

4 The Proposed Development

4.1 Introduction

4.1.1 This chapter presents a description of the Bank Station Capacity Upgrade (BSCU) which includes the following main elements:

- a new Station Entrance on Cannon Street with triple escalators down to the Northern Line;
- a new Northern Line southbound running and platform tunnel with the existing southbound platform converted into a passenger concourse with new cross passage links;
- a tunnelled passageway between the Northern and Central Lines, including a pair of moving walkways and a triple escalator;
- new triple escalators connecting the new Northern Line concourse and the Docklands Light Railway (DLR);
- above and below ground construction works will be undertaken from two main work sites;
- protective works and monitoring of buildings potentially affected by construction; and
- works to survey, divert and protect utility providers' assets.

4.1.2 Accompanying this chapter in the ES Figures Volume are Figures 4.1 to 4.8 which illustrate the BSCU Project. The proposed development is shown in 3 dimensions in Figures 4.1 and 4.2. Figures 4.3 to 4.8 show the proposed changes at each level and the new Station Entrance. In addition, Figures 4.9 to 4.14 illustrate the location and layout of the main work sites and traffic routes.

4.2 Overview of the BSCU Project

4.2.1 The BSCU involves a major upgrade of the Bank Monument Station Complex to provide greatly improved passenger access, circulation and interchange. It will also improve emergency fire and evacuation protection measures. It includes provision of a new passenger entrance with lifts and escalator connections; a new Northern Line passenger concourse using the existing southbound platform tunnel; a new Northern Line southbound train tunnel and platform tunnel; and new internal passenger connections between the Northern Line, the Docklands Light Railway (DLR) and the Central Line.

4.2.2 The new Station Entrance will open on to Cannon Street at the junction with Nicholas Lane. An entrance hall will provide circulation space, as well as accommodating staff facilities, plant rooms and associated retail space. New passenger lifts will link the entrance hall directly with the Northern Line and

DLR providing step free access. Escalators will also connect the entrance hall with the Northern Line

- 4.2.3 The existing southbound platform for the Northern Line will be converted into a new passenger concourse. A new southbound running tunnel and platform tunnel will be located to the west of the existing platform. New cross passages will connect the Northern Line concourses and platforms. New walkways and escalators will better connect the Northern Line, the DLR and the Central Line. In particular, a tunnelled passageway fitted with moving walkways and new escalators will greatly improve interchange between the Northern Line and the Central Line.
- 4.2.4 Works to divert and protect utilities and to protect listed and other buildings from ground settlement, will also be undertaken, where monitoring and/or damage analysis indicates this is required.
- 4.2.5 The BSCU will be constructed from two main work sites (see Figure 4.9). The first work site will be at the site bounded by King William Street, Nicholas Lane, Cannon Street and Abchurch Lane (the Whole Block Site – note that this was referred to as the Cannon Street Work Site in the June 2014 consultation material) (see Figure 4.10). The Whole Block Site will be used to construct the escalators, cross passages and new Northern Line passenger concourse. A second smaller work site will be located on Arthur Street (See Figure 4.11). A shaft will be sunk at Arthur Street and used to excavate the new Northern Line southbound running tunnel.
- 4.2.6 Approximately 80 per cent of the concrete required for construction will be prepared at the main work sites. The remaining 20 per cent of the concrete will be delivered to the sites. The disused King William Street underground station located beneath the junction of King William Street and Arthur Street will be used for logistics purposes during construction.
- 4.2.7 The BSCU will be constructed and operated within the limits of deviation applied for as part of the Transport and Works Act Order (TWAO) application. The TWAO application is accompanied by a request for a Planning Direction for deemed planning permission for all works that may be built for the BSCU Order. This is accompanied by proposed planning conditions which allows for some details of the BSCU such as materials and finishes of the new Station Entrance to be approved by the City of London Corporation when discharging these conditions.

4.3 BSCU Operational Infrastructure

A new Station Entrance

- 4.3.1 A new Station Entrance Hall will be constructed within the footprint of the Whole Block Site. It will open on to Cannon Street at the junction with Nicholas Lane. A canopy extending over the Cannon Street pavement will provide weather protection and add to the street presence of the station in long views. Bollards at the pavement boundary will be provided for security and to protect passengers at the entrance. Nicholas Lane will feature a level surface for pedestrians and vehicles. The new Station Entrance Hall will include staff facilities, plant rooms and associated retail space. The Nicholas Lane façade will include louvres to ventilate the plant rooms.
- 4.3.2 In response to pedestrian and vehicle studies, 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 Transport for London. Whilst a light controlled crossing is included at this stage in the process, the type of crossing will be developed at a later stage in discussion with the City of London Corporation.
- 4.3.3 From the new Station Entrance Hall, two banks of triple escalators will take passengers to the Northern Line concourse via an intermediate level. Two 17-person passenger lifts will be provided to access the Northern Line, with one also continuing down to the DLR level. An emergency intervention/escape staircase will be provided within the lift shaft. The existing passenger lift linking King William Street with the DLR will be upgraded to allow additional connection with the Northern Line. A walkway will be provided from this lift to the Northern Line concourse and platforms.

Northern Line Improvements

- 4.3.4 To improve circulation for Northern Line passengers, the existing southbound platform will be converted into a new concourse. This will require a new running and platform tunnel to accommodate the southbound Northern Line, which will be constructed west of the existing platform. The new tunnel will be approximately 700m long. It will diverge from the existing southbound track beneath a point approximately 16m north of the junction of Gresham Street with Lothbury and it will link into the existing Northern Line tunnel south of Lower Thames Street.
- 4.3.5 Four new cross-passages will be constructed which will link the platforms and concourse, with three also connecting with new interchange routes. The northernmost cross passage (CP1) will link with a new tunnelled passageway that will provide improved passenger interchange between the Northern and

Central Lines via a pair of moving walkways (see below). Cross-passage two (CP2) will connect to a bank of triple escalators that will allow improved interchange between the Northern Line and DLR. Cross-passage three (CP3) will provide access to the escalators up to the new Station Entrance Hall. The southernmost cross passage (CP4) will link to the north and southbound platforms.

- 4.3.6 Three new adits (openings) will be created linking the new passenger concourse and the existing northbound platform.

Central Line Improvements

- 4.3.7 A new tunnelled passageway (Central Line Link) from the Northern Line concourse with its moving walkways approximately 95m long, will provide access to a bank of triple escalators which will take passengers up to the Central Line platforms via an existing cross passage which will be reconstructed and enlarged. A second cross passage at the far (western) end will provide improved access between the eastbound and westbound platforms.

- 4.3.8 Supporting infrastructure will include a cable tunnel between the Central Line Link and the existing Bank Station ticket hall, and new electrical and communications rooms for the operation of the station.

Docklands Light Railway Improvements

- 4.3.9 A new set of triple escalators connecting the new Northern Line concourse and the DLR will be provided; to facilitate their installation a number of existing plant rooms will be relocated. Two new cross passages will link the DLR arrival and departure platforms with the existing DLR passenger concourse, and a third will link the DLR arrival platform to the existing passenger concourse.

4.4 BSCU Construction

- 4.4.1 Construction will commence in 2016 with the diversion of utilities within Arthur Street prior to construction of the Arthur Street Shaft. The tunnelling and below ground excavation works will start towards the end of 2016 and will take approximately four years (completing late 2020) with peak tunnelling activity occurring in 2017. Construction of the new Station Entrance Hall is programmed for 2021.
- 4.4.2 Permission for an Over Site Development (OSD) located over and around the new station infrastructure was sought via an application to the City of London Corporation under the Town and Country Planning Act 1990. Permission was granted on 27 June 2014.
- 4.4.3 Construction of an OSD is expected to occur between 2021/22 – 2023/25 (commencement within one year of completion of the BSCU; however, assessments have also considered a potential overlap in works of up to one

year). Further details of how this has been considered in the assessment are provided within Chapter 17: Inter-relationships and Cumulative Effects.

The Whole Block Site

- 4.4.4 The Whole Block Site is currently comprised of six buildings. The majority of these buildings will be demolished during the period Quarter 2 2016 – Quarter 1 2017. Full demolition will include: 135-141 Cannon Street, 10 King William Street, 12 Nicholas Lane, 14 Nicholas Lane and 143-149 Cannon Street. This will enable the construction of the new Station Entrance Hall and escalators on the eastern part of the site. The rear extension of 20 Abchurch Lane will be demolished and the rear of the main building made good. The main building and associated façade will be retained and used for project offices and site welfare facilities during construction works. Demolition of the remainder of 20 Abchurch Lane, including dismantling of its façade, will be undertaken as part of OSD construction works.
- 4.4.5 All demolition and construction activities will be undertaken in accordance with a Code of Construction Practice (CoCP) to be approved by the City of London Corporation. A draft CoCP is provided at Appendix A4.1.
- 4.4.6 The indicative layout for the Whole Block Site following demolition is shown in Figure 4.10. The eastern section of the Whole Block Site will be used to carry out the below ground construction works and excavate the new Station Entrance Hall. It will be excavated to basement level to create a basement structure with piled walls. A tower crane will be installed for use throughout construction.
- 4.4.7 The remainder of the Whole Block Site will be used for the storage of materials, plant and equipment. This will include a concrete batching plant. A shaft may be constructed on the northern part of the site to enable compensation grouting to mitigate potential settlement impacts on structures, where monitoring and/or damage analysis indicates this is required.
- 4.4.8 During construction, access to the Whole Block Site will be provided from Cannon Street, with an entrance in the southwest corner of the site and egress from the southeast corner (see Figure 4.10). Site access will be protected with secure gates and security staff will be present. Hoardings of 3.6m will be provided around the site boundary. They will be externally lit and painted and maintained in good condition at all times. Access to the Whole Block Site during demolition will also be provided from Nicholas Lane. Tunnel scaffold gantries will be erected on King William Street and Cannon Street to protect pedestrians.
- 4.4.9 The northern section of Nicholas Lane will be closed during demolition, so that demolition waste can be loaded into vehicles on Nicholas Lane. Some short term intermittent closures of Nicholas Lane during normal working hours, may

also be needed during the piling phase of construction. During demolition the site hoarding will also extend to the curb of the eastern pavement along Abchurch Lane; it will extend further across the highway during the roof demolition. Closure of the road to traffic is expected to be required on approximately four occasions, each for up to 48 hours. Pedestrian access will be maintained during closure. The closure of Nicholas Lane and Abchurch Lane will not occur concurrently.

Arthur Street Work Site

- 4.4.10 The new Northern Line running and platform tunnel will be excavated from the Arthur Street Work Site (see Figure 4.11). Construction of the tunnels will be carried out at the same time as the construction of the new Station Entrance Hall and main works at the Whole Block Site. During construction of the new running tunnel, works to remove, modify, reconstruct, alter, replace or interfere with piles, caissons, foundations and other subterranean structures of existing buildings will be carried out where required at locations where the new tunnels intercept these.
- 4.4.11 Works will include below ground access tunnels and shafts linking the new and existing tunnels. These will enable construction to take place and the station to continue to operate. Works within the new running tunnel will include the provision of new permanent way, traction power, signalling, lighting, and re-provision or diversion of services and communications assets.
- 4.4.12 The work site will occupy the road between Upper Thames Street and King William Street. It will require closure of Arthur Street for the duration of the construction works. Hoarding 3.6m high will be provided around the site and a tunnel scaffold gantry will be erected on King William Street in the vicinity of Arthur Street to protect pedestrians. Pedestrian access to buildings and vehicular access to service bays located on Arthur Street will be maintained.
- 4.4.13 The construction shaft will be located at the northern end of Arthur Street. Sheet piles will be installed around the perimeter of the shaft and it will be excavated beneath these using a sprayed concrete lining method to a depth of approximately 33m. Construction traffic will enter Arthur Street from Upper Thames Street and exit onto King William Street. Arthur Street will also be used as a regulating area for construction vehicles needing to access the Whole Block Site, 130m to the north. Vehicle movements will be carefully managed to ensure the safety of pedestrian and other road users when vehicles are entering and leaving the site.
- 4.4.14 Plant required to support the tunnelling operations, including a gantry crane and concrete batching plant, will be located at the Arthur Street Work Site. There will be a welfare and office block at the northern end of the site. It is estimated that approximately 70 per cent of the excavated material will be

- removed through the Arthur Street Work Site. Most excavation is likely to occur during Quarter 4 2017, which will involve a peak of approximately 300 one way Heavy Goods Vehicle (HGV) movements per week.
- 4.4.15 The closure of Arthur Street will require the removal of the 18 tonne weight restriction at the Monument Junction. To ensure that the junction has sufficient capacity to withstand full normal highway loading, works to strengthen infrastructure beneath this junction may be required, which will enable the weight restriction for the road to be lifted.
- 4.4.16 Works could include internal strengthening of two British Telecom chambers beneath the junction and/or the adjacent subway; or a new deck over the chambers using the subway walls as supports. For the construction of a new deck, reinforced concrete slabs, approximately 250mm deep, would be used and these would be supported on all four sides. Any utilities present may also require diversion. The new slabs would be designed to take the full vertical traffic loading and the pavement level would need to be raised by approximately 200mm over the chambers. The existing manholes and manhole supports would also need to be demolished and new ones accommodated in the new slabs.
- 4.4.17 It is anticipated that these works would be completed over two or three weekends or approximately 15 consecutive nights (8pm-6am). This would require the temporary closure of the northbound carriageway from London Bridge. Road plates will cover any excavations during works.
- 4.4.18 In addition, the closure of Arthur Street will require alternative access to the City of London for emergency service vehicles. This alternative access will be from Upper Thames Street to Cannon Street via Suffolk Lane, Golphir Lane and Bush Lane. The access on to Suffolk Lane from Upper Thames Street will be restricted to emergency service vehicles only. Works to provide this alternative access will require the removal of the bollards along Suffolk Lane/Upper Thames Street which form part of the City of London's Traffic and Environmental Zone. In addition, Closed Circuit Television (CCTV) equipment will be installed along Upper Thames Street and Suffolk Lane for enforcement purposes. The existing motorcycle parking at the end of Suffolk Lane will also be relocated to Laurence Pountney Hill (See Figure 4.12).
- 4.4.19 Further details regarding the construction logistics relating to the BSCU Work Sites are set out in the Outline Construction Logistics Plan (CLP) within Appendix A8.2.

Tunnelling

- 4.4.20 The construction of the new tunnel, cross passages, openings, walkways and escalator barrels will be carried out primarily using sprayed concrete lining method. This involves excavating the ground (at a rate of between one metre

and three metres per day) and spraying the excavated surfaces with steel fibre reinforced concrete.

Working hours

4.4.21 Standard working hours for the construction of the BSCU will be:

- 08:00 - 18:00 hours on weekdays (excl. public holidays); and
- 08:00 - 13:00 hours on Saturdays.

4.4.22 Mobilisation and demobilisation activities may be undertaken respectively for a period of up to one hour before and one hour after the standard working hours.

4.4.23 Certain elements of the construction works will need to be undertaken 24 hours a day, seven days a week. These works will include:

- below ground works associated with tunnelling excavation;
- surface operations undertaken in support of the tunnelling excavation (including transport of excavated material from site); and
- certain works to divert utilities and undertake protective works where required.

Construction Traffic Routes

4.4.24 The routes identified for construction traffic involve an outbound journey for both work sites via Eastcheap and Great Tower Street and subsequently the A3211 via Lower Thames Street and Tower Hill continuing onto the A1211-A1210 and A11 or A13 away from each site.

4.4.25 The A111 or A13 will form the foundation of the return journey with vehicles then following the A1202 and A1203 before returning to the A3211 to gain access to the southern junction of Arthur Street. Figure 4.13 shows these routes.

4.4.26 The closure of Arthur Street requires the diversion of A3 northbound traffic from London Bridge seeking to access Upper Thames Street and the northbound bus service of Route 344. Proposed alternative routes are shown in Figure 4.14.

4.4.27 Further details regarding the construction logistics relating to the BSCU are provided in the Outline CLP within Appendix A8.2.

Blockade

4.4.28 During the final phases of construction when the new tunnels and infrastructure are connected to the existing network, a period of closure (referred to as a blockade) of the Northern Line will be required between specified points. The blockade will comprise the following:

Full Closure

- Northern Line both northbound and southbound – 40 days of track closure between Kennington and Moorgate (April/May 2020).

Partial Closure

- Northern Line northbound – 77 days of trains non-stopping at Bank Station (May/August 2020).
- Northern Line southbound – 77 days of track closure between Kennington and Moorgate (May/August 2020).

Utilities Works

4.4.29 Works to divert and protect utilities potentially affected by construction are also proposed. These will comprise:

- protective works to the Low Level 2 Sewer (an west-east sewer between Cannon Street and King William Street) and to the London Bridge Sewer (a north-south sewer running beneath King William Street);
- diversion of utilities at Arthur Street to allow construction of the shaft; and
- other minor protective works to utilities to minimise impacts from settlement.

4.4.30 Utilities work will be undertaken in accordance with relevant codes of practice, the CoCP and Traffic Management Plan and with regular liaison with the City of London Corporation and Transport for London highways authorities.

4.4.31 Figure 4.9 shows the location of the main utility work sites.

Low Level 2 and London Bridge Sewer Works

4.4.32 The Low Level 2 Sewer works will include the installation of linings to the sewer to protect it from potential settlement effects of tunnelling and shaft excavations during the construction phase.

4.4.33 A 19m deep, 3.5m internal diameter wide construction shaft on Walbrook is required to access the sewer. Excavation will first require the diversion of water and gas mains, communications equipment and electrical cables. The utility diversions and shaft construction are expected to last approximately eight months and will be undertaken during standard working hours. The subsequent sewer protection works will take place at night (when flows through the sewer are lower) and are expected to last between four and six months. Shaft refill and reinstatement are expected to take up to one month. This will require the closure of the southern half of Walbrook for the duration of the works. Pedestrian access will, however, be maintained.

- 4.4.34 Emergency access and egress to the Low Level 2 Sewer will be via an existing shaft at the junction of Abchurch Lane (east) and King William Street. To maintain this, a work site will be needed which will require the temporary closure of the south end of Abchurch Lane and suspension of the cycle lanes and relocation of the northbound bus stops on King William Street (approximately the section from Sherborne Lane to Nicholas Lane).
- 4.4.35 Similar protective linings are also required for the London Bridge Sewer. To access this sewer a previously closed shaft will be opened up on King William Street at the junction with Lombard Street. This will involve breaking out the manhole cover slab (approximately 2-4m deep). An existing shaft located on Prince's Street will be used to provide ventilation and emergency access and egress from the sewer. The protective lining works will be undertaken at night over a period of approximately six months.

Arthur Street

- 4.4.36 Creation of the construction shaft within the Arthur Street Work Site will require the diversion of water and gas mains, communications equipment and electrical cables and the breaking open of the Arthur Street sewer. These works will require the closure of Arthur Street in both directions for approximately six months in advance of the main construction period closure. During these works, vehicle and pedestrian access will be maintained to those buildings serviced from Arthur Street.

Other Minor Utilities Works

- 4.4.37 Other minor utilities works will include the excavation of trenches, duct and pipe laying, chamber construction, pulling and jointing of pipes and cables, and then commissioning of new or reinstated connections. These works will need to be carried out at a number of locations between 2016 and 2017. During this period there may be a requirement for part closure of a number of roads including:

- Walbrook;
- King William Street;
- Prince's Street;
- Mansion House junction;
- Cannon Street;
- Abchurch Lane;
- Nicholas Lane;
- Mansion House Street;
- Lombard Street;
- Queen Victoria Street;
- Clement's Lane;
- Cornhill;
- Poultry;
- Moorgate;
- Mansion House Place;
- St Stephens Row;

- St Swithin's Lane;
 - Sherborne Lane;
 - Lothbury;
 - Gresham Street;
 - Threadneedle Street;
 - Martin Lane;
 - Monument Street;
 - Laurence Pountney Lane;
 - Lower Thames Street; and
 - Upper Thames Street.
- 4.4.38 Disruption will be minimised through careful phasing of the works to avoid parallel working and by maintaining operation of one lane on strategic roads.

Protective Works to Buildings and Roads

- 4.4.39 Tunnelling and shaft excavations during the construction phase can generate varying amounts of movement in the overlying and surrounding ground. Monitoring and surveying of structures and roads both prior to and during the construction works will be undertaken to provide data to:
- inform the need to protect existing assets or their operation; and
 - inform decisions for construction activities.
- 4.4.40 Protective works to, and other mitigation of, buildings (including listed buildings) and roads will be carried out where the ground movements and analysis indicates this is required. Although not expected to be necessary, this may include grouting works carried out via excavated shafts. If required, grouting will be undertaken from the new or existing tunnels or via temporary new shafts within the Whole Block Site and outside Mansion House on Walbrook. The shafts would be 6m in diameter and up to 14m deep in order to inject the grout via small-diameter sleeved port pipes. It is expected that any utility diversions and shaft construction would take between 6-12 months and would be undertaken during standard working hours. The compensation grouting would be undertaken throughout the tunnelling phase both during daytime and night time periods.
- 4.4.41 The Walbrook Grout Shaft would have 2.4m solid hoarding and be lit in the hours of darkness for safety and security. There are expected to be up to six construction vehicles per day during normal operations. A single lane of traffic past the work site would be provided where possible. During the grouting works and shaft reinstatement the work site footprint will be reduced in size to allow freer movement of vehicles and pedestrians.