

8 Transport and Movement

8.1 Introduction

8.1.1 This chapter of the Environmental Statement (ES) assesses the likely significant transport and movement effects of the Bank Station Capacity Upgrade (BSCU).

8.1.2 In summary, the project provides:

- a new Northern Line southbound platform and tunnel;
- a new escalator link between the Northern Line and the DLR platforms;
- a new Station Entrance on Cannon Street;
- improved arrangements for interchange within the station; and
- improved emergency fire and evacuation protection measures.

8.1.3 Two main construction work sites are required at the Whole Block Site (adjacent to King William Street) and Arthur Street. Utility and protective works are required in the nearby area.

8.1.4 Full details of the proposed scheme can be found in Chapter 4: Proposed Development. Locations of the required works are shown in Figure 8.1.

8.1.5 The following areas have been considered as part of the assessment of the project:

- relevant planning policy at national, regional and local level;
- assessment methodology and significance criteria;
- current and future baseline scenarios;
- incorporated mitigation measures;
- assessment of effects;
- other potential mitigation measures; and
- cumulative and residual effects.

8.1.6 The following elements of the scheme have been considered as part of the assessment:

Demolition and Construction

- impacts associated with utility and protective works required to implement the project;
- impacts associated with demolition of the Whole Block Site;

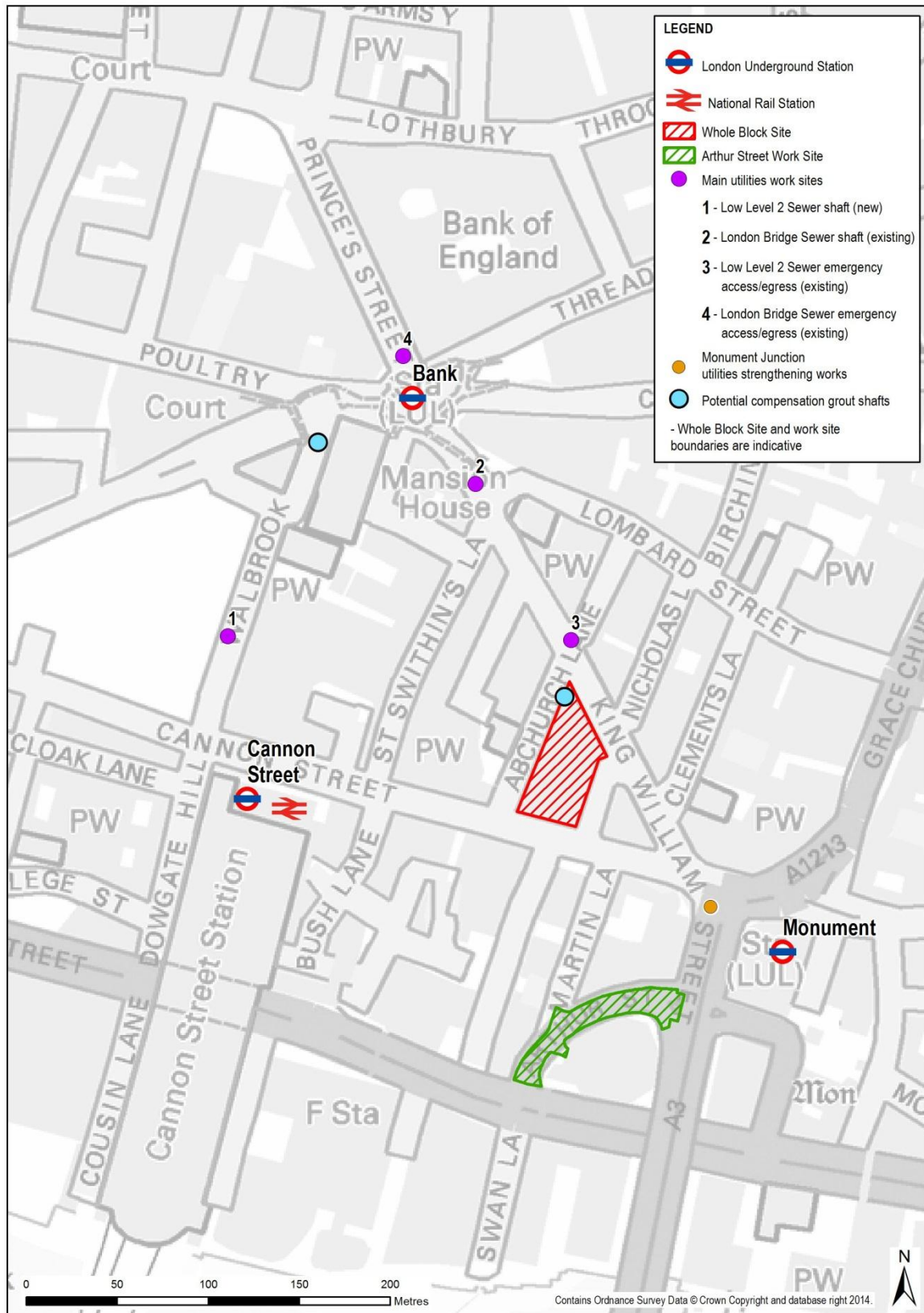
- impacts associated with the construction works at the Whole Block Site and Arthur Street Work Site;
- impacts of a total and partial 'blockade' of the Northern Line (City branch) which will restrict London Underground services; and
- impacts on passengers movements within the Bank Monument Station Complex (hereafter referred to as Bank Station) during construction.

Operation

- impacts on passenger movements within the completed Bank Station; and
- impacts on pedestrian movements on footway outside proposed new Station Entrance on Cannon Street.

- 8.1.7 A detailed analysis of the transport issues associated with the BSCU has been undertaken and the scheme has been compared against future baseline conditions. Detailed results of the analysis are presented in the Transport Assessment (TA) for the scheme (Appendix A8.1) and a summary is provided in this chapter.
- 8.1.8 The assessment has considered the impacts on vehicular traffic, public transport passengers, vulnerable road users (pedestrians and cyclists) and on the servicing of nearby businesses and buildings. Where appropriate, mitigation measures have been developed to minimise or remove significant adverse effects.
- 8.1.9 Further details of construction traffic impacts and proposed management and mitigation measures are provided in the Outline Construction Logistics Plan (Appendix A8.2) for the scheme. An assessment of the impacts from the associated utility and protective works required to implement the scheme has also been included in this chapter and further details are provided in Appendix A8.3.

Figure 8.1: Location of Bank Station and Surrounding Area



8.2 Planning Policy Context

- 8.2.1 The BSCU has been developed with planning policy in mind and the proposed scheme is consistent with, and supported by, current planning policy at a national, regional and local level.
- 8.2.2 The following sections provide an overview of relevant national, regional and local transport policy and describe how the BSCU facilitates the achievement of the objectives presented in the policy documents.
- 8.2.3 Further information is provided in the Supporting Statement that accompanies the Transport & Works Act Order (TWAO) application, Chapter 2: Planning Policy of this ES and Chapter 3 of the Transport Assessment.

National Planning Policy

National Planning Policy Framework (Department for Communities and Local Government, 2012)

- 8.2.4 Paragraphs 29, 30 and 32 in Section 4 of the *National Planning Policy Framework (NPPF)* state that:
- *the transport system needs to be balanced in favour of sustainable transport modes to give people a real choice about how they travel, while ensuring that safe and suitable access to the site can be achieved for all people; and*
 - *development should only be prevented or refused on transport grounds where the residual cumulative [transport] impacts of development are severe.*
- 8.2.5 In addition, *Paragraph 17* includes a core principle to actively manage patterns of growth to make the fullest possible use of public transport, walking and cycling, and focus significant development in locations which are or can be made sustainable.
- Planning Practice Guidance (Department for Communities and Local Government, 2014)*
- 8.2.6 The national *Planning Practice Guidance (PPG)* is an on-line guidance resource to use alongside the *NPPF*, and it covers 'Travel plans, transport assessments and statements in decision-taking', and advises on when transport assessments and transport statements are required, and what they should contain. The *PPG* states that Transport Assessments primarily focus on evaluating the impacts of development and may propose mitigation measures where necessary and can be used to establish whether residual transport impacts are likely to be severe.

Regional Planning Policy

The London Plan (Greater London Authority, July 2011)

- 8.2.7 *The London Plan 2011* is the overarching planning document for London, with the aim of ensuring that London's transport is easy, safe and convenient for everyone.
- 8.2.8 *Policy 6.1A* states that the Mayor will work with relevant partners to encourage the closer integration of transport and development through various schemes and proposals (some of which are included in the future baseline scenarios described later in this chapter). *Policy 6.2* sets out the objectives that need to be addressed to improve the attractiveness of the current and future public transport networks for passengers to increase their appeal relative to travel by car.
- 8.2.9 *Policy 6.3C* requires the provision of transport assessments, travel plans, construction logistics and delivery/servicing plans for major planning applications.

Draft Further Alterations to the London Plan (Greater London Authority, 2014)

- 8.2.10 The *Draft Further Alterations to The London Plan (FALP)* was published in January 2014 and a *Schedule of Suggested Changes to the Further Alterations to the London Plan* was published in July 2014. Changes proposed in the *FALP* and *Schedule of Suggested Changes* do not affect the relevance of *Policies 6.1A, 6.2 and 6.3C* to this ES. The *FALP* updates *Policy 6.9 Cycling* and supporting text, to support the delivery of cycling infrastructure in London.

The Mayor's Transport Strategy (Greater London Authority, 2010)

- 8.2.11 The *Mayor's Transport Strategy (MTS)* sets out the Mayor's vision for transport in London over the next 20 years:

London's transport system should excel among those of world cities, providing access to opportunities for all its people and enterprises, achieving the highest environmental standards and leading the world in its approach to tackling urban transport challenges of the 21st century. (paragraph 29, MTS, 2010)

- 8.2.12 The *MTS* recognises that the achievement of this vision requires a transport system that connects people to jobs and meets the needs of a larger London, including:

An upgraded Tube service including a separation of services on the Northern line to increase service frequencies through the City, an extension of the Northern line to Battersea, providing greater capacity and more reliable journeys, and consideration of an

extension of the Bakerloo line. (paragraph 32, Mayor's Transport Strategy, 2010)

8.2.13 The MTS adopts the vision of *The London Plan* and sets goals to implement the vision. Those most relevant to the BSCU are:

- *support economic development and population growth;*
- *enhance the quality of life for all Londoners;*
- *improve the safety and security of all Londoners;*
- *improve transport opportunities for all Londoners; and*
- *reduce transport's contribution to climate change and improve its resilience.*

8.2.14 In order to respond to the growth for the demand to travel in London the MTS includes *Policy 1*:

The Mayor, through TfL, and working with the DfT, Defra and other government agencies, regional development agencies, Network Rail, train operating companies, London boroughs and other stakeholders, will seek to develop London's transport system in order to accommodate sustainable population and employment growth.

8.2.15 This policy is taken forward in the MTS in *Chapter 5 'Transport proposals'*. Specifically, *Section 5.3* sets out the proposals that are directly relevant to the London Underground Network. *Proposal 17* addresses the renewal and repair of the network,

The Mayor, through TfL, will seek to deliver upgrades to all Tube lines in a phased programme to provide a significant increase in network capacity. This will involve a combination of new rolling stock and/or signalling systems and other asset replacement. As part of this, continued investment to bring the network to a good state of repair and maintain it at that level will be supported.

8.2.16 In *Section 5.3.4, Station Congestion Relief*, the following paragraphs set out the way in which the problem will be approached.

285 To relieve congestion experienced by Tube customers at key locations across the network, and to enable quicker journeys, some stations require more extensive improvements to ensure safe and efficient station operations while also enhancing passengers' journey experience. The delivery of capacity enhancements to strategic Underground stations and interchanges is critical to the functioning of the Tube as an integrated network to assist existing passenger flow, and cater for future increases in demand.

286 Congestion relief is required at the key central London interchanges of Victoria, Tottenham Court Road, Bond Street,

Paddington (Hammersmith & City) and Bank. Capacity increases at these stations will optimise the benefits of investment from the line upgrades, Crossrail and other developments. They will also greatly improve central London step-free access.

8.2.17 The section ends with *Proposal 19*:

The Mayor, through TfL, and working with the London boroughs, private developers and other transport stakeholders, will develop and implement a prioritised programme to deliver station capacity and accessibility enhancements at London's most congested Underground stations, including... Bank.

Local Planning Policy

Local Development Framework Core Strategy (City of London Corporation, 2011)

8.2.18 *Policy CS16* has four strands by which it seeks to build on the City of London's strategic central London position and good transport infrastructure to further improve the sustainability and efficiency of travel in, to, from and through the City of London. *Policy CS16.2*, set out below is of particular relevance:

Facilitating further improvements to public transport capacity and step-free access at existing mainline rail and London Underground stations including Aldgate, Bank, Cannon Street and St Paul's, subsurface and Northern Line upgrades and planning for possible longer term improvements such as the westward extension of the Docklands Light Railway beyond Bank and the City Tram scheme.

Draft Local Plan (City of London Corporation, 2013a)

8.2.19 The City of London Corporation is in the process of preparing a new planning strategy called the *Local Plan*. This retains the strategic objectives set out in the Adopted Core Strategy, together with *Policy CS16 Public Transport Streets and Walkways*. It modifies the policy relating to Bank Station, bringing it into the first strand:

1. *Securing increased public transport capacity through support for Crossrail and the Northern Line/Bank Station upgrade (including safeguarding land as shown on the Policies Map)*

Local Implementation Plan (City of London Corporation, 2011)

8.2.20 The Local Implementation Plan (LIP) builds on national, regional and other local policies, which are outlined above. It lists Key City Transport Issues, with those that are relevant to the BSCU being:

- *noise pollution;*
- *road traffic casualties;*

- *unreliable journey times;*
- *public transport construction disruption; and*
- *coping with growth.*

8.2.21 The *LIP* establishes eight objectives to address environmental sustainability, social sustainability and economic sustainability. The objectives include:

- *LIP 2011.2: To reduce the contribution of transport in the City to climate change and improve the resilience of the City's transport to its effects.*
- *LIP 2011.3: To reduce road traffic dangers and casualties in the City, particularly fatal and serious casualties and casualties among vulnerable road users.*
- *LIP 2011.4: To reduce the adverse effects of transport in the City on health, particularly health impacts related to poor air quality and excessive noise and the contribution that travel choices can make to sedentary lifestyles.*

8.2.22 The *LIP* includes a Programme of Investment, which includes the redesign of Bank Junction and surrounding streets in advance of the upgrade of Bank Station to address overcrowding and a poor casualty record.

8.2.23 Proposals for the new Station Entrance to Bank Station are included in the *LIP* to provide congestion relief and step-free access.

8.3 Assessment Methodology

Scope of Assessment

- 8.3.1 This assessment has examined the traffic and transport aspects of the BSCU during construction and operation to establish the potential effects of the scheme and to assess these effects against future baseline conditions without the scheme in place.
- 8.3.2 The Institute of Environmental Management and Assessment (IEMA) *Guidelines for Environmental Impact Assessment (2004)* have been taken into account throughout the completion of this assessment. In accordance with these guidelines the affected parties or locations that may be sensitive to changes in transport, traffic and access conditions have been identified. During demolition and construction phases these are:
- road users affected by construction traffic, alterations to road layouts, closures or diversions;
 - passengers using public transport services (including during the proposed total and partial 'blockade');
 - users of nearby properties and places of work (including servicing arrangements);
 - people walking or cycling near Bank Station; and
 - passengers entering, exiting or interchanging at Bank Station.
- 8.3.3 After completion of the scheme the following parties and locations have been considered:
- passengers entering, exiting or interchanging at Bank Station; and
 - people walking or cycling near the proposed new station entrance.
- 8.3.4 It should be noted that no material change to road traffic volumes or patterns associated with the operational stage of the BSCU is expected and so the effects of the completed scheme on road traffic have not been assessed.

Study Area

- 8.3.5 The study area for this assessment includes all parts of Bank Station and the wider public transport network across central London. This includes London Underground, DLR and Network Rail lines which have a connection with Bank Station or provide services nearby.
- 8.3.6 Two surface-level study areas have been used for the assessment of the transport and movement impacts: one for the demolition and construction phase; and one for the operational phase.

Demolition and Construction Phase – Highways and Access

- 8.3.7 The extent of the surface-level study area used to assess the demolition and construction impacts is shown in Figure 8.2. This area was agreed with Transport for London (TfL) and the City of London Corporation who are the relevant highway authorities for roads in the area. The area covers those roads expected to see changes in traffic conditions as a result of the construction of the project, particularly changes in the number of Heavy Goods Vehicles (HGV), and those roads where the project has an effect on local access and movement.

Operational Phase – Highways and Access

- 8.3.8 The operational phase affects the movement of people within the completed station and effects on the local highway network are limited to the area in the immediate vicinity of the new Station Entrance. This is therefore the extent of the study area at surface level for the operational phase and this is shown in Figure 8.3.

Current Baseline Conditions

- 8.3.9 Current baseline conditions have been determined through:
- site visits;
 - liaison with TfL, London Underground Limited (LUL), the City of London Corporation and other stakeholders to obtain existing traffic and Personal Injury Accident data;
 - specially commissioned traffic, pedestrian and cycle counts;
 - TfL's Rolling Origin and Destination Surveys (RODS); and
 - TfL's Bus passenger Origin and Destination Surveys (BODS).

Figure 8.2: Surface-Level Study Area: Demolition and Construction Phases – Highways and Access

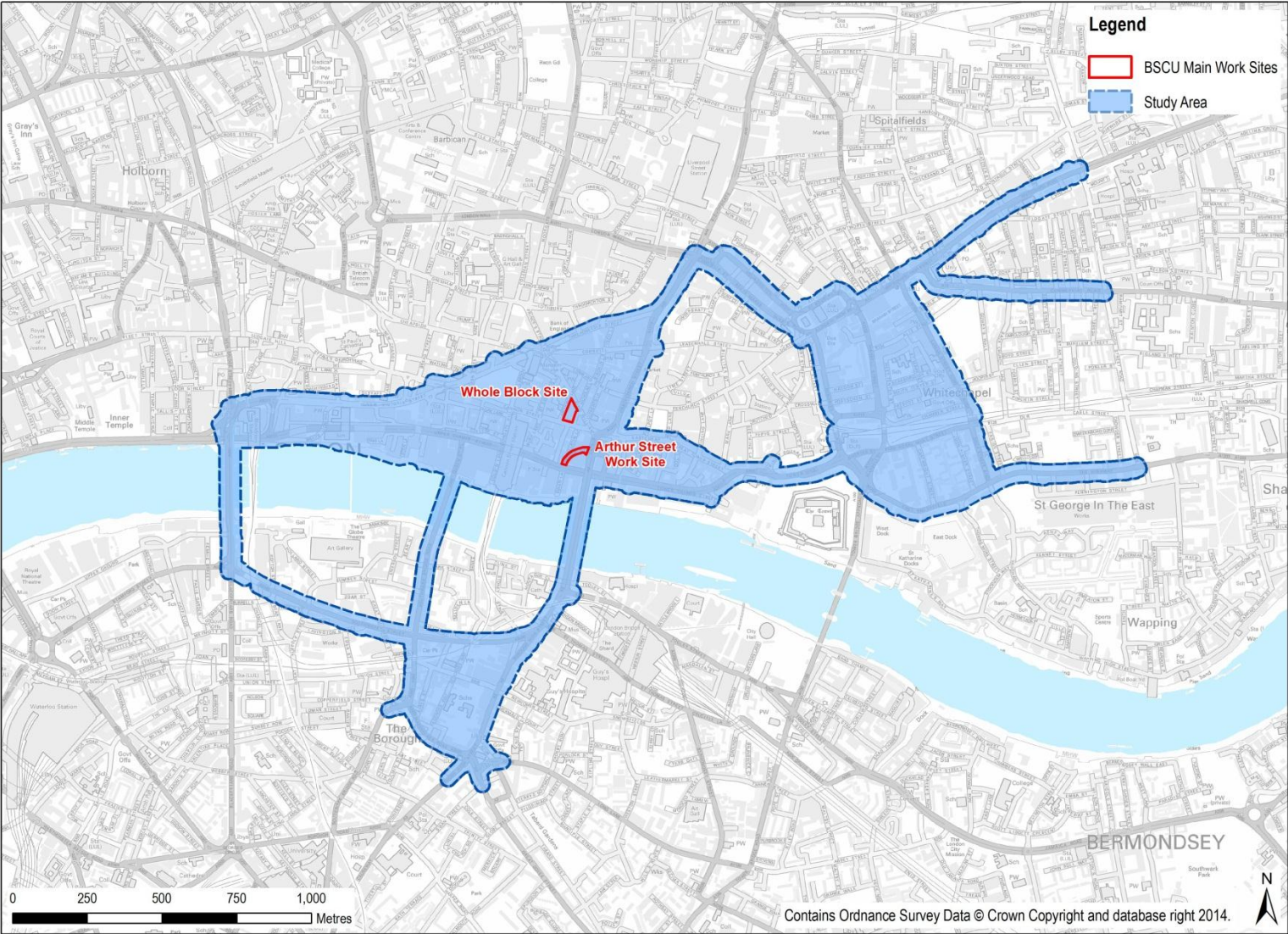
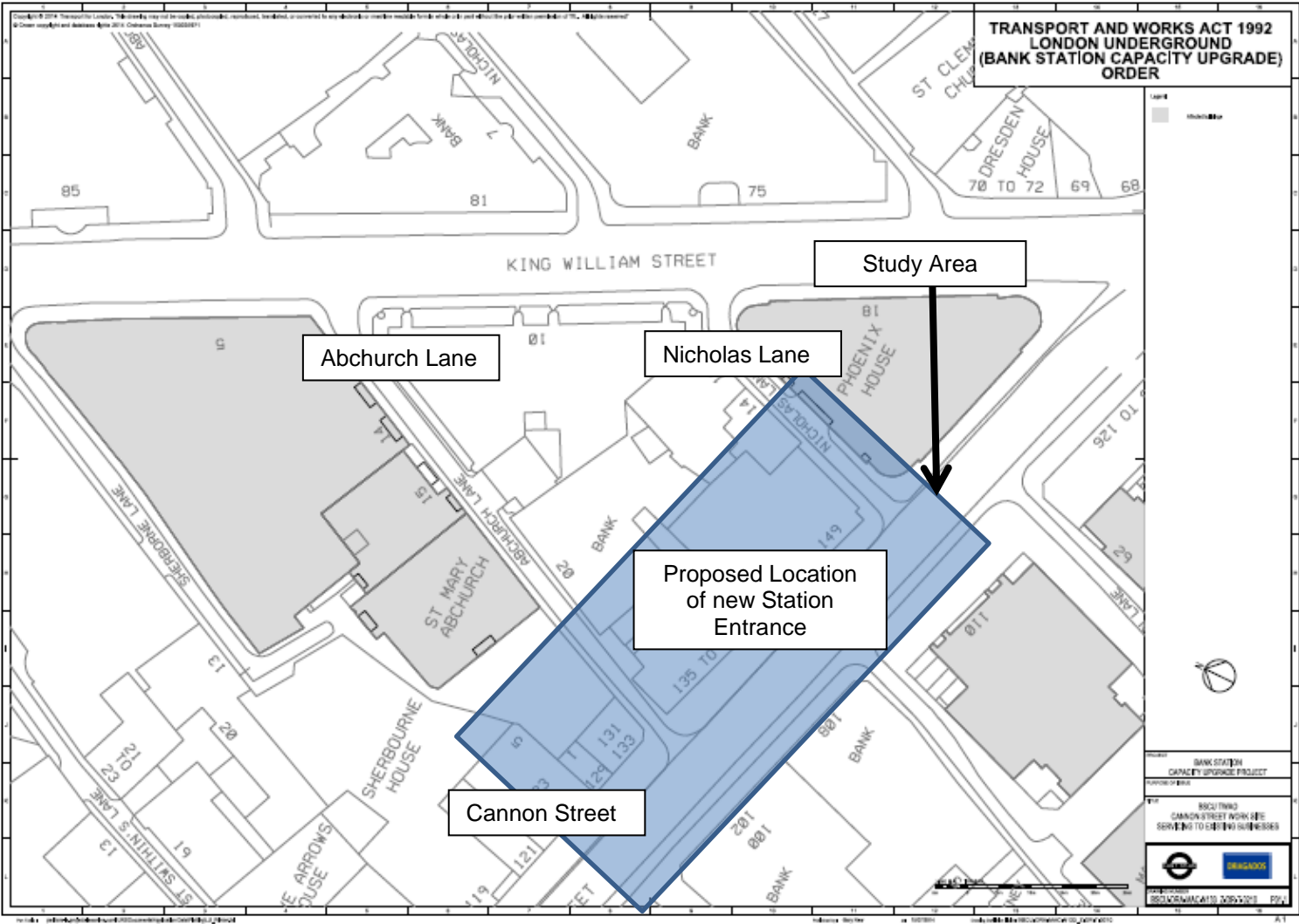


Figure 8.3: Surface-Level Study Area: Operational Phase – Highways and Access



Future Baseline Scenarios

- 8.3.10 The transport and movement impacts of the project have been assessed by comparing future baseline conditions (i.e. the situation without the BSCU in a given future year) with those that are expected during the demolition and construction, and operational phases of the project.

Demolition and Construction Impacts

- 8.3.11 The main impacts of the BSCU on the surrounding highway network are expected to occur during the main construction phases (as described in Chapter 4: The Proposed Development). As a consequence, the assessment has considered the activities associated with the BSCU Work Sites and in particular the impacts upon vehicles, vulnerable road users and public transport passengers affected by the works.
- 8.3.12 The BSCU has been assessed during the following periods in the construction phase when effects are expected to be greatest:

- Assessment Period 1 2016-2017 – Works to protect utilities and stabilise the ground; partial road closures required;
- Assessment Period 2 2017 – Peak period for generation of construction traffic and Arthur Street closed; and
- Assessment Period 3 2020 – Period when services on the Northern Line are restricted: total blockade (duration 6 weeks) and partial blockade (duration 11 weeks).

Operational Impacts

- 8.3.13 Operational impacts at Bank Station have been assessed for the following periods:
- Assessment Period 4 2026 – Assessment year used to examine operation of station once travel patterns have settled following introduction of the new facilities; and
 - Assessment Period 5 Assessment for scenario with passenger demand increased by 31 per cent (which is a standard uplift in demand used by TfL to ensure new station designs have sufficient capacity to accommodate future growth in passenger demand).
- 8.3.14 Station assessments in future years have been made against a 'Do Minimum' scenario.

Assessment Tools and Modelling

Assessment Periods 1 & 2 – Highways and Access

- 8.3.15 Existing traffic volumes on roads near the BSCU Work Sites have been obtained from a data collection exercise undertaken for roads in the study area and these are detailed in Appendix 6A of the Transport Assessment.
- 8.3.16 This data provides information on the level of traffic to be diverted during the closure of Arthur Street. The volume of additional road traffic generated during the demolition and construction phases has been obtained from the Outline CLP (see Appendix A8.2) and the Utilities ES Highways Assessment (see Appendix A8.3).
- 8.3.17 The operation of the road network has been examined using TfL's 'ONE' transport model of central London which uses the VISUM software platform.
- 8.3.18 The impacts of the scheme on users of nearby buildings and businesses (including servicing access to the buildings) have been based on an assessment of existing usage obtained through surveys and discussions with nearby building operators.

Assessment Periods 1, 2 & 3 – Operational Impacts within Bank Station during construction

- 8.3.19 To ensure the continued safe operation of Bank Station during demolition and construction, analysis has been undertaken for each phase of the works in accordance with the guidance and calculation methodologies presented in LUL's *Station Planning Standard* (LUL, S1371, 2012).

Assessment Period 3 – Total and Partial Blockade

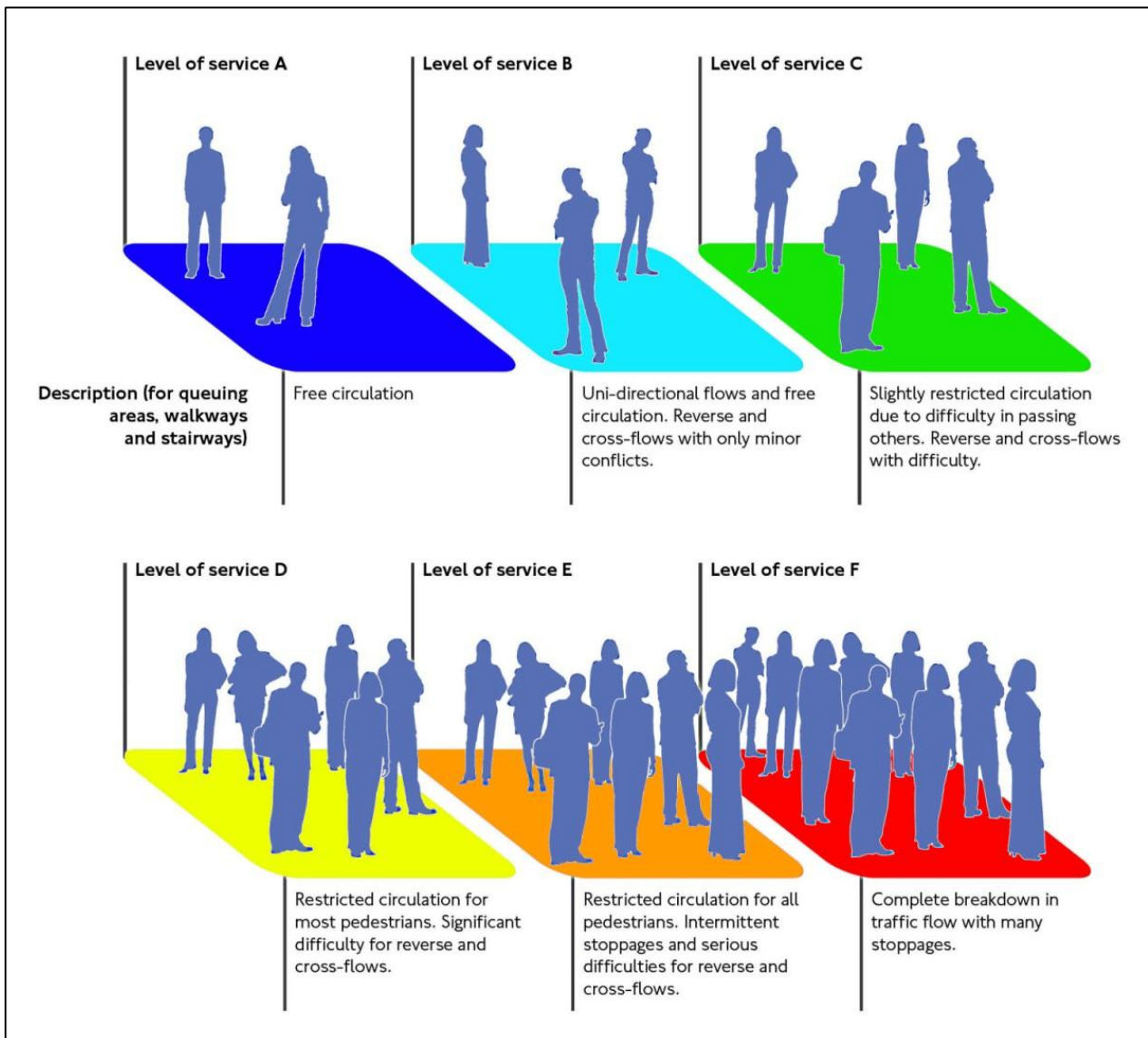
- 8.3.20 The assessment of the total and partial blockades in 2020 has used TfL's Railplan model. This is TfL's strategic public transport assignment model which covers all National Rail, London Underground, London Overground, Trams, DLR and bus movements in London in the AM peak (07:00-10:00) and PM peak (16:00-19:00) periods. The model is used to assess public transport movements and generate statistics based on forecast travel demand.
- 8.3.21 The following scenarios for AM and PM peak periods in 2020 have been used in Railplan to assess the impact of the blockades on public transport passengers:
- Reference Case i.e. baseline conditions - includes introduction of a 'world-class' service of 36 trains per hour on the Victoria Line and diversion of 344 bus service due to closure of Arthur Street;
 - Total blockade - includes frequency improvements on the Northern Line (Charing Cross branch); and

- Partial blockade – includes frequency improvements on the Northern Line (Charing Cross branch).

Assessment Period 4 - Operational Impacts within Bank Station following completion of the project

- 8.3.22 The Railplan model has been used to assess the impacts of the scheme in 2026 on public transport passengers once the scheme has been completed.
- 8.3.23 The following scenarios have been used:
- Reference Case i.e. scheme not implemented; and
 - Do Something i.e. scheme implemented.
- 8.3.24 The operational impacts of the scheme on passenger movements within Bank Station have been assessed using Legion micro-simulation software. This simulates the movement of pedestrians and provides analysis of the effects of the scheme on crowding and passenger journey times.
- 8.3.25 Outside Bank Station, Legion has also been used to model the effect of the new Station Entrance on pedestrian movements along the footways of Cannon Street.
- 8.3.26 The impact on pedestrians has been based on the assessment methodology and spreadsheet tool described in *Pedestrian Comfort Guidance for London Guidance Document* (TfL, 2010) and LUL's *Station Planning Standards and Guidelines* (2012).
- 8.3.27 Figure 8.4 presents information on the different LOS taken from the LUL document and used as part of the assessment.

Figure 8.4: Pedestrian Levels of Service



Source: London Underground Limited, 2012

8.3.28 Additional detail on this methodology is provided in the Transport Assessment.

Assessment Period 5 – Operational Impacts within Bank Station following completion of project

8.3.29 Assessment Period 5 has been included to ensure that the project proposals are designed to have sufficient capacity to accommodate further increases in passenger demand at the station. The assessment has been undertaken using the Legion pedestrian model.

Significance Criteria

- 8.3.30 Various methods and criteria are available for evaluating the effects of a transport scheme on traffic, public transport and pedestrian/cyclist movements.
- 8.3.31 The BSCU is expected to cover a similar range of transport and movement issues as projects such as Crossrail, the Victoria Station Upgrade and the Northern Line Extension (NLE). For these projects, appropriate criteria were devised, reviewed and agreed with key statutory and other consultees. The criteria were prepared to reflect both potential short-term and long-term effects, those during demolition and construction and those following completion of each scheme.
- 8.3.32 As the BSCU is expected to result in similar types of impacts, these previously developed criteria have been considered appropriate to use as a basis to develop assessment criteria for the BSCU.
- 8.3.33 Several criteria have been added to reflect the likely impact of the BSCU on passenger movements during the proposed blockades of the Northern Line and to reflect the final effects of the scheme once it has been completed.
- 8.3.34 The magnitude of each effect and its significance has been predicted by a variety of mechanisms, including computer modelling and professional judgement. The assessment has considered the potential to revise the construction methodology, programme or design and/or make alterations to the highway network or traffic arrangements to mitigate the potential impact. Further details of the mitigation measures which have been incorporated as part of the assessment are provided in Section 8.5 with further potential mitigation measures presented in Section 8.7.

Criteria for Temporary (Demolition and Construction) Assessment

- 8.3.35 The detailed criteria used for the identification and assessment of potentially significant effects during demolition and construction are provided in Table 8.1.

Table 8.1: Temporary (Demolition and Construction) Assessment Criteria – Definition of Significant Effects

Topic	Assessment Criteria
Traffic Levels and Delays to Vehicle Occupants	<p>AC1 - A 30 per cent net increase in traffic (lorries or all vehicles) over future baseline two-way flows (or one-way flows where either the link or the lorry route is one way) for links affected for more than four weeks in any 12-month period, and where the total increase in traffic is more than 40 vehicles a day, subject to the increase leading to delay. Individual temporary increases of up to five days do not count towards the four-week period.</p>
	<p>AC2 - or a 100 per cent net increase in traffic (lorries or all vehicles) over future baseline two-way flows (or one-way flows where the link or the lorry route is one-way) for links affected for more than five days up to four weeks in any 12-month period, and where the total increase in traffic is more than 40 vehicles a day, subject to the increase leading to delay. Individual temporary increases of up to five days do not count towards the four week period.</p>
	<p>AC3 - or a temporary diversion, for more than four weeks in any 12-month period, that leads to a maximum increase in length of journey of more than 2.5km on a route carrying more than 100 vehicles a day, 5km on a route carrying more than 50 vehicles a day, or 10km on any other route.</p>
	<p>AC4 - or a significant delay problem is forecast, such as at a specific junction or associated with access.</p>
Public Transport Delay	<p>AC5 - Changes in a majority of representative journey times by rail, London Underground or light rail of more than 20 per cent lasting for more than four weeks in any 12-month period.</p>
	<p>AC6 - or a temporary changes in journey distances by bus for more than four weeks in any 12-month period, of more than 400m in the GLA area and 1km elsewhere, where diversions apply.</p>
	<p>AC7 - or a temporary net increase of more than 30 per cent, for more than four weeks in any 12-month period, in lorries or total traffic on a route running along a bus route, or a net increase of more than 30 per cent in total traffic on a route intersecting a bus route.</p>
	<p>AC8 - Change of more than 10 per cent in crowding levels on National Rail, DLR or LUL services and change leads to more than four passengers/m² for a period exceeding four weeks in a 12-month period.</p>
	<p>AC9 - Crowding occurs on buses where the passenger volume to bus capacity ratio exceeds 0.8 for a period exceeding four weeks in a 12-month period.</p>

Topic	Assessment Criteria
Parking, Loading and Servicing	<p>AC10 - Public Off-street Parking</p> <p>Loss for more than four weeks in any 12-month period of:</p> <ul style="list-style-type: none"> • 30 or more public off-street car parking spaces; or • 20 per cent of the capacity of the car parks if the number of spaces lost is less than 30; or • loss of any public off-street spaces for disabled persons, buses, taxis, doctors, ambulances or police vehicles; or • loss of any public off-street loading bays or facilities; and • the spaces are reasonably well used and, for ordinary parking spaces, replacement facilities are more than 5 minutes' walk away.
	<p>AC11 - Private Parking</p> <p>A material traffic or transport impact due to a loss of private off-street parking or loading facilities for more than four weeks in any 12-month period.</p>
Vulnerable Road User Delay and Loss of Amenity	<p>AC12 - There will be a temporary increase of more than 30 per cent in the total traffic flow, or the number of lorries, for more than four weeks in any 12-month period; and</p> <ul style="list-style-type: none"> • the increase is more than 40 movements a day; and • there will be over 100 two-way movements of cyclists or pedestrians per 12-hour average weekday; and <p><i>Note: the vulnerability of the users is 'high' (e.g. there are no physically segregated facilities for cyclists, or there is no footway or an inadequate footway or crossing facilities for pedestrians).</i></p>
	<p>AC13 - or a temporary maximum increase, for more than four weeks in any 12-month period, in pedestrian journey length along a road or other public right of way of more than:</p> <ul style="list-style-type: none"> • 250m on a route carrying more than 200 pedestrians a day; or • 500m on a route carrying more than 100 pedestrians a day; or • 1km on a route carrying more than 50 pedestrians a day; or • 2km on any other route.
	<p>AC14 - or a temporary maximum increase in journey length, for cyclists or equestrians along a road or other public right of way, for more than four weeks in any 12-month period, of more than:</p> <ul style="list-style-type: none"> • 1.5km on a route carrying more than 100 cyclists a day; or • 3.0km on a route carrying more than 50 cyclists a day; or • 6.0km on any other route.

Topic	Assessment Criteria
	AC15 - A change in pedestrian comfort (defined by Pedestrian Comfort Guidance for London Guidance Document (TfL, 2010) on the surrounding streets by one category, for more than four weeks in a 12-month period.
Collisions and Safety	<p>AC16 - Those junctions that have experienced more than ten personal injury collisions in a three-year period ending in 2013 for which data is available; or links for which data is available that have experienced on average more than ten personal injury collisions per 100m length in a three-year period ending in 2013; and</p> <ul style="list-style-type: none"> the junctions or links would be subject to a net increase of 10 per cent or more in total traffic flow during construction for a period exceeding four weeks in any 12-month period.
Passenger safety within Bank Station	AC17 - Incidences of compliant parts of the station (with reference to LUL's Station Planning Standard – S1371) becoming non-compliant for a period of four weeks or more in any 12-month period.

Criteria for Operational Assessment

8.3.36 The criteria set out in Table 8.2 have been used to assess the significance of the transport and movement effects when the construction of the BSCU is complete and the scheme is operational.

Table 8.2: Operational Assessment Criteria – Definition of Significant Effects

Topic	Assessment Criteria
Crowding levels within Bank Station	AC18 - Change in a pedestrian Level of Service (LOS) on a given link by at least one category (+1 or -1 LOS).
Journey times within Bank Station	<p>AC19 - Change in average journey time for passengers entering and exiting the station by 20 per cent compared with 'Do Minimum' 2026 levels.</p> <p>AC20 - Change of in average journey time for passengers interchanging within the station by 20 per cent compared with 'Do Minimum' 2026 levels.</p>
Surrounding pedestrian amenity	AC21 - Change in pedestrian comfort (defined by Pedestrian Comfort Guidance for London Guidance Document (TfL, 2010) on surrounding streets by at least one category compared with the future baseline and the resulting LOS is worse than C.

8.4 Current Baseline and Future Baseline Conditions

8.4.1 This section presents details of current baseline conditions near Bank Station. Expected conditions in the future without the implementation of the BSCU are also presented and are referred to as the future baseline.

Bank Station – Current Baseline

8.4.2 Bank Station is located in the centre of the City of London and, as shown in Figure 8.5, it provides access to five London Underground Lines (Central, Northern, Waterloo & City, District, and Circle Lines) and DLR services.

8.4.3 The station contains three ticket halls, ten platforms, 15 escalators and two 100m moving walkways. Figure 8.6 illustrates the below-ground configuration of the station. The maze of different routes within the station hampers wayfinding and increases conflicts between opposing passenger movements.

8.4.4 At surface level, Bank Station has 15 existing entrances/exits, of which 14 are small stairwell access points near busy traffic junctions. The only step-free access point is via the King William Street/Lombard Street entrance and this provides passengers with an indirect route (using two different passenger lifts) to and from the DLR level.

8.4.5 Passenger usage of the station is very high during the morning weekday peak hours (07:00 to 10:00). Based on the latest RODS data (2012) some 98,000 passengers use Bank Station during the morning peak period with approximately 50 per cent of passengers changing between lines. The RODS data shows that in the morning peak more than 60 per cent of passengers alighting from Northern Line trains transfer to other lines at the station.

8.4.6 During the evening peak (16:00 to 19:00) the number of passengers using the station exceeds 100,000 people. In a reverse of the morning peak more than two thirds of passengers boarding Northern Line trains transfer from another line.

8.4.7 As a result of the large passenger demand and existing station configuration, crowding problems at the station regularly occur.

8.4.8 This crowding is a particular problem on the Northern Line platforms (which are 2.7m wide), the DLR platforms (2.5m to 3.0m wide) and the escalators leading from the DLR to the Triplication Area which is an interchange level serving the Northern Line. During peak hours, platforms within the station do not empty of passengers between the arrival of trains and long queues build-up at lifts and escalators.

- 8.4.9 Operational controls (known as ‘interventions’) are regularly implemented to manage passenger congestion. These include: imposing lengthy one-way diversions for passengers requiring on-street interchange between lines; non-stopping of trains on the Central and Northern Lines; holding passengers at ticket gates; suspension of the DLR service; and even a controlled station evacuation.
- 8.4.10 The current movement of passengers through the station has been modelled using Legion software and the results are shown in Figure 8.7.
- 8.4.11 The figure shows the LOS output for the morning ‘high peak’ (08:45 to 09:00). The colours show the LOS ranging from blue (which reflects free circulation) to red for Northern Line and DLR platforms (which is a complete breakdown in pedestrian flow with many stoppages for passengers moving through the station).

Figure 8.5: Current Baseline, Public Transport Context

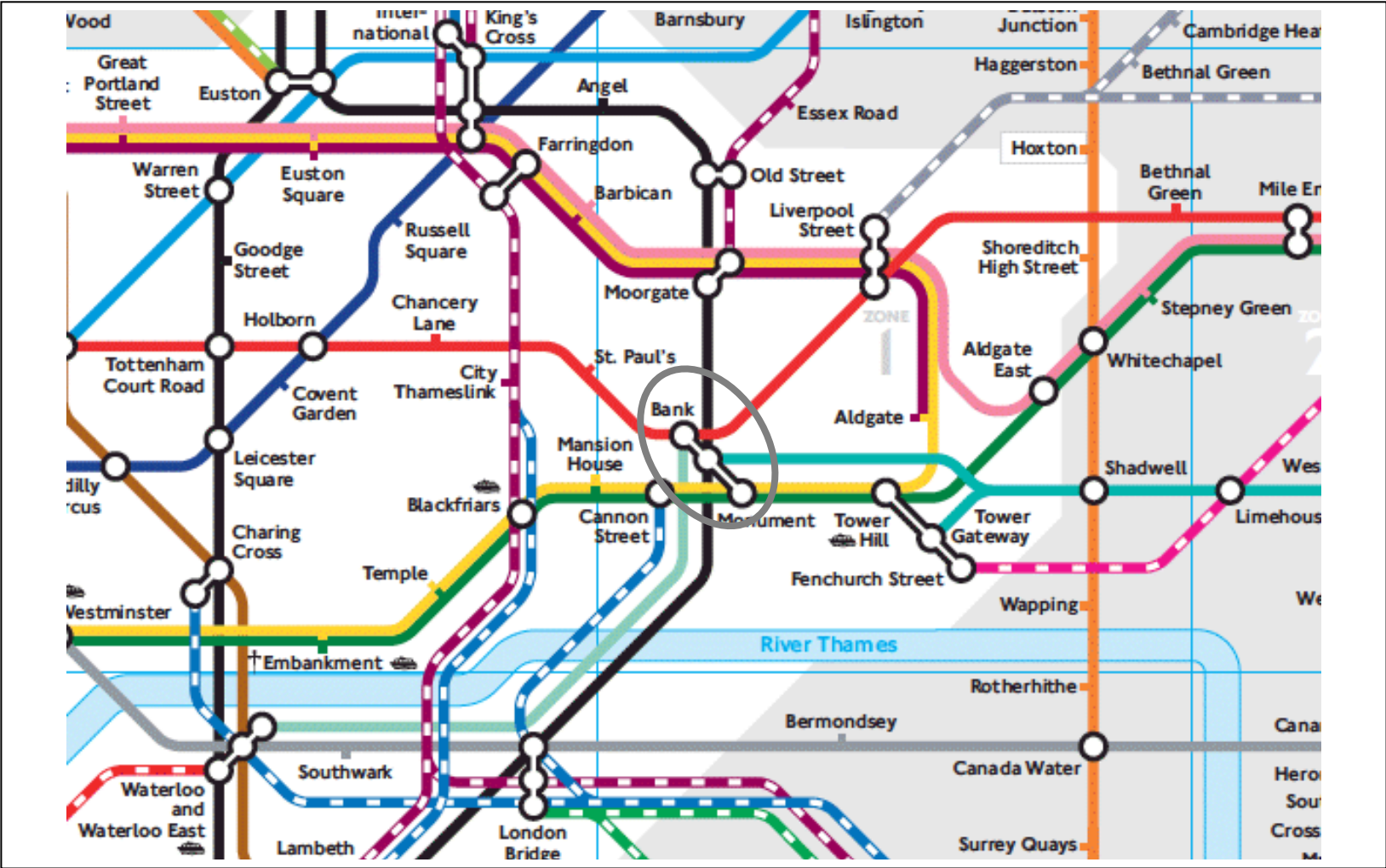


Figure 8.6: Bank Station Configuration

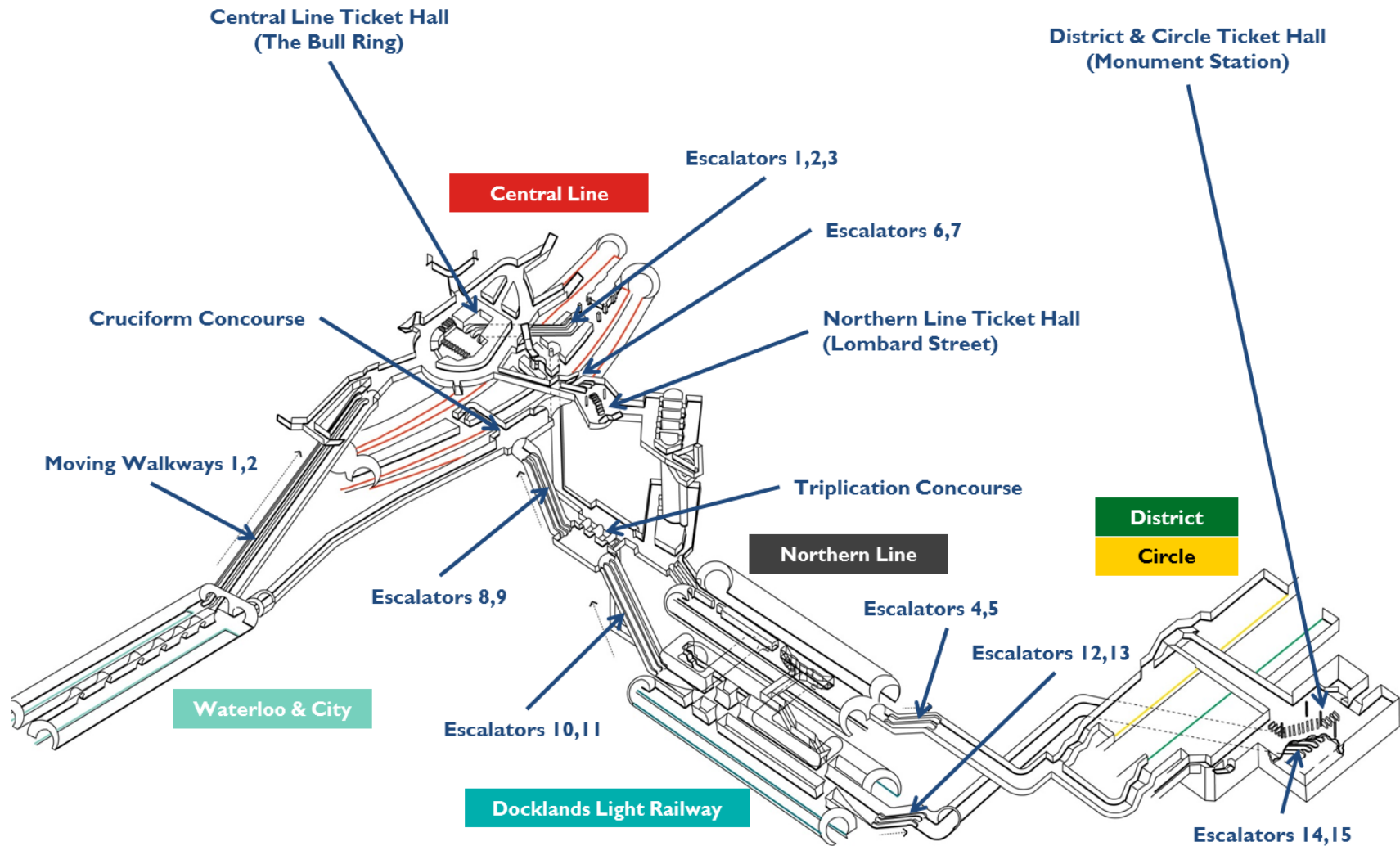
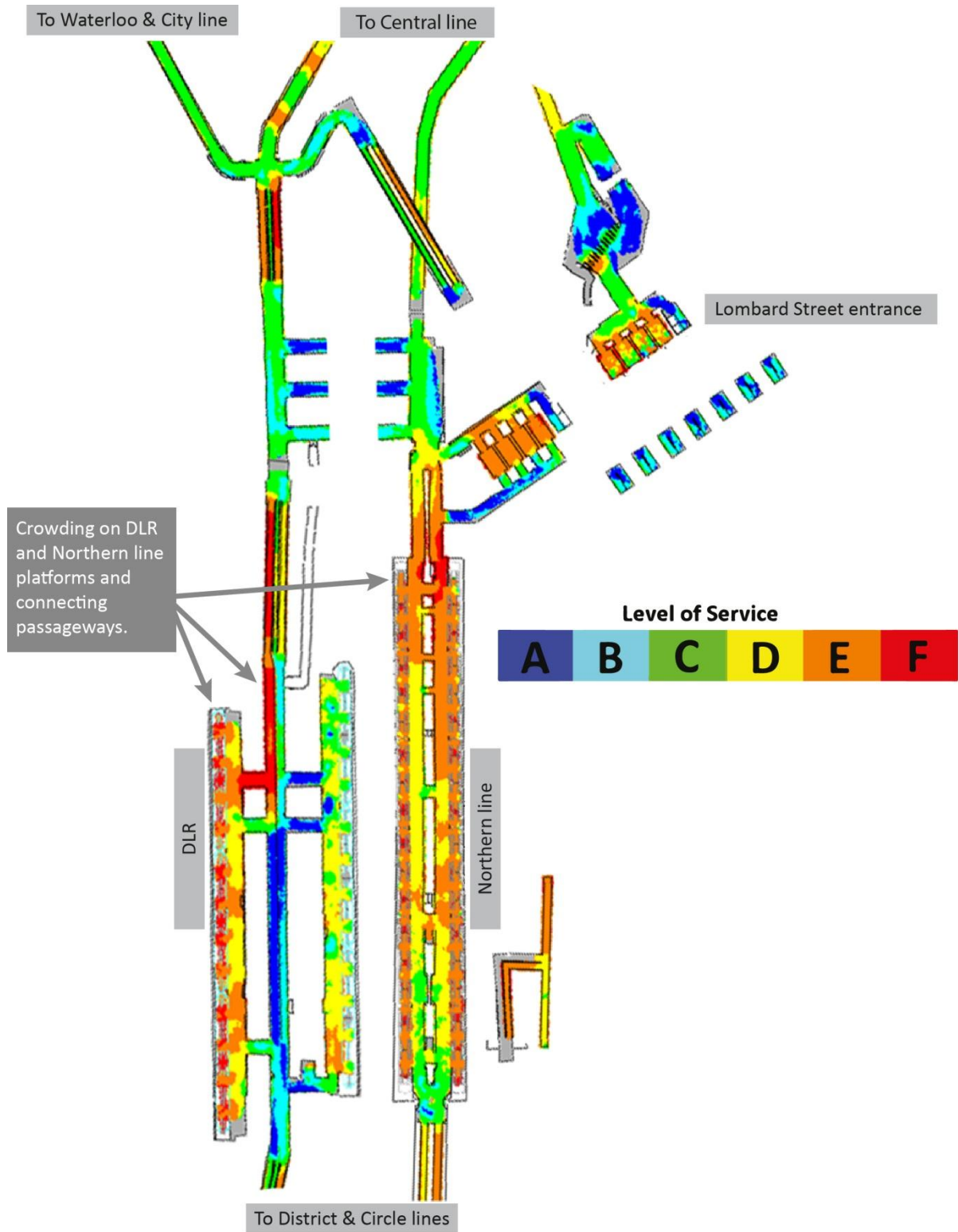


Figure 8.7: Current Baseline, Legion Modelling, Bank Station, 2012 AM Peak



Bank Station – Future Baseline

- 8.4.12 By 2016, the AM peak three-hour demand at Bank Station is expected to exceed 100,000 passengers. This could increase further due to large new employment developments near the station and the increased train service capacity associated with London Underground and DLR upgrades. These will allow more passengers to arrive and depart the station per hour.
- 8.4.13 To help manage the operation of the station, and as part of separate works unrelated to the BSCU, two projects are currently underway with the expectation they will be completed by 2017:
- £16 million scheme at Monument Station to improve the station's operation systems. This includes the provision of a new Station Operation Room and staff accommodation at Monument Station, closed-circuit television and a help-point system. Management systems are also currently being integrated across all of Monument Station; and
 - Bloomberg Development Ticket Hall at street level on Walbrook. This will provide a new station entrance with passenger lifts and escalators and provide step-free access to the Waterloo & City Line.
- 8.4.14 The future operation of the station has been modelled using Legion for a 'Do Nothing' and a 'Do Minimum' scenario in 2026.
- 8.4.15 The results of the 'Do Nothing' scenario are shown in Figure 8.8. This shows that the number of passengers moving within the station would be so great that there would be a breakdown in passenger flow and circulation. Based on current station management practice, it is reasonable to assume that the station would have been closed prior to congestion reaching the levels shown in the modelling.
- 8.4.16 A 'Do Minimum' scenario has been established to enable a comparison to be made with a 'Do Something' scenario i.e. a scenario which includes the completion of the proposed BSCU. The 'Do Minimum' scenario includes the measures ('interventions') which would be required to enable the station to continue to function during the AM peak:
- there would be no access from Monument to Bank, only from Bank to Monument with the escalators from both Northern Line and DLR running in the up direction only;
 - the three cross passages in the Triplication Area would be closed (to segregate flows to and from the Northern Line and DLR);
 - a large number of interchanging passengers would be re-routed via King William Street and held outside the station, before re-entering the station at Lombard Street;

- queues for access to the Lombard Street ticket hall would be expected because of gateline entry restrictions (see Figure 8.9), the lifts would not be in use and both escalators serving Lombard Street would operate in the up direction only; and
 - the pedestrian connection between the Lombard Street entrance and the Bull Ring entrances will be closed.
- 8.4.17 All these measures mean that access to the Northern Line from street level would only be possible via the single multi-level stair and the Triplication Area.
- 8.4.18 To accomplish this level of control would be extremely challenging for LUL staff and highly disruptive to general passenger access to the City of London. The 'interventions' provide very large disbenefits to passengers and they would almost certainly lead passengers to migrate towards other transport routes and in doing so, create major capacity concerns at neighbouring transport hubs.
- 8.4.19 During the PM peak the passenger demand is more evenly spread as people leave work and travel home over a period of several hours. This means that no 'interventions' are expected to be necessary during the PM peak period for the 'Do Minimum' scenario.
- 8.4.20 The 'Do Minimum' scenario has been modelled using Legion and Figure 8.9 illustrates the LOS output from the assessment of the morning peak. The need for some passengers to make an out-of-station interchange can be seen in the extreme congestion occurring around the Lombard Street entrance. The modelled queuing on Lombard Street is shown in Figure 8.10 with each dot representing a passenger.

Figure 8.8: Future Baseline, Legion Modelling, Bank Station, 'Do Nothing' (2026) AM Peak

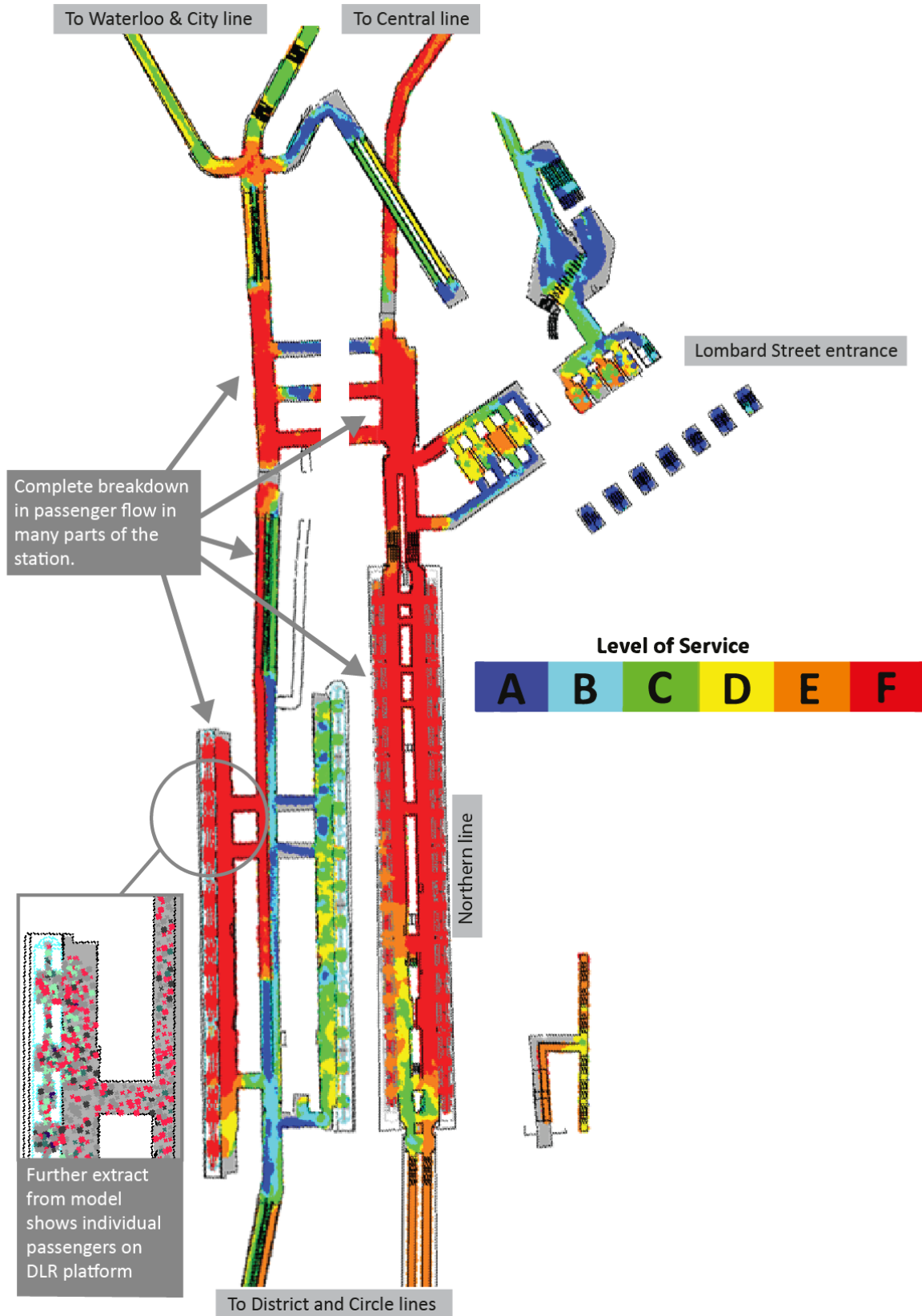


Figure 8.9: Future Baseline, Legion Modelling, Bank Station, 'Do Minimum' (2026) AM Peak

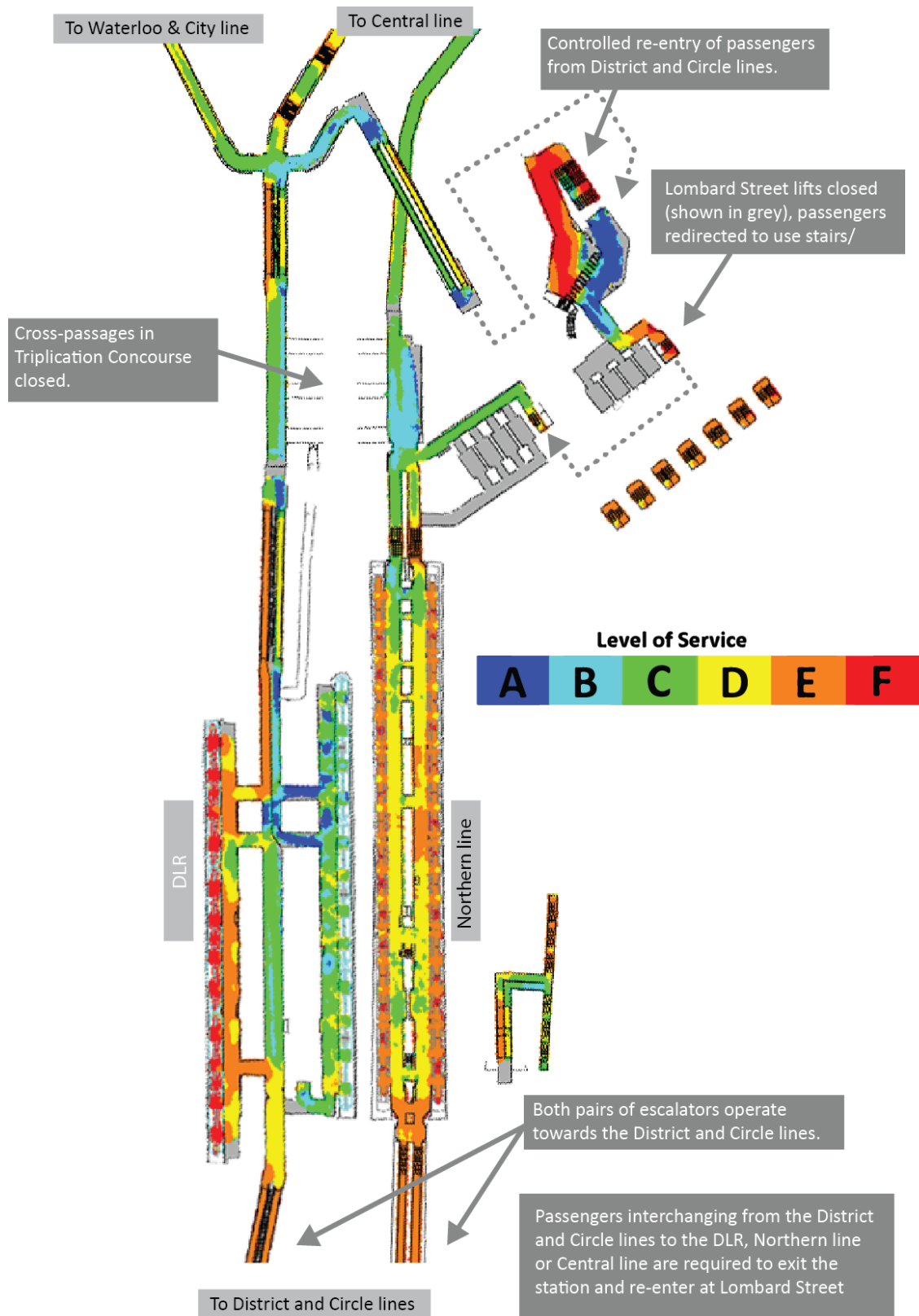
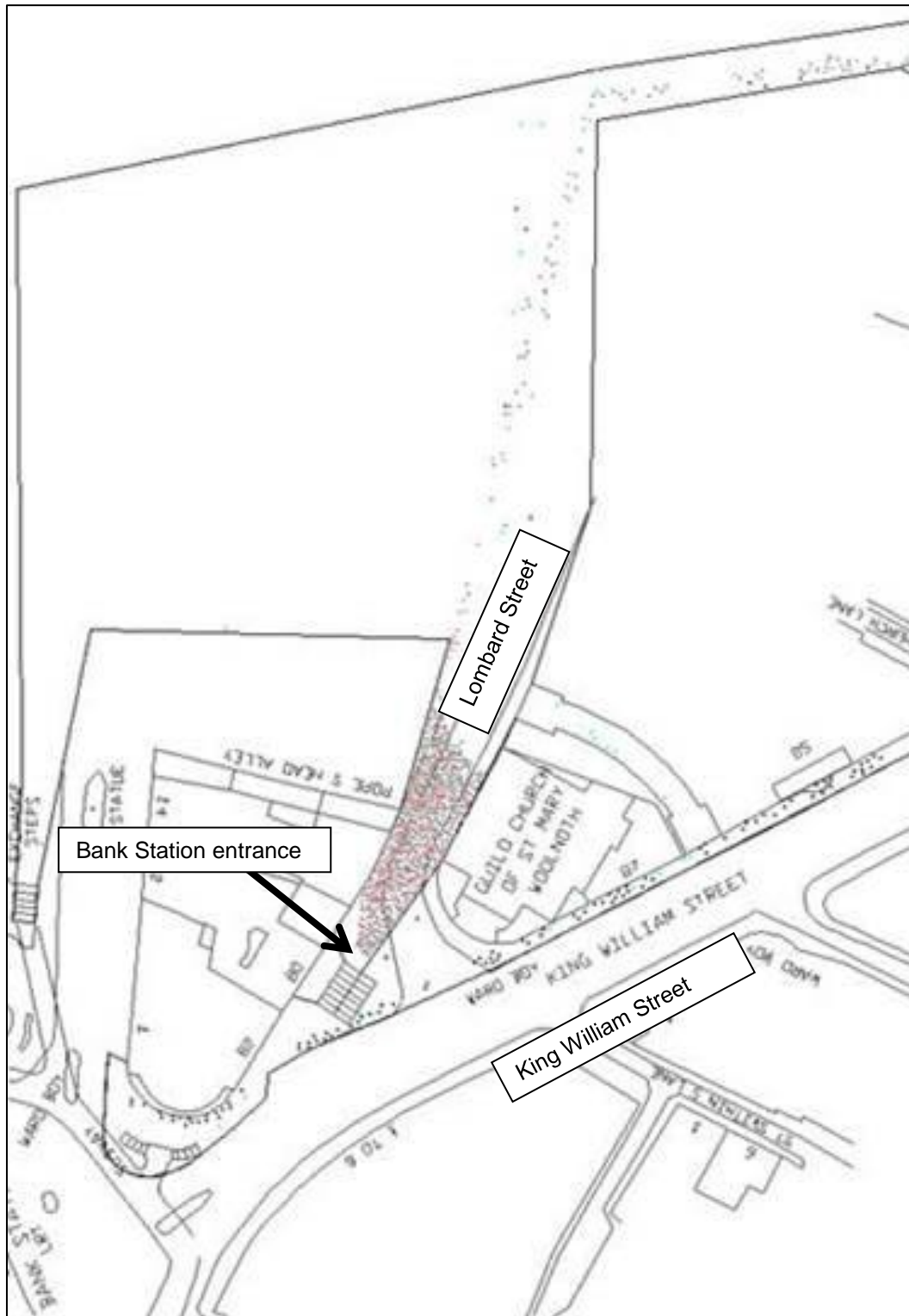


Figure 8.10: Future Baseline, Legion Modelling, Lombard Street Entrance, Bank Station, 'Do Minimum' AM Peak



London Underground, National Rail and DLR – Current Baseline

- 8.4.21 The London Underground, National Rail and DLR services operating in central London have been presented previously in Figure 8.5 and the current peak period frequency of these services is set out in Table 8.3.

Table 8.3: Current Baseline, Peak Period, London Underground/DLR Frequencies

Service	Direction Towards	Trains per Hour	
		AM Peak	PM Peak
CENTRAL	Leytonstone (Eastbound)	26	30
	West Ruislip (Westbound)	32	26
CIRCLE	Edgware Road (Clockwise)	6	6
	Hammersmith (Anti-clockwise)	6	6
DISTRICT	Upminster (Eastbound)	21	20
	Ealing Broadway (Westbound)	21	22
NORTHERN (CITY)	High Barnet (Northbound)	22	21
	Morden (Southbound)	20	21
WATERLOO & CITY	Waterloo (Southbound)	22	22
	Bank (Northbound)	22	22
DLR	Bank Station - Lewisham Station	15	15
	Bank Station - Woolwich Arsenal Station	8	8

- 8.4.22 The high demand at Bank Station means that the DLR platforms are currently non-compliant in terms of their operation in comparison with LUL's Station Planning Guidance.
- 8.4.23 Bank Station is close to several mainline stations including Cannon Street to the south-west, London Bridge to the south, Fenchurch Street to the east and Moorgate to the north. All these stations have a high frequency of service during peak periods.

London Underground, National Rail and DLR – Future Baseline

- 8.4.24 The *MTS* presents the aspiration to upgrade the Northern Line as part of a major upgrade to the London Underground Network.
- 8.4.25 The Northern Line Upgrade 1 project (NLU1) is currently underway and it involves the implementation of a new signalling system that will deliver a 20 per cent increase in train frequencies in central London. The project is expected to be completed by the end of 2014.

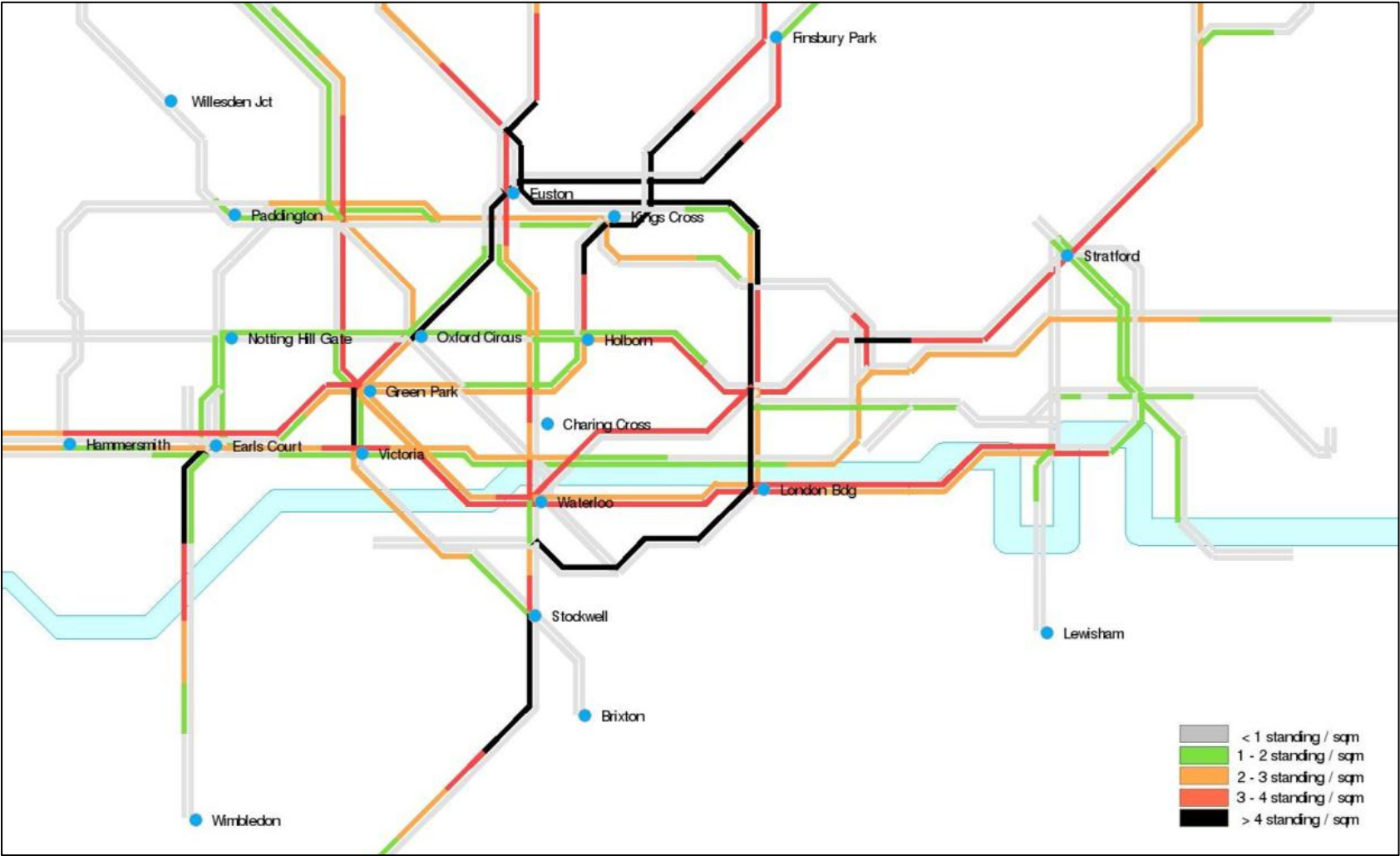
- 8.4.26 A second Northern Line upgrade (NLU2) is also scheduled for implementation by April 2021 to deliver a further increase in capacity of 31 per cent on the Bank branch and 25 per cent increase on the Charing Cross branch.
- 8.4.27 The introduction of the NLU1 and NLU2 schemes will increase the number of passengers likely to use the Northern Line and this could exacerbate the passenger congestion problems that are already experienced at Bank Station.
- 8.4.28 In addition to the NLU1 and NLU2 schemes, the NLE is proposed to extend the Northern Line from Kennington to Nine Elms and Battersea. The TWAO for the NLE scheme was examined at Public Inquiry in November and December 2013.
- 8.4.29 By 2020, Crossrail will have opened and this will provide an additional east-west link across London with a frequency of 24 trains per hour. Stations at Tottenham Court Road and Liverpool Street will provide additional options for passengers accessing the West End and the City of London.
- 8.4.30 Table 8.4 presents the future baseline frequencies on the London Underground Network. These frequencies incorporate the changes related to the upgrades being implemented by TfL across the network.
- 8.4.31 The Railplan model has been used to assess the operation of the public transport network during the blockade in the future baseline year of 2020.

Table 8.4: Future Baseline, Peak Period, London Underground/DLR Frequencies

Service	Direction Towards	Trains per Hour
CENTRAL	Leytonstone (Eastbound)	26-32
	West Ruislip (Westbound)	26-32
CIRCLE	Edgware Road (Clockwise)	6
	Hammersmith (Anti-clockwise)	6
DISTRICT	Upminster (Eastbound)	21-23
	Ealing Broadway (Westbound)	21-23
NORTHERN (CITY)	High Barnet (Northbound)	26
	Morden (Southbound)	26
WATERLOO & CITY	Waterloo (Southbound)	22
	Bank (Northbound)	22
DLR	Bank Station - Lewisham Station	15
	Bank Station - Woolwich Arsenal Station	8

- 8.4.32 The model results are shown in Figure 8.11 for the AM peak and indicate that crowding of more than four passengers per square metre is expected to occur on the northbound section of the Northern Line from Kennington to Moorgate and southbound from Camden Town to Moorgate as well as on other sections of the London Underground Network. Crowding in the PM peak is lower and results for this period are provided in Appendix 9A of the Transport Assessment.
- 8.4.33 Analysis of the Railplan model results for the future baseline year of 2020 also shows that some sections of the Overground and National Rail networks are likely to be crowded, including routes into Waterloo. Further details are provided in Appendix 9A of the Transport Assessment.
- 8.4.34 The high demand at Bank Station means that the DLR platforms are currently non-compliant in terms of their operation in comparison with LUL's Station Planning Guidance and this is expected to remain the case as part of the future baseline.

Figure 8.11: Future Baseline (2020), London Underground Crowding

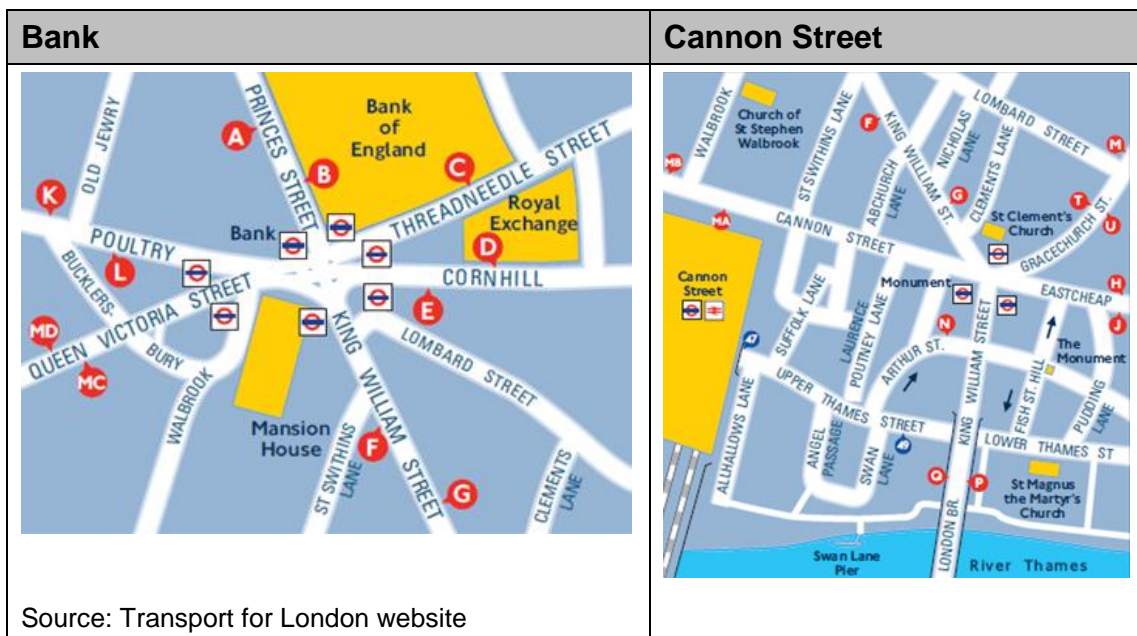


Bus Services - Current Baseline

8.4.35 The area around Bank Station is very well served by buses with many nearby bus stops providing access to high-frequency services to a large number of destinations. Table 8.5 lists the services, with stop locations shown in Figure 8.12. The listed frequencies are generally maintained between 07:00 and midnight, although some routes offer a slightly reduced service after 20:00. Six of the services operate on a 24 hours per day basis.

Table 8.5: Local Bus Routes and Frequencies

Route	Bus route	Stops At (Cannon Street)	Stops At (Bank)	Peak Frequency (buses/hour per direction)
8	Roman Road Market - Tottenham Court Road Station		C, K, L	6
11	Fulham Town Hall - Liverpool St Station		MC, C, MD	6
15	Blackwall – Charing Cross	H, MB, J, MA		6
17	Archway - London Bridge	MA, Q, MB,P		8
21	Lewisham - Newington Green	G, P, F, Q	B, G, A, F	10
23 (24hr)	Great Western Rd – Liverpool St		C, MD, MC	6
25 (24hr)	Holles Street – Hainault Street		D, K, E, L	8
26	Hackney Wick – Waterloo		C, MD, MC	6
35	Clapham Junction – Shoreditch	P, U, M, Q		6
40	Dulwich Library – Aldgate	Q, T, P, U		8
43 (24hr)	Friern Barnet - London Bridge	F, Q, G, P	A, F, B, G	12
47	Bellingham Catford Bus Garage – Shoreditch	P, U, M, Q		6
48	Walthamstow - London Bridge	P, U, M, Q		8
76	Lower Marsh - Philip Lane		A, MD, B, MC	8
133	Streatham - Liverpool Street St	F, Q, G, P	C, F, G	15
141	Wood Green - London Bridge	G, P, F, Q	B, G, A, F	11
149 (24hr)	Edmonton Green - London Bridge	P, U, M, Q		13
242 (24hr)	Homerton Hospital - Tottenham Court Road Station		C, K, L	6
344	Clapham Junction – Appold Street	U, M, N		9
388 (24hr)	Hackney Wick – Blackfriars		MC, C, MD	5
521	Waterloo - London Bridge (weekdays only)	MB, P, MA, Q		25

Figure 8.12: Current Baseline, Bus Stop Locations

Bus Services - Future Baseline

- 8.4.36 No changes are expected to be made to the bus network near Bank Station in the near future and hence the future baseline for bus services is the same as the current baseline.
- 8.4.37 Analysis of the Railplan outputs for buses for the future baseline shows that most of the bus corridors in central London will be operating within their available capacity in both the AM and PM peaks.
- 8.4.38 The main exceptions are the following sections of the network which are expected to have volume to capacity ratios between 0.9 and 1.0 i.e. the services would be operating near capacity:
- AM Peak: Waterloo Bridge; Blackfriars Bridge; and St Thomas Street; and
 - PM Peak: St Thomas Street; Long Lane; and New Kent Road.

Local Highway Network – Current Baseline

- 8.4.39 The highway network near Bank Station is shown in Figure 8.13. The Whole Block Site is bounded by King William Street to the north, Nicholas Lane to the east, Cannon Street to the south and Abchurch Lane to the west.
- 8.4.40 Cannon Street and King William Street meet at Monument Junction some 60m east of the Whole Block Site, along with Gracechurch Street/Eastcheap and King William Street. Gracechurch Street is the closest section of the Transport for London Road Network (TLRN). King William Street is also part of the TLRN and this links with London Bridge to continue the TLRN across the River Thames to connect with Southwark. Heading north, Gracechurch Street crosses Lombard Street and Fenchurch Street and then continues into Bishopsgate.
- 8.4.41 The Arthur Street Work Site requires the use of almost all of Arthur Street which has a length of approximately 100m. The layout of Arthur Street is presented in Figure 8.14.
- 8.4.42 Arthur Street has one lane in each direction and at the northern end of the street northbound vehicle movements are restricted to buses only and all buses must turn left onto King William Street. This means that northbound general traffic flows along Arthur Street only comprise vehicles servicing or accessing buildings. These vehicles must turnaround to leave Arthur Street in a southbound direction.
- 8.4.43 Arthur Street is used in a southbound direction by traffic travelling from King William Street (London Bridge) to eastbound or westbound routes on Upper Thames Street.
- 8.4.44 To the north of Arthur Street, a set of bollards prevents vehicles travelling between Laurence Pountney Lane and Martin Lane.
- 8.4.45 A fire station is located on the southern side of Upper Thames Street opposite Suffolk Lane. Fire vehicles from this fire station currently use Arthur Street to access locations in the City of London.

Figure 8.13: Current Baseline, Local Highway Network

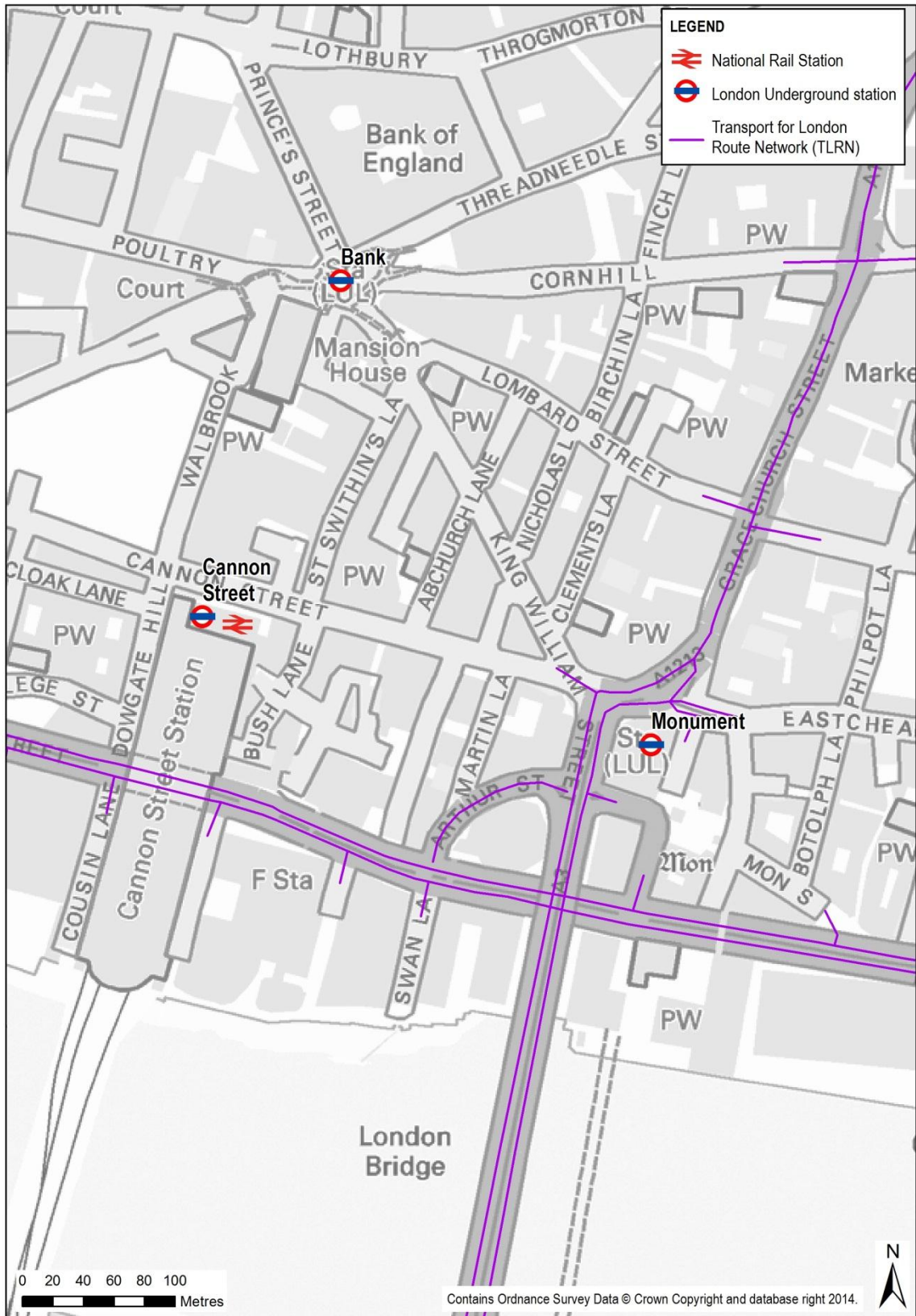
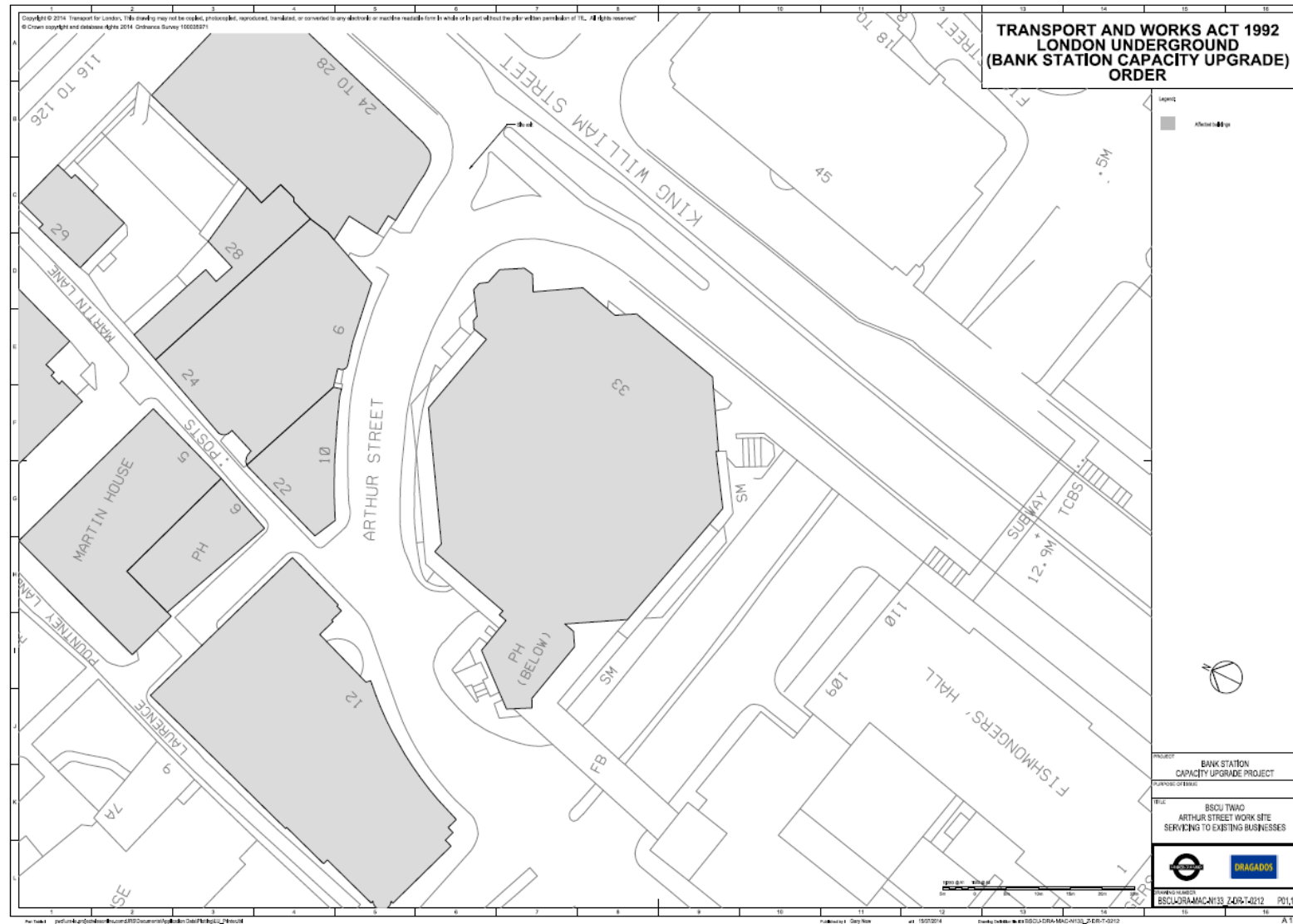


Figure 8.14: Current Baseline, Layout of Arthur Street



Traffic Flows

- 8.4.46 Current traffic flows measured by automatic traffic counters near Bank Station are presented in Table 8.6 and further details are provided in the Transport Assessment.

Table 8.6: Peak Period Traffic Volumes

Location	Direction	Vehicles per hour	
		AM Peak	PM Peak
King William Street near Abchurch Lane and Nicholas Lane	Two-way	909	753
Cannon Street near between Abchurch Lane and Nicholas Lane	Two-way	523	677
Arthur Street near Martin Lane	Two-way	270	227

Road Safety

- 8.4.47 The most recent available collision data has been obtained from TfL for the 36 month period to the end of June 2013. This data has been analysed and Table 8.7 presents those 100m sections of a link or junctions which have had more than ten Personal Injury Accidents (PIA) during this period. Further analysis of this data is provided in the Transport Assessment.

Table 8.7: Summary of Collision Data

Location	Number of Personal Injury Accidents
Bank Junction	32
Monument Junction	30
Whitechapel Road/ Brick Lane	25
Whitechapel High Street/ Commercial Road	23
Whitechapel Road/ Vallance Road	22
Tower Hill/ East Smithfield	20
Southwark Street/ Thomas Street	18
Whitechapel Road/ Greatorex Street	17
Whitechapel Road/ Adler Street	17
Commercial Road/ Settles Street	13
Whitechapel Road/ Davenant Street	12

Location	Number of Personal Injury Accidents
The Highway/ Dock Street	12
Queen Victoria Street/ Puddle Dock	12
Whitechapel Road/ Commercial Road	11
Tower Hill/ Trinity Square	11
Borough High Street/ Duke Street Hill	11

8.4.48 This analysis shows that there are several locations near Bank Station where the number of accidents exceeds ten PIAs over a three-year period.

Parking, Loading, and Servicing

Whole Block Site

- 8.4.49 'No Waiting At Any Time' restrictions cover the road frontage surrounding the Whole Block Site with further conditions overlaid on Cannon Street and King William Street in the form of 'No Loading' restrictions for the period 07:00 to 19:00 in selected areas.
- 8.4.50 An existing service entrance for 10 King William Street is provided beside 20 Abchurch Lane, which includes a compact vehicle turn-table for servicing vehicles flanked by separately marked areas to accommodate parking for around six cycles and four motorcycles.
- 8.4.51 There is a gated service entrance on the opposite side of the road next to 5 Abchurch Lane and this entrance provides an internal through-route that connects with Sherborne Lane to the west.
- 8.4.52 Vehicles using this facility can therefore enter from either Cannon Street or Sherborne Lane but are required to exit using King William Street as Sherborne Lane is a dead end and Abchurch Lane has one-way operation.
- 8.4.53 Some servicing for 5 Abchurch Lane is currently undertaken from Cannon Street, with goods then loaded onto a motorised pallet truck that is manually guided along the lane to the building.
- 8.4.54 Nicholas Lane also contains two service access bays to serve Phoenix House which are used by vehicles loading / unloading from the kerb.

Arthur Street

- 8.4.55 There are 'No Waiting At Any Time' restrictions in place on Arthur Street.
- 8.4.56 There are two properties that have service yards, or vehicle garages, accessed directly from Arthur Street: 24-28 King William Street; and 33 King William Street. These buildings are serviced by vehicles and have refuse collected from Arthur Street. 12 Arthur Street has a ground-level service area accessed from the section of highway between Laurence Pountney and Martin Lane. Vehicles access this section of highway from Arthur Street. Refuse is collected from 12 Arthur Street from refuse collection vehicles using Arthur Street.

Other Locations

- 8.4.57 There are nine motorcycle parking spaces located at the southern end of Suffolk Lane.

Local Highway Network – Future Baseline

- 8.4.58 Historical traffic flows for the period since 2000 have been examined on six roads in the vicinity of the BSCU Work Sites to estimate background traffic growth. Examination of the data shows that traffic volumes at each site have generally declined over the years, or have remained fairly stable. Following a review of this evidence TfL has agreed that for the purposes of the assessment of the impact of the BSCU the adoption of zero growth in background traffic is appropriate.
- 8.4.59 This means that the current baseline traffic flows have been used in the 2017 and 2020 future year assessments. It is assumed that there will be no other changes to the highway network that will influence traffic flows between the current and future baselines.
- 8.4.60 The *Mayor's Vision for Cycling – Central London Grid* assumes a reduction of 25 per cent in traffic flows in the City of London if the scheme is implemented. This means that an assumption of no growth provides a conservative assessment of traffic flows near Bank Station.

Parking, Loading and Servicing

- 8.4.61 No changes to parking, loading or servicing arrangements have been assumed as part of the future baseline.

Pedestrians – Current Baseline

- 8.4.62 To serve the high footfall in central London there is excellent provision for pedestrians around the Whole Block Site and near the Arthur Street Work Site such as pedestrian subways and informal and signalised crossings at numerous locations. The layout of the pedestrian network is shown in Figures 8.15 and 8.16 and further details are provided in Section 6.8 of the TA.

Figure 8.15: Current Baseline, Pedestrian Network, Whole Block Site



Figure 8.16: Current Baseline, Pedestrian Network, Arthur Street Work Site

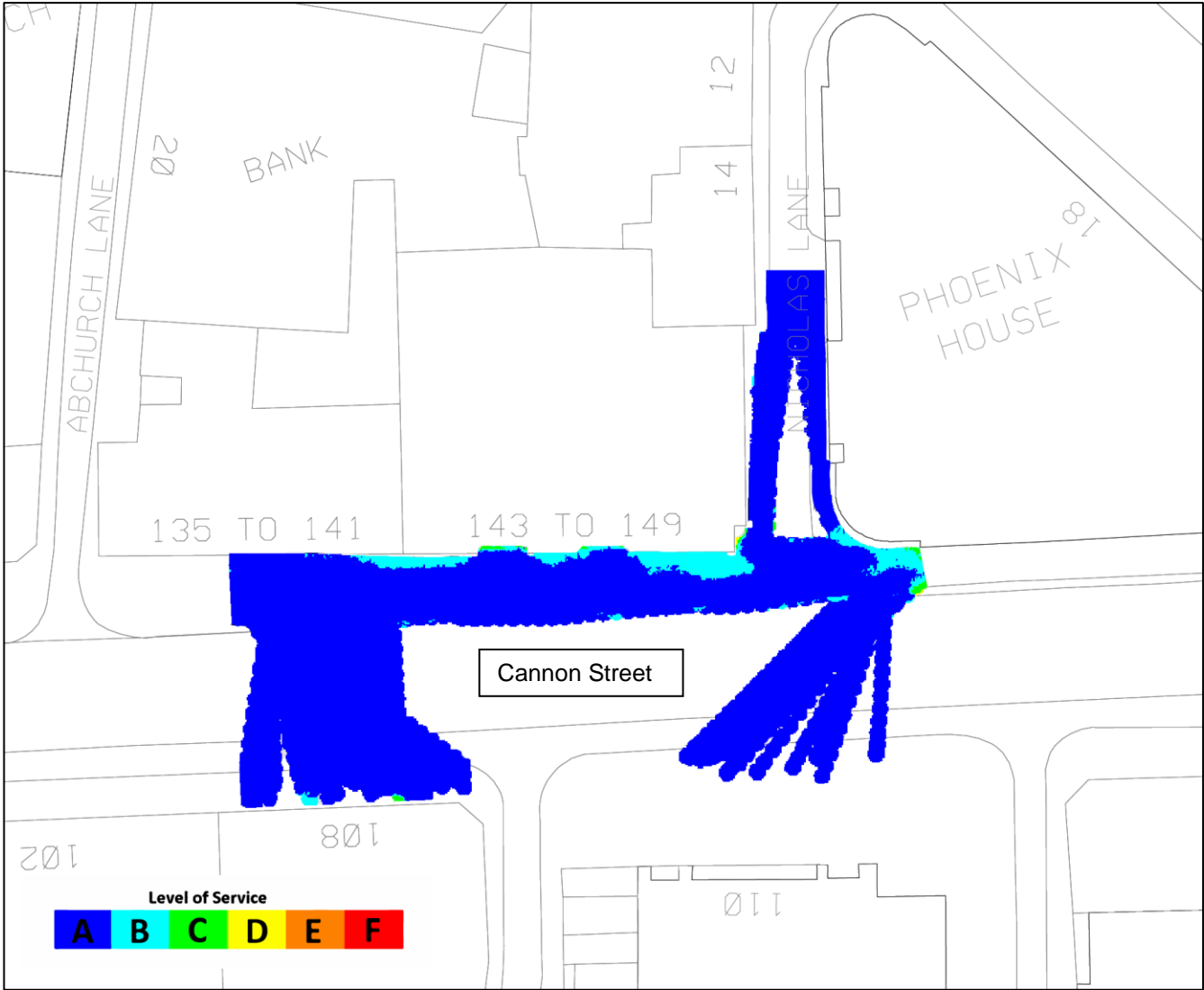


- 8.4.63 Outside the new Station Entrance proposed on Cannon Street as part of the BSCU the footway is approximately 5m wide. This footway provides a link along the northern side of the carriageway for pedestrian movements between Monument Station in the east and Cannon Street Station in the west. The footway on the southern side of King William Street has a width of 2m and this provides a connection between Monument and Bank Stations. The footway on the northern side of King William Street is approximately 3.5m wide.
- 8.4.64 The footways on either side of Abchurch Lane have a width of approximately 1.5m. The footways on Nicholas Lane range in width from 1m to 2m. The footway on Arthur Street is approximately 1.6m wide at its narrowest point on the northern side of the carriageway and 2.0m wide on the southern side.
- 8.4.65 The lanes that lead north from Cannon Street Station, including Abchurch Lane and Nicholas Lane, are busiest during morning and evening rush hours and Nicholas Lane, Birchin Lane and Finch Lane provide a direct north-south route between Liverpool Street, Monument, the River Thames and London Bridge.
- 8.4.66 The lanes and footways carry large numbers of pedestrians and in practice many people walk in the road as traffic flows are low and pedestrian movements tend to dominate.

Pedestrians – Future Baseline

- 8.4.67 As discussed previously, the Bloomberg Development Ticket Hall is to be provided at street level on Walbrook. This will provide a new station entrance with passenger lifts and escalators and provide step-free access to the Waterloo & City Line. The introduction of this new entrance will provide another means of entering or exiting the station and this will tend to reduce pedestrian activity to, from and near the 15 other existing entrances.
- 8.4.68 The *Bank Area Enhancement Strategy* (City of London Corporation, 2013b) provides recommendations to enhance the area's historic lanes and alleys as priority pedestrian and cycling routes at peak hours and quieter rest spaces at other times. This includes changes near the Monument junction to improve pedestrian facilities.
- 8.4.69 Discussions with officers from the City of London Corporation indicate that both Nicholas Lane and Abchurch Lane may be subject to access restrictions that will remove all but essential motorised traffic from using them to complement the other proposed enhancements to the nearby pedestrian environment.
- 8.4.70 As part of the BSCU, a new Station Entrance is proposed on Cannon Street. The movement of pedestrians at this location has been modelled using Legion for a situation in 2026 without the new Station Entrance in place. The results are shown in Figure 8.17.

Figure 8.17: Future Baseline, Legion Modelling, Cannon Street Footway, 'Do Minimum' (2026)



- 8.4.71 This Legion output shows that the LOS in the area are generally Level A or B and that pedestrians cross Cannon Street at two main locations.

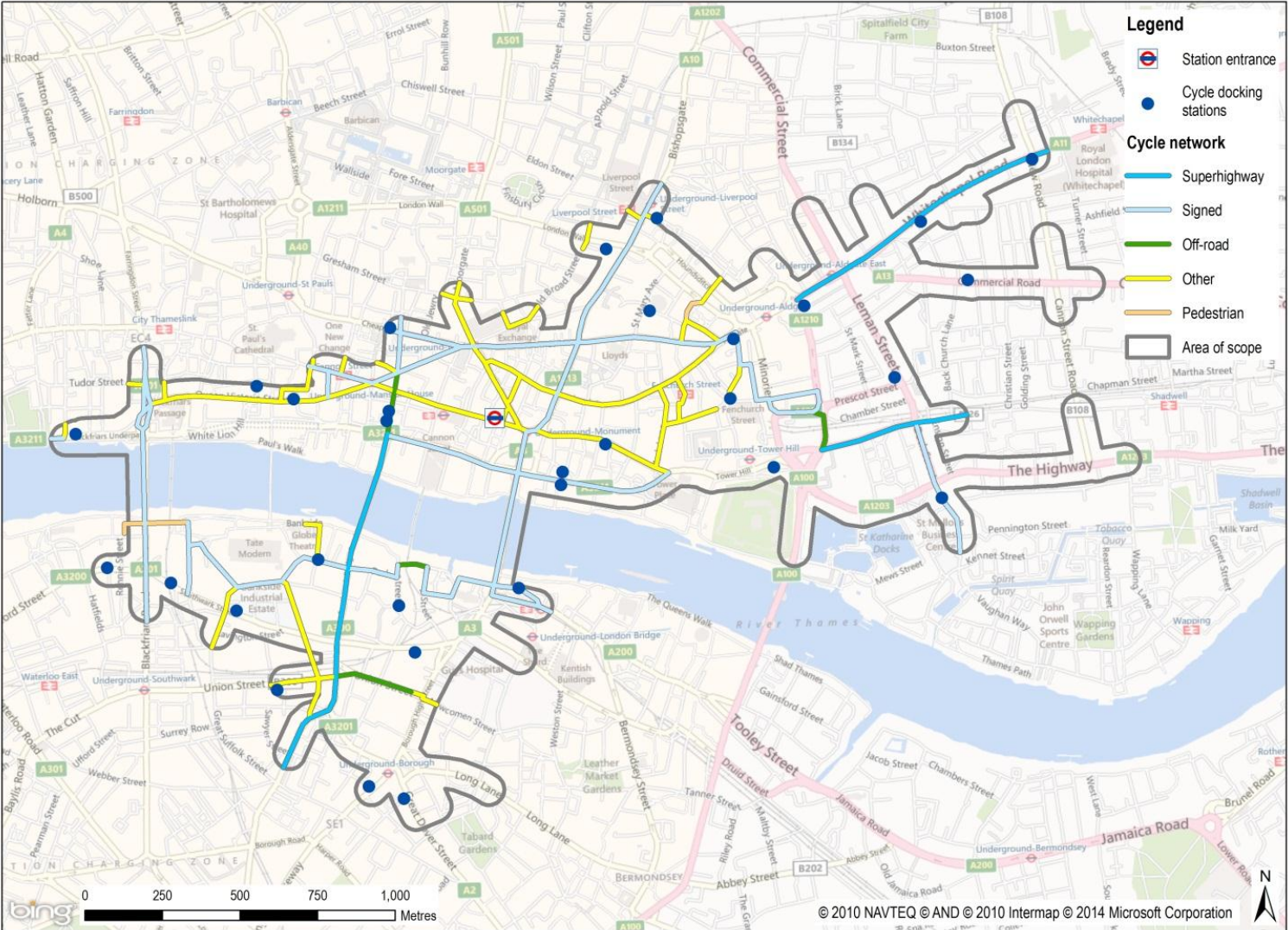
Cyclists – Current Baseline

- 8.4.72 There is a dense network of cycle routes around Bank Station and the proposed work sites and this is shown in Figure 8.18. Nearby signed routes on the formal cycle network are provided for north-south routes on King William Street, London Bridge to the east and Blackfriars Bridge to the west. East-west routes are provided on Lower Thames Street to the south of the Arthur Street Work Site and on the Cornhill/Queen Victoria Street/Cannon Street corridor to the north. Cycle superhighway route CS7 enters the City of London from the south via Southwark Bridge.
- 8.4.73 Figure 8.18 also shows that there are several Barclays cycle hire docking stations near Bank Station and the work sites.

Cyclists – Future Baseline

- 8.4.74 The City of London Corporation is currently promoting a Traffic Regulation Order that would allow two-way operation for cyclists along Abchurch Lane.
- 8.4.75 Cycle superhighway route CS1 is proposed to connect the City of London with north London via Shoreditch, Stoke Newington and Tottenham. The route, which will upgrade existing signed routes, is expected to be open by 2015.
- 8.4.76 Current proposals by TfL also include an East-West route to be implemented by 2016 following Upper and Lower Thames Street, which runs past the southern end of Arthur Street. This scheme would be implemented as part of wider changes to the cycle network and TfL is expected to consult on the proposal in autumn 2014.

Figure 8.18: Current Baseline, Cycle Network



8.5 Incorporated Mitigation

8.5.1 The section presents the mitigation measures that are included as part of the BSCU and which have been included in the assessment of the scheme.

Demolition and Construction Phases – Assessment Periods 1 and 2

8.5.2 The project will be registered under the City of London Corporation's Considerate Contractor Scheme and a detailed CLP will be prepared in consultation with the relevant highway and traffic authorities and the emergency services.

8.5.3 A Traffic Management Plan will also be prepared to manage potential impacts on transport and movement. The plan will be agreed with the City of London Corporation and TfL and will include:

- measures to minimise the impact upon the surrounding area by making the BSCU Work Sites as self-sufficient within their boundary as practicable and implementing industry best practice;
- arrangements so that construction vehicles are able to enter and leave the Whole Block Site and Arthur Street Work Site in a forward gear;
- requirement for construction vehicles to use the TLRN as far as possible to travel to and from the work sites;
- production and administration of a Construction Worker Travel Plan to ensure that the construction workforce will not use private vehicles for journeys to and from work, since the BSCU Work Sites are well served by public transport and as a consequence on-site vehicle parking will not be provided;
- measures to protect the travelling public from the works and to include suitable road closures and diversions only where necessary to ensure public safety;
- registration of construction vehicles to the Fleet Operator Recognition Scheme (FORS), which is an accredited membership scheme for businesses operating van and lorry fleets; and
- requirement for construction vehicles and drivers to meet specific safety standards e.g. vehicles fitted with close proximity warning system and side under-run guards and drivers required to undertake FORS approved Safe Urban Driving accredited training each three years and FORS approved annual safety e-learning.

8.5.4 The assessment of construction traffic has focused on the routes between the Whole Block and Arthur Street Work Sites and the main road network. The shortest practicable route to this network is to be used, with construction traffic using routes to or from the east of London, thereby avoiding travel through central London.

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- 8.5.5 The same routing requirements will apply to very large lorries carrying special loads or equipment. This type of large vehicle movement will be infrequent and is likely to occur at non-peak periods (e.g. at weekends) when the impacts on road users will be low. The routing of these loads will be agreed with the City of London Police prior to delivery on the basis of up to date information about traffic conditions and the type and nature of the load.
- 8.5.6 Some construction activities, such as the removal of excavated material, could occur during night-time periods. These periods are times when vehicle, cyclist and pedestrian flows would be low with the consequence that the impact of construction traffic would be reduced compared to daytime activities.
- 8.5.7 The traffic management arrangements for the utility and protective works have been prepared to ensure that generally only a single lane of the main roads in the area is closed at any one time during the day. Each closure would be agreed with TfL and the City of London Corporation.
- 8.5.8 There are two exceptions to this at Arthur Street and King William Street. At Arthur Street the entire street is to be closed and the same mitigation measures are proposed as part of the main demolition and construction works. At King William Street both lanes are to be closed and to reduce traffic disruption these works would only occur at night with the traffic lanes reinstated during the day.
- 8.5.9 As part of the BSCU proposals a new highway connection is to be provided for fire and other emergency vehicles between Upper Thames Street and Suffolk Lane. The link is required because the closure of Arthur Street during construction phases restricts access from the fire station on the south side of Upper Thames Street opposite Suffolk Lane to other parts of the City of London.
- 8.5.10 The introduction of the new highway link requires the temporary relocation by approximately 100m of nine motorcycle parking spaces from the southern end of Suffolk Lane to a location near the existing motorcycle parking facility on Laurence Pountney Hill. When the construction works have been completed and Arthur Street is reopened the motorcycle parking spaces will be re-provided at their original location on Suffolk Lane.
- 8.5.11 A further change to the highway network is required on the section of highway to the north of 12 Arthur Street and between Laurence Pountney Lane and Martin Lane. At present vehicles are prevented from travelling along this section of road by railings. The railings would be removed as part of the scheme to enable service vehicles to access the car park and service area provided at the ground-floor level of 12 Arthur Street.
- 8.5.12 Abchurch Lane would be closed occasionally during the demolition phase with each closure lasting no more than 48 hours and likely to be at weekends.

8.5.13 Nicholas Lane would be closed to through traffic and pedestrian and cyclist movements during the demolition phase. There would be up to three further closures during the construction phase with each closure lasting no more than 48 hours.

8.5.14 Abchurch Lane and Nicholas Lane would not be closed at the same time to reduce the distance vehicles, pedestrians or cyclists have to divert.

Total and Partial Blockade – Assessment Period 3

8.5.15 During the blockades additional services will be operated on the Charing Cross branch of the Northern Line during peak periods giving total frequencies as follows:

- Total blockade - 32 trains per hour per direction; and
- Partial blockade - 32 trains per hour in southbound direction and 26 trains per hour in northbound direction.

8.5.16 This change in service pattern equates to an extra eight trains per hour per direction during the total blockade and between two and eight additional trains per hour during the partial blockade. These additional services have been incorporated into the Railplan model of the public transport network when the blockades are in place.

8.5.17 Other mitigation measures including rail replacement bus services and a Travel Demand Management (TDM) strategy are described in Section 8.7.

8.5.18 Weekend restrictions on access to Northern Line, Central Line and DLR services at Bank Station are also anticipated during the construction works. The restrictions mean that services will continue running along each line but will not stop at Bank Station.

8.5.19 Passenger flows are substantially lower during weekends than on weekdays and impacts are expected to be lower than those for the total and partial blockades. The impact of the weekend closures would also be managed and mitigated by TfL using the same techniques used to manage other weekend closures across the London Underground Network.

Operational Phase – Assessment Periods 4 and 5

8.5.20 The BSCU aims to increase the capacity of the station, reduce passenger journey times through the station, improve the quality of access, interchange and ambience (including step-free interchange between Northern Line and DLR trains) and improve emergency fire and evacuation protection measures.

8.5.21 The project is therefore inherently a mitigated scheme from an operational perspective.

8.6 Assessment of Effects

8.6.1 This section examines the effects of the BSCU during construction (temporary effects) and operation (permanent effects).

Temporary Effects – Assessment Period 1 – Utility and Protective Works

8.6.2 The utility works required to deliver the BSCU are expected to be undertaken in 2016 to 2017. Further details of the general utility works are provided in Appendix A8.3.

8.6.3 A range of traffic management measures is expected to be implemented as part of each set of utility works including single lane closures, partial lane closures, shuttle working and junction closures. These works are expected to last for periods exceeding four weeks. The required traffic management measures, servicing arrangements and associated mitigation will be defined as part of the Traffic Management Plan for each work site contained within the draft Code of Construction Practice (CoCP) for the BSCU.

8.6.4 Warning and advisory signs for pedestrians will be located around each work site in accordance with the CoCP.

8.6.5 Cyclists may be required to divert to new routes for those sites where the entire width of road is to be closed. As part of the Traffic Management Plan contained within the CoCP, warning and advisory signing will be implemented and the layout of each work site will follow best practice (e.g. *Cyclist at Road Works Guidance, TfL*).

8.6.6 The impacts of the utility works on accidents (collisions) and safety are considered more generally in a following section which examines the impact of the main construction works on these issues.

8.6.7 A summary of the effect of the five types of work required is provided in the following sections.

General Utility Works

8.6.8 These works include a range of measures including excavation, duct/pipe laying and chamber construction. These works are expected to generate no more than five construction vehicles per hour. Up to 20 nearby roads have the potential to be affected by the works but the proposed traffic management arrangements will ensure that only a single lane of a strategic road would be closed at a time. At least one pedestrian footway would be provided around each work site.

- 8.6.9 These impacts are expected to have a significant adverse effect when compared to assessment criterion AC1 on the following roads:
- King William Street;
 - Cannon Street;
 - Queen Victoria Street;
 - Threadneedle Street;
 - Mansion House Street;
 - Bishopsgate; and
 - Gracechurch Street.
- 8.6.10 In practice, the phasing of the works means that the impacts will not occur at the same time. In addition, the impacts are likely to be lower due to further development of the programme for general utilities works which is expected to lead to further coordination of the works to reduce impacts on traffic flows, pedestrians and cyclists. This is expected to reduce the traffic impacts so that they are not considered significant when compared to assessment criterion AC1.
- Shafts for Sewer Works
- 8.6.11 Two construction shafts on Walbrook and King William Street are to be built to provide access to major sewers for installing protective linings.
- 8.6.12 The works at Walbrook would require the closure of the road to traffic. Pedestrian and cycle routes around the work site would be maintained. Up to five construction vehicles per day are expected to travel to the site.
- 8.6.13 As part of the Walbrook works an emergency egress from the sewer is required to be provided in King William Street. This will require the closure of the southern end of Abchurch Lane and the suspension of the advisory south-westbound cycle lane and bus stop on this section of King William Street (this is bus stop F in Figure 8.12).
- 8.6.14 The overall impact of the works at Walbrook is considered to be not significant when compared to the assessment criteria.
- 8.6.15 The works at King William Street require the closure of both lanes of traffic and this closure would only occur at night (22:00 to 06:00) to reduce the impact on traffic flows. A ventilation and emergency egress is required from the sewer at Prince's Street and this can be provided without affecting two-way traffic flows on this road.

- 8.6.16 The overall impact of the works at King William Street are considered to be not significant when compared to assessment criteria AC1, AC3, AC13 and AC14.

Arthur Street Utility Works

- 8.6.17 The utility works will require the closure of Arthur Street in both directions for approximately six months. Up to six construction vehicles per hour are expected to travel to the site. The impact on traffic flows, pedestrians, cyclists, servicing and parking is the same as that for the main demolition and construction works which also require the closure of Arthur Street.

- 8.6.18 These impacts are considered in the analysis of Assessment Period 2 and the analysis shows that they are not significant when compared to the assessment criteria.

Shafts for Compensation Grouting

- 8.6.19 Shafts may be constructed in two locations for the purposes of compensation grouting: Walbrook; and within the Whole Block Site.
- 8.6.20 If required, the shaft at Walbrook would require the closure of the road near Mansion House and up to six construction vehicles would access the site per day. The work site for the shaft would be positioned to maintain a single lane of traffic around the site. This means that the impacts are not considered to be significant when compared to the assessment criteria. Once the shaft has been constructed the size of the work site would be reduced further reducing impacts on traffic flows, pedestrians and cyclists.
- 8.6.21 The shaft within the Whole Block Site would also be expected to generate no more than six construction vehicles per day and the impacts of this work site would be less than those for the full construction works at the Whole Block Site. This means that the impacts are not considered to be significant when considered against assessment criteria AC1, AC3, AC13 and AC14.

Strengthening of Monument Junction

- 8.6.22 Utilities works are potentially required to strengthen Monument junction. These works will require the closure of the northbound carriageway of King William Street on its approach to Monument junction and as part of this northbound traffic would use a contraflow lane on the southbound carriageway of King William Street.
- 8.6.23 These works would either occur at night over a 15 day period or over two weekends. The duration of these works and the low impact on traffic flows due to either night-time or weekend working means that the traffic impact is not expected to have a significant adverse effect when considered against assessment criteria AC1, AC3, AC13 and AC14.

Temporary Effects – Assessment Period 2 - Demolition and Construction

- 8.6.24 The demolition and construction stage for the scheme is expected to start in 2016 and finish in 2021. The construction proposals include the closure of Arthur Street to through-traffic in order to construct a shaft and to provide a marshalling area for construction vehicles accessing both work sites.
- 8.6.25 The peak year for construction vehicle movements is expected to be 2017 and this year has been used for the assessment of temporary affects associated with demolition and construction activities.
- 8.6.26 The people most affected by the construction of the BSCU are expected to be other road users, bus passengers on the northbound route of bus service 344 (which is to be diverted), pedestrians and users of buildings near Arthur Street.

Traffic Levels and Delays to Vehicle Occupants

- 8.6.27 The proposed construction routes to and from the work sites are shown in Figure 8.19. This shows that the TLRN is used apart from the sections of route which provide the final approach to each work site. Further details are provided in the outline CLP for the scheme (Appendix A8.2).
- 8.6.28 The number of construction vehicles travelling to and from each work site has been estimated using the outline demolition and construction programme for the scheme and the information on associated activities during these phases.
- 8.6.29 The profile of vehicles movements over the duration of the construction works is shown in Figure 8.20. This figure shows that a maximum of 299 vehicles per week or approximately 60 construction vehicles per day would access the Arthur Street Work Site. This means that 60 vehicles would travel to the site and then depart the site with approximately one-third to a half of vehicles travelling on to the Whole Block Site with the remainder leaving the area. For the purposes of this assessment all construction vehicles are assumed to HGVs.

Figure 8.19: Assessment Period 2, Site Access Routes

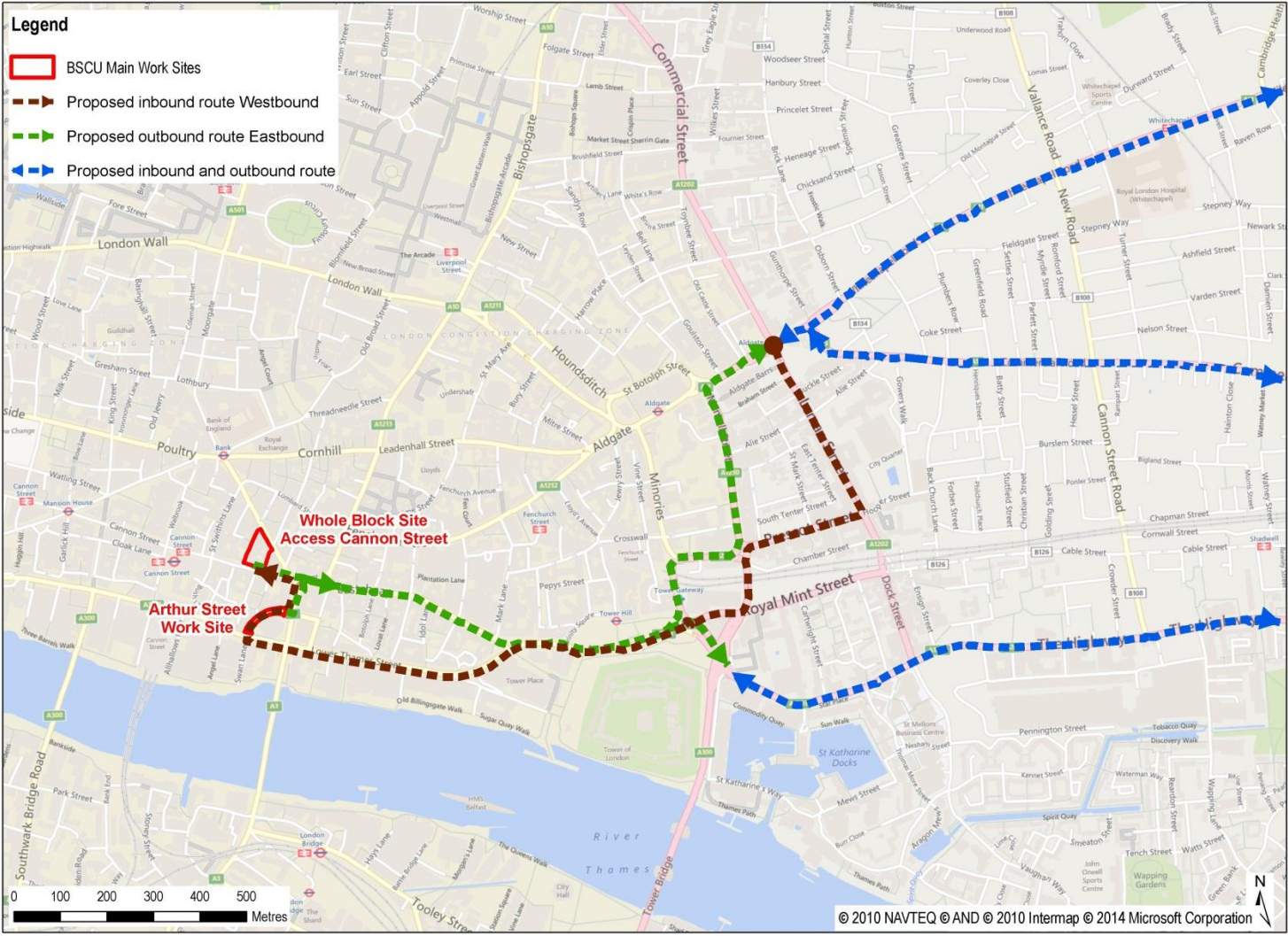
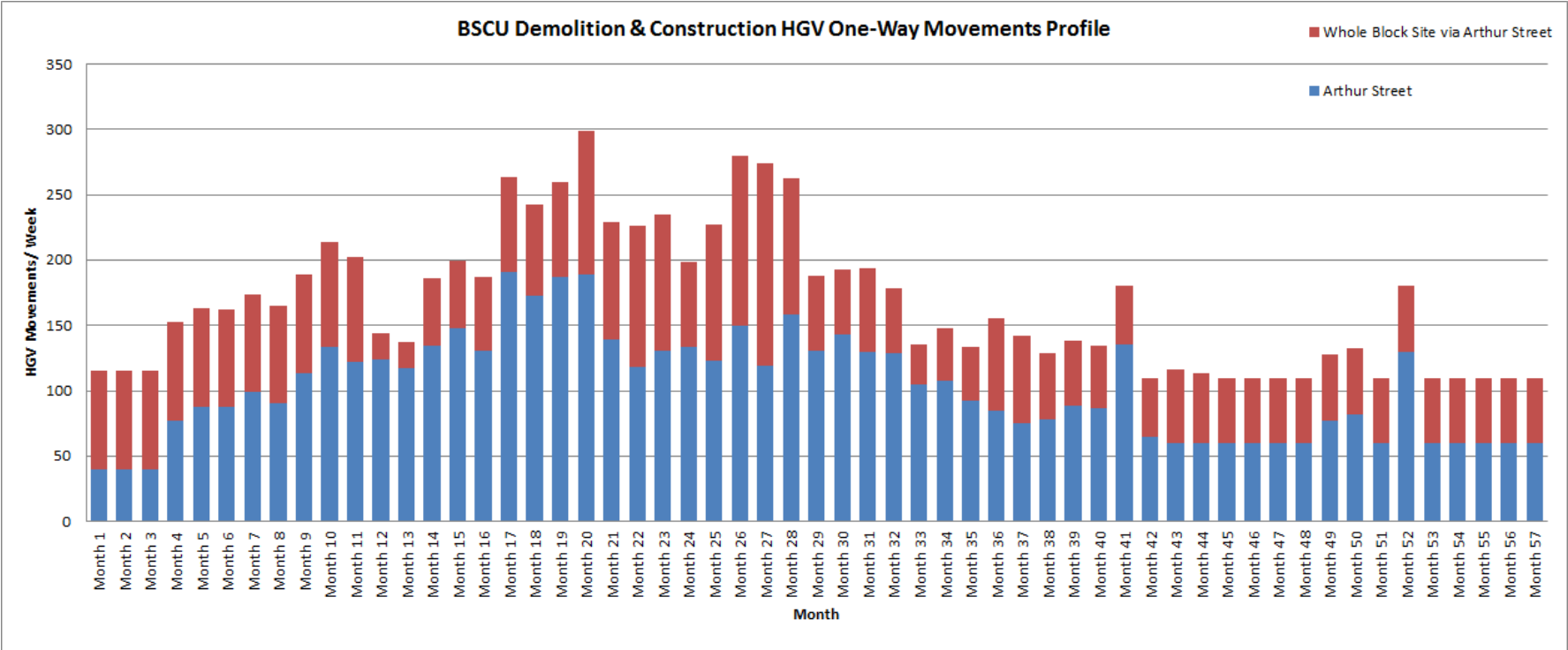
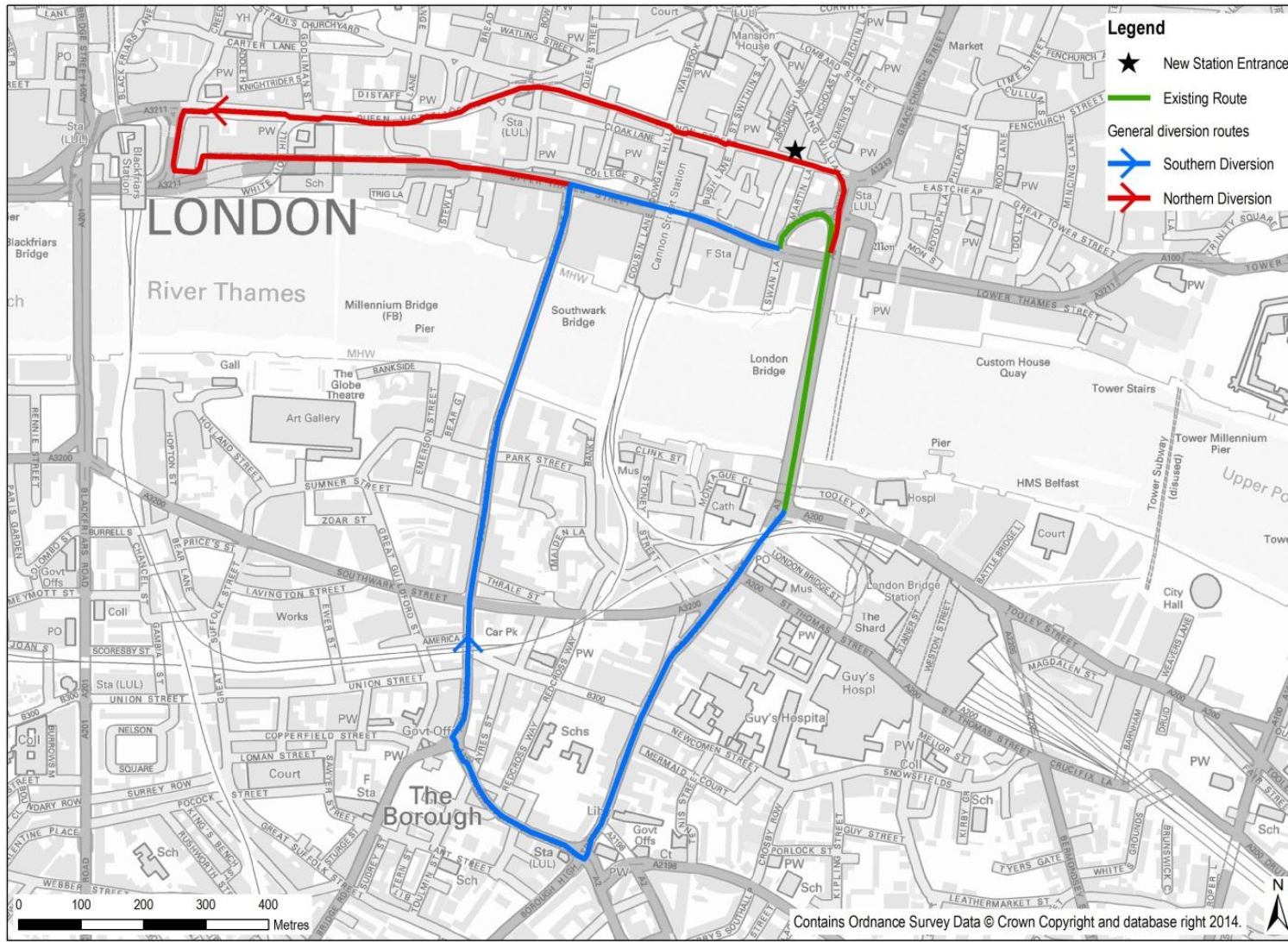


Figure 8.20: Assessment Period 2, Construction Vehicle Movements per Week



- 8.6.30 The impact of the demolition and construction phase on other road users is related to the additional construction traffic using nearby roads and also the impacts associated with the closure of Arthur Street and the need for traffic to divert to new routes. Expected diversion routes are shown in Figure 8.21. This shows that traffic travelling north on London Bridge and normally turning left into Arthur Street could divert to the north via Cannon Street, Queen Victoria Street and Puddle Dock to turn onto Upper Thames Street. Some drivers would divert in advance of using London Bridge and use a route to the south via Borough High Street and Southwark Bridge to reach Upper Thames Street.
- 8.6.31 The impact of these changes has been assessed using the 'ONE' traffic model for London. The results of the modelling process have indicated that no roads are expected to experience more than a 30 per cent increase in traffic flows for more than four weeks and have an increase of more than 40 vehicles per day.
- 8.6.32 There are no sections of the highway network that are expected to experience a significant adverse effect when the traffic changes are compared to traffic-related assessment criteria (AC1, AC2, AC3 and AC4).

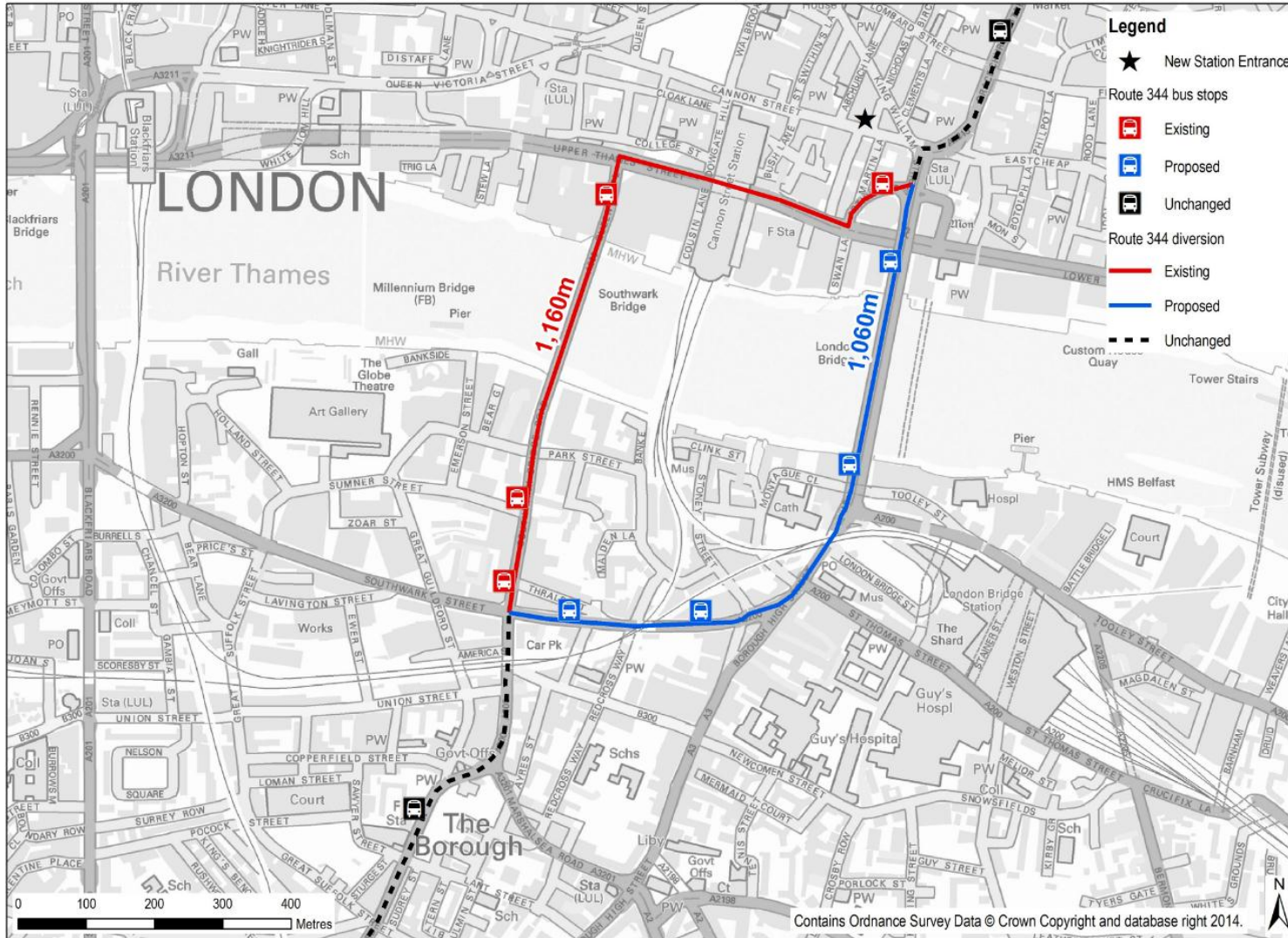
Figure 8.21: Assessment Period 2, Arthur Street Work Site Diversion



Public Transport Delay – Bus Services

- 8.6.33 This section examines the effect of the closure of Arthur Street on bus services.
- 8.6.34 Bus service Route 344 currently uses Arthur Street in a northbound direction on its journey towards Shoreditch. The closure of Arthur Street means that the northbound service would need to be diverted to a new route. Southbound services would not be affected.
- 8.6.35 As part of the scheme proposals, the 344 service would divert from its current routing over Southwark Bridge, along Upper Thames Street, into Arthur Street and then into King William Street to a new route which uses Southwark Street and then London Bridge to reach King William Street. These routes are shown in Figure 8.22. This diversion was previously implemented during the 2012 Olympic Games.
- 8.6.36 The proposed diversion route (1,060m) is approximately 100m shorter than the existing route (1,160m) and is expected to have a minor effect on bus journey times. The length of the required diversion of bus route 344 and the related journey time impact are not significant when compared to assessment criteria AC6.
- 8.6.37 The diversion of the northbound 344 service means that it will no longer serve four bus stops. The dense network of bus services in central London means that many other stops and services are available nearby (e.g. RV1 and 381) and this means that the effect of the diversion on the accessibility of bus services is not considered to be significant.

Figure 8.22: Bus Route 344 Proposed Northbound Diversion



Parking, Loading, and Servicing

- 8.6.38 There are no on-street car parking facilities that are affected by the demolition and construction proposals. This means that the scheme has no impact on on-street car parking arrangements.
- 8.6.39 There are no proposals that will affect public off-street car parking spaces.
- 8.6.40 The Arthur Street Work Site limits the ability of vehicles to access nearby buildings and businesses. Servicing will continue to be possible to the adjacent buildings with service vehicles allowed to enter the work site to access the basement servicing facilities at 24-28 King William Street and 33 King William Street.
- 8.6.41 As part of this arrangement, service vehicles could need to book an arrival slot expected to be 30 minutes in duration. This is normal practice for deliveries at many buildings across the City of London.
- 8.6.42 Vehicle access to the servicing area for 12 Arthur Street would be provided from Laurence Pountney Lane. This requires the removal of the existing railings directly to the west of the service entrance. Vehicles leaving the service area would depart via Laurence Pountney Lane. In exceptional circumstances, service vehicles would also be able to access the service area via the Arthur Street Work Site.
- 8.6.43 Refuse collection will continue to be possible for buildings along Arthur Street. Refuse collection typically occurs before 07:00 or after 23:00 and refuse collection vehicles will be allowed into the work site to collect waste or refuse bins will be moved by operatives to a collection point outside the area enclosed by the hoarding.
- 8.6.44 The Arthur Street Work Site will affect access to the private car park for 24-28 King William Street. Access to this car park will continue to be possible for cars which are registered to the building.
- 8.6.45 The required closure of Abchurch Lane will require different servicing arrangements to be implemented for adjacent buildings. Servicing would continue to be possible from either Cannon Street, Sherborne Lane or King William Street with trolleys being used if required to manoeuvre goods from kerbside to building. In exceptional circumstances, service vehicles would also be able to enter the worksite area to access the vehicle access bay located within 5 King William Street.

- 8.6.46 The required closure of Nicholas Lane will require different servicing arrangements to be implemented for adjacent buildings on the eastern side of the road, particularly 18 King William Street. The buildings located on the western side of Nicholas Lane are to be demolished as part of the scheme. Servicing for 18 King William Street will continue to be possible with vehicles using Nicholas Lane with the support and assistance of traffic marshals from the BSCU.
- 8.6.47 As part of this arrangement, service vehicles could need to book an arrival slot expected to be 30 minutes in duration. This is normal practice for deliveries at many buildings across the City of London. In exceptional circumstances, service vehicles would also be able to enter the worksite area to access the service area located on the ground-floor level of 18 King William Street.
- 8.6.48 These arrangements mean that the closures of Nicholas Lane and Abchurch Lane are not expected to have any significant adverse effect on parking, loading or servicing of nearby buildings.
- 8.6.49 The requirement to relocate nine motorcycle parking spaces by 100m from Suffolk Lane to Laurence Pountney Hill is not expected to have a significant adverse effect on motorcycle users when compared to assessment criterion AC10.

Vulnerable Road Users (Pedestrian and Cyclist) Delay and Loss of Amenity

- 8.6.50 Vulnerable road users could be affected by the demolition and construction of the scheme through increases in traffic flows due to construction traffic, changes to traffic flows due to the closure of Arthur Street and other changes which affect pedestrian movements.
- 8.6.51 Figure 8.23 shows that there are no locations which have experienced more than ten PIAs over a three-year period and which are expected to experience more than a 10 per cent increase in flows during construction. This demonstrates that there is not expected to be a significant adverse effect on accidents and safety when compared to assessment criterion AC16. As described in Section 8.7 a range of measures is to be introduced as part of the Traffic Management Plans for the scheme to mitigate and manage the impact of construction traffic.
- 8.6.52 The footway on the southern side of Arthur Street will be closed, whilst that on the northern side will remain open. Pedestrians will be advised through signing that the use of the northern footway is only for those people wishing to access buildings or businesses along Arthur Street. Pedestrian diversion routes away from Arthur Street will be signed and are shown in Figure 8.24. The diversion routes have a length of under 250m and are not considered to be significant when compared to assessment criteria AC13.

Figure 8.23: Collisions and Changes in Traffic Flows

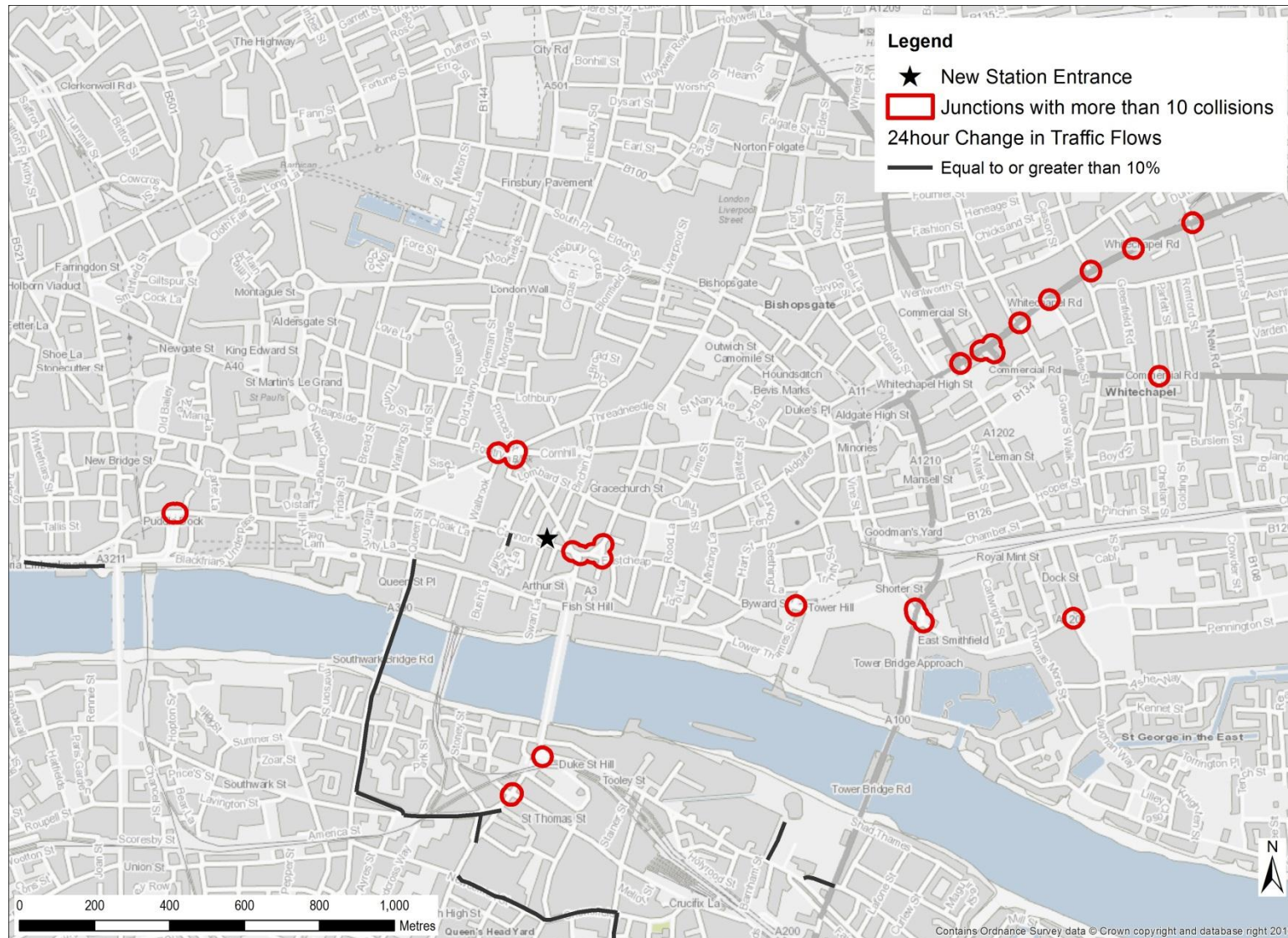


Figure 8.24: Assessment Period 2, Footway Closures, Pedestrian Diversion at Arthur Street Work Site

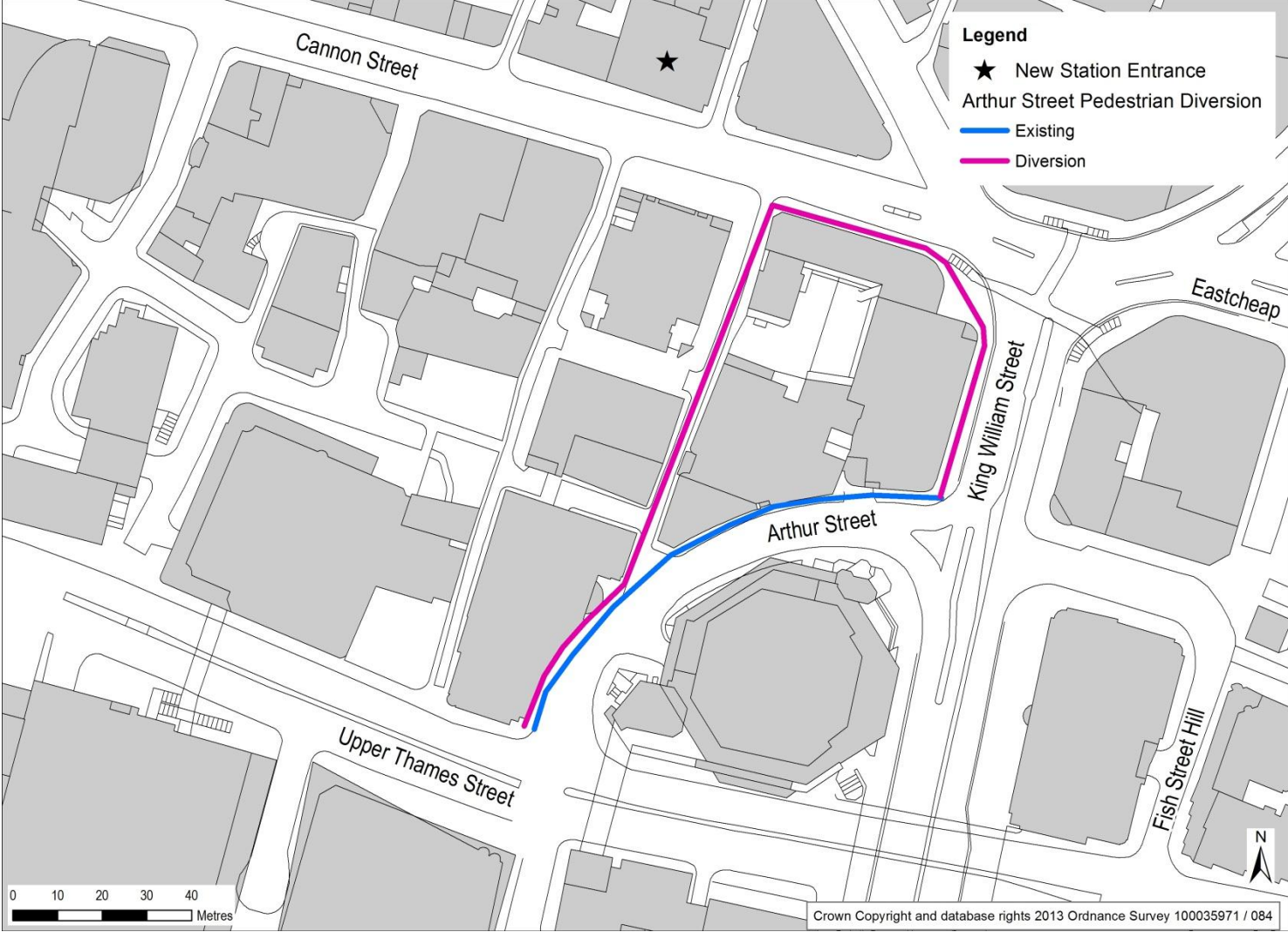
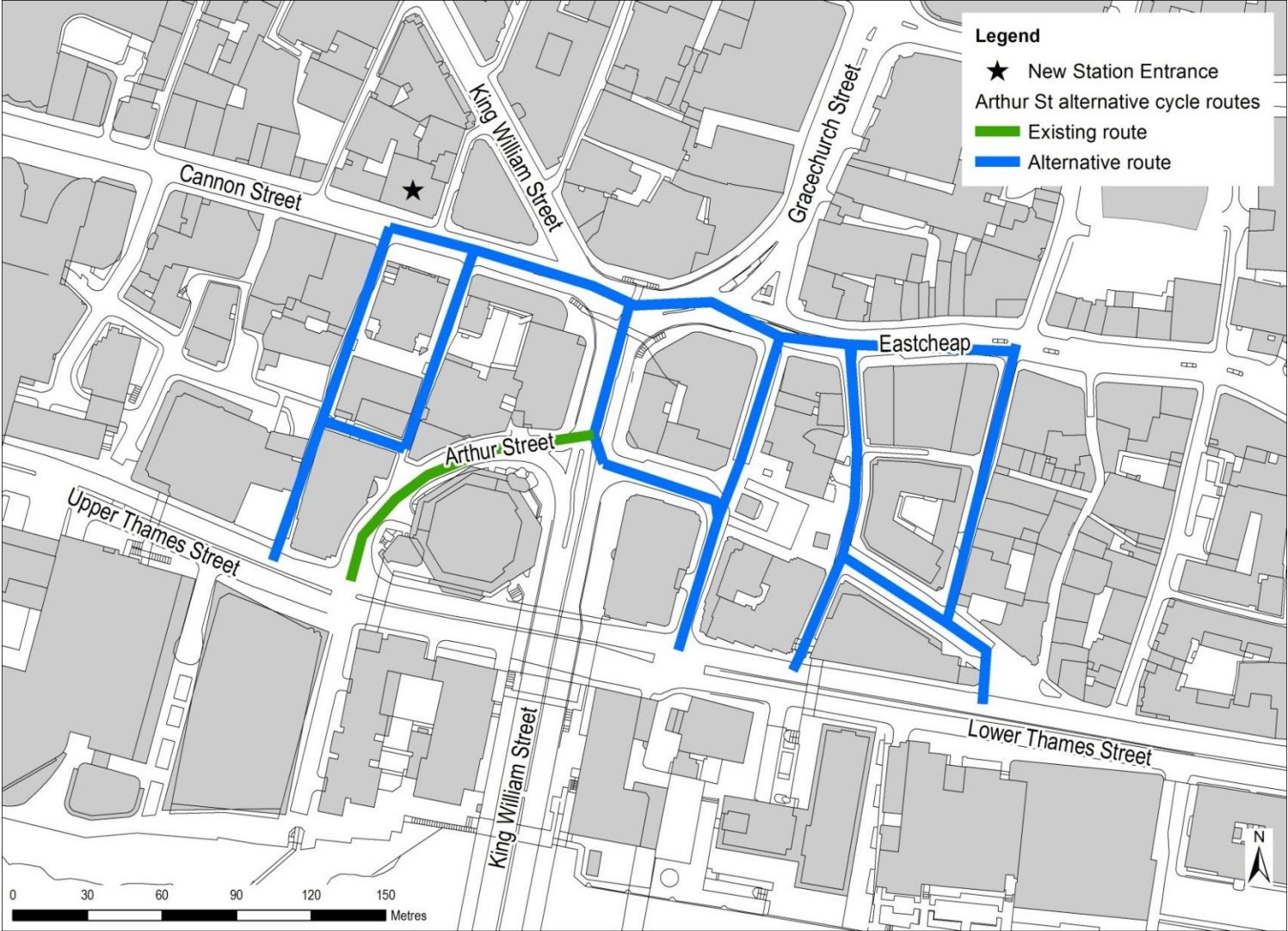
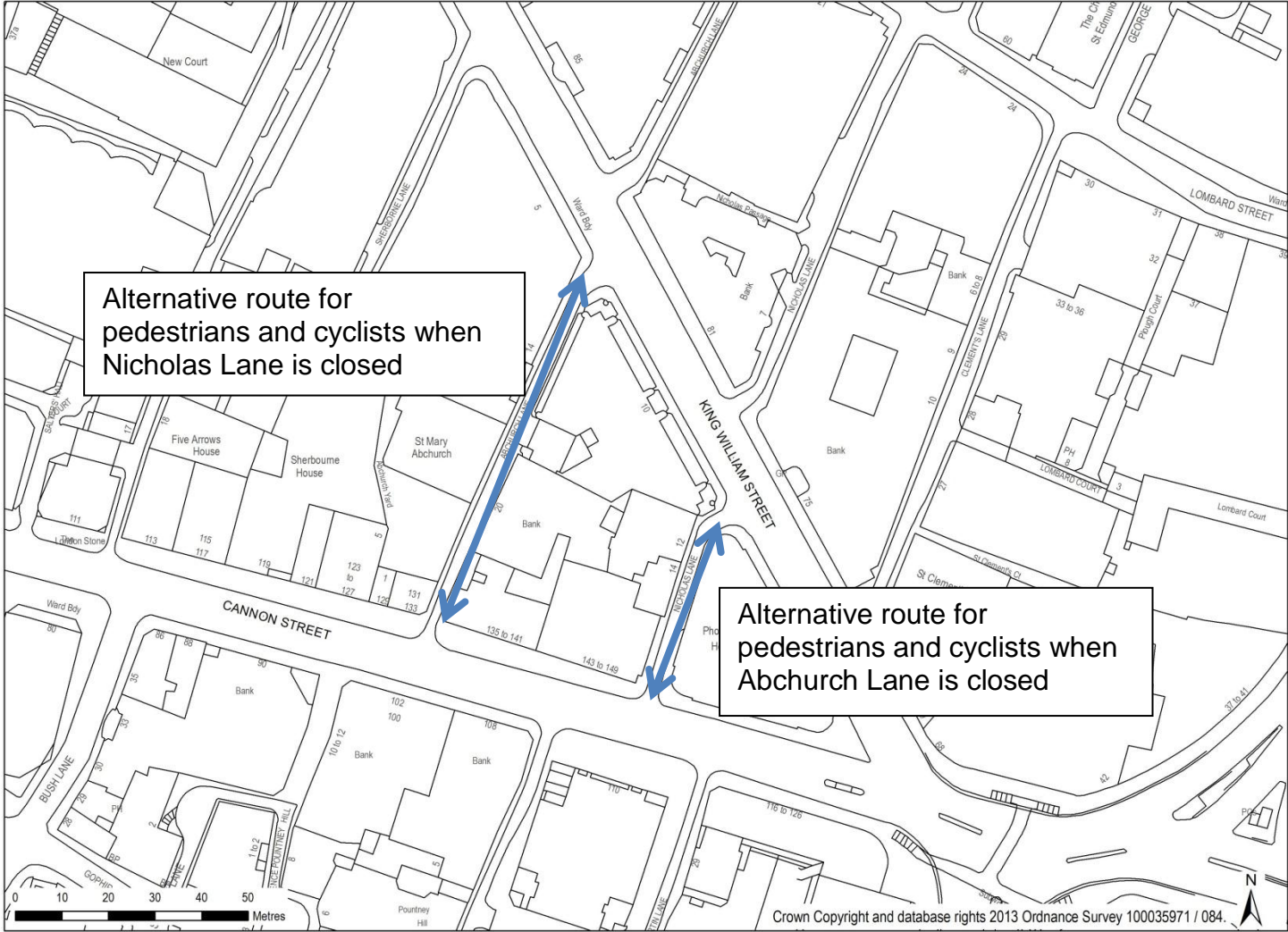


Figure 8.25: Assessment Period 2, Footway Closures, Cycle Diversions at Arthur Street Work Site



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- 8.6.53 When Arthur Street is closed, cyclists could still pass on foot to gain access to buildings and businesses and the alternative routes shown in Figure 8.25 would be advised for cyclists travelling through the area. The length of the diversion will be under 1.5km and is not considered to be significant when compared to assessment criteria AC14.
- 8.6.54 Diversion routes will also be signed for pedestrians when Abchurch Lane is closed. The length of the diversion route is approximately 80m (Figure 8.26) and is not considered to have a significant adverse effect when compared to assessment criteria AC13.
- 8.6.55 Diversion routes will also be signed for pedestrians when Nicholas Lane is closed. The length of the diversion route is approximately 80m (Figure 8.26) and is not considered to have a significant adverse effect when compared to assessment criteria AC13.
- 8.6.56 When Abchurch Lane is closed, cyclists have the option of using either Nicholas Lane or St Swithin's Lane as an alternative route. When Nicholas Lane is closed the most convenient alternative will be either Abchurch Lane or St Swithin's Lane. In both cases the maximum diversion that could be experienced by a cyclist will be under 400m, which is not considered to be a significant adverse effect when compared to assessment criteria AC14.
- 8.6.57 The introduction of a hoarding on the western side of Nicholas Lane will require pedestrians to use the eastern footway or divert to another route. The number of pedestrians using Nicholas Lane and the low traffic flows on the lane mean that this is not expected to have a significant adverse effect on pedestrian comfort levels when compared to assessment criteria AC15. The introduction of the hoarding will not further restrict vehicle access along Nicholas Lane.
- 8.6.58 The introduction of a hoarding on the eastern side of Abchurch Lane will require pedestrians to use the western footway or divert to another route. The number of pedestrians using Abchurch Lane and the low traffic flows on the lane mean that this is not expected to have a significant adverse effect on pedestrian comfort levels when compared to assessment criteria AC15. The introduction of the hoarding will not further restrict vehicle access along Abchurch Lane.
- 8.6.59 As previously identified, for the duration of the Arthur Street closure there are no highway links which are predicted to have a 30 per cent increase in traffic or HGVs and an increase of more than 40 movements per day. Comparing this result with assessment criterion AC12 this means that there is not expected to be a significant adverse effect on cyclists.

Figure 8.26: Assessment Period 2, Footway Closures, Pedestrian and Cyclist Diversion at Whole Block Site



Passenger Safety and Other Impacts within Bank Station

- 8.6.60 This section considers the effect of below-ground construction works on passenger movements within the station. There will be periods when hoardings will need to be erected within Bank Station to segregate areas within which construction is taking place and this will affect pedestrian movements.
- 8.6.61 The analysis presented in the Transport Assessment shows that the DLR platforms and the vertical circulation area near the Central Line are expected to be non-compliant when the pedestrian flows and station layout are compared to the LUL standards during construction works. These impacts are expected to last for up to 12 months.
- 8.6.62 For the periods when non-compliance is identified, it should be noted that these areas are already non-compliant in the absence of the scheme and it has been concluded that the construction proposals will not have a significant adverse effect when compared to assessment criterion AC17.
- 8.6.63 Although there are no criteria for assessing their significance, the works within the station may also result in temporary periods of passenger disruption, including increased difficulty with wayfinding, reduced access for people with reduced mobility and changes to journey times which could lead to temporary significant adverse effects.
- 8.6.64 Mitigation measures to address these potential effects are discussed in Section 8.7 and the implementation of these measures is expected to ensure that the remaining effects are not significant.

Temporary Effects – Assessment Period 3 - Blockade

- 8.6.65 A 'blockade' of the Northern Line is required to connect the new below ground running tunnel with the existing Northern Line. The blockade will prevent trains running in either direction on the City branch between Moorgate and Kennington for a period of six weeks: this is the total blockade.
- 8.6.66 This will be followed by a period of 11 weeks when northbound trains will run on the City branch but not stop at Bank Station and the southbound section will remain closed between Moorgate and Kennington: this is the partial blockade.
- 8.6.67 The need for total and partial blockades of the Northern Line will affect public transport passengers, in particular users of the Northern Line.

- 8.6.68 The main effects of the blockade will be the additional time passengers incur travelling, increased levels of crowding on some London Underground lines, and increased congestion affecting some pedestrian corridors and movements through stations. The most significant adverse effects will be:
- re-routing of passengers from the City branch to the Charing Cross branch of the Northern Line and the Waterloo & City Line;
 - increased use of buses on a number of corridors; and
 - people walking rather than using the London Underground, particularly walking on the corridor between Moorgate – Bank – Monument - London Bridge Station.

Public Transport Delay - Crowding

- 8.6.69 Railplan has been used to assess how passenger travel patterns could change and the results of the model have been used to determine which sections of the transport network experience increased crowding. The results of this process are presented in figures provided in the Transport Assessment and these show the links on the network which are expected to have more than four passengers per square metre on each train.
- 8.6.70 A further analysis of the crowding effects presented in the Transport Assessment has been undertaken. This analysis assesses the links on the public transport network which experience more than a ten per cent increase in crowding levels and which also lead to more than four passengers per square metre on each train i.e. the links which satisfy assessment criteria AC8. The results of this process are presented in Tables 8.8 to 8.11 and further details are provided in the Transport Assessment.

Table 8.8: Significant Crowding due to Total Blockade AM Peak

Line	From	To
Waterloo & City Line	Waterloo	Bank

Table 8.9: Significant Crowding due to Total Blockade PM Peak

Line	From	To
Waterloo & City Line	Bank	Waterloo

Table 8.10: Significant Crowding due to Partial Blockade AM Peak

Line	From	To
Northern Line	Kennington	Elephant & Castle
	Elephant & Castle	Borough
	Borough	London Bridge
	London Bridge	Bank
	Bank	Moorgate
Waterloo & City Line	Waterloo	Bank

Table 8.11: Significant Crowding due to Partial Blockade PM Peak

Line	From	To
Waterloo & City Line	Bank	Waterloo

- 8.6.71 These sections of the network have therefore been assessed to have a significant temporary adverse effect when compared to assessment criteria AC8.
- 8.6.72 On the National Rail and Overground network the total blockade increases crowding on the sections of line between Shadwell and Wapping in the AM peak. No such increases are expected in the PM peak.
- 8.6.73 It is considered that overall these increases in crowding effects on rail passengers represents a significant temporary adverse effect.

Public Transport – Network-wide Effects

- 8.6.74 The Railplan forecasts have been used to identify the changes in the number of passenger hours across the entire London public transport network when there will be crowding.
- 8.6.75 For the total blockade there is a 0.9 per cent increase in crowded hours (i.e. when passengers cannot find an available seat) in the AM peak period together with 0.5 per cent increase in the total number of passenger hours on the network. The greatest increase in the number of passenger hours is predicted to occur on the bus network.
- 8.6.76 The increase in crowded hours would be marginally greater during the partial blockade with a value of 1.0 per cent. The only mode that would see a decrease in crowded hours would be the DLR. The greatest increase in the number of passenger hours is again predicted to occur on the bus network.

- 8.6.77 Analysis of results from the Railplan model shows that similar changes are expected in the PM peak period.
- 8.6.78 These overall network-wide changes are not considered to be significant when compared to assessment criteria AC5.

Public Transport Delay- Journey Times

- 8.6.79 Railplan has been used to assess changes to average journey times caused by the blockade and summary results for the AM peak period are provided in Table 8.12 and Table 8.13.

Table 8.12: Average Journey Times on London Underground Lines – Total Blockade - AM Peak

London Underground Line	Calculated Average Journey Time per Boarding (minutes)			
	Reference Case	Total Blockade	Absolute Difference	Percentage change
Northern – City branch	20.6	15.0	-5.6	-27%
Northern – Charing Cross branch	16.0	19.4	3.4	21%
Victoria	15.2	15.8	0.6	4%
Waterloo & City	7.1	7.9	0.8	12%
Jubilee	17.9	18.1	0.2	1%

Table 8.13: Average Journey Times on London Underground Lines – Partial Blockade - AM Peak

London Underground Line	Calculated Average Journey Time per Boarding (minutes)			
	Reference Case	Partial Blockade	Absolute Difference	Percentage change
Northern – City branch	20.6	21.0	0.4	2%
Northern - Charing Cross branch	16.0	19.2	3.2	10%
Victoria	15.2	15.5	0.4	2%
Waterloo & City	7.1	7.8	0.2	3%
Jubilee	17.9	18.0	0.2	1%

- 8.6.80 The analysis shows that the main journey time impacts of the blockade are expected to be experienced by passengers on the Northern Line, on both the City and the Charing Cross branches.
- 8.6.81 The large reduction in journey times on the City branch directly reflects the impact of part of this line being closed during the blockade, and it being used less. Of the other changes, only the 21 per cent increase on the Charing Cross exceeds the 20 per cent threshold included as part of assessment criteria AC5 and is considered to be a significant temporary adverse effect.

8.6.82 Table 8.14 and Table 8.15 provide the same detailed measure of the average PM journey times for those journeys, or parts of journeys, made on affected London Underground lines as shown. These again show that the main impacts of the blockade will be experienced by passengers on the Northern Line, on both the City and the Charing Cross branches.

Table 8.14: Average Journey Times on London Underground Lines – Total Blockade - PM Peak

London Underground Line	Calculated Average Journey Time per Boarding (minutes)			
	Reference Case	Total Blockade	Absolute Difference	Percentage change
Northern – City branch	16.0	11.3	-4.8	-30%
Northern – Charing Cross branch	13.1	15.6	2.4	19%
Victoria	12.8	13.1	0.3	3%
Waterloo & City	5.4	6.4	1.0	19%
Jubilee	16.0	16.3	0.3	2%

Table 8.15: Average Journey Times on London Underground Lines – Partial Blockade - PM Peak

London Underground Line	Calculated Average Journey Time per Boarding (minutes)			
	Reference Case	Partial Blockade	Absolute Difference	Percentage change
Northern – City branch	16.0	13.5	-2.5	-16%
Northern – Charing Cross branch	13.1	15.4	2.2	17%
Victoria	12.8	12.9	0.1	1%
Waterloo & City	5.4	6.4	1.0	19%
Jubilee	16.0	16.3	0.2	2%

8.6.83 The large reduction in journey times on the City branch reflects the impact of part of this line being closed during the blockade, and there being less use of it as a result. None of the increases exceed the 20 per cent threshold required by assessment criteria AC5 to define an effect as significant.

Public Transport Delay – Effect on Stations

- 8.6.84 TfL has used its Pedroute Strategic (PEDS) model to understand how affected London Underground stations will cope with the increased level of interchange and change in travel patterns during the blockade.
- 8.6.85 Although there is the potential for some residual significant adverse effects to remain, it is considered that most of the in-station impacts will be adequately mitigated by providing operational strategies that will be developed and deployed by station managers. LUL will develop and refine these strategies as the blockade approaches. Further details are provided in Section 8.7. The introduction of these measures is expected to ensure there will not be a significant effect on London Underground passengers.

Public Transport Delay – Bus Passengers

- 8.6.86 Analysis of the Railplan model results has shown that there will be substantial increases in bus passenger numbers on some corridors in peak periods during the blockade.
- 8.6.87 This is expected to have a significant temporary adverse effect on bus passengers. TfL has therefore prepared proposals to introduce a rail replacement bus service and increased frequencies on two other services to provide additional capacity to accommodate the expected increase in bus demand. These proposals are described in Section 8.7. The introduction of these measures is expected to ensure there will not be a significant effect on bus passengers.

Pedestrians

- 8.6.88 The Railplan model results show that during the blockade there will be a large increase in the number of pedestrians walking along the London Bridge-Bank-Moorgate corridor. Analysis of the Railplan results shows that in some locations the LOS of some footways could reduce by one level or more and this would be considered a significant temporary adverse effect when compared to assessment criteria AC15.
- 8.6.89 As the Railplan model uses a simplified representation of the routes available for pedestrians, this means that the increases in pedestrian demand on assessed links is likely to be lower than those suggested by the model results.
- 8.6.90 As described in Section 8.7, TfL also proposes to implement a TDM strategy which is expected to further reduce peak pedestrian demand along the corridor. Other measures could include the use of crowd control techniques and the use of marshals to ensure the safe and smooth flow of people.
- 8.6.91 The introduction of these mitigating measures means that the impact of the blockade on pedestrian movements is not expected to be significant.

Cyclists

- 8.6.92 The introduction of the blockade could lead to some London Underground passengers cycling to locations near Bank Station. The need for cycle management measures will be considered as part of the TDM strategy for the blockade and the development of associated pedestrian management techniques.
- 8.6.93 The introduction of these mitigating measures means that the impact of the blockade on cycle movements is not expected to be significant.

Summary – Assessment Periods 2 and 3

- 8.6.94 Overall, it is considered that with the incorporated mitigation measures the blockade could be implemented within safe and generally acceptable conditions, albeit with some significant temporary adverse effects.
- 8.6.95 As described in Section 8.7, additional mitigation measures such as a TDM strategy are proposed as part of the BSCU. The introduction of these measures is expected to reduce the impacts below those identified in the analysis.

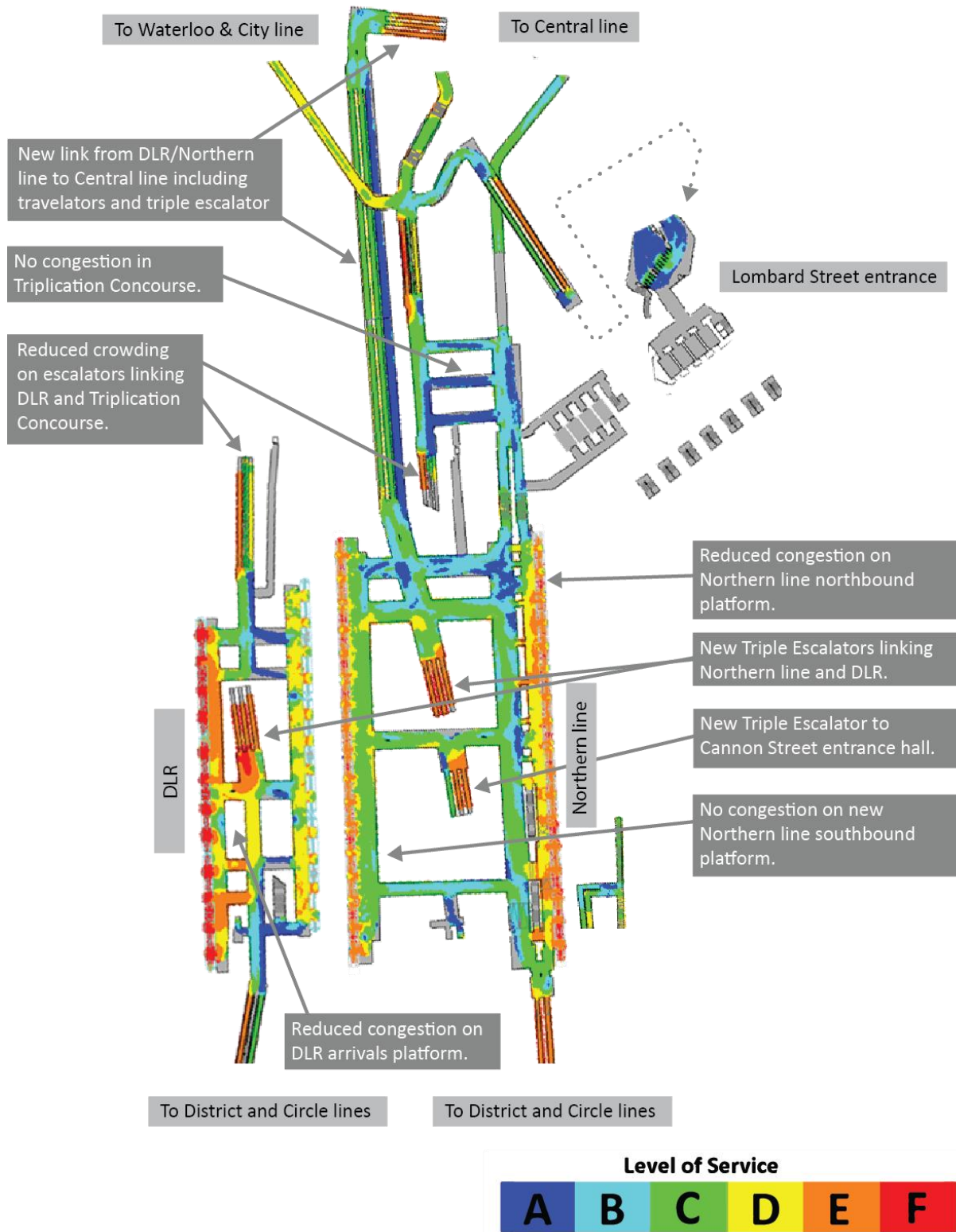
Permanent Effects – Assessment Periods 4 and 5

- 8.6.96 This section examines the permanent effects of the BSCU in 2026 once it has been completed and travel patterns have adapted to reflect the changes provided by the new infrastructure.
- 8.6.97 As stated previously, there is expected to be no changes in traffic levels, parking and loading, bus services or cycle facilities as a result of the operational BSCU. Therefore, no assessment of the effect of the scheme on these transport issues has been undertaken and the assessment examines crowding and pedestrian effects in and near the station.

Crowding Levels within Bank Station

- 8.6.98 The operation of the completed station has been modelled using Legion. A comparison between the output from the Legion modelling of the station for 2026 'Do Minimum' (Figure 8.9) and 2026 with the BSCU (Figure 8.27) shows several locations where there is a change in the LOS for passengers indicating improved amenity and safety.

Figure 8.27: Assessment Period 5, Legion Modelling, Station, 'Do Something' (2026) AM Peak



8.6.99 The following areas will experience improved LOS:

- Triplication Area;
- Northern Line northbound platform;
- Northern Line southbound platform;
- DLR arrivals platform; and
- Lombard Street entrance.

8.6.100 The increases in the LOS in these areas (which are generally greater than one level) are assessed to be significant beneficial effects when compared with assessment criteria AC18.

8.6.101 An assessment of the operation of the station with demand increased by 31 per cent has shown the BSCU would be able to operate effectively with this increased level of demand. The relevant output from Legion is shown in Figure 8.28.

Change of Journey Times within Bank Station

8.6.102 The introduction of the BSCU will simplify the layout of the station and reduce journey times for some interchanging movements.

8.6.103 The average time saving for interchanging passengers is predicted to be approximately three minutes in the morning peak period and half a minute in the evening peak period.

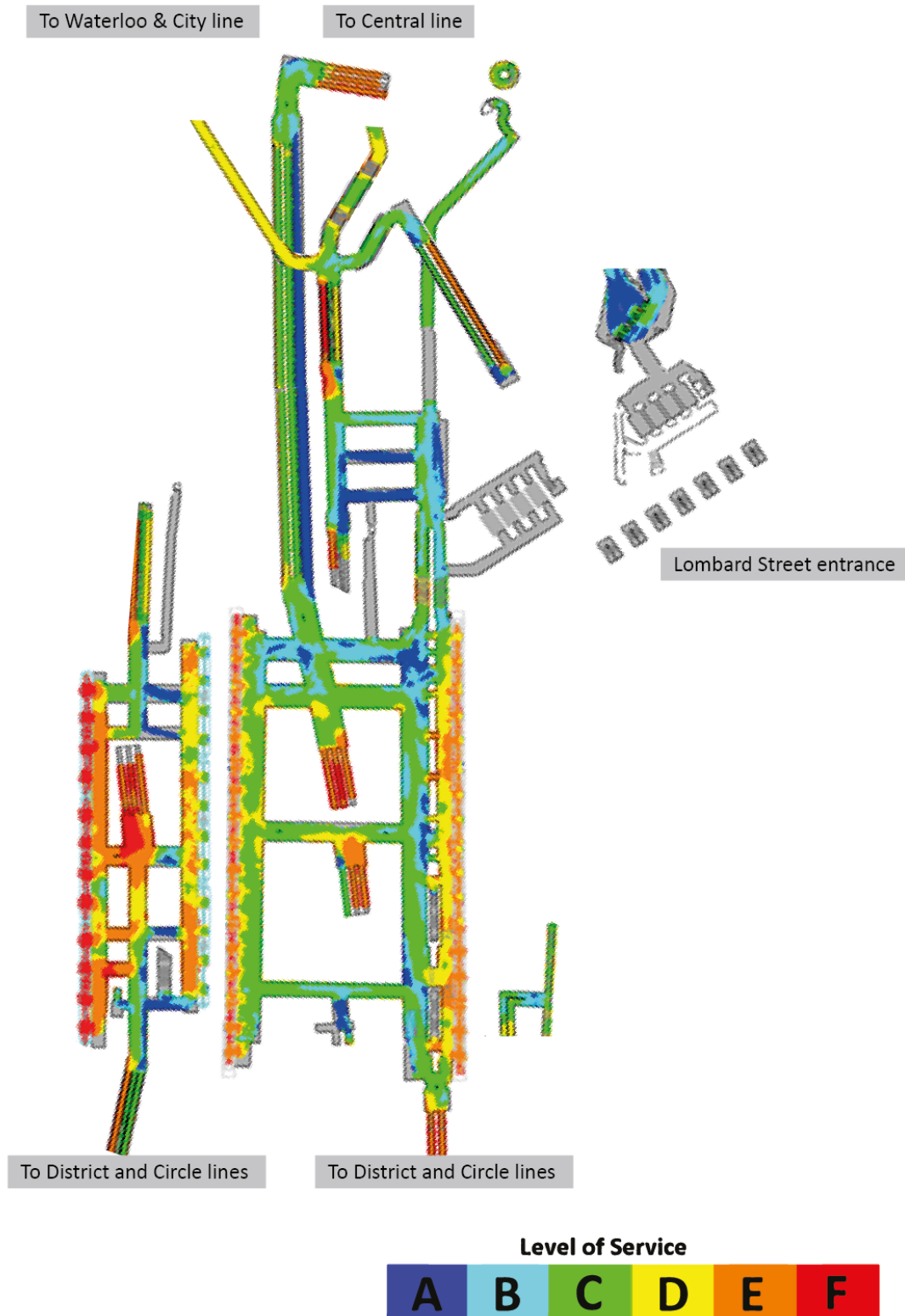
8.6.104 Passengers on three interchange routes are expected to experience a reduction in interchange time in excess of 20 per cent:

- DLR to the Northern Line in both the morning and evening peaks;
- Central Line to the DLR in the morning peak; and
- Central Line to Northern Line in the evening peak.

8.6.105 Passengers on these interchange routes will therefore receive a significant beneficial effect when compared to assessment criteria AC20.

8.6.106 All other changes to passenger interchange times are not significant.

Figure 8.28: Assessment Period 5, Legion Modelling, Station, 'Do Something + 31 per cent increase in demand AM Peak



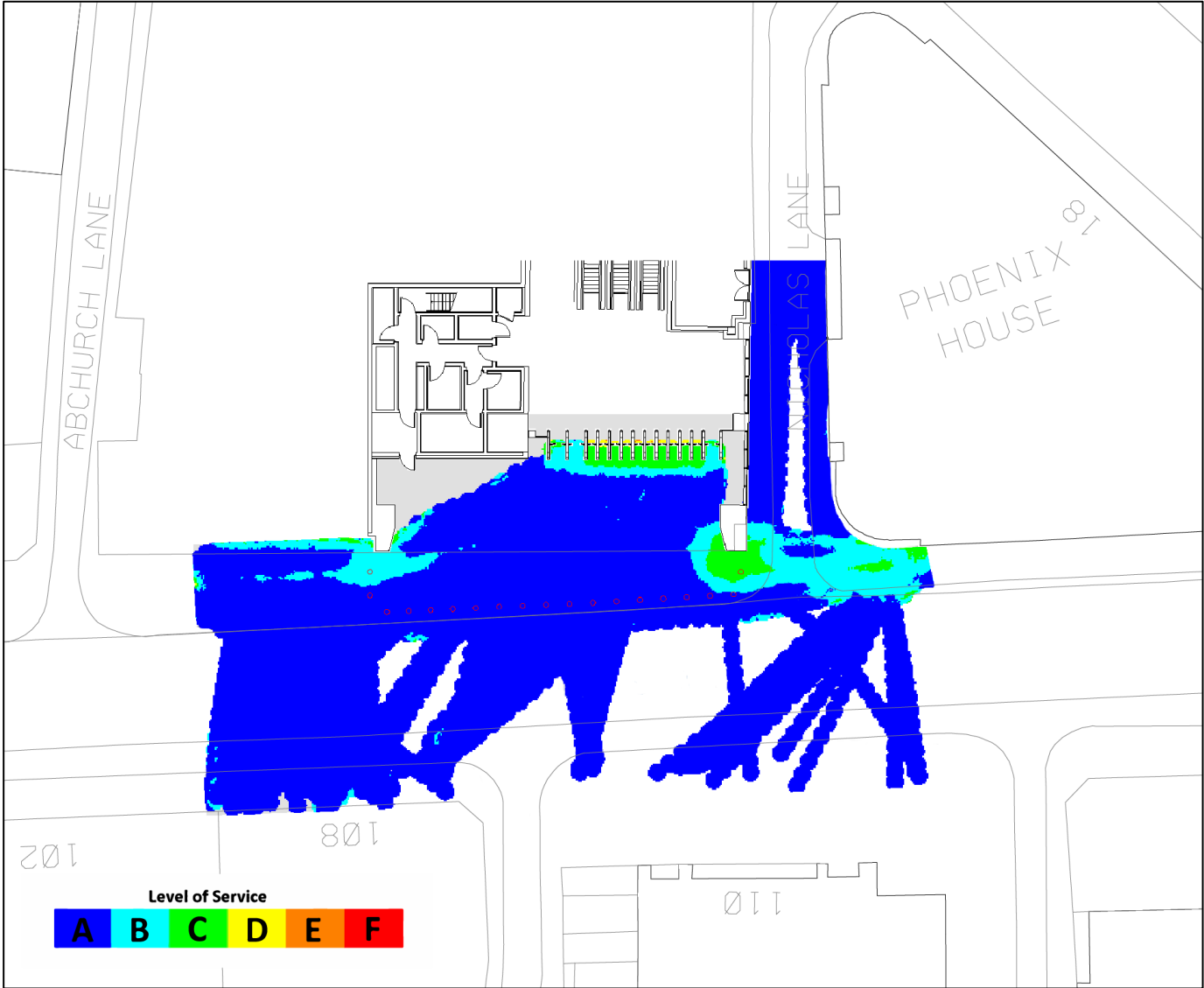
Passengers Entering, Exiting or Interchanging at the Station

- 8.6.107 Some passengers will use the new Station Entrance on Cannon Street because it is more convenient and will reduce their journey time between the station and their journey origin or destination. The introduction of this new entrance will help reduce demand and associated congestion at other entrances to the station.
- 8.6.108 The journey time saving associated with the new Station Entrance has been estimated from the Railplan model results for journeys to and from the station together with an analysis of the destinations or origins of these passengers. These results show that during the morning peak period around 20 per cent of passengers are expected to pass through the new Station Entrance. Passengers will use this new route because it reduces travel time between the platforms and the external origin or destination of their journey.
- 8.6.109 The journey time benefits experienced by these passengers are estimated to be a significant beneficial effect.
- 8.6.110 Passengers will also benefit from the improved quality of access, interchange and ambience provided by the new facilities. This is because the BSCU will improve access by creating two new lifts which will provide step-free access from the new Station Entrance to lower levels. The introduction of new escalator links and moving walkways will also ease movements through the station. Although there is no assessment criteria covering these issues they are considered to have significant beneficial effects for passengers.

Surrounding Pedestrian Amenity

- 8.6.111 The footway outside the new Station Entrance on Cannon Street has been modelled using Legion and the results are shown in Figure 8.29.

Figure 8.29: Assessment Period 5, Legion Modelling, Cannon Street Footway, 'Do Something' (2026) AM Peak



- 8.6.112 When these results are compared with the 'Do Minimum' scenario (see Figure 8.17) it can be seen that although the underlying capacity is placed under greater stress, it still does not reach levels that would be regarded as congested.
- 8.6.113 LOS 'C' is seen on the corner of the western Cannon Street/Nicholas Lane junction as station users, the majority of which are exiting the station during the AM peak, merge with the dominant east-west desire line. This effect occurs over a short distance and it is not considered significant.
- 8.6.114 The number of pedestrians crossing Cannon Street near Nicholas Lane is expected to increase following the introduction of the new Station Entrance. There are no nearby formal crossing facilities close to the desire line for pedestrians crossing Cannon Street and whilst there is no criteria to assess the significance of this change it is considered that more pedestrians crossing Cannon Street at this location would be a significant adverse effect.
- 8.6.115 The potential to improve facilities for pedestrians crossing Cannon Street at this location is considered in the following section.
- Summary – Assessment Periods 4 and 5
- 8.6.116 The introduction of the BSCU has been assessed to provide significant beneficial impacts on crowding levels and interchange movements within Bank Station.
- 8.6.117 The potential significant adverse impact of additional pedestrian movements to and from the new Station Entrance on Cannon Street is to be mitigated as described in the following section.

8.7 Mitigation

- 8.7.1 A range of measures is proposed as part of the BSCU to mitigate the potential impacts of the scheme. Mitigation measures that have been included as part of the assessment are presented in Section 8.5 Incorporated Mitigation.
- 8.7.2 Additional mitigation measures which could be implemented but which have not been directly assessed are described in following sections.

Mitigation during Utilities Work

- 8.7.3 The requirements for the utilities works will continue to be developed and refined as further information is obtained about the location and status of the utilities that require relocation or adjustment. As part of this process a Traffic Management Plan for each work site will be developed and refined to reduce impacts on traffic flows and pedestrian and cycle movements. Each plan will require the approval of the City of London Corporation and TfL.

Additional Bus Services during Blockade

- 8.7.4 TfL Buses has considered the need for additional bus capacity to be provided on the bus network during the total and partial blockades. They propose that a rail replacement bus service will be operated to mitigate the impacts of the blockade in the AM and PM peak periods. This service would operate in both directions between Stockwell and Old Street/Angel and during peak periods the service would run at 10 buses per hour during the total blockade and at 7.5 buses per hour during the partial blockade.
- 8.7.5 This service would run all week, between 05:00 to 24:00, with services outside the AM and PM peak periods operating with at least five buses per hour.
- 8.7.6 Elsewhere, it is also proposed to operate the following additional buses to mitigate the impacts of the blockade in the AM and PM peak periods:
- additional peak direction services on bus route 77, from Tooting to Waterloo in the AM, and in the opposite direction in the PM. A further four buses per hour would be required during the total blockade and two for the partial blockade; and
 - additional peak direction services on bus route 344, from Clapham Junction to Liverpool Street Station in the AM, and in the opposite direction in the PM. A further four buses per hour would be required during the total blockade and two for the partial blockade.

Travel Demand Management during Blockade

- 8.7.7 TfL will develop and implement a TDM strategy that will inform people about the likely impacts of the blockade. The TDM strategy will be targeted at existing users of both branches of the Northern Line.
- 8.7.8 As part of the TDM strategy, existing London Underground passengers affected by the blockade will be encouraged to reduce the number of trips they make or re-time them, and to consider the use of alternative routes and modes of travel to avoid affected London Underground lines and reduce the forecast impacts.
- 8.7.9 TfL has also had initial discussions with the Travel Demand Management Board (comprising Network Rail, TfL, the Department for Transport and the Association of Train Operating Companies) about increasing opportunities for

passengers to use rail services between Charing Cross and London Bridge during the blockade.

- 8.7.10 This arrangement would provide an alternative to using the Jubilee Line during the blockade and LUL will continue to develop this proposal to make best use of available capacity and provide additional options for passengers.

Management of Pedestrian Movements during Blockade

- 8.7.11 Substantial increases in additional on-street pedestrian movements have been forecast using Railplan on the Moorgate–Bank–London Bridge corridor. The introduction of TDM measures will reduce the increase below that forecast by Railplan and TfL will also introduce pedestrian and crowd management measures including the use of barriers, junction controls and crowd control procedures if required.

Management of Passengers at Stations during works at Bank Station and Blockade

- 8.7.12 Crowd management techniques would also be considered and developed on a station-by-station basis to accommodate and control the increased passenger flows in a safe way.

Pedestrian Crossing of Cannon Street following Completion of Scheme

- 8.7.13 Analysis of the scheme indicates that the new Station Entrance proposed on Cannon Street as part of the BSCU can be expected to result in large numbers of additional pedestrians crossing this street.
- 8.7.14 The provision of a safe, controlled crossing point would reduce the level of vulnerability of these pedestrians crossing Cannon Street so that the impact of this effect on vulnerable users would reduce and become not significant.
- 8.7.15 A new pedestrian crossing on Cannon Street to the west of the new Station Entrance will be provided in the event that no alternative arrangement emerges as a result of area-wide initiatives by the City of London Corporation and / or TfL. While a signal controlled crossing is assumed at this stage of the process, the type of crossing will be developed at a later stage in discussion with the City of London Corporation.

Construction Worker Travel Plan

- 8.7.16 As part of the CoCP for the scheme a Travel Plan will be developed for construction workers. This plan will provide details of public transport and cycle routes to the work sites to ensure that there is no travel by car, van or motorcycle to the work sites.

8.8 Residual Effects

8.8.1 The assessment of the BSCU has shown that it is expected to have a range of significant effects, beneficial and adverse, temporary and permanent.

8.8.2 A summary of the residual effects of the scheme is provided in Table 8.16.

Table 8.16: Summary of Residual Effects

Transport Receptor/ Significance criteria reference	Potential Impacts	Comment and Mitigation Measures	Significance of Residual Effect
Assessment Period 1 – Utility and Protective Works			
Highway users (AC1 & AC2)	Additional construction traffic due to works.	Up to six vehicles per hour are expected during construction. Typically there would be 1-2 per hour. Traffic management plan to include measures to manage impacts on highway users.	Not Significant
Highway users (AC1, AC2, AC3 & AC4)	Delays or diversions due to lane closures or other traffic management measures.	Only one lane of a strategic road to be closed at a time during daytime. Closure of two-lanes of a road would only occur at night-time. Traffic management plan to include measures to manage impacts on highway users.	Not Significant
Public Transport Delay (AC6 & AC7)	Increases in bus journey times or bus diversions.	Typically there would be 1-2 additional vehicles per hour. Traffic management plan to include measures to manage impacts on buses.	Not Significant
Parking, Loading and Servicing (AC11)	Reduced access to buildings or businesses adjacent to work sites.	Servicing arrangements to be implemented to maintain ability to service.	Not Significant
Pedestrians and Cyclists – Impact of Traffic (AC12)	Additional construction traffic due to works and changes in traffic flows due to lane closures or other traffic management measures.	Typically there would be 1-2 additional vehicles per hour. Traffic management plan to include measures to manage impacts on pedestrians and cyclists including diversion routes and appropriate signing.	Not Significant
Pedestrians – Diversions and Comfort (AC13 & AC15)	Pedestrians may be required to divert around work sites.	At least one footway around each work site is to be maintained meaning diversion routes are short.	Not Significant

Transport Receptor/ Significance criteria reference	Potential Impacts	Comment and Mitigation Measures	Significance of Residual Effect
Cyclists – Diversions (AC14)	Cyclists may be required to divert around work sites when two lanes of a road are closed.	Closure of two-lanes only occurs at night-time when cycle flows are low.	Not Significant
Collisions and Safety (AC16)	Additional construction traffic due to works and changes in traffic flows due to lane closures or other traffic management measures.	Traffic Management Plan to include a range of measures to mitigate potential impacts of construction traffic.	Not Significant
Assessment Period 2 –Peak Period of Construction			
Highway users (AC1 & AC2)	Additional traffic due to diversions caused by the Arthur Street Work Site and HGVs generated by construction activities will increase the amount of traffic in the Bank area.	Traffic Management Plan to be implemented to manage and mitigate impacts.	Not Significant
Highway users (AC3)	Diversions caused by the Arthur Street Work Site will add additional time and distance to journeys	Traffic Management Plan to be implemented to manage and mitigate impacts.	Not Significant
Public Transport users (AC6)	344 bus service to be diverted	Additional journey time is low (less than one minute).	Not Significant
Public Transport users (AC6)	Diversion of the 344 bus service may reduce access for some users	Dense bus network provided in area and many other bus options are available.	Not Significant

Transport Receptor/ Significance criteria reference	Potential Impacts	Comment and Mitigation Measures	Significance of Residual Effect
Parking, loading and servicing (AC10 & AC11)	<p>Closure of Arthur Street, Abchurch Lane and Nicholas Lane will change access arrangements to nearby buildings and businesses.</p> <p>Nine motorcycle parking spaces to be relocated.</p>	<p>For Arthur Street, buildings will continue to be serviced through their existing service bays. Access will be provided through the work site and delivery vehicles will use a site delivery management system.</p> <p>For Abchurch Lane servicing will continue to be possible from other nearby streets or via the work site in exceptional circumstance.</p> <p>For Nicholas Lane servicing will continue to be possible, potentially with the assistance of traffic marshals or via the work site in exceptional circumstances.</p> <p>Motorcycle parking moved under 100m.</p>	Not Significant
Cyclists (AC12)	Increase in traffic due to diversions and construction vehicles.	Traffic Management Plan to be implemented to manage and mitigate impacts. Contractors will be required to be members of FORS and implement safety measures for construction vehicles and drivers.	Not Significant
Pedestrians (AC12)	Increase in traffic due to diversions and construction vehicles.	Traffic Management Plan to be implemented to manage and mitigate impacts. Contractors will be required to be members of FORS and implement safety measures for construction vehicles and drivers.	Not Significant
Pedestrians (AC13)	<p>Pedestrian access will be maintained for buildings on Arthur Street. Some pedestrians may divert to routes via Martin Lane or Laurence Pountney Lane.</p> <p>When Abchurch Lane or Nicholas Lane is closed pedestrians will divert to other routes.</p>	Diversions will be less than 250m.	Not Significant
Cyclists (AC14)	Cyclists will need to divert around the Arthur Street Work Site.	Diversion will be less than 1.5km.	Not Significant

Transport Receptor/ Significance criteria reference	Potential Impacts	Comment and Mitigation Measures	Significance of Residual Effect
Collisions and Safety (AC16)	Additional construction traffic due to works and changes in traffic flows due to lane closures or other traffic management measures.	Traffic Management Plan to include a range of measures to mitigate potential impacts of construction traffic.	Not Significant
Users of Bank Station (AC17)	Construction works (closures, narrowing of platforms and corridors) will affect pedestrian circulation within the station.	No new non-compliant areas will occur. Station management procedures will ensure safe movement of passengers through station.	Not Significant
Assessment Period 3 – Northern Line Blockade			
Public Transport users (AC5)	Journey times will increase due to the closure of the City branch of the Northern Line.	Impacts to be mitigated through enhanced service frequency on Charing Cross branch of the Northern Line. Replacement bus service and additional buses on existing services to be introduced. TDM programme to be implemented.	Significant Adverse (Temporary)
Public Transport users (AC5)	Change in passenger movements could increase crowding at other stations.	Operational strategies developed with station managers to address crowding.	Not Significant
Public Transport users (AC8)	Crowding will increase on the network as other routes are used to access stations served by the City branch of the Northern Line.	Sections of Northern Line (Charing Cross branch), Waterloo & City Line and parts of the London Overground Network experience additional crowding. Impacts to be mitigated through enhanced service frequency on Charing Cross branch of the Northern Line. Replacement bus service and additional buses on existing services to be introduced. TDM programme to be implemented.	Significant Adverse (Temporary)
Bus Passengers (AC9)	Increased use of bus services.	Replacement bus service and additional buses on existing services to be introduced. TDM programme to be implemented.	Not Significant
Pedestrians (AC13 & AC15)	Increase in pedestrian movements on London Bridge-Bank-Moorgate corridor.	Pedestrian management system. TDM programme to be implemented.	Not Significant

Transport Receptor/ Significance criteria reference	Potential Impacts	Comment and Mitigation Measures	Significance of Residual Effect
Cyclists (AC14)	Increase in cycling to and from City of London.	Potential for increase in cycling to be considered as part of TDM programme and pedestrian management system.	Not Significant
Assessment Period 4 – Operational Impacts within Bank Station following Completion of Project (2026)			
Bank Station users (AC18)	Reduction in crowding levels at Bank Station.	Benefit of the scheme.	Significant Beneficial (Permanent)
Bank Station users (AC19)	Introduction of new station entrance and new step-free facilities improves quality of access and ambience of station.	Benefit of the scheme.	Significant Beneficial (Permanent)
Bank Station users (AC20)	Reduction in interchange journey times of up to three minutes in the AM peak.	Benefit of the scheme.	Significant Beneficial (Permanent)
Pedestrians (AC21)	Additional pedestrian flows across Cannon Street.	Requirement for new crossing facility to be considered as part of proposals by City of London Corporation to improve pedestrian conditions in nearby area.	Not Significant
Assessment Period 5 - Operational Impacts within Bank Station following completion of project – Additional Demand			
Bank Station users (AC18)	Reduction in crowding levels at Bank Station.	Benefit of the scheme.	Significant Beneficial (Permanent)
Bank Station users (AC19)	Introduction of new Station Entrance and new step-free facilities improves quality of access and ambience of station.	Benefit of the scheme.	Significant Beneficial (Permanent)
Bank Station users (AC20)	Reduction in interchange journey times in the AM peak.	Benefit of the scheme.	Significant Beneficial (Permanent)

8.8.3 This analysis of residual effects shows that there are significant temporary adverse effects on public transport passengers during the blockade. There are significant permanent beneficial effects for users of Bank Station once the BSCU is completed.

8.9 Inter-relationships and Cumulative Effects

- 8.9.1 This section considers the inter-relationships and interaction between the various impacts of the BSCU on a common receptor, such as passengers and road users, and also the cumulative impact of the BSCU with other proposed developments or transport schemes in the nearby area.

Inter-relationship between different Elements of BSCU

- 8.9.2 The BSCU will provide several benefits for passengers: reduced crowding; easier and quicker interchange between lines; and step-free access to more parts of the station. These separate benefits are inter-related as they can all apply to the same passengers and hence reinforce each other.

Cumulative Effects – Over Site Development

- 8.9.3 The assessment of the completed BSCU is based on TfL passenger forecasts for 2026. These forecasts have been prepared using baseline information associated with the current occupants of the Whole Block Site i.e. the site where the Over Site Development (OSD) will be located.

- 8.9.4 The OSD has a floor area greater than the combined floor areas of the buildings that are to be replaced. This means that the OSD will generate additional trips compared to the existing uses at the site. The number of additional pedestrians associated with the increase in area is though small and is therefore not considered to be a significant cumulative effect.

Cumulative Effects - with other Transport Schemes

- 8.9.5 Proposals for a new east-west Cycle Superhighway are currently being prepared by TfL. The route, if it is implemented, is expected to pass through the Arthur Street/Upper Thames Street junction and the BSCU design team will work with the relevant designers of the cycle route to ensure the schemes are delivered in a complementary way.

Cumulative Effects – Other Development Sites

- 8.9.6 Planning applications for nearby schemes have been reviewed to understand potential cumulative effects during the construction of the BSCU.

- 8.9.7 The scheme at 33 King William Street (11/00933/FULMAJ) was the only one identified to be both near the site and likely to be under construction at the same as the BSCU. The planning application included a detailed CLP and this information has been considered to assess the combined impact of this scheme and the BSCU. This CLP describes a proposed construction programme covering six months for demolition and 21 months for construction. Completion of the building is expected during the second half of 2016. The CLP includes forecasts for a maximum of three construction vehicles per hour travelling to the site.
- 8.9.8 The BSCU construction works using Arthur Street are expected to overlap with the fit-out stage of the works at 33 King William Street. During this period of overlap the total number of vehicle movements from both the BSCU and the 33 King William Street scheme is approximately six to seven vehicle movements per hour and this is similar to the maximum number of vehicle movements assessed for the main BSCU.
- 8.9.9 The cumulative impact of the two schemes in 2016 is therefore expected to be similar to the overall impact of the BSCU during the period of peak activity examined in Assessment Period 2, which is not assessed to be a significant adverse effect.

Cumulative Effects – After Completion of the Scheme

- 8.9.10 The passenger demand forecasts for 2026 make allowance for growth in travel to and from the City of London and an additional assessment (Assessment Period 5) has been made assuming a further 31 per cent growth in passenger demand. This assessment shows that the station will be able to accommodate this potential growth in passenger demand.
- 8.9.11 The scope for additional impacts of the scheme once it has been completed is therefore expected to be low due to the assessment of this scenario which considers increases in passenger usage of the station.

8.10 Assumptions and Limitations

- 8.10.1 This section provides a summary of issues associated with the assumptions required to prepare the assessment.

Reassignment of Traffic

- 8.10.2 The assessment of changes to traffic flows has been based on the TA, the outline CLP, the assessment of the traffic impact of the utilities works and TfL's ONE traffic model.

Traffic Forecasting

- 8.10.3 Traffic growth is assumed to be zero per cent per year. This is based on an analysis of historic traffic data which shows reducing traffic levels in recent years and hence is likely to be a conservative assumption.

Modelling of Passenger Trips

- 8.10.4 The modelling of passenger trips during the blockade has been based on Railplan which incorporates changes to the transport network such as upgrades to the Northern Line and Crossrail. Legion has been used to model passenger movements within and near Bank Station.

BSCU Work Sites

- 8.10.5 The assessment has taken into account the proposals for temporary road closures associated with the demolition of the existing buildings and the construction of the BSCU as set out in the outline CLP.

Use of the River Thames during Construction

- 8.10.6 This assessment assumes that the River Thames is not used as a means to transport construction materials to or from the work sites.
- 8.10.7 This is because the level of excavated material produced by the scheme is relatively low and insufficient for the economies-of-scale associated with the use of large barges. In addition, the constrained nature of the work sites means that there is no space to store excavated material on-site and an additional area would be required close to the river.
- 8.10.8 Swan Lane would provide one location for this activity but the deposition of excavated material in this area would have an impact on nearby buildings and businesses. Further, excavated material would have to be loaded onto lorries and then transported via the road network to get from each work site to Swan Lane even though it is a short distance from the work sites. This need for double-handling of the excavated material increases costs.
- 8.10.9 The use of Walbrook Wharf is not considered possible as this is a waste transfer station and its vehicle entrance and servicing area has restricted headroom which makes it unsuitable for use by construction vehicles unloading material using a tipping mechanism.

Use of London Underground Network for Transport of Construction Materials

- 8.10.10 The London Underground Network is not considered suitable for the transport of construction materials because of the impact it would have on normal train operations.

8.11 Conclusions

- 8.11.1 Bank Station is located in the centre of London and it is currently used by approximately 100,000 people during the morning and evening peak periods. The station provides access to five London Underground lines and DLR services and a large proportion of passengers interchange between different lines. The station has been developed in a piecemeal fashion over many decades and this means that connections between different parts of the station are complex and wayfinding is difficult. The evolution of the station in this way means that it was never designed to accommodate the number of passengers currently using it.
- 8.11.2 The existing layout of the station coupled with its high usage means congestion and crowding in the station is a regular occurrence. Passenger demand is expected to increase and without changes, crowding problems will become an ever greater issue. When crowded, there will be a need for increasingly stringent management interventions to ensure the safety of passengers such as closure of entrances, passengers required to interchange at surface level and the potential closure of the entire station during peak periods.
- 8.11.3 To address existing problems and those forecast in the future, LUL proposes to make substantial changes to the station as part of the BSCU. This project will provide a new southbound running tunnel and platform for the Northern Line enabling the current southbound platform to be widened. Changes will be made to the internal layout of the station to ease passenger movements and reduce crowding and a new Station Entrance will be provided on Cannon Street.
- 8.11.4 The proposed improvements are identified in the *MTS* and they are supported by policy at a national, regional and local level.
- 8.11.5 The impact of the BSCU has been assessed during its construction and when it is operational. The assessment has examined transport conditions with the scheme against likely transport conditions without the scheme in place.
- 8.11.6 During the utilities and protective works required before the main construction works, a series of road closures and traffic management measures will need to be implemented. The Traffic Management Plan for these works will aim to minimise impacts through weekend working and only closing one lane of a strategic road at a time. The resulting impact of these works with these measures in place is considered to be not significant.
- 8.11.7 During construction, Arthur Street is to be closed for a period of approximately five years. The traffic impacts related to the diversion of traffic associated with the closure are of a low magnitude and are considered to be not significant.

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- 8.11.8 As part of the construction process, construction vehicles (typically HGVs) will travel to the Arthur Street Work Site. Approximately one-third to a half of these vehicles will then travel to the nearby work site adjacent to King William Street (the 'Whole Block Site'). The peak of these movements occurs in 2017 when up to six HGVs per hour are expected to travel to and then from the work sites. The traffic effect of this additional construction traffic has been assessed to be not significant.
- 8.11.9 The two work sites for the scheme will temporarily alter access to some nearby buildings and businesses. Servicing arrangements will be made to enable all nearby buildings and businesses to continue to function without significant adverse effects.
- 8.11.10 The Traffic Management Plan to be prepared in accordance with the CoCP for the scheme will include a range of measures to reduce potential impacts for vulnerable road users e.g. cyclists and pedestrians. These include a requirement for the contractor to be a member of FORS, lorries to be fitted with safety measures, drivers to receive additional training and for vehicles only to use specified routes.
- 8.11.11 A further part of the construction process requires a total and partial blockade of the Northern Line. The total blockade will last for six weeks and during this period no trains will run on the Bank branch of the Northern Line between Kennington and Moorgate. During this period, additional trains will be operated on the Charing Cross branch of the Northern Line, a rail replacement bus service will operate between Stockwell and Old Street/Angel and other bus routes will have increased frequencies. TfL will also implement a TDM strategy to advise people of the blockade and encourage them to use alternative routes, to retime their journey or to not make their journey at all. The blockade is expected to lead to additional crowding on some sections of the Charing Cross branch of the Northern Line and the Waterloo & City line. This is a significant adverse effect but it is temporary and will only last for six weeks.
- 8.11.12 During the partial blockade, only northbound services at a reduced frequency will operate on the Bank branch of the Northern Line and trains will not stop at Bank Station. Similar mitigation measures will be put in place as for the total blockade and the impact although lower, will still be significant adverse. These impacts will be temporary and will last for 11 weeks.
- 8.11.13 The completion of the scheme will lead to the following significant permanent transport benefits:
- crowding on Northern Line platforms reduced;
 - crowding in passageways and circulation areas reduced;

- interchanging passengers have journey times reduced and wayfinding made easier; and
 - step-free access provided to the Northern Line.
- 8.11.14 A sensitivity test has shown that the scheme proposals provide sufficient additional capacity to accommodate growth of 31 per cent in passenger demand.
- 8.11.15 The introduction of the new Station Entrance on Cannon Street will increase pedestrian movements in this area and new arrangements are to be developed by TfL in conjunction with the City of London Corporation to improve pedestrian facilities in this location and the nearby area.
- 8.11.16 In conclusion, the BSCU provides significant permanent benefits by reducing crowding, improving the ease of interchanging and providing step-free access to more parts of the station. There are significant temporary adverse traffic effects associated with the utility works, the closure of Arthur Street, the traffic generated by the construction of the scheme and the significant temporary adverse effects on public transport passengers due to the total and partial blockade of the Northern Line.

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