Committees: Planning and Transportation Committee *[for decision]* Projects Sub Committee *[for decision]* Markets Committee *[for information]*	**Dates:** 01 October 2019 20 September 2019 25 September 2019
Subject: Pipe Subways of Holborn Viaduct and Snow Hill over Thameslink **Unique Project Identifier:** 9845	**Gateway 4:** **Detailed Options Appraisal (Complex)**
Report of: Director of the Built Environment **Report Author:** Jagdeep Bilkhu	**For Decision**
PUBLIC	

1. Status update	**Brief Description:** Refurbishment/maintenance/replacement to extend the life of existing structures and to mitigate the Corporation's risk from third party claims. **RAG Status:** Amber (Green at last report to committee) **Risk Status:** Medium (Medium at last report to committee) **Total Estimated Cost of Project (excluding risk):** £2.666m (incl. construction costs of £2.160m and £506k of fees, enabling works, Network Rail Access etc., which includes a scope change to extend waterproofing and repairs to jack-arches across the carriageway). **Change in Total Estimated Cost of Project (excluding risk):** Decrease of £7.614m since last report to Committee (as a result of not selecting the most expensive options which involved total or significant replacement of elements). **Spend to Date:** £256k (including commitments). **Costed Risk Provision Utilised:** Zero **Slippage:** There are no delays/issues to report that impact cost/quality/scope/time with respect to highway work in isolation.

	It is proposed that these works proceed on the premise of collaborative effort to utilise common railway access requirements with the MoL Relocation Project as they will likely be the same as those required for the completion of these works. It is therefore imperative that the design is ready as soon as practically possible this year (in 2019) to allow the works to be undertaken to align with the programme of the museum project, due for construction next year (in 2020) if possible. **Background:** 1.1 The requirements of this project were previously reported in April 2017. Since then, feasibility studies have been prepared for both sites at Holborn Viaduct and Snow Hill, including liaisons with utility companies. More importantly an agreement has been put in place for the City to commence dialogue with Network Rail for the arrangement of access (possessions) for both further inspections and for the construction phase. 1.2 Since the previous report to committee in relation to these two pipe subways it has become apparent that works need to be coordinated as far as practically possible, with (i) the Museum of London Relocation project and also (ii) the capital scheme involving bridges on West Smithfield and Charterhouse Street which are reported separately (as project no. 12021). The bridges require re-waterproofing, re-surfacing and concrete repairs to the underside (needing railway access). The report referred to in (ii) above is an Issue Report following the combined GW1/2/3/4 presented in September 2018. 1.3 An outline location plan is presented in Appendix 2, showing all the structures covered by this report (**33/P11**, **33/P12** and **33/P13**). Other highway structures of interest to the City of London as highway authority and currently of interest to the Museum of London (MoL) relocation project are also shown, for information only. 1.4 Both of the projects mentioned in 1.2 above involve permanent work to highway around or adjacent to the General, Poultry and Annexe Markets. The MoL project also involves the relocation of a Road Rail Access Ramp (RRAP) adjacent to the railway sidings. The commonality in all these schemes is both the construction work and gaining access to the railway through Network Rail. 1.5 ECI has taken place in the form of a non-committal consultation with a contractor. The ECI process has also confirmed synergies between the construction works of this project and the MoL relocation project. Consideration has been given to the construction phase being undertaken by a contractor through the MoL tender process to be most prudent, although certain principles and approvals need to

	be agreed with CoL as highway authority, Network Rail and in respect of structures supporting the highway owned by CoL in a private capacity. 1.6 The engineering team have already commenced a collaborative effort with the Museum of London team to coordinate work and common goals, including liaising with Network Rail for access. **Project Description:** 1.7 The preferred option at Snow Hill is to keep the existing buckle plates that form the roof of the subways and cast a reinforced concrete slab over the top with the buckle plates acting as a non-structural formwork. This will require raising of highway levels to accommodate the concrete slab. 1.8 This is not possible at Holborn Viaduct as the shallow depth above the structure and the existing gradient make it less amenable to raising of levels. The proposed solution here is to replace the roof slabs. 1.9 This report also proposes that the carriageway of Snow Hill is waterproofed at the same time as the work to the pipe subways situated under the footways. The carriageway is carried by a series of jack-arches. A recent inspection dated 20/01/2019 has revealed that the jack-arches supporting the carriageway have extensive loss of pointing, as well as corrosion to the metal elements, which can only be accessed from the railway. The above described scope change is also proposed to be included in the works covered in this project to make economic use of the railway access and reduce the City's risk associated with maintenance of our structures. 1.10 The works to the pipe subways will result in some excavation into the carriageway at both sites when the kerbs are removed and potentially resulting in damage of the waterproofing in the road. It is proposed that a sprayed applied waterproofing system will be used over the new roof slabs for the pipe subways under the footways at both locations. Given the potential for damaging the waterproofing in the carriageway when working along the line of the kerbs, it is prudent to waterproof the entire bridge structure where possible, including both footways and the carriageway. At Snow Hill it is possible to do this with little disruption to traffic flow and therefore, waterproofing of the entire deck is recommended. While this would also be preferred at Holborn Viaduct, it is more difficult due to impact on the highway network and consequently will not form part of this project. A suitable construction detail will be specified to lap the waterproofing on Holborn Viaduct.

1.11 It is also noted that the structure supporting the carriageway of Holborn Viaduct is a single span masonry arch as opposed to jack-arches carrying the carriageway of Snow Hill. The condition of these two structures is also different, with the jack arches of Snow Hill being in worse condition.

1.12 This project will also require considerable liaison and coordination with the developer of Citycape House at 61-65 Holborn Viaduct, which is the land that lies between the bridges at Snow Hill and Holborn Viaduct. There are plans to bring the existing building, currently soft-stripped and empty, back into use with demolition and construction work scheduled to possibly overlap with our own programme.

2.

Next Gateway: 4c (Detailed design)

Next Steps:

- Complete all investigations.
- Further communications with all stakeholders and interested parties.
- Complete the preferred design and prepare specifications and drawings.

Requested Decisions:

1. That additional budget of **£225,000** is approved for GW4 to reach the next Gateway, including scope change for inclusion of structure supporting the carriageway of Snow Hill;
2. Note the revised cumulative project budget of **£481,000** (excluding risk);
3. Note the total estimated cost of the project at **£2.666m** (excluding risk);
4. That a Costed Risk Provision of **£75,000** is approved (to be drawn down via delegation to Chief Officer).
5. That Gateway 4C Detailed Design is approved via Planning and Transportation Committee.

3. Resource requirements to reach next Gateway

For recommended option 3a and 3b:

Item	Reason	Funds/ Source of Funding	Cost (£)
Staff Costs	Project management and coordination	On-Street Parking Reserve (OSPR)	30,000

Consultant Fees	Design, detailing, specification including 33/16	OSPR	65,000
Consultant Fees	Coordination with MoL project	OSPR	20,000
Consultant Fees	CDM duties	OSPR	20,000
Further Investigations	Inform design and mitigate risks	OSPR	50,000
Cost Consultant		OSPR	40,000
Total			225,000

Costed Risk Provision requested for this Gateway: £75,000 (as detailed in the Risk Register – Appendix 3)

4. Overview of project options

4.1 Doing nothing was presented as an option at GW3 but it has become apparent that the vicinity of these structures to the new Museum of London and Annexe Building will mean that this is not a feasible option.

4.2 Options 4 and 5 have been discounted primarily due to the significantly high costs of these two options and the complexity associated with them.

5. Recommendation

5.1 Option 3a, recommended for Snow Hill. Involves keeping the metal buckles plates that form the roof wherever possible and strengthening with a concrete over-slab. Refurbish other elements from within and from railway below.

5.2 Option 3b, recommended for Holborn Viaduct. Involves replacing the roof slabs. Refurbish other elements from within and from railway below.

6. Risk

6.1 Reference should be made to the Risk Register for further details (Appendix 3).

Most risks can be reduced and/or controlled. However, it is worth noting that the biggest risk by far to this project

	could be from potential delays to the train operating companies should construction work affect the railway. This could run into the £m's as delays are in the order of £100k per hour should train operation be affected. This is to be managed by undertaking as much, if not all work that could affect the railway in possessions when no trains are running and physically protecting the railway infrastructure. 6.2 The Risk Register is contained in Appendix 3. It should be noted that the costed risk is large due to the possibility of overrunning engineering work and/or damage to the railway infrastructure which cannot be eliminated completely. This will be mitigated by undertaking as many investigations and considered design and logistics, as well as appointing an experienced contractor who understands the risks associated with the railway and will likely be the holder of many of the large risk items. However, the costed risk provision of £75,000 is an estimated figure to allow for protracted coordination efforts with the MoL project and Network Rail to continue without the need to revert to committee.
7. Procurement strategy	7.1 Members were advised that we would seek pre-contract advice. Arcadis have engaged with a contractor to provide that pre-contract advice. The consensus from that advice was that the scheme would be too small for a large contractor to be interested in submitting a tender. Unfortunately, a smaller contractor may not have the experience or be able to deal with the associated risk of working on the railway. 7.2 However, since that advice has been received the City have been working collaboratively with the MoL relocation project and another scheme to refurbish bridges on West Smithfield and Charthouse Street (covered by a separate report).

Appendices

Appendix 1	Project Coversheet
Appendix 2	Plan showing extent and location of structures
Appendix 3	Risk Register

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Options Appraisal Matrix

The matrix includes the options presented to Members in the previous report that will now not be considered further.

Option Summary	*Option 1*	*Option 2*	*Option 3a*	*Option 3b*	*Option 4*	*Option 5*
1. Brief description of option	"Do nothing" to the pipe subways but provide protection.	Replace the roof slabs of all pipe subways only. Not the preferred option and is not recommended.	**From above and within the subway** -Keep the iron buckle plates that form the roof of the pipe subways. Strengthen with a concrete over-slab. -refurbish the internal metal faces of the girders and other structural elements of the subway **From below, i.e. requiring railway access** -Carry out concrete repairs to the soffit of the subway bases -Replace any mortar loss, re-pointing of the jack-arches -repair/replacement of tie-bar between jack-arches	**From above and within the subway** -Replace the roof slabs of the pipe subways. -refurbish the internal metal faces of the girders and other structural elements of the subway **From below, i.e. requiring railway access** - Carry out concrete repairs to the soffit of the subway bases -Investigate the condition of the outer walls of the subways and remediate as appropriate	Replace roof and base slabs, with full refurbishment of main girders. Not the preferred option and is not recommended due to high costs and complexity.	Fully replace all pipe subways, including the main girders, the base and the roof. Not the preferred option and is not recommended due to significantly high costs and complexity.
2. Scope and exclusions	▪ Considered to be no longer	▪ No refurbishmen	▪ Pipe subway remedial works are limited to	▪ Pipe subway remedial works are limited to	▪ Work could potentially	▪ Work could potentially include

Option Summary	Option 1	Option 2	Option 3a	Option 3b	Option 4	Option 5
	feasible as it is understood that both the Annexe Market and the property at 65 Holborn Viaduct have proposals to return to use. ▪ As a result of the above return to use, protection would not be possible to the full length of the subways.	t of any other elements.	approximately the area over the railway. ▪ At Snow Hill this would involve raising of footway levels locally over the structure and grading the surfacing back into the sides to accommodate a concrete slab over the buckle plates which would be used as permanent formwork, not structurally participating.	approximately the area over the railway.	include refurbishing fixtures holding utilities apparatus within the pipe subway. ▪ Utilities may need to be diverted for this option	refurbishing fixtures holding utilities apparatus within the pipe subway. ▪ Utilities will need to be temporarily diverted for this option
Project Planning						
3. Programme and key dates	The construction phase of the project is now proposed to align with construction phase activity of the Museum of London relocation project from above. Therefore, the programme and key dates, broadly, are as follows: ▪ complete design and drawings – October to December 2019					

Option Summary	*Option 1*	*Option 2*	*Option 3a*	*Option 3b*	*Option 4*	*Option 5*
	▪ prepare specification – December 2019 to January 2020 ▪ Top side construction works – February 2020 to March 2021 (depending on activities of the Museum of London).					
4. Risk implications	Medium Risk ▪ Breach of agreement with utility companies to maintain pipe subways in suitable condition ▪ Risk of legal challenge from utilities if damage occurs to their plant from a structural failure. ▪ Consequential reputational value to the City	Medium Risk ▪ Increased reactive (unplanned) maintenance costs of replacing the roof slabs and potential damage that could be caused to utilities. ▪ Base slabs and internal pipe subway utilities/apparatus would need protection when	Medium Risk ▪ Increased reactive (unplanned) maintenance costs of replacing the roof slabs and potential damage to utilities. ▪ Base slabs and internal pipe subway utilities/apparatus would need protection when demolishing roof slabs at either location. ▪ Small but significant risk from damage to Overhead Line Electrification (OLE), particularly from soffit remedial work. ▪ Breach of agreement with utility companies to maintain pipe subways in a suitable condition. ▪ Depreciation in asset value. ▪ Risk of legal challenge from utilities if damage occurs to their plant from a structural failure. ▪ Consequential reputational value to the City. Further information on Option 3a and 3b , including construction risks is available within the risk register (Appendix 3).		High Risk ▪ Increased reactive (unplanned) maintenance costs of replacing the roof slabs and potential damage that could be caused to utilities. ▪ Overhead Line Electrification (OLE) is very close to the soffit of the base slab. ▪ Breach of agreement	High Risk ▪ Overhead Line Electrification (OLE) is very close to the soffit of the base slab. ▪ Breach of agreement with utility companies to maintain pipe subways in suitable condition. ▪ Depreciation in asset value.

Option Summary	*Option 1*	*Option 2*	*Option 3a*	*Option 3b*	*Option 4*	*Option 5*
	▪ Risk to railway.	demolishing roof slab. ▪ Breach of agreement with utility companies to maintain pipe subways in suitable condition ▪ Depreciation in asset value. ▪ Risk of legal challenge from utilities if damage. ▪ Risk to railway.			with utility companies to maintain pipe subways in suitable condition. ▪ Depreciation in asset value. ▪ Risk of legal challenge from utilities if damage occurs to their plant from a structural failure.	▪ Risk of legal challenge from utilities if damage occurs to their plant from a structural failure. ▪ Consequential reputational value to the City.
5. Stakeholders and consultees	Same as Options 2-5 but long, protracted negotiations with Network Rail are	<u>Internal</u> City of London – City Surveyor's Department City of London Police Smithfield Market <u>External</u> Network Rail				

Option Summary	*Option 1*	*Option 2*	*Option 3a*	*Option 3b*	*Option 4*	*Option 5*
	unlikely to be required.	Transport of London Utilities Companies Museum of London Relocation Project Various parties involved in the re-development of 65 Holborn Viaduct Neighbours and Local Businesses				
6. Benefits of option	▪ Short term cost benefits only, plus lack of disruption to both highway and railway traffic by works.	▪ Understrength roof elements replaced. ▪ Cheapest works option which addresses the understrength roof elements. ▪ Least disruption to traffic and railway (apart from Option 1).	▪ Understrength roof elements strengthened or replaced (where not possible to strengthen). ▪ Addresses defects to the soffits of the pipe subways. ▪ The most important maintenance will be completed. ▪ Complete structure over railway area waterproofed.	▪ Understrength roof elements replaced ▪ Addresses defects to the soffits of the pipe subways. ▪ Will allow inspection and hopefully repair if necessary, of the outside face of girders. ▪ The most important maintenance will be completed.	▪ Understrength roof elements replaced. ▪ Completely refurbishes the main girders. ▪ Reduced risk of failure.	▪ Longer life with low maintenance ▪ Eliminate risk of failure.
7. Disbenefits of option	▪ Disbenefits as risks above, including depreciation	▪ Other maintenance identified from	▪ Not a cheap option but not as expensive as a full replacement.	▪ Not a cheap option but not as expensive as a full replacement. ▪ Likely to be quite disruptive above ground	▪ Expensive. ▪ No real need to	▪ Likely to be much more expensive than all the

Option Summary	*Option 1*	*Option 2*	*Option 3a*	*Option 3b*	*Option 4*	*Option 5*
	in asset value and let-able value. ▪ May not be feasible for both sites at all locations.	structural inspections not carried out.		in terms of traffic management and various physical obstacles.	replace the base slabs	other options. ▪ Potential to disrupt traffic a lot more than the other options. ▪ Utilities will likely need to be diverted.
Resource Implications						
8. Total estimated cost	£150k - £200k	£3m - £5m.	Costs are difficult to estimate with high level of confidence given the location and position of the structures over railway. The costs below are estimated by the consultant following completion of the feasibility studies. (Does not include risk money) Construction works = £1,000,000 approx.	Construction works = £700,000 approx.	£5m – £7m	Up to £10m

Option Summary	*Option 1*	*Option 2*	*Option 3a*	*Option 3b*	*Option 4*	*Option 5*
			Rail possessions = £260,000 approx. Supervision of Client's Representative = £25,000	Rail possessions = £200,000 approx.		
9. Funding strategy	This project has previously been agreed for progression outside of the Fundamental Review due to the deteriorating condition of the structures making them essential and urgent and the synergy with the Museum of London tunnel lids works. Internal funding is anticipated from the City Fund's On-Street Parking Reserve. For the works, external sources will be considered, including application for funding from TfL for specific schemes (possibly through LoBEG) as well as exploring the possibility for Third Party contribution, i.e. reviewing the potential for utilities companies that use the pipe subway to make contribution. As this project is working jointly with the MoL relocation project, our consultant's brief has been evolving. The estimated cost of the construction works is now £ 2.160m (excluding risk) and £25,000 for supervision of works by Client's representative. The estimated total cost of the project is now £ 2.666m (excluding risk of £75,000). After allowing for funding of £313,000 previously approved, a funding shortfall of £2428m remains to be funded from the OSPR.					
10. Investment appraisal	n/a					

Option Summary	*Option 1*	*Option 2*	*Option 3a*	*Option 3b*	*Option 4*	*Option 5*
11. Estimated capital value/return	n/a					
12. Ongoing revenue implications	Maintenance costs of pipe subways through routine programmed inspections and reactive maintenance coming from current revenue budget for highway structures/pipe subways and recharged to utilities companies.					
13. Affordability	Of all the options this is the most affordable but does not address any maintenance or strengthening issues with the pipe subways.	Options 4 and 5 have been discounted as affordability has been taken into account. It was previously reported that funds for at least Option 2 or 3 would need to be found. However, Option 2 is not recommended and therefore funds need to be found for Option 3.			Option 4 is desirable but it may not be necessary to replace the base slabs.	Option 5 would require significant financial input but may be the best whole life cost solution.
14. Legal implications	Under Part V of the City of London (Various Powers) Act 1900 the City is authorised to construct pipe subways under streets to accommodate utilities apparatus (utilities are prohibited from installing apparatus directly into the road where pipe subways are available, and this enables utility apparatus to be installed and maintained without breaking open the streets and the consequential traffic disruption, as well as increasing capacity for apparatus). The 1900 Act provides for the pipe subways to vest in the City's ownership and for the City to be responsible for the maintenance and repair of the pipe subways. Utilities may be charged for their use of the pipe subways and the charge may reflect the City's expenses incurred in the maintenance, repair, management and improvement of the pipe subways (s.73 London Local Authorities Act 2007).					

Option Summary	*Option 1*	*Option 2*	*Option 3a*	*Option 3b*	*Option 4*	*Option 5*
15. Corporate property implications	None of the pipe subways have corporate property implications. The two subways in Holborn Viaduct form part of the wider viaduct structure, some of which is let by the City Surveyor's Department. The scheme is not expected to directly impact the tenanted properties within Holborn Viaduct. It is understood that the Annexe Market which has been in a state of dilapidation is being brought back into use. The work to the pipe subways in Snow Hill will impact the crossovers to the Annexe Market but it is understood that at the present time, this proposal will not negatively impact access/egress from the crossovers.					
16. Traffic implications	▪ Closure of footways but not necessarily together. ▪ Least impact on road traffic of all options.	▪ Closure of both footways at Holborn Viaduct which would require pedestrian management. ▪ Potentially requiring some carriageway space but no lane closures expected.	▪ Moderate traffic implication. ▪ If the work to waterproof the carriageway is agreed, then construction may need to be phased on Snow Hill if a full closure cannot be obtained.	▪ Major implications. ▪ Traffic management on Holborn Viaduct is likely to be more complicated than Snow Hill. ▪ The work on Holborn Viaduct is very likely to need phasing, therefore removal of the central reservation and reinstatement after completion of the work to the pipe subways. ▪ There is a bus shelter/stop that will require re-location as well as a staggered crossing, a telephone	▪ Closure of both footways at Holborn Viaduct which would require pedestrian manageme nt. ▪ Potentially requiring some carriageway space but no lane closures expected.	▪ Closure of both footways at Holborn Viaduct which would require pedestrian managemen t. ▪ Work is likely to be phased and would require the removal of at least part of the central

Option Summary	*Option 1*	*Option 2*	*Option 3a*	*Option 3b*	*Option 4*	*Option 5*
				box, utilities cabinet and various items of street furniture.	▪ Work is likely to be phased and would require the removal of at least part of the central reservation on Holborn Viaduct. ▪ If carriageway space is required, London Buses may be impacted.	reservation on Holborn Viaduct. ▪ Carriageway space is likely to be required and London Buses will be impacted.
17. Sustainability and energy implications	All options will endeavour to support local labour where possible. However, it should be noted that there are specialisms involved in the works that could make this difficult.					
18. IS implications	n/a					
19. Equality Impact Assessment	n/a					

Option Summary	*Option 1*	*Option 2*	*Option 3a*	*Option 3b*	*Option 4*	*Option 5*
20. Data Protection Impact Assessment	n/a					
21. Recommendation	Not recommended	Not recommended	**Recommended**	**Recommended**	Not recommended	Not recommended