requirements for the station, particularly in terms of capacity, both exisiting and future demand has been considered. Once the total future demand was understood, the direction of the demand was analysed to understand how the station design can best support future growth. Both the station location and station entrances were considered in the design process as set out in this section.

Existing Demand

The latest available Rolling Origin-Destination Survey (RODS) data, for 2014, has been used to determine the base year demand at North Acton station during the AM and PM peaks. The data indicated the number of movements between key locations in the station, such as between the station entrance and the westbound platform. At North Acton, there are a small number of passengers interchanging between the two platforms in order to change for the appropriate branch of the Central line.

Growth Areas

The Old Oak and Park Royal Development Corporation (OPDC) has drafted a list of development sites in Old Oak and Park Royal which are expected to come forward for re-development. The information provided by OPDC sets out expected locations and volumes of growth, in terms of additional homes and jobs in the area. A plan showing the locations of development is provided in Figure 3.1. Future details about the site including anticipated delivery date are in Appendix 1.

Collectively, the identified sites in Old Oak and Park Royal are projected to deliver around 25,500 homes and up to 65,000 jobs. This development would be brought forward in a phased approach. Development around North Acton is already taking place, and there have been recent planning approvals for high-density mixed-use developments south of the station, such as the perfume factory development.

It should be noted that the quanta of development provided by the OPDC are, at this stage, high-level and indicative but provide an indication as to the potential timing and location of the development.

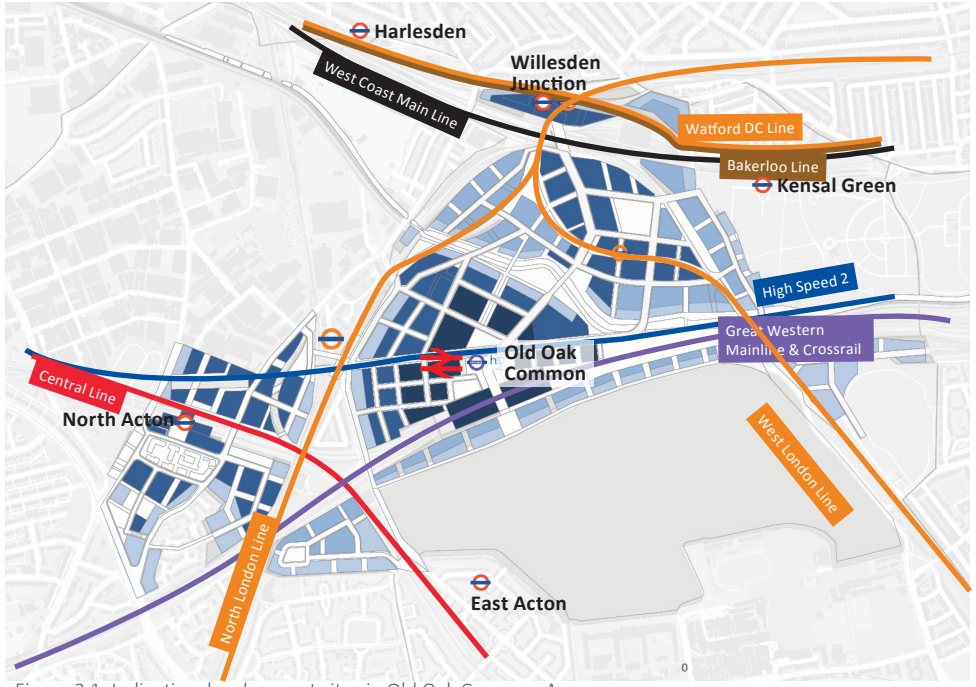


Figure 3.1: Indicative development sites in Old Oak Common Area
Source: OPDC.

Future Demand

Methodology

In order to analyse the level of future demand at North Acton, the development sites identified by OPDC and additional development at Park Royal were assessed in terms of their peak hour person trip generation using Metro/Underground modes. To determine the likely residential trips, the TRICS 7.2.2 database was used to derive a residential trip rate per person for departures and arrivals, provided in Appendix 1. In addition, the assumption of 2.5 people per residential unit and modal share of 41% of residential trips using Metro/Underground (based on 2011 census data for the area) has been used.

For the purposes of this assessment, the commercial trip rate has been derived using the following assumptions:

- Employee density of 1 employee per 11.5 sqm. office floor space;
- 85% daily staff attendance rate for each job;
- 80% of commercial trips Metro/ Underground mode share; and
- 45% of all commercial trips during 1 hour peak (08:00-09:00; 17:00-18:00).

The commercial trip mode share has been calculated because although the nature of current employment uses and poor public transport services in the area results in a car dominated mode share, the jobs expected to be created are however more office based and high density, similar to Canary Wharf. Therefore an assumption of 80% underground share has been used which is slightly less than Canary Wharf (82% for underground / DLR). This mode share may seem high however no modal shift has been assumed for the existing population (residential and commercial) and therefore the combined demand is likely to be realistic when residential and commercial trips are combined. Some mode shift is likely to occur due to the improved public transport provision, but also due to planning policy alterations since the 2011 Census as recent and emerging planning policy is limiting the number of parking spaces permitted. The Old Oak and Park Royal Opportunity Area Planning Framework (OAPF) limits parking to a maximum ratio of 0.2 spaces per residential unit and therefore

The data has come from the residential demand phasing provided by OPDC, as well as applying assumptions about the additional growth within the commercial sector. It has been assumed that commercial growth within the Park Royal and Old Oak Common area would be likely to come forward equally across each year between 2026 and 2041.

This assumption is based on the understanding that many of the identified commercial development sites are HS2 work sites and therefore will not be completed until HS2 is operational from 2026.

In order to take account of additional unidentified residential (windfall) development which may come forward over the assessment period, an extra 1000 residential units have been included in the model, situated to the south of North Acton station. It has been assumed that these sites would come forward post-2026.

This demand is provided in tabular form in Appendix 1, along with the other assumptions used in this analysis.

the mode split for new developments being brought forward is likely to have a higher public transport share.

Results

Based on the trip generation analysis described, the additional future demand at North Acton station is shown in Figure 3.2. It has been assumed that the number of people interchanging increases by 1% each year to account for background network growth, (1% of 2014 figures, not as an increasing proportion of total station users).

This demonstrates that the demand at North Acton is expected to grow in a fairly linear manner. The steady growth in demand lends itself to a phased construction of the station which has been considered for the preferred option.

It can be seen from Figure 3.2 that between 2015 and 2041 demand at the station is likely to grow by between three and four times. When assessing the standard (LU) 30% uplift on top of 2041 demand this represents almost five times the demand.

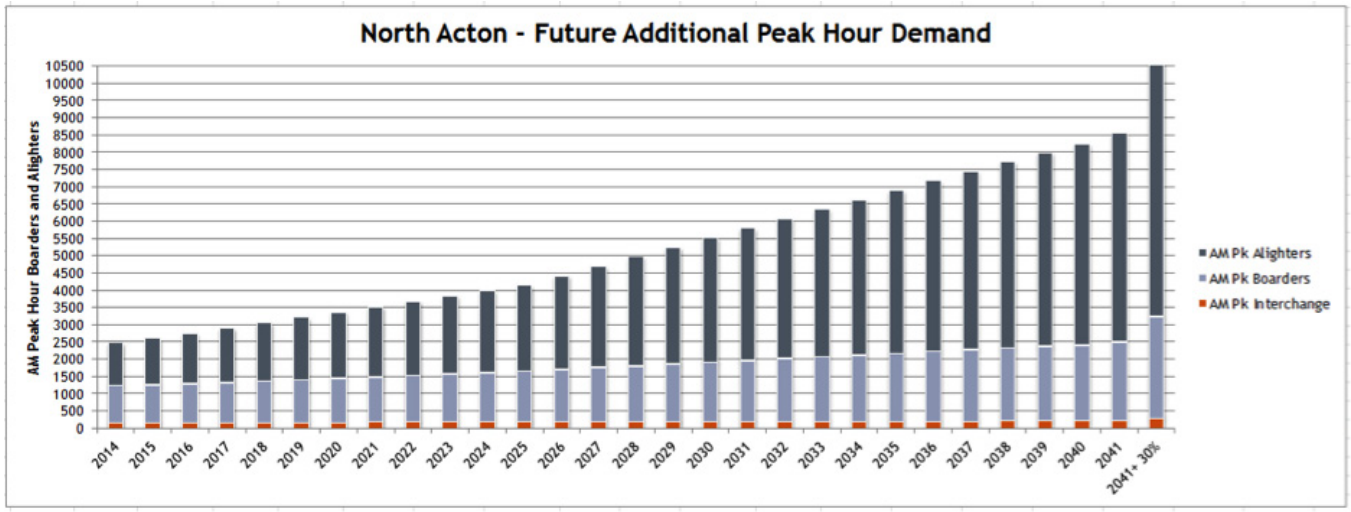


Figure 3.2: Estimated future AM peak hour demand at North Acton Station

Sensitivity of Station Location to Future Demand

Taking into account the potential future passengers for the station, an assessment as to whether the station is, as currently located, in the most suitable location was undertaken. The demand for North Acton station in its current location was therefore compared to three alternative station locations. One station site situated to the west of North Acton and two sites situated to the east of the station were considered. The analysis was based on 2015 Experian residential population data and the projected population growth as a result of the OPDC identified development sites in 2041.

In order to facilitate a station in the alternative locations, new pedestrian links that would need to be implemented to provide access have been added to the mapping analysis. With these links in place, 10 minute walking catchments from each of the potential North Acton station locations have been created. A second scenario where the proposed Old Oak Common station is in place has also been considered. The current and future residential population within these catchments have been analysed.

In the second scenario, removing the population that would also be within a 10 minute walk of the proposed HS2 / Crossrail station at Old Oak Common.

The differences in population that each option would serve is provided in Table 3.3.

Table 3.3 shows that the demand for moving the station to location 2 appears to have a larger catchment population, particularly without a new Crossrail station at Old Oak. However, moving North Acton station to the east would disbenefit the existing local business community, given that a high degree of local employment is concentrated to the north west of the station at industrial sites towards Park Royal. In addition, due to the operational requirement to maintain three platforms, space constraints and track curvature would be likely to make platform width and curvature non compliant in this location. The costs to achieve maximum width would be high due to the engineering constraints. It was therefore agreed at the first stakeholder workshop to focus the study on the station in its current location.

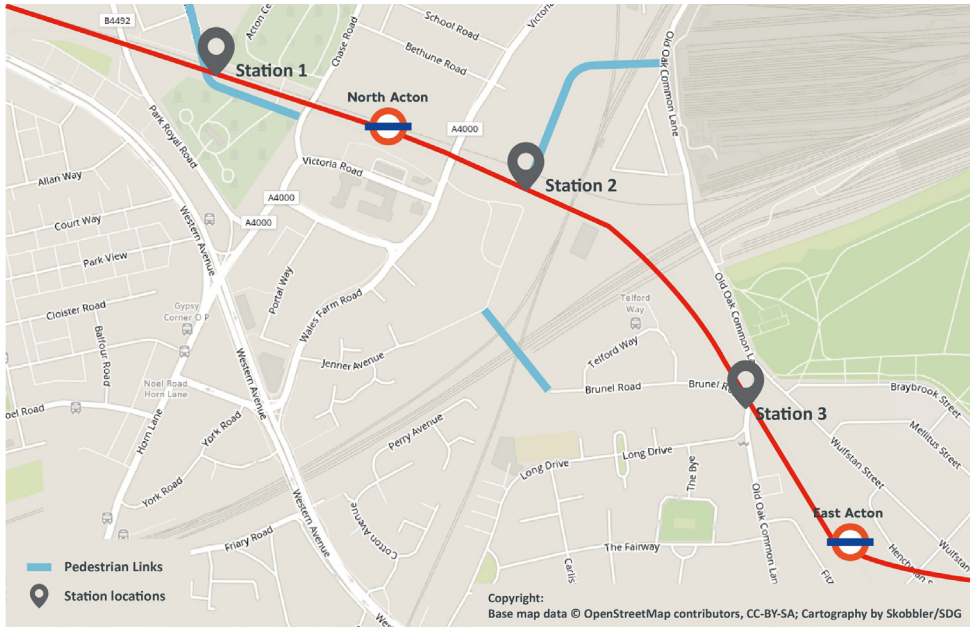


Figure 3.3: Potential alternative station locations

STATION LOCATIONS	Post 2041 Residential Catchment	
	Total within 10min (no OOC station)	Total within 10min walk (with OOC station)
North Acton	16,550	16,344
Station 1	13,279	13,279
Station 2	28,982	18,278
Station 3	20,206	16,196

Table 3.3: Comparison of residential population served by each potential station location.
Please note these are indicative estimates only

Existing Station Configuration

North Acton Station currently has two inbound and two outbound pedestrian gates plus a manual accessible wide gate, allowing both inbound and outbound movements. From on-site observations and informal discussions with the Station Supervisor, the wide aisle gate is often left open during peak periods to alleviate any potential queuing.

The station has three platforms joined by an over bridge with stair access. No lifts are provided for disabled access to platform level. On-site observations confirm that the existing stairs and footbridge are extremely well used.

North Acton station is the Westernmost part of the central line before the service splits to serve West Ruislip and Ealing Broadway, therefore some passengers use the station to interchange between branches of the central line. The station is also used as a terminating point for Westbound trains so often an entire trainload of passengers will interchange to another platform.

When looking at recent studies of the station and its usage, it is evident that the existing demand is higher than the capacity of the station configuration.

In addition, the lack of a northern entrance to the station results in relatively circuitous route towards the area north of the railway line, most noticeably to Bethune Road, School Road and St Leonard's Road. Also, the current location of station entrance halfway down the side of the railway cutting results in a feeling of disconnection from the rapidly developing local centre on Victoria Road.

A new pedestrian and cycling link is proposed to improve access to the new Old Oak Common Station, from the North Acton Area, often referred to as the 'North Acton Link'.

Direction of future demand (entrances)

As this study has a focus on how the station sits within the wider area and not just about the stations internal dynamics, it is important to understand the direction from which the demand would be coming from to reach the station.

Methodology

A 20 minute walk catchment was generated for the station using Transcad GIS mapping and modelling software. This walk catchment was then divided into eight 'segments' which were each labelled according to their direction in relation to the station.

The OPDC identified development sites (residential and commercial) were then plotted onto the GIS mapping and overlaid on the 20 minute walk catchment of North Acton station. This made it possible to allocate each development site to a segment, and consequently, to a direction of travel to the station.

2015 Experian population data for the existing demand and OPDC residential/ commercial development population data was then extracted from each segment in order to quantify the demand within each directional segment.

The directional segments sites are shown in Figure 3.4.

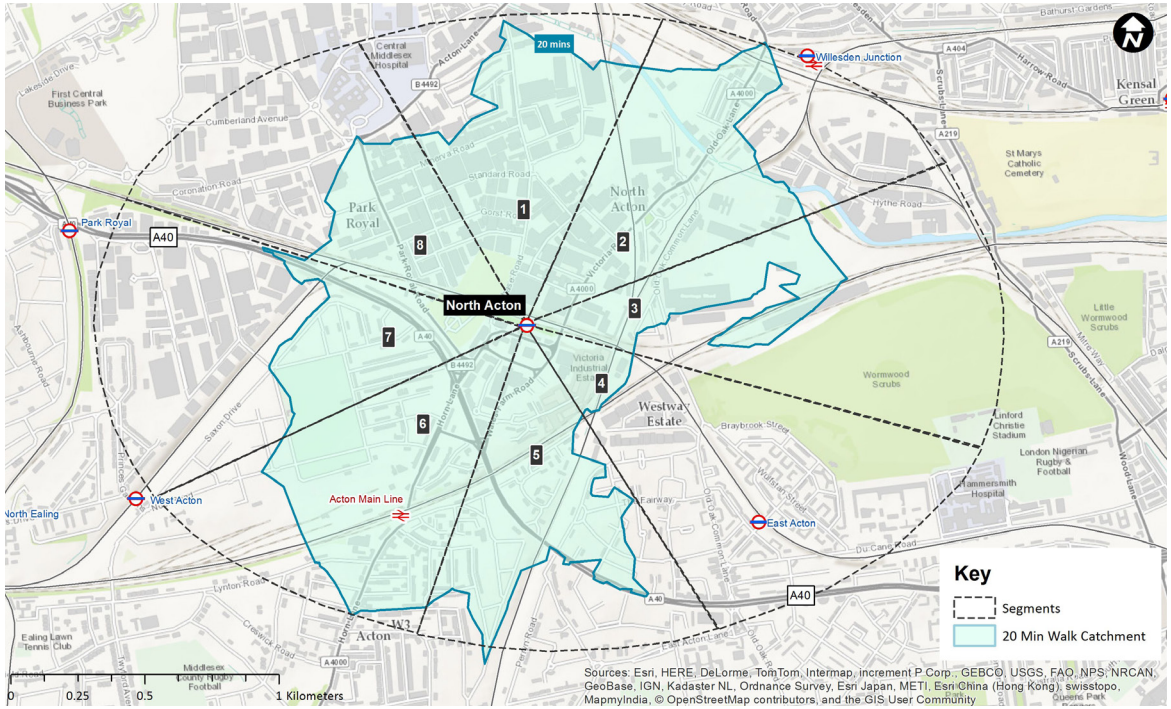


Figure 3.4: Segments used to understand direction of station demand

Results

The 2041 future directional analysis shown in Figure 3.5 indicates a heavy weighting of demand towards the north eastern segment (57%), which is where most of the OPDC development is expected to come forward, close to Old Oak Common station. A further 23% of future demand is expected to come from the south east of the station. This clearly suggests that a northern station entrance is desirable.

The north west (8%) and south west segments (12%) would only account for a small proportion of demand for North Acton station.

Prior to 2041, figure 3.6 shows the demand is less heavily weighted to the north as not all of the new developments will have been built. It is therefore important therefore to maintain access to the south to serve existing communities. An unpaid link between South and North will also provide a permeable link through the area.

Figure 3.5: Predicted direction of demand in 2041

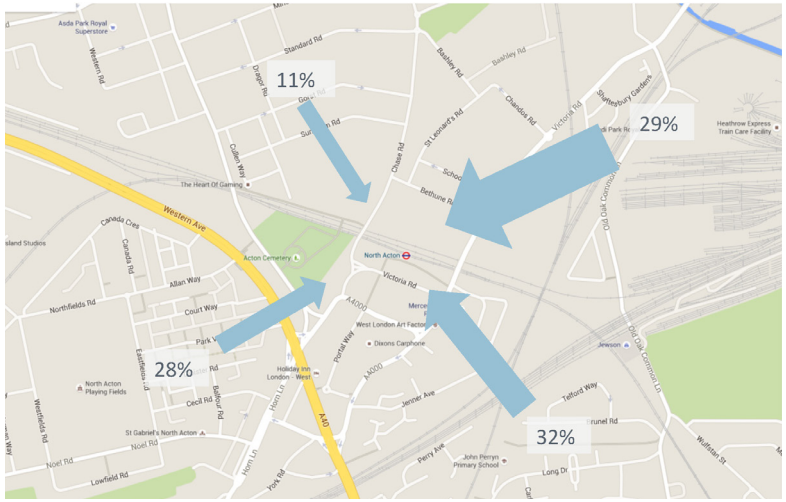


Figure 3.6: Prediction direction of demand in 2026

4 Constraints and Assessment Criteria

4 Constraints & Assessment Criteria

Stakeholder Engagement

In order to develop the station designs to meet the range of requirements of the client steering group as well as the wider stakeholder group, two stakeholder workshops were held in addition to regular client steering group meetings.

In addition to the project team, these were attended by representatives of the following organisations:

Transport for London

- TfL Planning
- HS2 Liaison
- London Underground sponsor team
- London Underground operations
- London Underground engineering
- TfL Urban Design

London Borough of Ealing

- Transport

Old Oak and Park Royal Development Corporation

- Strategic Planning

The focus of the first stakeholder workshop, which was held on the 26th August 2015, was to present the demand analysis undertaken with regard to testing the catchment and resultant demand for different station locations. It was also to discuss and reach agreement on the constraints and assessment criteria to be used in the study as presented overleaf.

Constraints

The group present in the first stakeholder workshop agreed a list of potential constraints to the redevelopment of North Acton station, listed as follows:

- The need to maintain three platforms, to enable turn backs and operational flexibility on the Central line. Any station configuration with two platforms would reduce the ability to increase service frequency and reduce service resilience.
- There is no requirement for the station to remain a surface (and non Section 12 compliant) station assuming the cost of decking can be justified with the level of development and design of station above.
- The HS2 Victoria Road Crossover Box directly to the north of the station with two portal buildings must be maintained, but the rest of the site could be used if justified (allowing for development).
- Highway widening works along Victoria Road and the provision of a new footbridge to the east of the existing Victoria Road bridge over the Central line railway cutting as proposed as part of the HS2 works. These works may have an influence on local pedestrian wayfinding and interchange between North Acton and Old Oak Common.
- The Station Square public realm works taking place directly to the south of North Acton station should be considered, albeit with minor alterations as required.
- An aspiration to maintain the green corridor along the northern embankment of the railway cutting. It was agreed that any decking-over works would affect the green corridor, but the re-provision of green space elsewhere would be an option.
- Compliant with LU Station Planning Standards Guidance.
- Aspiration to mantain part of the existing station building for heritage reasons.

Assessment Criteria

Key assessment criteria and measurements were discussed by the group in the first stakeholder workshop. It was agreed that many of the criteria tabled by SDG were suitable in order to enable a robust assessment, with some minor amendments as follows:

- It was agreed that the assessment scenario for future demand should be based on post-2041 flows (+30%).
- TfL confirmed that the desired step free access requirement is from street to platform, with humps/ manual boarding ramps used to facilitate train boarding.
- A further assessment criterion was added in relation to future proofing North Acton station to enable potential integration of Chiltern Railways services.
- Sustainability was added to the assessment criteria, to ensure that the sustainability of development is maximised, with relation to construction and provision of green space.

The resulting list of agreed assessment criteria is provided in Table 4.1.

KEY CRITERIA	MEASUREMENTS
Capacity to meet future demand	All of the station operates within appropriate levels of service as set out in SPSG for post 2041 flows (+30%)
Step Free Access to all platforms	At least one lift serving each platform and assist with train loading on platforms Step free route from street to platform from all entrances
Improve the permeability of the area	Reduce journey times for those using the station from the north through cross track pedestrian permeability, without increasing journey times from the south
Station provides user friendly intuitive design	Station routes are legible, intuitive and require minimal wayfinding (customers will not need to stop en-route)
Integrate station into wider public realm and encourage interchange	Scheme ties in well with surrounding area and works (Victoria Bridge, Station Square) Scheme integrates and supports proposed North Acton – Old Oak Common Ped / Cycle route Scheme encourages interchange with walking and cycling
Development provides commercial opportunities	Development opportunities are provided where they do not impact negatively on the operation of the station
Minimise construction impacts	Minimise line and station closures during construction
Cost effective	Maximise value throughout scheme development
Future proofing Chiltern railway station	Scheme allows integration from future station to serve Chiltern services
Sustainability	Sustainability of development is maximised (construction, green space etc)

Table 4.1: Agreed Assessment Criteria

Later discussion with the client steering group has reduced the list for the scoring process (refer to section 5) although all the criteria have been considered throughout the design.

5 Proposals

5 Proposals

Design process and options

Existing station

North Acton station currently suffers from congestion during both the AM and PM peaks. With the intensive additional demand expected over the coming years, this will significantly exceed the capacity of the existing infrastructure. Key station constraints will be linked to both horizontal and vertical circulation including the gate-line and ticket hall as well as the overbridge and both staircases.

An initial assessment of the future requirements has been based on static analysis. Figure 5.1 compares the current 2014 AM peak condition with the 2041 + 30% projection as described in section 3. As the design progresses through further stages, this is likely to be tested with dynamic passenger flow modelling.

When comparing the current station to future requirements, the key issues to be addressed are:

- Non-compliant step free access between street, ticket hall and platforms
- Maximum platform escape distances in excess of 45m
- Insufficient ticket gates (additional 10 gates required)
- Insufficient gate-line run-off available (10m required)
- Insufficient stair width
- Insufficient bridge width
- Insufficient unpaid concourse area
- Provision of more extensive canopies to help train loadings
- Enhancing inconsistent platform surfaces

These elements are therefore addressed within the proposed design. The comparison of the existing and required widths (for 2041) are shown in Figure 5.1. Further details on the calculations are in Appendix 1, along with the requirements for 2026. The widths required have been calculated according to station planning Standards Guidances (S1371.A5) Written Notice (2014) -LU-WN-01314.

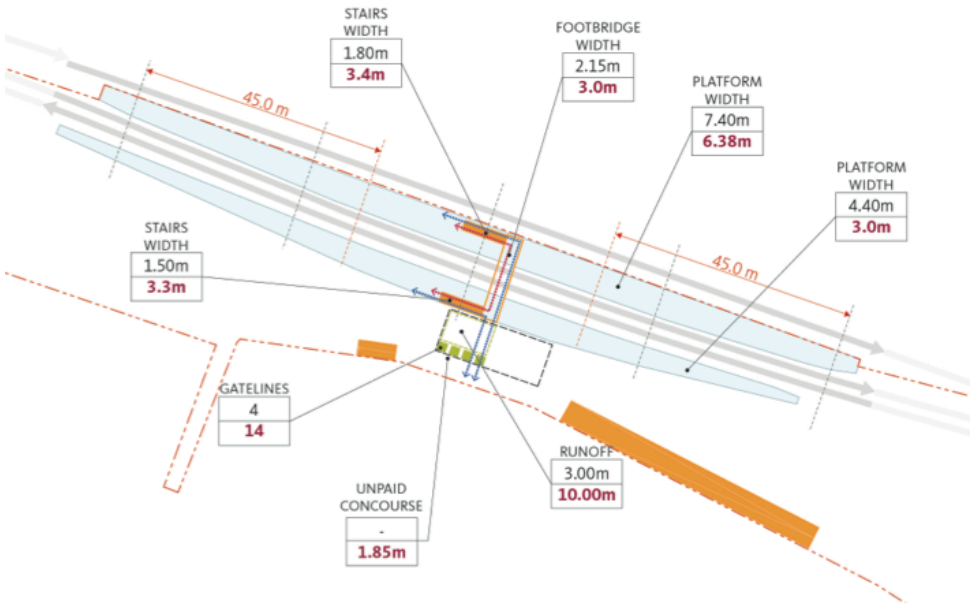


Figure 5.1: Comparison of existing widths (black) with future 2041 +30% requirements (red).

Connectivity

One of the key objectives of this study is to improve the permeability of the site and improve connectivity between the LU services, and the development potential north of North Acton station.

The existing ticket hall is located below street level, thereby limiting access and also legibility of the station both from the south and the north. To improve connectivity, access and legibility from both the south and from emerging development to the north, there is an opportunity to raise the ticket hall from its current level.

Figure 5.2 suggests a station arranged on three principal levels as follows:

- Platform level
- Interchange level
- Ticket hall level

This arrangement therefore helps to achieve:

- Improved visibility and legibility for the station
- Level access between the ticket hall and street
- Permeability across the site; and
- Operational clearance over National Rail tracks to allow for future electrification if required

Station Square

LB Ealing are currently upgrading Station Square to link with the existing ticket hall. This will help to improve the visibility of the station from the street to some extent. A cycle hub is incorporated into these plans, so needs to be maintained during design development. It is acknowledged that minor changes may be needed in Station Square but the combined projects will be positive for both the station and the public realm.

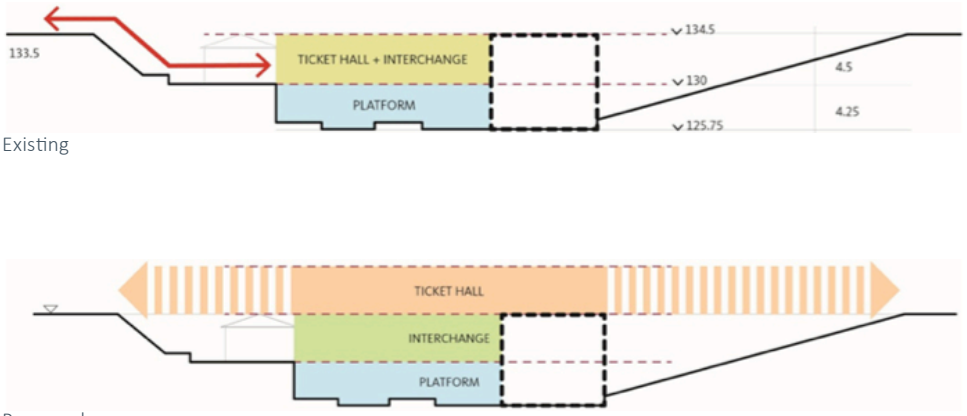


Figure 5.2: Existing and proposed station cross-sections

Development of Options

Considering the desire to improve site permeability and the analysis undertaken to justify access from the north, the designs include methods to improve the access to the station and the ticket hall experience.

Platform design has been considered first, then ticket hall features before being combined into full options which have then been assessed against the agreed assessment criteria.

The options all follow the principles and standards set out in the London Underground Station Planning Standards Guidelines (SPSG) version S1371 – June 2011.

The existing ticket hall building which although is not listed, has features which are understood to have heritage design merit due to the 'Great Western' character and have therefore been safeguarded through the design. As the design progresses in the future, the extent that these should be retained can be investigated.

Platform Alternatives

Alternative A: Southern access only

LU standards require a minimum platform width, clear of obstruction, of not less than 2.5m. A single stair per platform, sized to meet increased capacity (as previously discussed), will result in less than the minimum clear platform width required. The design therefore provides dual staircase access per platform to not only facilitate the required capacity and clear platform width but also provide compliant means of escape, improved passenger distribution and reduced interchange travel distances.

Alternative A considers the stepped access to the ticket hall above located to the south of the interchange concourse. Operational continuity can be maintained during construction by locating the station approach to the west of the existing ticket hall.

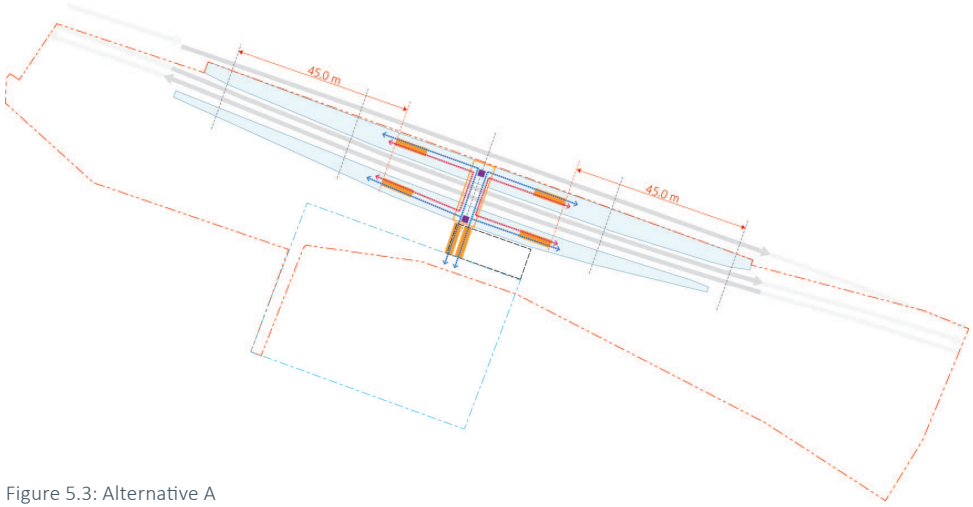


Figure 5.3: Alternative A

To provide direct access for people with reduced mobility (PRM) to the island platform will require an additional horizontal link at ticket hall level, to the west of the existing ticket hall.

✓

The key advantages of Alternative A are:

- Compliant means of escape
- Compliant minimum platform width free of obstruction
- Step free access to all levels
- Improved passenger distribution at platform level
- Future-proofing for escalator provision (in lieu of one stair per platform)
- Direct (west-bound) transfer for persons of reduced mobility (PRM) at all levels via lifts

x

The key disadvantages of Alternative A are:

- Indirect PRM (east-bound) transfer via the Interchange Concourse
- Station access directed towards the south only

Alternative B

Alternative B differs from Alternative A with the provision of additional access to the emerging catchment to the north, through a paid side pedestrian link to a second ticket hall on the north embankment.

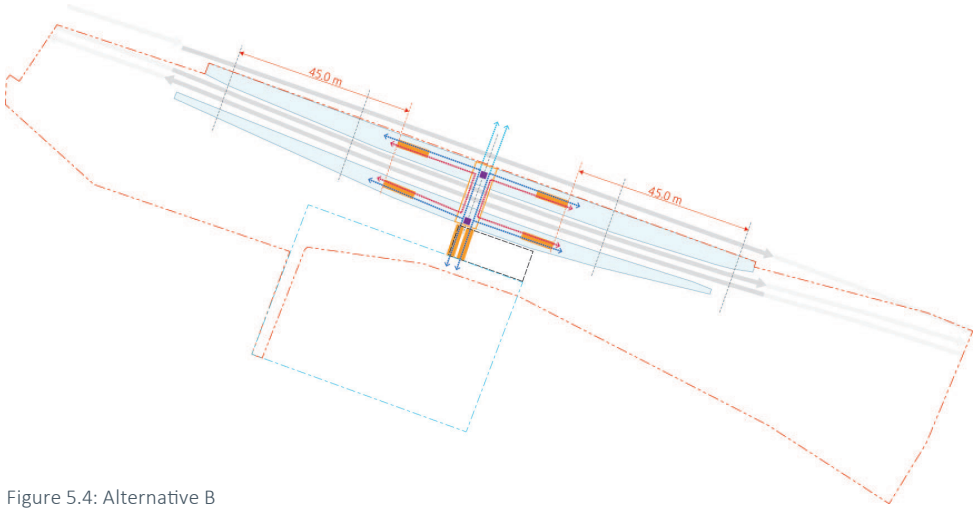


Figure 5.4: Alternative B

The key advantages of Alternative B are:

- Compliant means of escape
- Compliant minimum platform width free of obstruction
- Step free access to all levels
- Improved passenger distribution at platform level
- Future-proofing for escalator provision (in lieu of one stair per platform)

The key disadvantages of Alternative B are:

- From the south; indirect PRM (east-bound) transfer via the Interchange Concourse
- From the north; indirect PRM (west-bound) transfer via the Interchange Concourse
- Two ticket halls

Alternative C

Alternative C is similar to Alternatives A & B, but with access to the ticket hall above placed centrally; reducing travel distances within the station and aligning more directly with the lifts, encouraging equality of experience. By locating the vertical circulation centrally, Alternative C addresses the disadvantages of both Alternatives A & B and allows for a single centralised ticket hall that can be accessed from both the north and south (with a pedestrian link over the tracks to the North).

Alternatives B and C both provide a straight link across the railway tracks to the north. This has been suggested both to reduce its length and therefore cost and operational impact during the construction. Also, links to both the east and west can be provided on the land through the HS2 'sword' site in a flexible nature to cater for the demand as it comes forward.

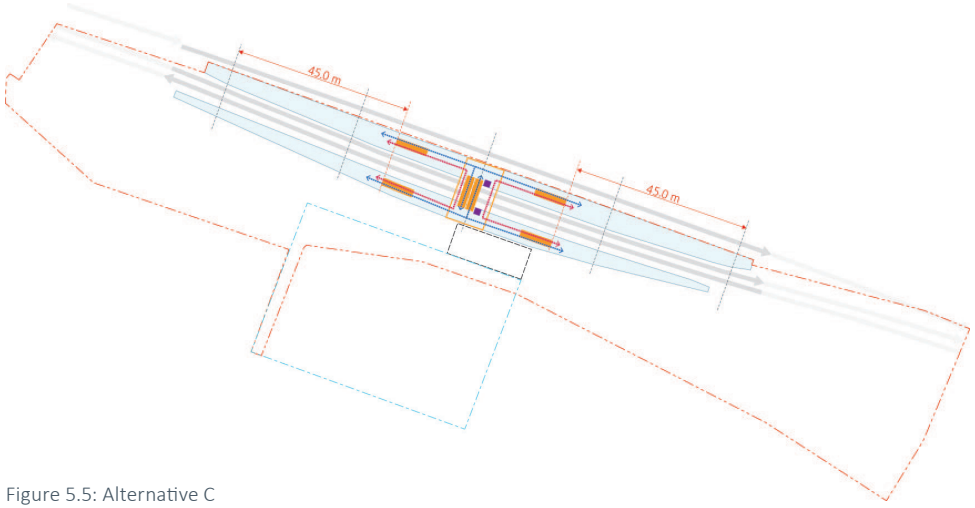


Figure 5.5: Alternative C

The key advantages of Alternative C are:

- Compliant means of escape
- Compliant minimum platform width free of obstruction
- Step free access to all levels
- Improved passenger distribution at platform level
- Future-proofing for escalator provision (in lieu of one stair per platform)
- Direct PRM transfer to both platforms from all levels
- Equality of experience for Step-free and stepped route

Alternative D

Alternative D considers a new station entrance to the east (adjacent to Victoria Road) with single stair flights accessing the platforms.

LU standards require a minimum platform width (adjacent to the platform edge), clear of obstruction, of not less than 2.5m. A single stair per platform, sized to meet increased capacity (as discussed above) will result in less than the minimum clear platform width required.

Following discussion at the second stakeholder workshop, Alternative D was not progressed.

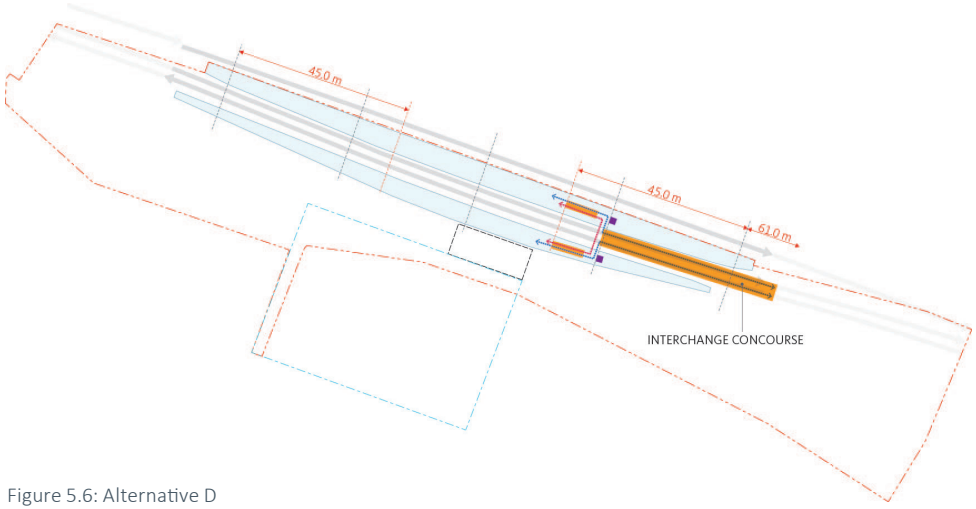


Figure 5.6: Alternative D

The key advantages of Alternative D are:

- Step free access
- Directly serves the greater potential demand to the east

The key disadvantages of Alternative D are:

- Non-compliant means of escape
- Non-compliant minimum platform width resulting from single stairs
- Increased travel distances (platforms in excess of 100m from street)
- Increased Interchange distances
- Poor passenger distribution at platform level
- No future-proofing for escalator provision
- Indirect PRM transfer via Interchange Concourse

Platform Alternatives

	Option A	Option B	Option C	Option D
Advantages				
Compliant means of escape	✓	✓	✓	
Compliant minimum platform width free of obstruction	✓	✓	✓	
Step free access to all levels	✓	✓	✓	✓
Improved Passenger distribution at platform level	✓	✓	✓	
Direct (west-bound) transfer for persons of reduced mobility (PRM) at all levels via lifts	✓		✓	
Equality of experience for PRMs			✓	
Directly serves the greater potential demand to the east				✓
Disadvantages				
Indirect PRM (east-bound) transfer via the interchange concourse.	×		×	×
Station access directed towards the south only	×			
Station access split between North and South		×		
Non-compliant means of escape				×
Non-compliant minimum platform width resulting from single stairs				×
Increased travel distances (platform in excess of 100m from street)				×
Increased Interchange distances				×
Poor Passenger distribution at platform level				×
No future-proofing for escalator provision				×

Table 5.1: Summary of advantages and disadvantages of platform alternatives

Table 5.1 provides a summary of the advantages and disadvantages of the different platform alternatives.

It is clear from this that alternative C provides the greatest benefit with least disadvantages.

Future-Proofing for Escalators

Escalators can provide faster throughput of passengers within a station. Escalators will decrease journey times, increase capacity and improve the passenger experience. Should demand increase to the point that the two stair configuration is not sufficient, escalators are the best method of providing for this. Although these are not desired (or required) at North Acton at present, the designs have been developed to ensure that they do not preclude the possibility of converting stairs to escalators between platform and interchange concourse in the future, if required.

If escalators were installed, a further means of escape would be required within the station during escalator repairs and therefore an overbridge to connect the platforms is required. This would have an added benefit if connected to a further entrance on Victoria Road to the east of the platforms as this could provide significant additional capacity. This could be useful if catalyst uses are developed within the Old Oak and Park Royal area which lead to temporary increased demand at North Acton station at particular times, such as events.

The key features include:

- Future-proofing escalator provision (in lieu of one stair per platform)
- Additional overbridge to the ends of the platforms providing compliant means of escape during escalator repairs
- Overbridge connection to Victoria Road could serve temporary demand increases.

It should be noted, as escalators are unidirectional and platform widths do not facilitate two sets adjacent to each other, wayfinding will be required to ensure the capacity can be maximised.

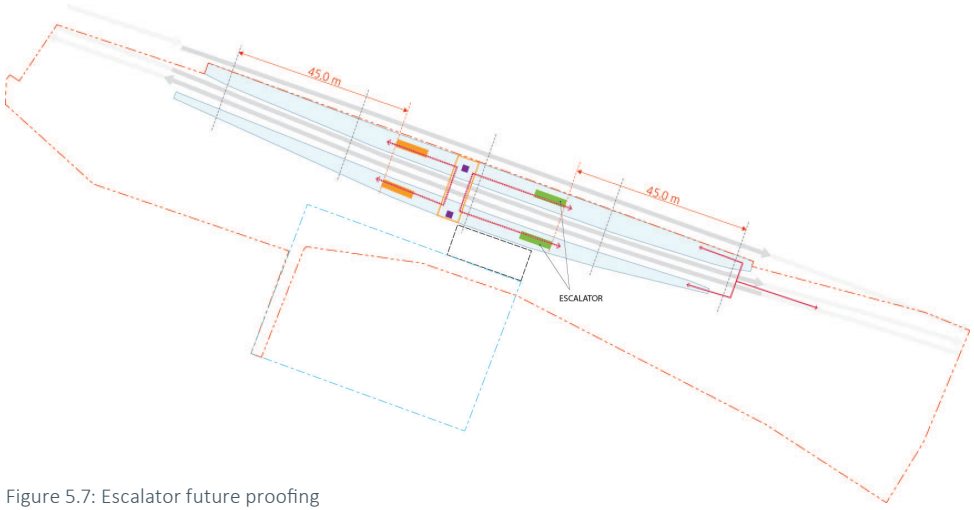


Figure 5.7: Escalator future proofing

Ticket Hall Alternatives

Having developed options for the platforms to connect to the ticket hall, it is important to consider how the ticket hall(s) should be configured to provide access to the wider area and increase permeability.

Alternative E: Two ticket halls with paid link

This alternative provides a primary ticket hall to the south of the existing station with level access from Station Square. There is an opportunity for a future secondary ticket hall to the north to serve the emerging catchment for the station, with a pedestrian (paid) link over National Rail tracks to the north embankment to connect with the HS2 'sword' site to the north.

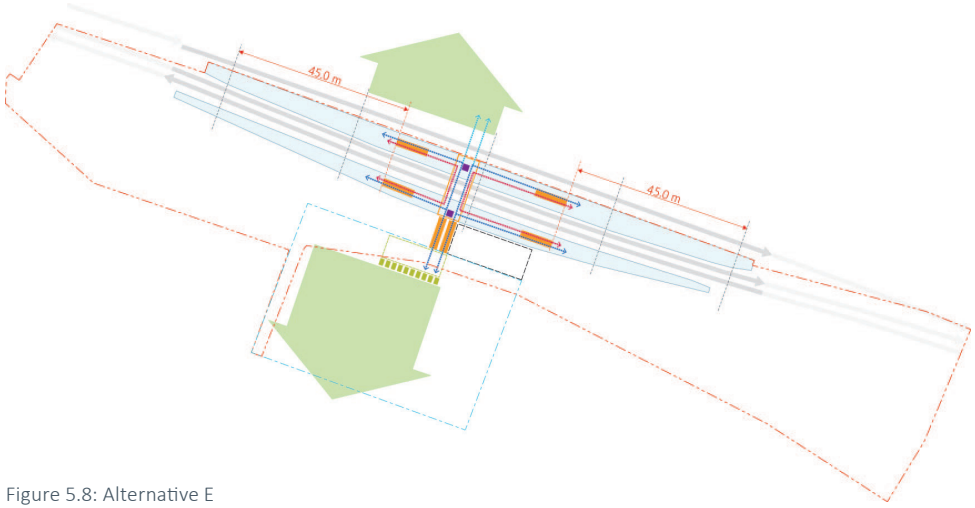


Figure 5.8: Alternative E

The key advantages of Alternative E are:

- Level access from Station Square
- Future-proofing for station entrance from the north
- Phasing of the works facilitates operational continuity of the station during construction

The key disadvantages of Alternative E are:

- Gateline line split between south and north ticket halls
- Longer route for passengers to get to westbound platform
- Potential conflict at Ticket Hall level for waiting area for lifts
- Potential conflict between PRMs and passengers from/ to new eastern staircase
- Less resilience during maintenance periods with single lift from ticket hall (two lifts could be provided with an expanded link between the two platforms)

Alternative F: One combined ticket hall

This alternative provides a centrally located ticket hall with level access from a new shared public (unpaid) pedestrian and cycle bridge serving both the Station Square and the emerging station catchment to the north. Decking across both the LU and Network Rail tracks, the link bridge provides permeability across the site.

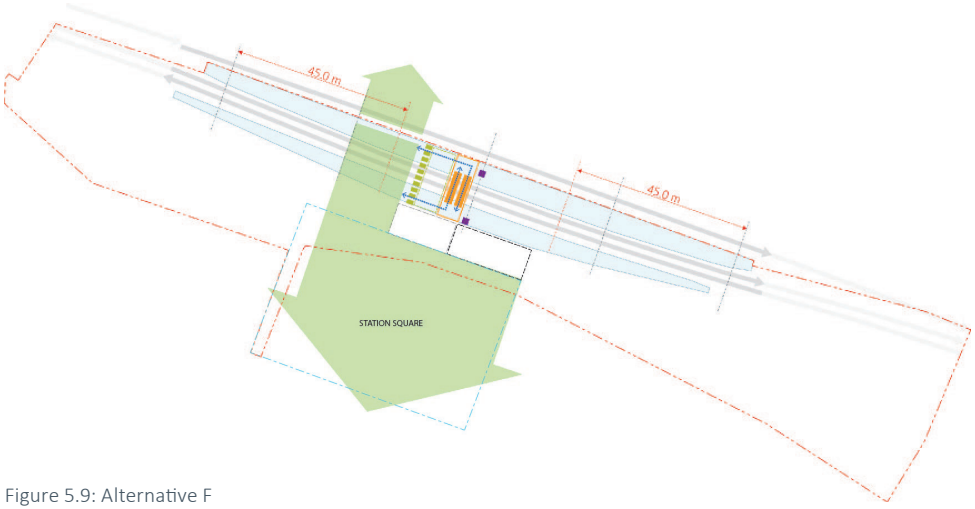


Figure 5.9: Alternative F

The key advantages of Alternative E are:

- Level access from Station Square
- Single gate-line with access from both north and south
- Direct PRM access to all levels
- Equality of experience for PRM's
- Phasing of the works allows operational continuity of the station during construction
- PRM routes, not in conflict with main passenger flows
- Added resilience during maintenance periods with dual lift access from the Ticket Hall

Ticket Hall Alternatives

	Alternative E	Alternative F
Advantages		
Level access from Station Square	✓	✓
Future-proofing from station entrance from the North	✓	
Phasing of the works facilitates operational continuity of the station during construction	✓	✓
Single gate-line with access from both north and south		✓
Direct PRM access to all levels		✓
Equality of experience for PRMs		✓
PRMs segregated from passenger flows		✓
Added resilience during maintenance periods with dual lift access from the Ticket Hall		✓
Disadvantages		
Gateline line split between south and north ticket halls	×	
Longer route for passengers to get to westbound platform	×	
Potential conflict at Ticket Hall level for waiting area for lifts	×	
Potential conflict between PRMs and passengers from/to new eastern staircase	×	
Less resilience during maintenance and periods with single lift from ticket hall (two lifts could be provided with an expanded link between the two platforms)	×	

Figure 5.2: Summary of advantages and disadvantages of the potential ticket hall configurations

Table 5.2 provides a summary of the advantages and disadvantages of the two potential ticket hall alternative configurations.

It is clear from this that alternative F provides the greatest benefit.

Combined Options

Following the identification and assessment of firstly the platform experience; looking "Inside-out", and secondly the ticket hall experience; looking "outside-in", the viable alternatives are brought together to generate potential options.

Option 1 (Alternative C + Alternative F); Single ticket hall (figure 5.10)

The first of these options considers a single ticket hall by combining Alternative C & Alternative F and includes an unpaid publically accessible pedestrian (and cycle) link bridge.

The scissor stair arrangement between ticket hall and the interchange concourse relies on passengers committing themselves to the direction of travel at the earliest opportunity (although the interchange concourse does allow for a further change in direction).

Decision points will occur at:

- Ticket Hall; choice between platforms
- Interchange concourse; choice between end of platform.

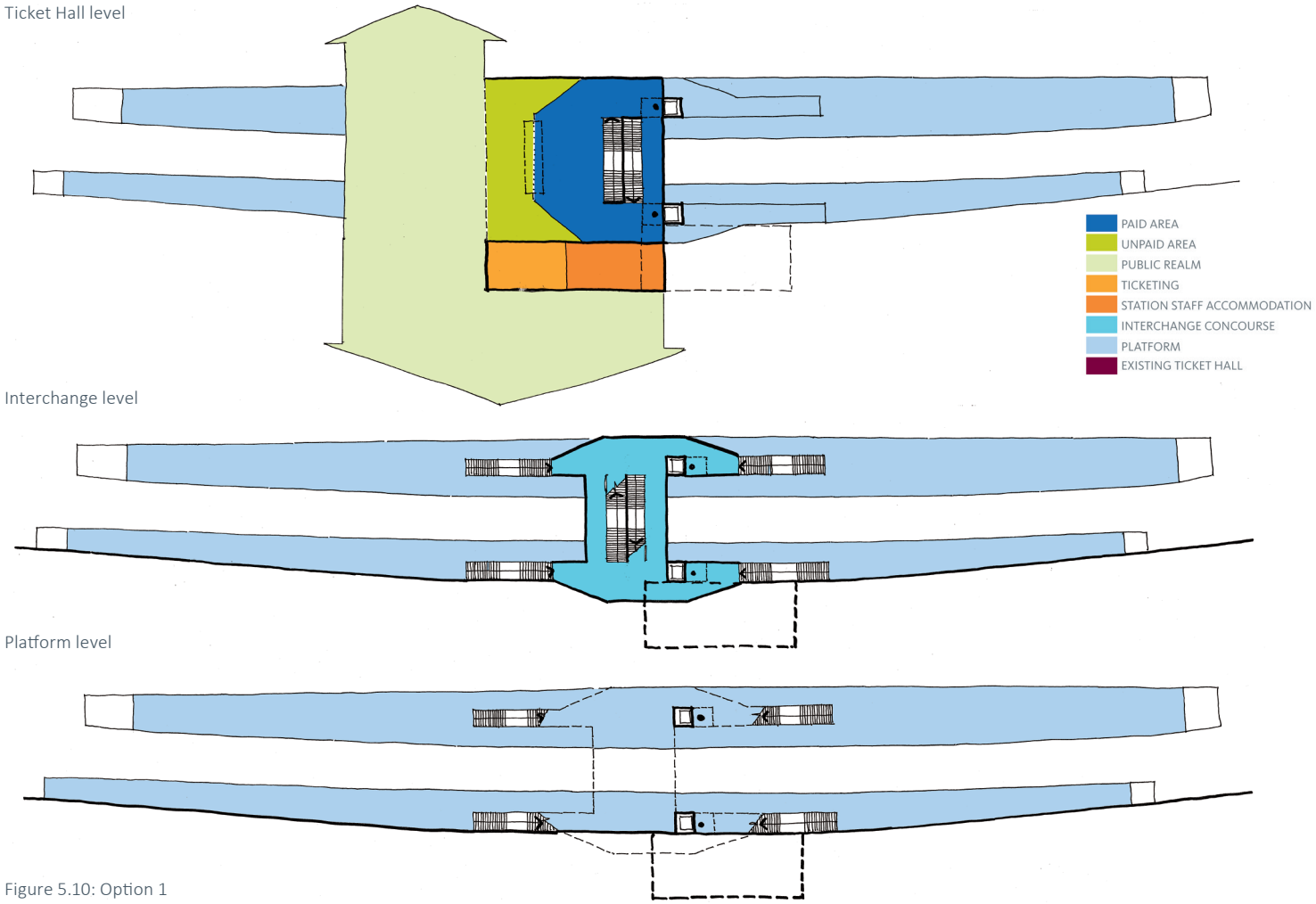


Figure 5.10: Option 1

Option 2 (Alternative B + Alternative E); Two ticket halls (figure 5.11)

By combining Alternative B & Alternative E, the second option considers an initial primary ticket hall to the south and future-proofing for a secondary ticket hall to the north.

Decision points will occur at:

- Interchange concourse; choice between platforms
- Interchange concourse; choice between end of platform

The multiple decision points at interchange concourse will require careful wayfinding to reduce cross flows. Travel distances to the westbound platform will be greater than the scissor stair option (option 1) requiring an increased number of changes of direction of travel.

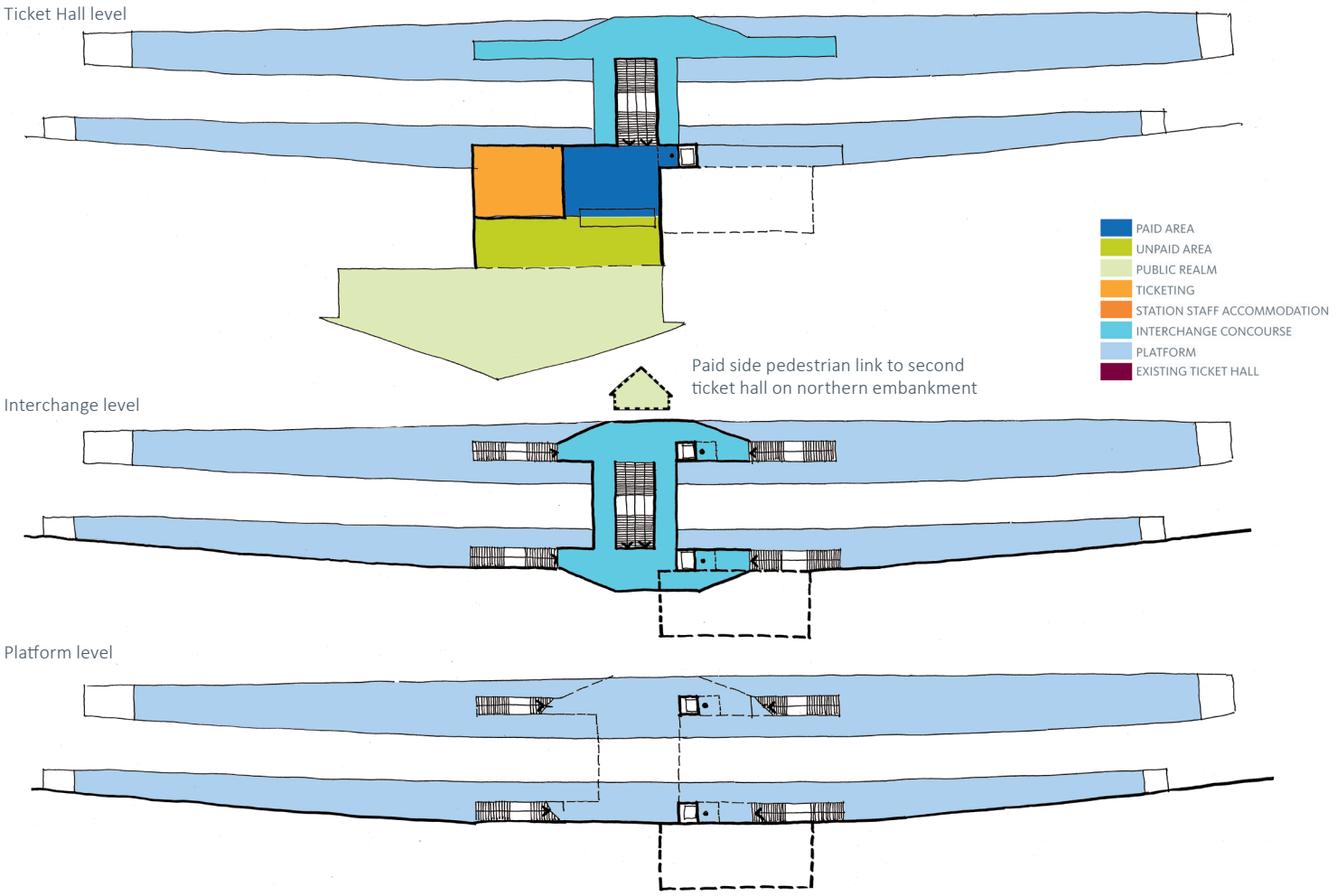


Figure 5.11: Option 2

Comparison of options (assessment criteria)

The assessment criteria were agreed with the stakeholder group. They have been prioritised into primary criteria and secondary criteria and are weighted accordingly. The primary criteria have been assigned twice the value. The two options – Option 1 (combined ticket hall) and Option 2 (two ticket halls) have been assessed against a Do Nothing scenario. The score range used was 0 to 2.

A score of zero represents no improvement or worsening situation than the existing. A score of 1 represents an improvement and 2 represents a significant improvement.

Table 5.3 represents the scores for the three options against each criteria.

			OPTIONS		
			0	1	2
Key Assessment Criteria	**Measurements**	**Weighting**	Do nothing	Pedestrian link bridge with central ticket hall	Two ticket halls with pedestrian link via interchange level of new station
Capacity to meet future demand	All of the station operates within appropriate levels of service as set out in SPSG for post 2041 flows (+30%)	2	0	2	2
Step Free Access to all platforms	At least one lift serving each platform from all entrances	2	0	2	2
	Step free route from street to platform from all entrances	2	0	2	2
Improve the permeability of the area, integrate station into wider public realm and encourage interchange	Reduce journey times for those using the station from the north through cross track pedestrian permeability, without increasing journey times from the south. Scheme ties in well with surrounding area and works (Victoria Bridge, Station Square)	2	0	2	1
Ability to phase in a cost effective manner	Interim options to be able to cater for existing demand and provide SFA asap	2	0	2	1
Station provides user friendly intuitive design	Station routes are legible, intuitive and require minimal wayfinding (customers will not need to stop en route)	1	0	2	2
Development provides commercial opportunities	Development opportunities are provided where they do not impact negatively on the operation of the station	1	0	2	1
Minimise construction impacts	Minimise line and station closures during construction	1	2	1	1
Future proofing Chiltern railway station	Scheme allows integration from future station to serve Chiltern services	1	0	2	1
Sustainability	Sustainability of development is maximised (construction, green space etc.)	1	0	2	2
		Total	**2**	**29**	**23**

Table 5.3: Assessment of options against agreed criteria

Option Refinement

Table 5.3 demonstrates that Option 1 is the preferred option with the highest score. This option has been refined further to explore how it could be further improved. In the main this is related to the vertical circulation having taken on board stakeholder comments in the second of the two workshops. Four different options have been investigated and these are presented below.

Option 1.1: Lifts to the west (figure 5.12)

A variation on Option 1, the alternative lift location aligns step free access more directly with the ticket hall providing the opportunity for an improved quality of experience and improved surveillance by LU staff.

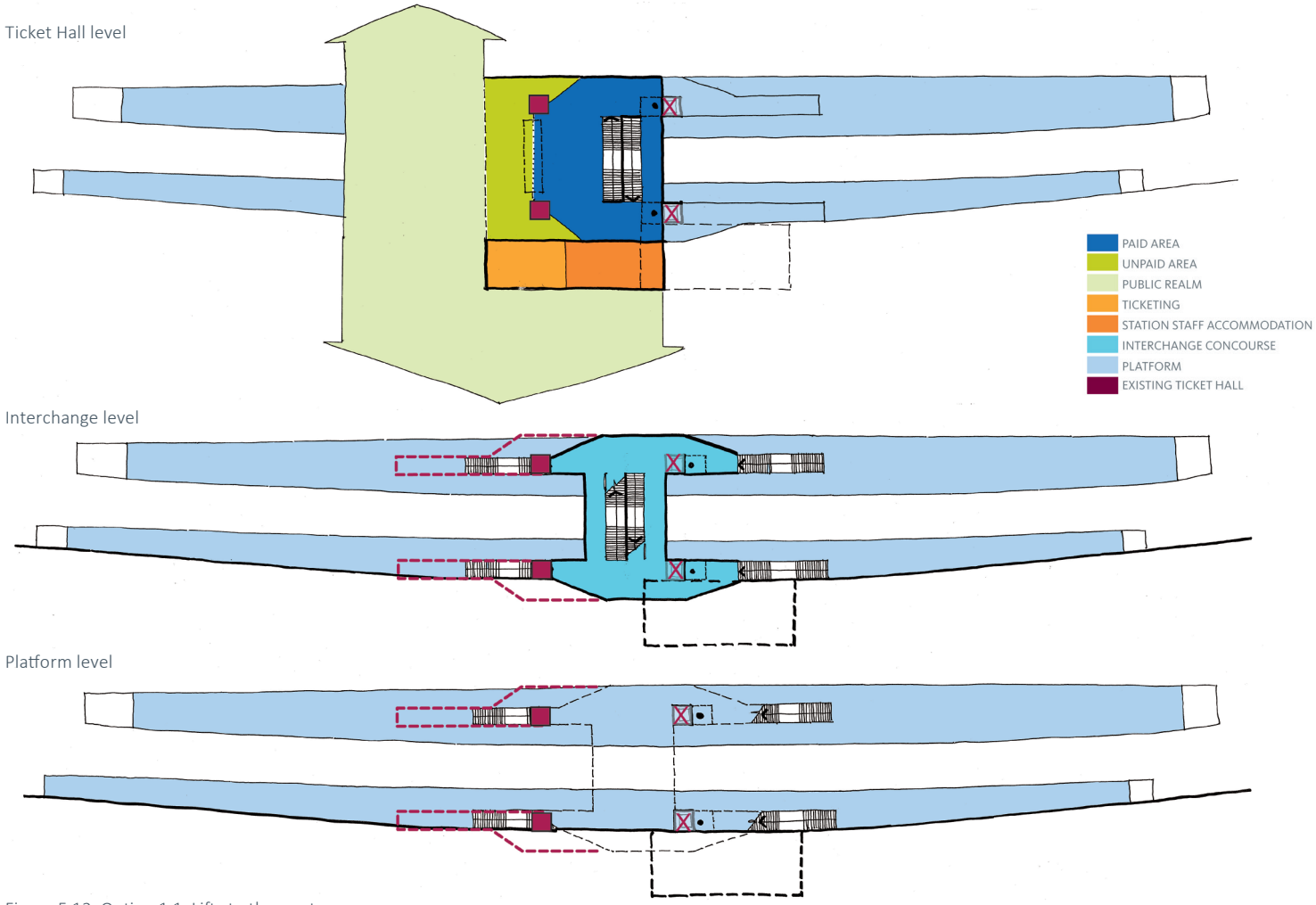


Figure 5.12: Option 1.1: Lifts to the west

Option 1.2: Dog-Leg stair (figure 5.13)

A variation on Option 1, the "dog-leg" stair allows for decision making to be deferred until passengers reach the interchange concourse. Consequently it provides more flexibility than the scissor stair option, particularly at times of tidal demand in the station, although it does require an increased number of changes of direction of travel.

Decision points will occur at:

- Interchange concourse landing; choice between platforms
- Interchange concourse; choice between end of platform.

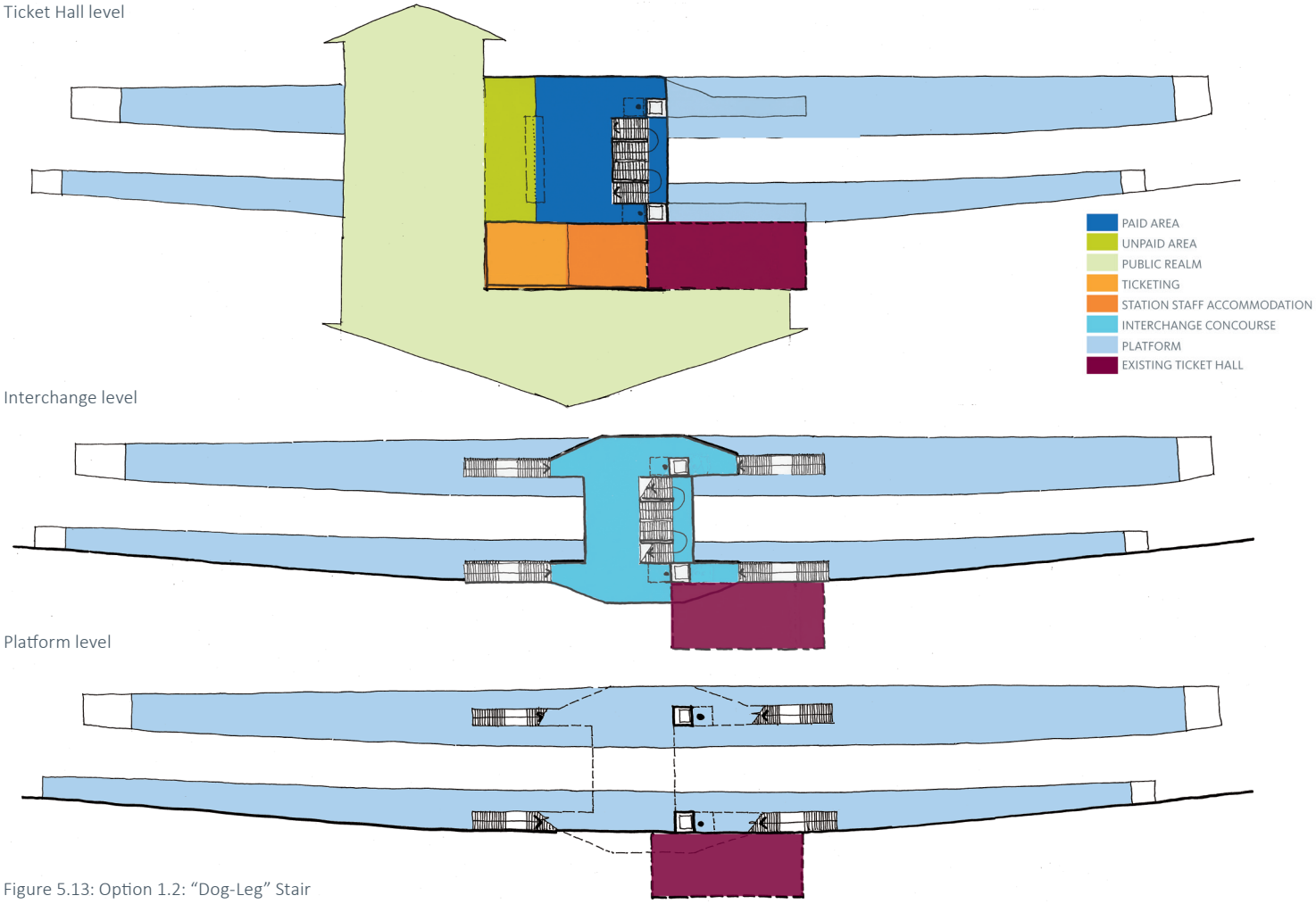


Figure 5.13: Option 1.2: "Dog-Leg" Stair

Option 1.3: Straight flight (figure 5.14)

A variation on Option 1 and an alternative to Option 1.2 (dog-leg stair), this option reduces the number of changes of direction but increases the travel distance to and from the western end of both platforms.

Like Option 1.2, this sub option also allows for decision making to be deferred until passengers reach the interchange concourse. Consequently it provides more flexibility than the scissor stair option above although it does require a 180 degree change in direction to reach the western ends of both platforms.

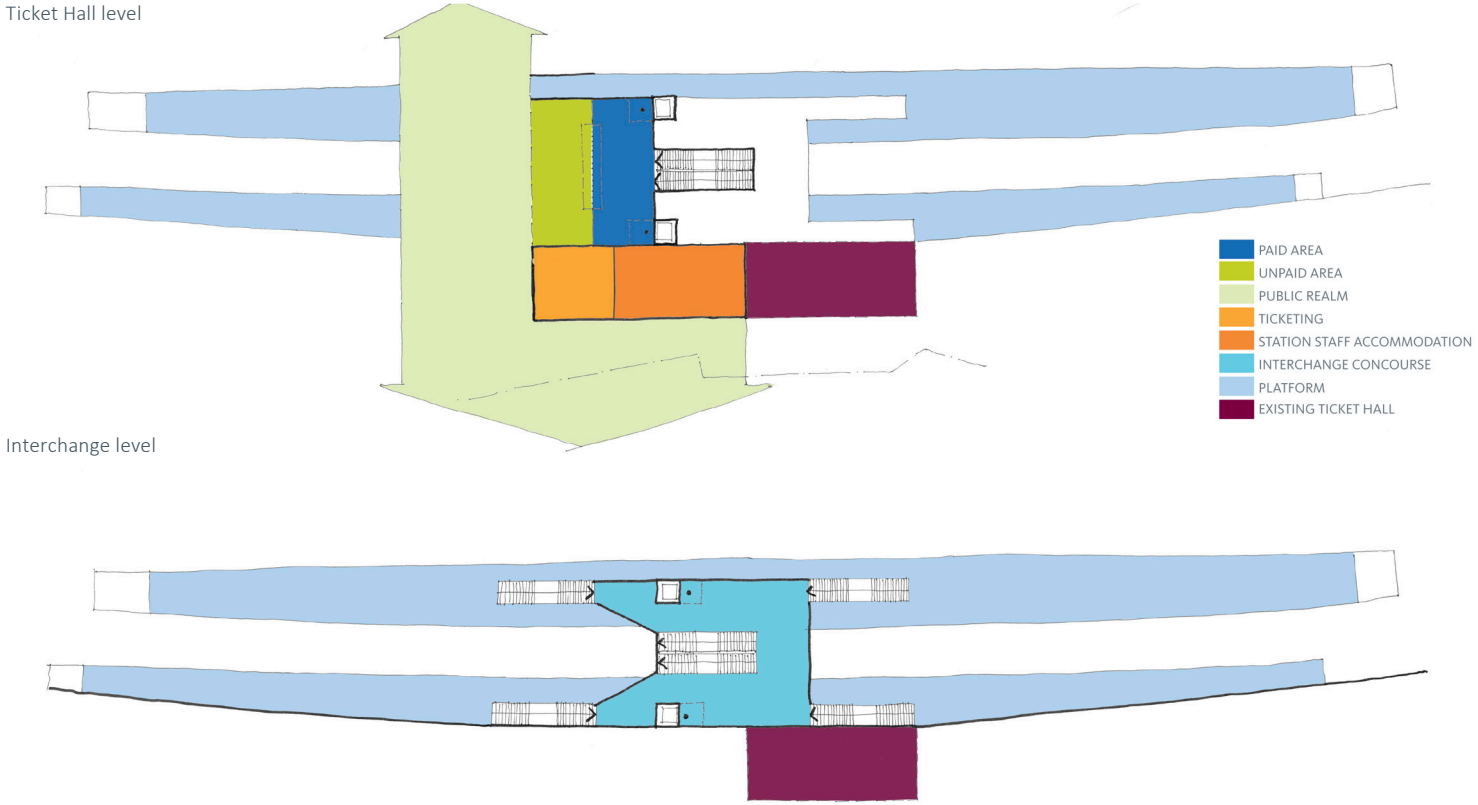


Figure 5.14: Option 1.3 - Straight flight of stairs

Option 1.4: Hybrid (figure 5.15)

Having reviewed all the previous options, Option 1.4 builds on this to address the disadvantages in up to two 180 degree turns. This option has an additional set of stairs to link to the eastern extent of platforms and therefore provides the following:

- Operational flexibility; access between interchange concourse accommodates both AM and PM peaks;
- Improved way finding; direct line of sight to platforms; and
- Reduced travel distances between platform level and ticket hall

The location of the ticket hall above the interchange concourse helps to reduce the number of structures at platform level; both the lift enclosures and columns placed centrally on platforms to minimise operational constraints and maintain unobstructed platform width.

This option is therefore the preferred option due to the benefits it brings to the scheme and is the recommended option to progress further through future design stages.

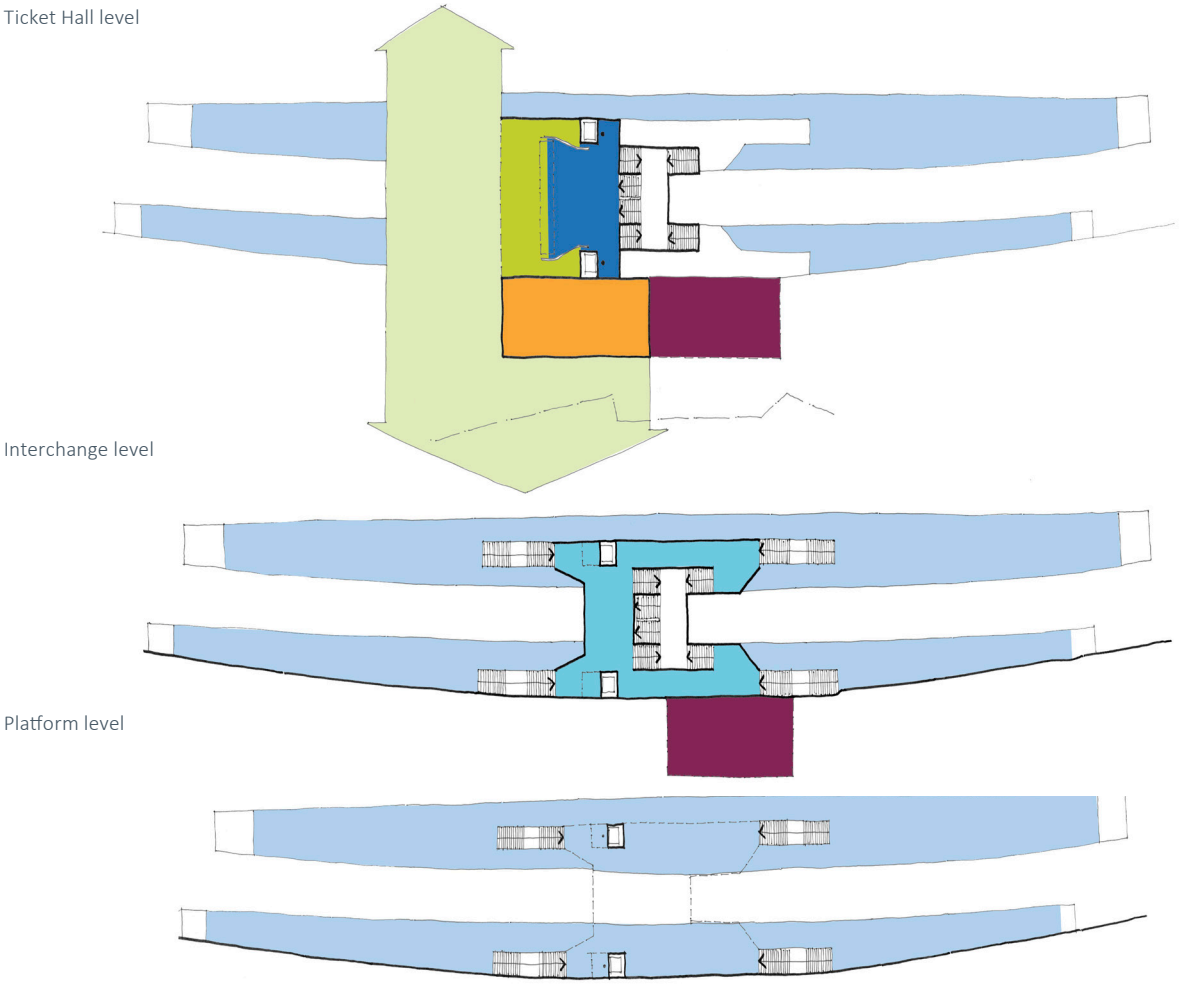


Figure 5.15: Option 1.4 - Hybrid stairs option

Platform coverage (figure 5.16)

In all options, including Option 1.4, the station buildings, ticket hall and interchange level provide a degree of platform coverage which provides shelter for passengers on the platforms. In order to assist further with the distribution of passengers along the platforms to assist with train loading, canopies are proposed to be provided along the platform lengths. This level of coverage would not affect the classification of the station (open air station).

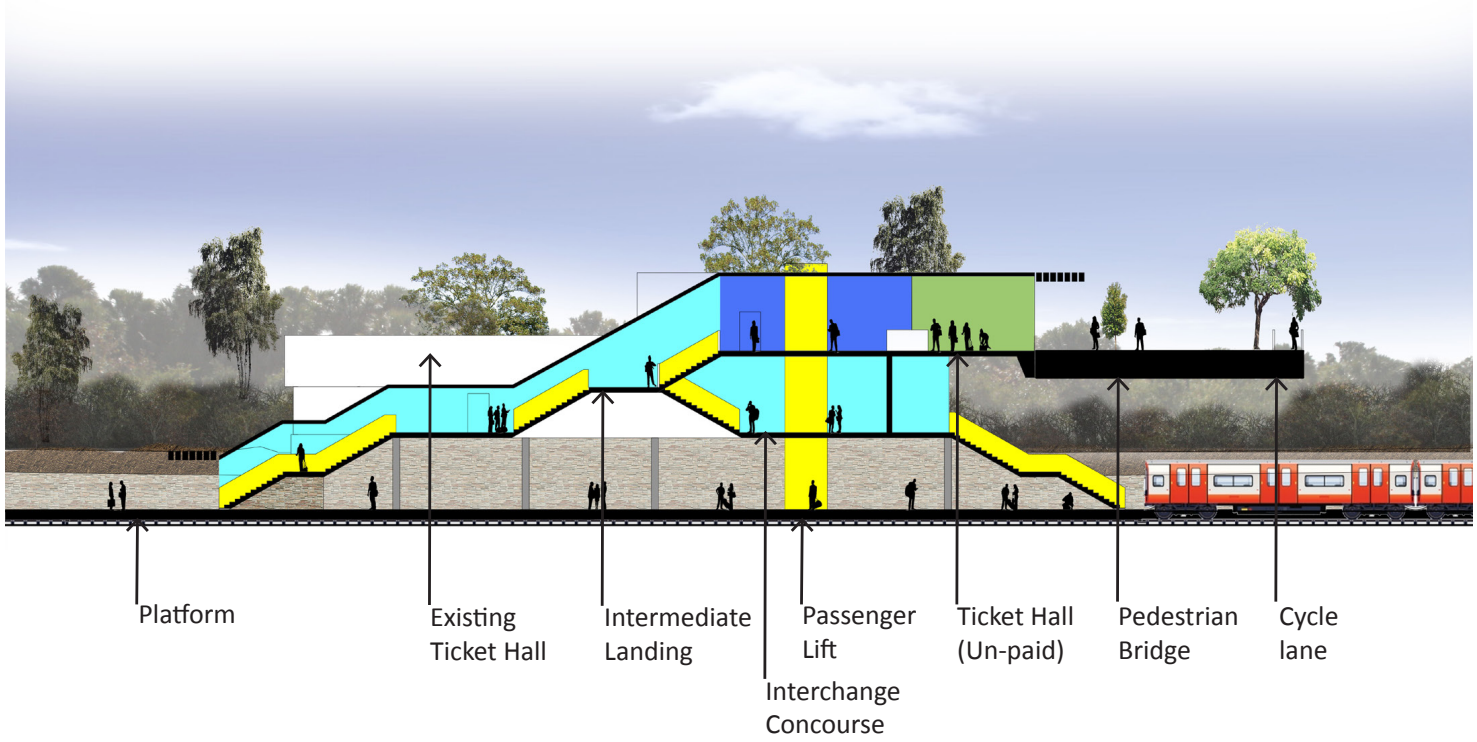


Figure 5.16 : Option 1.4 - Cross section - view from the north facing south

Summary of Options

The platform and ticket hall alternatives were assessed and combined, and then refined to create the preferred option as summarised in the chart in Figure 5.17.

Figure 5.17 : Summary of optioneering process

Development potential for options

Providing opportunities for development can help to bring additional funding to transport schemes, however development over railway tracks is significantly more expensive than on other land. In order to assess the opportunities for North Acton station, the site has been considered as a whole. LU own a significant part of the embankment and surrounding land, bound by existing road bridges to the west and east, at Chase Road and Victoria Road with the northern site boundary defined by the platform and excludes the east bound track beyond, as shown in Figure 5.18. This totals a site area of 0.85ha.

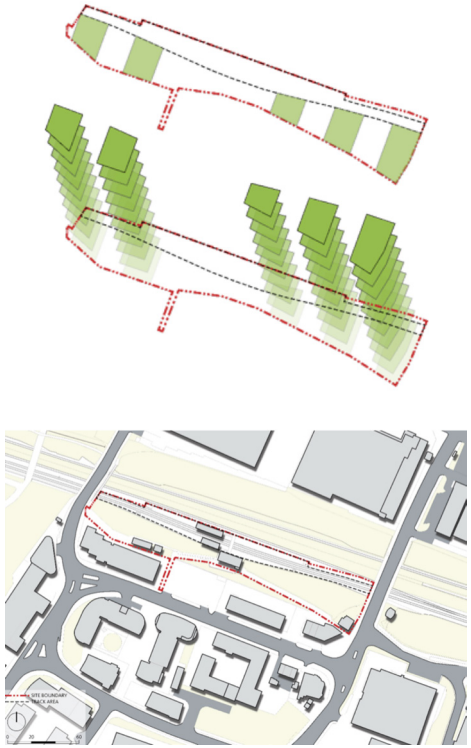


Figure 5.18: Potential development site coverage

Emerging Residential Density

To the south of North Acton station the existing catchment is characterised by high density residential accommodation largely serving a student population.

As agreed with OPDC, the assumption for maximum residential density for the emerging area is 550-600 units per hectare; some 1500 habitable rooms on site, compared to the 600 habitable rooms that policy might otherwise suggest. This amounts to some 41,500m^2 of gross residential development with circa 35% site coverage at 15 stories.

- Residential units/Ha; 550-600
- Gross Floor Area of buildings (m2); 41,500m^2
- Residential Site Coverage (15 stories); circa. 35%

This would equate to approximately 500 residential untis on site. This would equate to approximately 60 AM peak hour trips on services from North Acton and can be accomodated within the station design.

Site Coverage

Of the whole site, only 30% is made up of the track, platforms and existing station buildings. The 70% remaining site area can accommodate the residential site coverage of 35% with the remaining space providing amenity space and helping to maintain the green corridor. The precise design of such development may mean that small areas need to be decked over the railway to provide a continuous green link, but careful design or a slight reduction in density are likely to remove this need.

Urban Realm & Integration

The existing railway cutting severs North Acton station and Station Square from the north. The proposed pedestrian and cycling link across the tracks aims at improving both the connectivity between the LU services, the HS2 sites ('sword' site) and the development potential north of North Acton station.

To the north of the tracks, there is a need to provide links to both the east and west. The link to the east to facilitate links to the dense development in the Old Oak area and North Acton link to Old Oak Common station, and to the West linking to Park Royal. A link parallel to the tracks to the west is very important as this will provide access to the pedestrian link through the cemetery which the Park Royal Transport Strategy has found to be a heavy desire line to/from Park Royal. This path is being promoted for an upgrade as part of that study.

In addition, it would also be beneficial to provide links to the north through the HS2 'sword' site, ideally due north as well as north east and north west to reduce the distance for new residents and employees to be able to access North Acton station.

It is understood that the designs for the HS2 cross-over box and the 'sword' site that houses it are not yet finalised. The potential future development opportunities for the sword site are currently being assessed as part of the HS2 Over Station Development (OSD) study. Safeguarding north-south pedestrian/cycle routes through the site should be undertaken where it is possible to do so.

If further east-west links were developed to the south of the station it could help to further improve the pedestrian connectivity within the wider area.

These potential future pedestrian and cycle links to North Acton are shown in Figure 5.19.

Both the tracks and station building are within a designated Green Corridor, safeguarding the vegetated embankments either side of the tracks anticipated to be of greatest value in terms of biodiversity. The station design proposed does not reduce this biodiversity and the pedestrian / cycle link across the tracks, could help to link the north to the south with careful planting / vegetation.

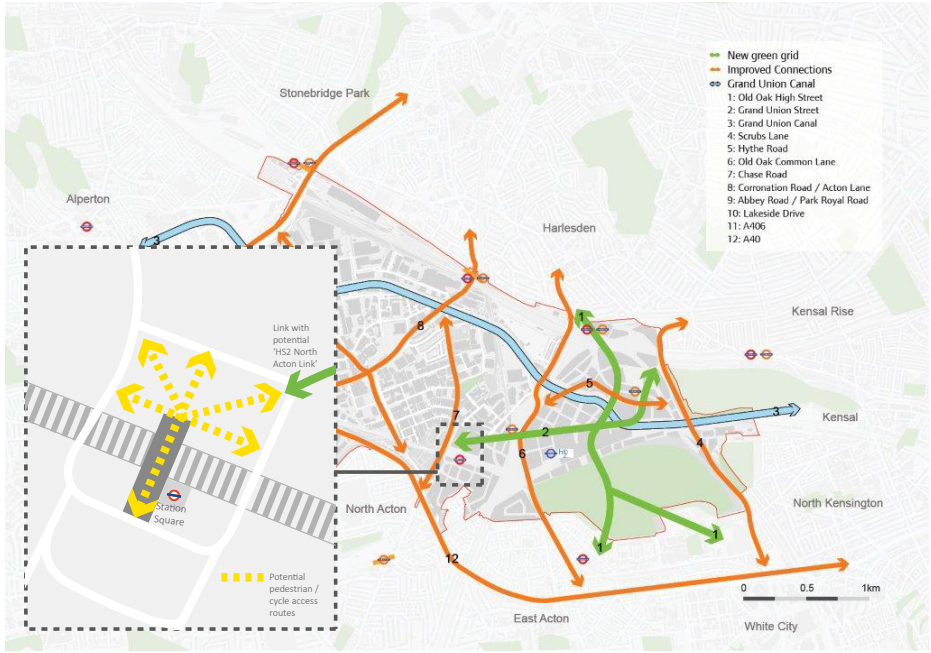


Figure 5.19: Potential pedestrian and cycle integration with the wider area (Source: OPDC, with SDG designed inset).

If the southern side of the site is developed there should be sufficient amenity space to maintain the green link but will need careful design to incorporate this into the development providing both amenity space for the development and publically available space.

6 Phasing of Preferred Option

6 Phasing of Preferred Option

Phasing of options

One of the primary criteria of the scheme is for the construction to be able to be phased and therefore this has been investigated in detail for the preferred Option (1.4). Although the phasing of other options is not presented, they can also be phased but Option 1.4 provides the most flexibility.

Within stakeholder meetings, LB Ealing have stated that delivering step free access in the short term is key, particularly in the light of additional capacity pressures that will be generated in the area.

The potential phasing of incremental station improvements facilitating long term objectives as well as short term step free access has therefore been considered.

The phasing presented could be altered to some extent as required, including construction of the pedestrian / cycle link early at any phase to improve the area's permeability.

Phase 1 (figure 6.1)

Lack of step-free access is one of the most pressing issues facing the existing station. The 2012 study identified a 'quick win' through retrofitting lifts to the existing footbridge. Although this provides lift access this solution does not provide additional capacity, which is required as the station currently operates to capacity at peak hours, and demand is expected to increase significantly.

Unfortunately since that study, LU asset engineers have determined that the bridge only has an estimated life expectancy of 5-10 years due to corrosion. The additional weight of both the lift structures and passenger demand is not thought to be able to be accommodated by the current structure. Even if the existing footbridge had been found to be stable enough to support the lifts as a short term solution, additional supports would be required at platform level. In addition, when moving the lifts to the preferred option location, there would be a period where they could not be in use thereby creating operational disruption whilst demand for the station is growing.

The Optioneering study identified a preferred position for the lifts to the west of the existing footbridge. A temporary connection between the new overbridge and existing ticket hall is indicated in Figure 6.1. As well as providing the first phase of the preferred option, and negating the need to move lifts, delivering lifts in this location has a number of benefits:

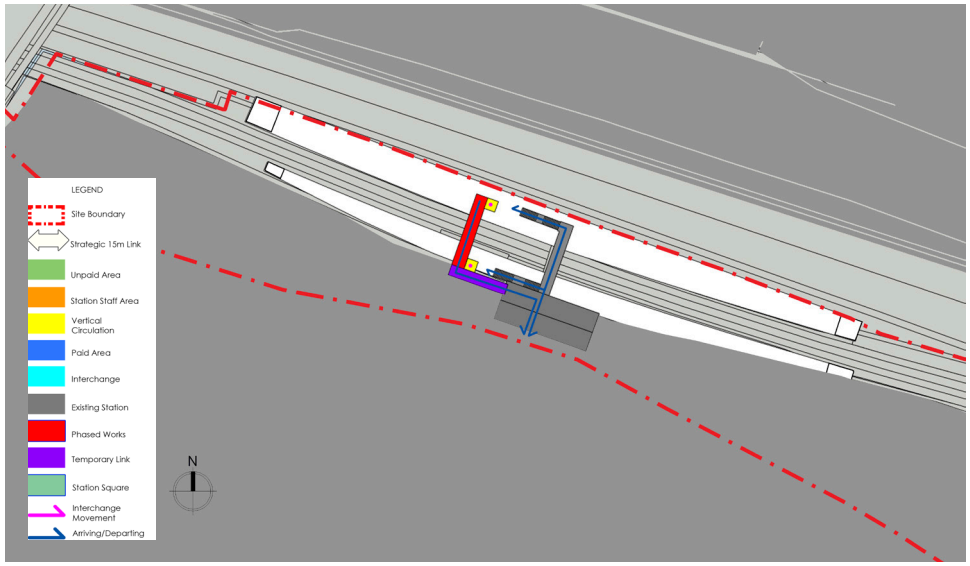


Figure 6.1: Phase 1 Platform level

- The proposed new lift location reduces disruption to operations as it can be constructed whilst the existing station remains operational
- The existing footbridge provides additional capacity in the short term until the final phases of the preferred option are constructed
- Depending when the final phases are constructed minor changes to the existing gateline configuration can accommodate the additional required capacity
- There is only a very small element of abortive work if the scheme is built in phases (temporary link to existing ticket hall).

Phase 2 (figure 6.2)

Insufficient capacity is another key issue affecting North Acton station. The existing stepped approach from the ticket hall to both platforms suffers from congestion particularly during the AM peak.

Additional stair capacity to the west of the lifts, together with completion of the final interchange concourse, will seek to address this issue. Access from the existing ticket hall may include an enlarged temporary gate-line within the existing ticket hall. The number of gates provided will depend on when this is implemented, the level of nearby development that has come forward and the resulting demand. Enhancements to the ticket hall would also provide additional gates and entrance improvements.

Together with phase 1, this is likely to provide for demand until the existing overbridge needs to be replaced by 2026/7.

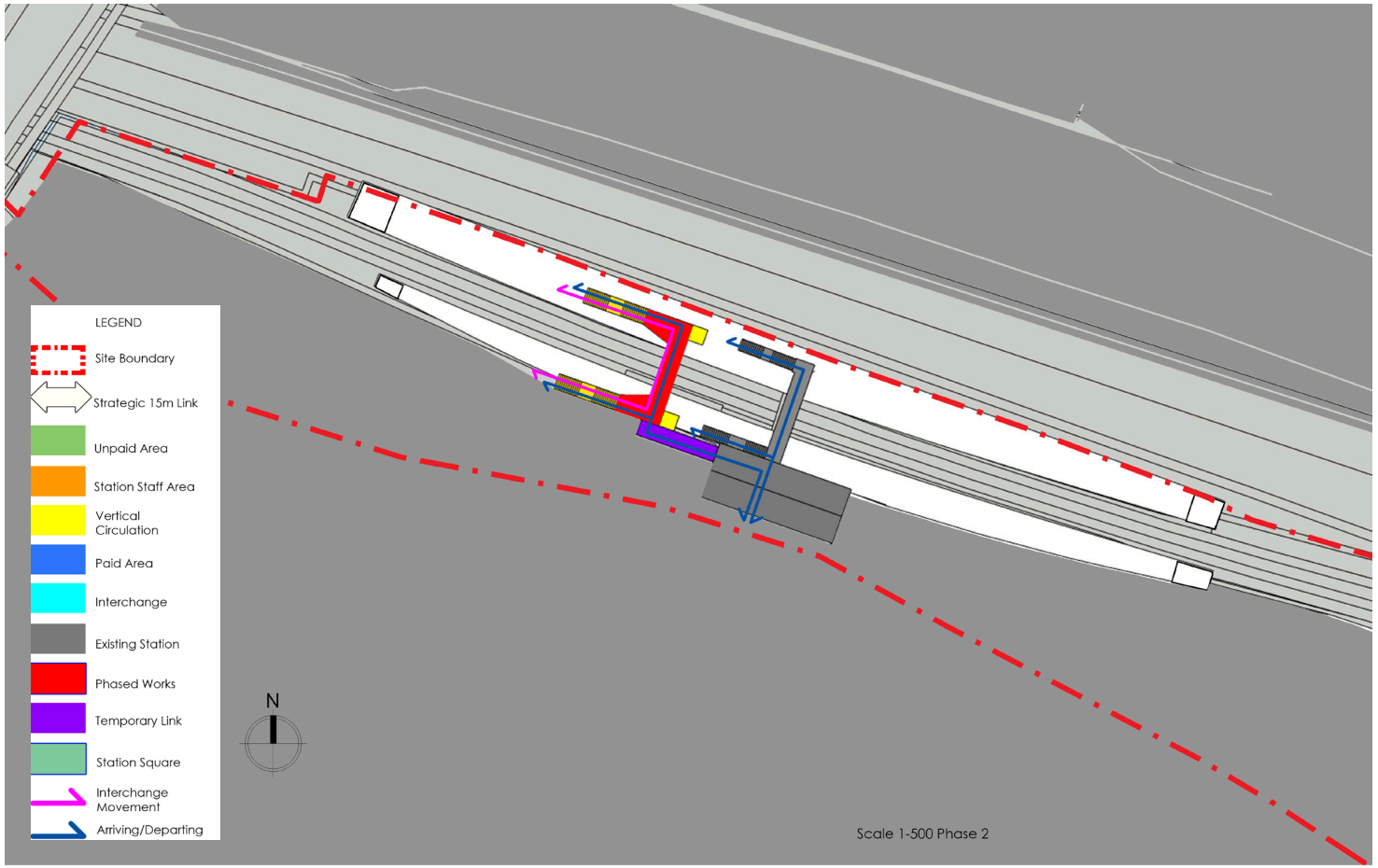
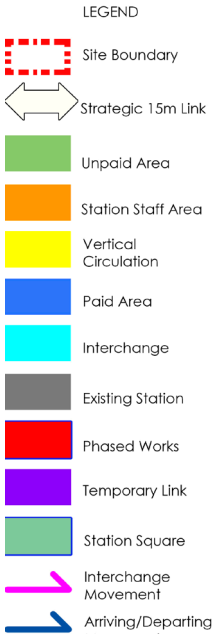


Figure 6.2: Phase 2 Platform level

Phase 3 (figures 6.3 and 6.4)

Phase 3 sees the construction of the new ticket hall above the interchange access, with step free access from Victoria Road via Station Square. During this phase, and to maintain operational continuity of the station, the temporary connection between the new interchange concourse and existing ticket hall would remain in use.



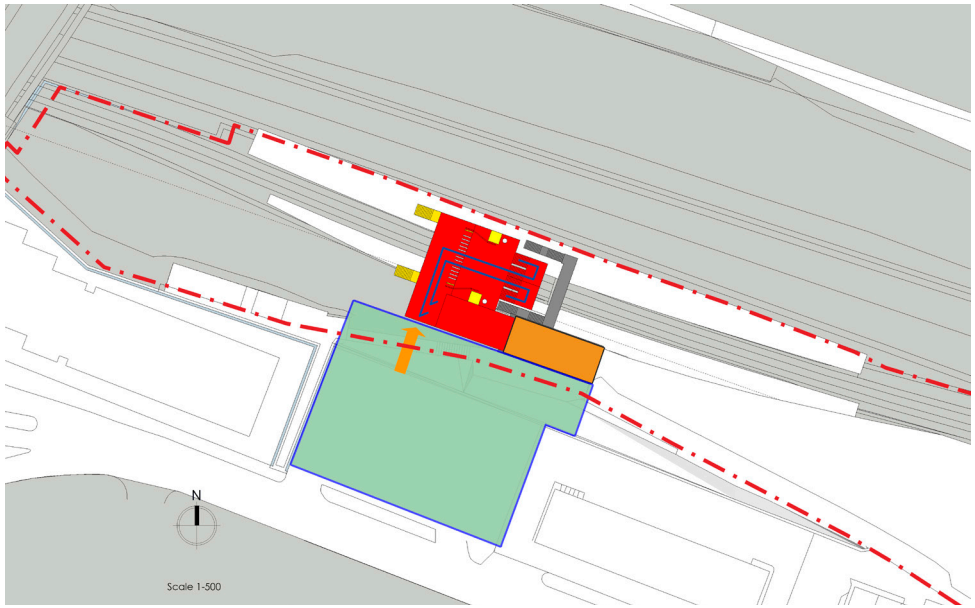


Figure 6.3: Phase 3 Ticket Hall level

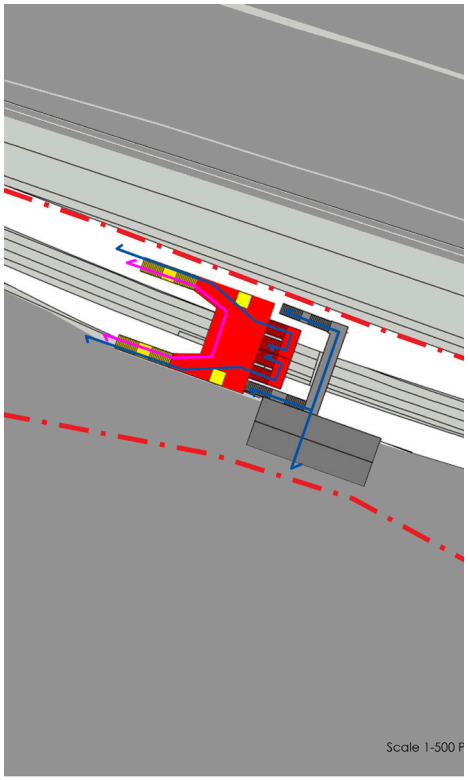
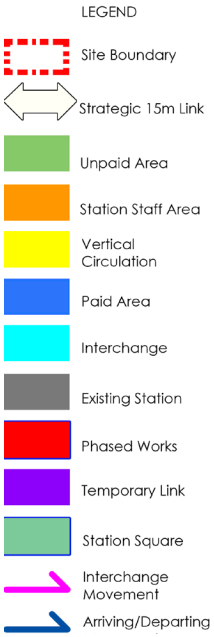


Figure 6.4: Phase 3 Platform level

Phase 4 (figures 6.5 and 6.6)

Following the opening of the new ticket hall the existing footbridge and stairs can be demolished. To reduce operation disruption it maybe that the new stairs (in phase 5) are erected prior to demolition of the existing footbridge.



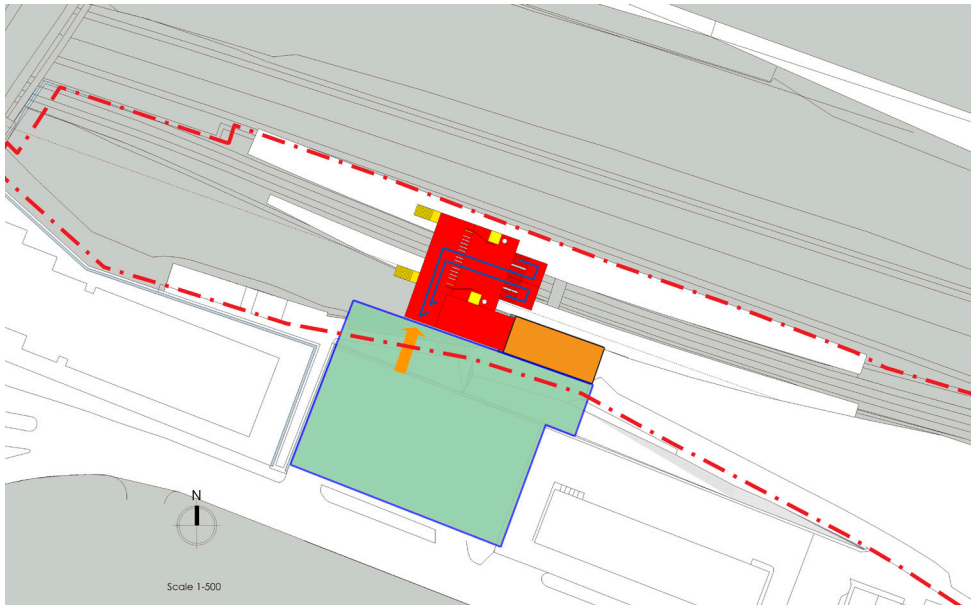


Figure 6.5: Phase 4 Ticket Hall level

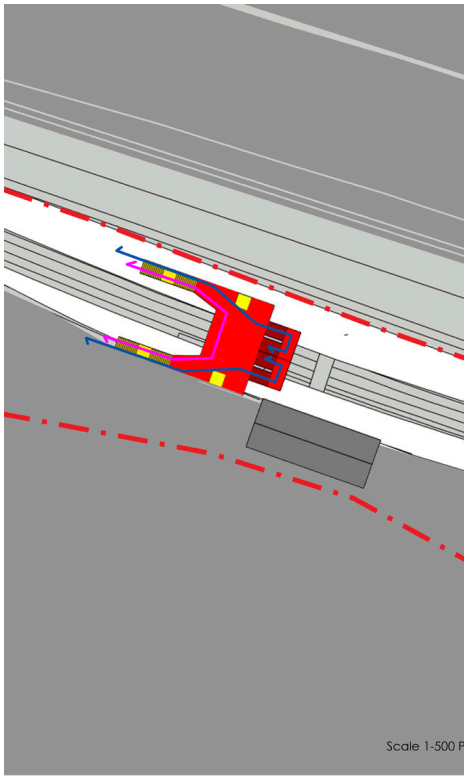


Figure 6.6: Phase 4 Platform level

Phase 5 (figures 6.7 and 6.8)

Phase 5 sees the construction of the additional stairs to the east of the station. These could be combined with phase 4.

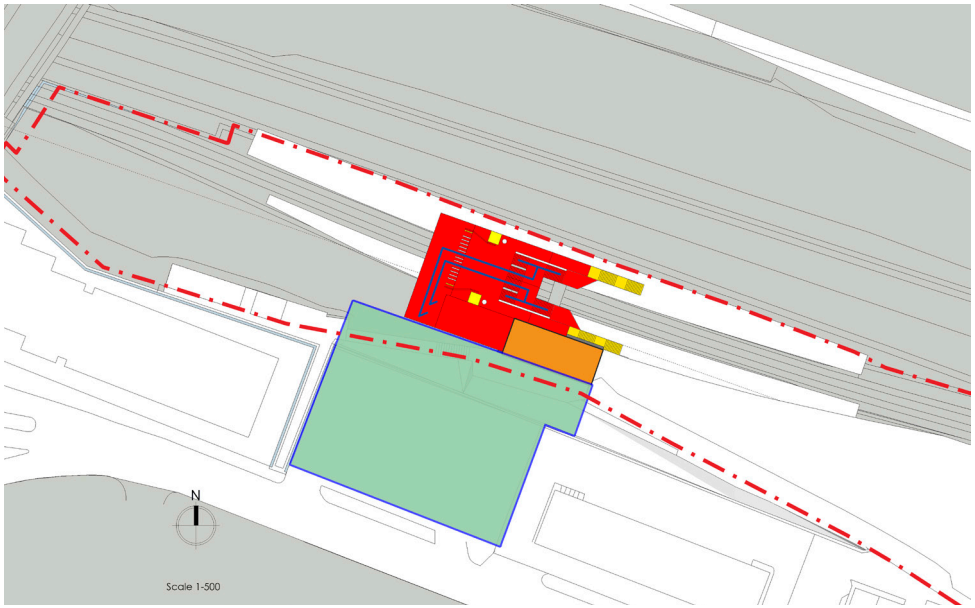


Figure 6.7: Phase 5 Ticket Hall level

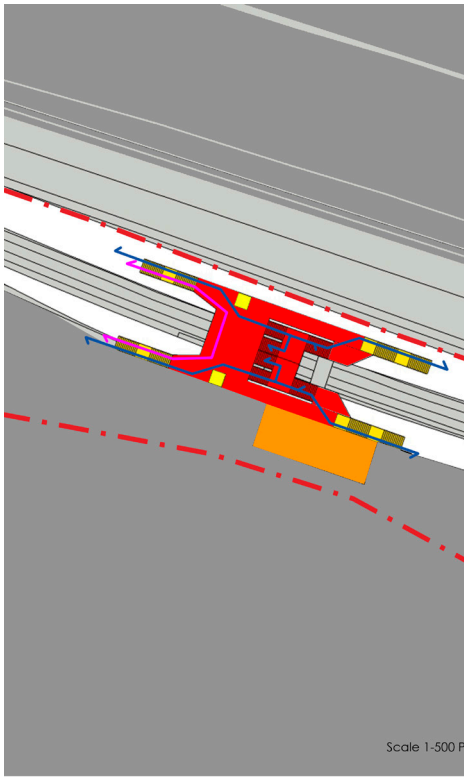


Figure 6.8: Phase 5 platform level

Phase 6 (figure 6.9)

The final phase includes the completion of the pedestrian and cycle link spanning both the LU and Network Rail track, providing access from the emerging catchment to the north (post completion of the HS2 works).

At this time the new station entrance can be realised in its final location i.e. from the link bridge rather than from Station Square.

General Works

Platform surfaces and lighting would also be enhanced as part of the preferred option. All circulation space in the concourse, on the stairs and on the footbridge would be covered in the preferred option.

Station Square Works

Station Square is subject to redevelopment at present improving the access to the current station buildings. With the final design of the station lifting the ticket hall and entrance to street level (above the current level of Station Square) alterations will be required, phase 3 onwards. Phases 1 and 2 are considered to be able to tie in with Station Square as being designed.

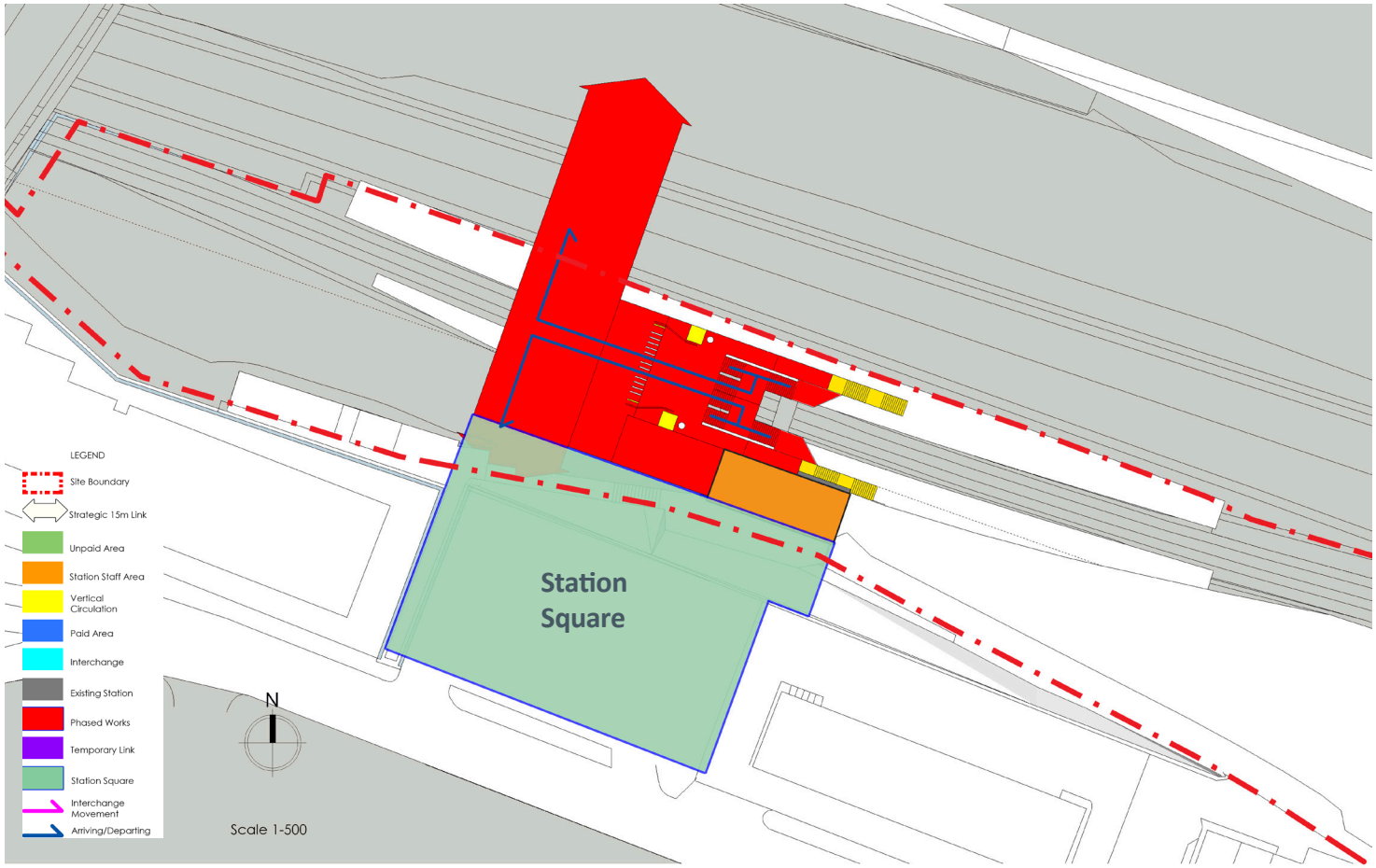


Figure 6.9: Phase 6 Ticket Hall level

Phasing Strategy

One of the study criteria was to provide a scheme that could be delivered in phases to coincide with the stages of development in the area. The phasing of the preferred option (Option 1.4) has demonstrated that the design can be phased with only two small elements of abortive work (the pedestrian link to the existing ticket hall (shown in purple on drawings for phases 1 and 2) and the reconfiguration of the gateline in the existing ticket hall to facilitate additional gates, to make the ticket hall compliant prior to phase 3 being constructed. It is assumed that the existing ticket hall can be reconfigured to a small extent to provide additional ticket gates as was presented in the McAslan and Partners report in 2012 (Figure 6.10).
The feasibility of this has not been investigated further as part of this project. It has also not been costed as the extent of abortive work required will depend upon when phases 2 and 3 are delivered.

In order to understand when each phase of the design is required to facilitate the demand, the predicted station demand has been analysed by year as has been set out in Figure 3.2.

It is important that the construction of each phase has been completed prior to it being required by the additional demand and therefore the indicative construction programme for each phase has been considered. Along with the cost estimates for each phase, Table 6.1 provides an indication of when construction is required to start and the level of funding needed to support this for each phase.

Phase 6 (construction of the pedestrian / cycle link to the north) could be provided earlier in the scheme to assist with reducing the walk distances for people accessing the station from the north.

There are some cost savings through construction of the final scheme in one phase however the availability of funding is important to consider, as well as when the full capacity would be required.

As the design of the station progresses through feasibility and additional information is known about each of the development sites, this demand analysis will need to be refined to ensure that the works are timetabled to start at a suitable time.

Figure 6.10: Potential gateline reconfiguration to increase ticket gates for phases 1 to 2.
Sourse McAslan & Partners (2012)

It is important to note the detailed design for the full scheme phases 1-6 is required prior to construction of phase 1 to ensure that all of the phases contribute to the final scheme and abortive work is minimised.

Table 6.1: Preferred option: Indicative Phasing Costs & Timescales

Phase	Cost	Year start construction	Year required
Enabling work	**£1.5m**		**Present**
1 Provide 2 new lifts and link to existing ticket hall and reconfigure existing gateline (uncosted)	**£6.1m**	**(2 year programme)**	**Present**
2 Provide new staircases to new overbridge	**£0.8m**	**2027**	**2028**
3 Provide new upper level ticket hall and link to Station Square	**£10.8m**	**2033**	**2035**
4 Demolish existing old stairs and overbridge	**£1.5m**	**2034**	**2036**
5 Provide secondary set of stairs	**£8.9m**	**2034**	**2036**
6 Provide public pedestrian/ cycle link to the north	**£15.9m**	**(2 year programme)**	**Anytime**
Total Phased Cost	**£45.4m**	-	-
Total cost if not phased	**£40.6m**	-	-

Note: Costs exclude TFL management costs. Costs are reported in present values (2015)

Bridge Width

The bridge has been sized at a total of 15m wide assuming a 4m cycle lane, 3m buffer zone with opportunity for trees/ cycle parking, benches, lighting etc and 8m wide pedestrian only area. The pedestrian area has been based on a Fruin level of service A which is deemed appropriate for this type of link. The 8m pedestrian width can accommodate approximately 10,000 pedestrians per hour, which is appropriate to accommodate the 2041 predicted demand that will be accessing the station. Additional pedestrians using the link as a through route and not using the station itself will reduce the level of service once the station demand has reached 10,000 per peak hour, however the link could accommodate approximately 17,000 people per peak hour prior to the level of service dropping to C “increasingly uncomfortable”.

7 Conclusions and Recommendations

7 Conclusions and Recommendations

Summary

North Acton station, within the Old Oak and Park Royal Opportunity Area is expected to be subject to significant additional demand due to the large scale development that will surround the station. The demand by 2041 is expected to be approximately three to four times the current demand. As the existing station is already straining under the current demand, reconfiguration to provide both additional capacity and step free access is key.

This study has investigated whether the station in its current location is suitable, as well as how the station will link to the future demand most appropriately. Providing a link over the railway cutting to the north will help to unlock this large scale future development to the north.

Providing a phased construction was an important criteria within the study brief, particularly to bring forward the installation of lifts to each platform to provide full step free access. The design has enabled step-free access to be provided whilst being in a suitable location so as not to prejudice the final scheme when the demand will require it.

The phasing could be altered to provide the link to the north earlier should it be wished and funding is available. This could help to unlock the development in the area and also if completed prior to HS2 works on Victoria Bridge, could also help to reduce disruption to residents in the area.

Further Work

This study recommends further development of Option 1.4 through feasibility design, where the design can be developed in more detail, with additional structural considerations and building programme, allowing the costs and phasing to be refined further.

The feasibility should investigate in further detail how the exisiting 'Great Western heritage' features of the existing station could be retained, if at all.

The pedestrian links through the HS2 'sword' site to the north of the station are important to maximise the benefit of the northern link to enable access to the east, west, and north east and north west and therefore they should be safeguarded through the design of the site development.

The development potential of the southern railway embankment should be investigated in further detail as this could help to fund the station development. Once the new ticket hall is constructed at the level of the southern Victoria Road, the current pedestrian ramp from Victoria Road to the existing ticket hall could be provided at grade as part of potential future development. In addition, the reliance upon this link, which is dominated by demand from the north, will be reduced as soon as the northern link over the tracks is provided.

Appendix 1

Appendix 1

Demand calculations and assumptions

1.1 In order to understand the level of future demand expected at North Acton, a number of assumptions have been made in addition to understand existing demand and future known development.

Existing Demand

1.2 Existing Rail Origin Destination Data (RODS) supplied by TfL provides the 2014 base level of existing demand data. This data is provided in three hour periods to cover the peak period (07:00-10:00). These have been converted to a single AM peak hour (08:00-09:00) with a factor of 0.45 and the PM peak hour (17:00-18:00) with a factor of 0.41. These are in accordance with Station Planning Standards Guidance (SPSG) for stations in zones 1-3.

1. 3 Existing mode share in the area has been assessed using data from the 2011 Census (2011).

Future Demand

1.4 A number of data sources have been used:

- Old Oak and Park Royal Development Corporation (OPDC) have supplied data regarding the location and predicted quantum of development on each site within the Old Oak Common area, this includes both residential and commercial development. This data includes whether the development was due to come forward prior to 2026 or between 2026 and 2041. A flat profile of development has been assumed across these years in lieu of any alternative information.
- For Park Royal, OPDC expects to see growth of 10,000 jobs in the area. As this is not currently available on a site specific basis, an assumption has been made that of 40% of this growth would use North Acton station if using rail / underground services. Although there are four stations surrounding Park Royal, North Acton following redevelopment will have a large capacity and potentially improved walking, cycling and bus links following implementation of measures identified in the Park Royal Transport Strategy. In addition, these jobs are predominantly within a 20 minute walking catchment from North Acton. The further calculation of trip rates is described below.
- Unidentified Residential demand – It is likely that during the development of the area additional residential development will take place that has not yet been identified. An estimate of 1000 residential units has been included within the analysis, using trip rates as described below.

Trip Rates

1.5 Having collated the level of future growth, we have applied certain trip rates to the development in order to understand the demand on North Acton Station itself.

1.6 For residential trip rates, we have made an assumption that there are 2.5 people per residential unit and using the TRICS 7.2.2 database a residential trip rate of 0.2732 departures for the AM peak, and 0.2124 for arrivals in the PM peak. In addition a modal share of 41% using the Underground has been applied (based on 2011 census data for the North Acton area).

1.7 To calculate commercial trips, an employee density of 1 employee per 11.5sqm has been assumed. Of these jobs, 85% daily attendance is expected (to account for annual leave, sickness and working from home). Of these trips it is expected that 80% will use underground / rail services (based on the Canary Wharf travel to work mode share of 82%). It is expected that 45% of those commuting trips will occur during the peak hour (08:00-09:00 or 17:00-18:00).

Station Capacity Requirements

1.8 The existing and future capacity requirements have been calculated by using the predicted demand figures for peak hours against the SPSG (Written Notice-2014-LU-WN-0314) requirements.

1.9 Figure 5.1 in the report provides details of the current widths of infrastructure along with the requirement in 2041 (+30%). In order to understand when each phase of the station is required according to demand, the requirements by year have been calculated for the two key elements of infrastructure: vertical circulation and number of ticket gates. These are provided in the tables opposite.

AM peak	Stair Requirements (metres)		Gate line requirement (number of gates)		
	Plat 1 stair requirement	Plat 2 stair requirement	Entry Gates	Exit gates	Total
2015	0.8	1.0	1	2	4
2016	0.8	1.0	1	2	4
2017	0.9	1.1	1	2	4
2018	0.9	1.1	2	2	5
2019	1.0	1.2	2	2	5
2020	1.0	1.2	2	3	6
2021	1.1	1.3	2	3	6
2022	1.1	1.3	2	3	6
2023	1.2	1.4	2	3	6
2024	1.2	1.4	2	3	6
2025	1.3	1.5	2	3	6
2026	1.4	1.6	2	3	6
2027	1.4	1.7	2	4	7
2028	1.5	1.7	2	4	7
2029	1.6	1.8	2	4	7
2030	1.7	1.9	2	4	7
2031	1.8	2.0	2	5	8
2032	1.9	2.1	2	5	8
2033	2.0	2.2	2	5	8
2034	2.1	2.2	2	5	8
2035	2.2	2.3	2	6	9
2036	2.3	2.4	2	6	9
2037	2.4	2.5	2	6	9
2038	2.5	2.6	2	6	9
2039	2.5	2.7	2	7	10
2040	2.6	2.7	2	7	10
2041	2.7	2.8	2	7	10
2041+30%	3.3	3.4	3	9	14

PM peak	Stair Requirements (metres)		Gate line requirement (number of gates)		
	Plat 1 stair requirement	Plat 2 stair requirement	Entry Gates	Exit gates	Total
2015	0.8	0.9	2	1	4
2016	0.8	0.9	2	1	4
2017	0.8	1.0	2	2	5
2018	0.9	1.0	2	2	5
2019	0.9	1.1	2	2	5
2020	0.9	1.1	2	2	5
2021	1.0	1.2	2	2	5
2022	1.0	1.2	2	2	5
2023	1.0	1.3	2	2	5
2024	1.1	1.3	3	2	6
2025	1.1	1.4	3	2	6
2026	1.2	1.5	3	2	6
2027	1.2	1.6	3	2	6
2028	1.3	1.7	3	2	6
2029	1.4	1.8	3	2	6
2030	1.4	1.9	4	2	7
2031	1.5	2.0	4	2	7
2032	1.5	2.1	4	2	7
2033	1.6	2.2	4	2	7
2034	1.7	2.3	4	2	7
2035	1.7	2.4	4	2	7
2036	1.8	2.5	5	2	8
2037	1.8	2.6	5	2	8
2038	1.9	2.7	5	2	8
2039	2.0	2.8	5	2	8
2040	2.0	2.9	5	2	8
2041	2.1	3.0	6	2	9
2041+30%	2.5	3.7	7	3	11

Appendix 2

Appendix 2 Construction Constraints and Risks

A summary of constraints and risks identified at this pre-feasibility stage are provided below.

Phase 1 (New lifts)

Constraints:

- Development of step-free access solution requires advancing the design of the final upgraded station solution to ensure full co-ordination of all the elements.
- On-site construction of both lifts and footbridge will need to be undertaken during engineering periods
- Lineside cabling may need to be relocated
- Constrained site access

Key Risks:

- Extent of below platform structures and services not known at this stage
- Structure of existing platform retaining wall not known at this stage
- Construction in close proximity to an operational railway

Phase 2 (New stairs to platform)

Constraints:

- On-site construction of new stairs will need to be undertaken during engineering periods
- Lineside cabling may need to be relocated
- Constrained site access

Key Risks:

- Extent of below platform structures and services not known at this stage
- Structure of existing platform retaining wall not known at this stage
- Construction in close proximity to an operational railway

Phase 3 (New Ticket Hall)

Constraints:

- On-site construction will need to be undertaken during engineering periods
- Lineside cabling may need to be relocated
- Constrained site access

Key Risks:

- Construction in close proximity to an operational railway

Phase 4 (Demolition of existing footbridge and existing stairs)

Constraints:

- Demolition will need to be undertaken during engineering periods
- Constrained site access

Key Risks:

- Construction in close proximity to an operational railway
- Phase 5 (New secondary stairs to platforms)

Phase 5 (New secondary stairs to platforms)

Constraints:

- On-site construction will need to be undertaken during engineering periods
- Constrained site access

Key Risks:

- Extent of below platform structures and services not known at this stage
- Structure of existing platform retaining wall not known at this stage
- Construction in close proximity to an operational railway

Phase 6 (Pedestrian & Cycle link)

Constraints:

- On-site construction will need to be undertaken during engineering periods
- Constrained site access

Key Risks:

- Extent of below ground structures and services not known at this stage
- Construction in close proximity to an operational railway