SCHEDULE 6B CALL-OFF CONTRACT

Framework Agreement:	GLA 80814 - Decentralized Energy Framework
Sub-Lot:	1.1 – Energy Generation. Energy Centre Design and Controls 1.4 – Feasibility Studies for DE Projects
Outline Agreement:	4600006877
Call-Off Contract Number:	GLA 80814 / Task 12 – Rooftop solar feasibility study for Transport for London

THIS CALL-OFF CONTRACT is made 28th day of October 2019

BETWEEN:

(1) Transport for London whose principal office is at 55 Broadway, London, SW1H 0BD (**"the Authority"**); and

(2) AECOM Limited, a company registered in England and Wales (Company Registration Number 01846493 whose registered office is at AECOM House, 63-77 Victoria St, AL1 3ER St Albans (**"the Service Provider"**).

RECITALS:

A. The Contracting Authority and the Service Provider entered into an agreement dated August 2017 which sets out the framework for the Service Provider to provide certain Services to the Authority (**"the Framework Agreement"**).

B. The Authority wishes the Service Provider to provide the specific Services described in this Call-Off Contract pursuant to the terms of the Framework Agreement and this Call-Off Contract and the Service Provider has agreed to provide such Services on those terms and conditions set out in the Call-Off Contract.

THE PARTIES AGREE THAT:

1. CALL-OFF CONTRACT

1.1 The terms and conditions of the Agreement shall be incorporated into this Call-Off Contract.

1.2 In this Call-Off Contract the words and expressions defined in the Agreement shall, except where the context requires otherwise, have the meanings given in the Agreement. In this Call-Off Contract references to Attachments are, unless otherwise provided, references to attachments of this Call-Off Contract.

2. SERVICES

2.1 The Services to be performed by the Service Provider pursuant to this Call-Off Contract are set out in Attachment 1.

2.2 The Service Provider acknowledges that it has been supplied with sufficient information about the Agreement and the Services to be provided and that it has made all appropriate and necessary enquiries to enable it to perform the Services under this Call-Off Contract. The Service Provider shall neither be entitled to any additional payment nor excused from any obligation or liability under this Call-Off Contract or the Agreement due to any misinterpretation or misunderstanding by the Service Provider of any fact relating to the Services to be provided. The Service Provider shall promptly bring to the attention of the Call-Off Co-ordinator any matter that is not adequately specified or defined in the Call-Off Contract or any other relevant document.

2.3 The timetable for any Services to be provided by the Service Provider and the corresponding Milestones (if any) and Project Plan (if any) are set out in Attachment 1. The Service Provider must provide the Services in respect of this Call-Off Contract in accordance with such timing and the Service Provider must pay liquidated damages in accordance with the Agreement of such an amount as may be specified in Attachment 1. The Service Provider shall be liable for the ongoing costs of providing Services in order to meet a Milestone. For the avoidance of doubt, the timetable in Attachment 1 shall be adjusted to take into account the actual contract signature date and therefore the Contract Award date in Attachment 1 shall be amended to the date mentioned above (when the call-off shall be made) and all subsequent dates in Attachment 1 shall be adjusted accordingly but shall maintain the same task durations (i.e. 10 days between Contract Award and Initiation workshop).

2.4 The Service Provider acknowledges and agrees that as at the commencement date of this Call-Off Contract it does not have an interest in any matter where there is or is reasonably likely to be a conflict of interest with the Services provided to the Authority under this Call-Off Contract.

3. CALL-OFF TERM

This Call-Off Contract commences on the date of this Call-Off Contract or such other date as may be specified in Attachment 1 and subject to Clause 4.2 of the Agreement, shall continue in force for the Call-Off Term stated in Attachment 1 unless terminated earlier in whole or in part in accordance with the Agreement.

4. CHARGES

4.1 The tendered Price for the 4 phases is fixed at:

- Phase 1 [redacted]
- Phase 2 [redacted]
- Phase 3 [redacted]
- Phase B [redacted]
- Total [redacted] and shall not exceed this amount.

4.2 Attachment 2 specifies the Charges payable in respect of the Services provided under this Call-Off Contract. The Charges shall not increase during the duration of this Call-Off Contract unless varied in accordance with the Agreement.

4.3 The Service Provider shall issue an invoice to (and in the name of) the Authority in respect of the Charges in accordance with Attachment 2.

4.4 The Service Provider shall submit invoices to the address set out in Attachment 1 or in electronic format as set out in Attachment 1. Each invoice shall contain all information required by the Authority as required in Attachment 1. Invoices shall be clear, concise, accurate, and adequately descriptive to avoid delays in processing subsequent payment.

4.5 In the event of a variation to the Services in accordance with this Call-Off Contract that involves the payment of additional charges to the Service Provider, the Service Provider shall identify these separately on the relevant invoice.

4.6 The Authority shall consider and verify each invoice, which is submitted in accordance with this Clause 4 in a timely manner. If the Authority considers that the Charges claimed by the Service Provider in any invoice have:

4.6.1 been correctly calculated and that such invoice is otherwise correct, the invoice shall be approved for payment which shall be made by bank transfer (Bank Automated Clearance System (BACS)) or such other method as the Authority may choose from time to time within 30 days of receipt of such invoice from the Service Provider;

4.6.2 not been calculated correctly and/or if the invoice contains any other error or inadequacy, the Authority shall notify the Service Provider. The Parties shall work together to resolve the error or inadequacy. Upon resolution, the Service Provider shall submit a revised invoice to the Authority.

4.7 Except where otherwise provided the Charges shall be inclusive of all costs of staff, facilities, equipment, materials and other expenses whatsoever incurred by the Service Provider in discharging its obligations under the Call-Off Contract.

4.8 The Service Provider will be paid for the invoiced fee plus VAT amount shown on the invoice by the Authority within 30 days of receipt of the invoice from the Service Provider.

5. INSURANCES

In accordance with the provisions of Clause 21 of the Agreement, the Service Provider shall maintain the specified Insurances as per the Agreement, unless alternatives have been specified in Attachment 1.

6. LIABILITY

[redacted]

7. CALL-OFF CO-ORDINATOR AND KEY PERSONNEL

The Authority's Call-Off Co-ordinator in respect of this Call-Off Contract is named in Attachment 1 and the Service Provider's Key Personnel in respect of this Call-Off Contract are named in Attachment 2.

The Employer's Procurement Manager is:

[redacted]

The Employer's Contract Manager is:

[redacted]

The Consultant's Key Persons are:

[redacted]

8. THE DOCUMENTS FORMING THE CALL OFF CONTRACT ARE

- this Call-Off Contract duly executed by the Parties;
- Attachment 1 the Authority's Requirement
- Attachment 2 Service Providers Proposal; and
- Attachment 3: Pricing

This Call-Off Contract has been signed by duly authorised representatives of each of the Parties.

SIGNED
For and on behalf of [*State Company name*] (the Service Provider)
AECOM LIMITED

Signature: [redacted]

Name:

Title:

Date:

SIGNED
For and on behalf of Transport for London (the Authority)

Signat [redacted]

Name

Title:

Date:

Specification

for

Rooftop solar feasibility study for Transport for London

Tender Ref: GLA 80814 / Task 12

Date: 20 August 2019

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0. DOCUMENT CONTROL

0.1 Document History

Version	Date	Changes since previous issue
V0.1	15/07/2019	First draft
V0.2	29/07/2019	Update from
V0.3	07/08/2019	Update from
0.4	07/08/2019	Update from
V0.4 (2)	09/09/2019	Updates in readiness for issue

0.2 Final Version Approval

Authors

Name	Signature	Date	Title
[redacted]			
[redacted]			

Reviewed by

Name	Signature	Date	Title
[redacted]			
[redacted]			

Approved by

Name	Signature	Date	Title

I. ORGANISATIONAL OVERVIEW

1.1 Transport for London (TfL)

TfL was created in 2000 as the integrated body responsible for London's transport system. TfL is a functional body of the Greater London Authority. Its primary role is to implement the Mayor of London's Transport Strategy and manage transport services to, from and within London.

TfL manages London's buses, the Tube network, Docklands Light Railway, Overground and Trams. TfL also runs Santander Cycles, London River Services, Victoria Coach Station, the Emirates Air Line and London Transport Museum. As well as controlling a 580km network of main roads and the city's 6,000 traffic lights, TfL also regulates London's taxis and private hire vehicles and the Congestion Charge scheme.

Further background can be found on the TfL website:

https://tfl.gov.uk/corporate/about-tfl/what-we-do

1.2 Business Unit

City Planning works with key stakeholders to provide strategic direction through the London Plan and Mayor's Transport Strategy to improve the City's transport, enable its future growth and secure better health and environmental outcomes.

Its priorities are:

- Lead TfL's strategic thinking on transport policy and its role in driving London's success
- Integrate transport and land use planning to shape our city's future
- Support strategy and scheme development
- Develop options for high profile transport infrastructure projects
- Work with Surface to translate strategy and policies into action plans and delivery programmes

A TfL multidisciplinary team, including, but not limited to, representatives of Asset Strategy, Engineering, Commercial Development and Operational Property will work with the appointed Consultant to achieve the Objectives of this Commission.

2. INTRODUCTION

2.1 Background & Introduction

The Greater London Authority (GLA) has published three core documents during 2018 related to energy generation. The Mayor's Transport Strategy (MTS) defines the vision for transport in London up to 2050 and the key steps to achieve it. Proposal 40 of the MTS states "*The Mayor, through TfL, will seek to deliver a package of measures both to increase the level of low-carbon energy generation on TfL's land and for supply to its assets*".
In the London Solar Action Plan (SAP) and London Environment Strategy (LES) the Mayor has set an ambition for London to achieve one gigawatt of installed solar capacity by 2030 and two gigawatts by 2050. This would contribute towards the objectives set out in the MTS, LES and GLA's Solar Action Plan (SAP).

In May 2019, TfL completed a pre-feasibility study (desktop assessment) of the solar potential of 80 of its rooftops. This work identified approximate array sizes (accounting for aspects such as panel orientation and shading) and calculated capex and likely energy savings. This study did not assess roof condition.

This commission seeks to appoint a Consultant to build on the pre-feasibility study and assess 40[1] of TfL's largest rooftops to develop options for solar PV delivery. This will involve building surveys, structural assessments, electrical surveys and design work. It will also identify and incorporate options for enhancing biodiversity and blue roofs where appropriate. The key output will be a summary of solar deliverability and cost for each site deemed to have a viable business case, outlining the options to deliver solar and a financial appraisal of each option. This will bring together the data collected by the Consultant in the assessment process consisting of several phases, which will be provided to TfL in an agreed format.

TfL's outline approach to achieving the required outcomes is set out in section 3. We welcome bidders to outline their own approach in their submission using the content in the tender as a guide for the type of requirements expected.

[1] TfL envisages a number of sites dropping out of the phased assessment process as outlined below. It is highly unlikely that all of the sites will reach stage 3, but consultants should be prepared to undertake this work if required. Similarly, TfL reserves the right to add more sites to the commission, up to a maximum of 100 sites.

Key milestones are provided in section 4, however TfL welcomes submissions that are able to deliver more quickly.

3. SCOPE

Undertake detailed feasibility for solar PV installation on 40 of TfL's rooftops, moving towards a RIBA stage 3 concept design for those rooftops offering the best opportunities. This commission is structured in several phases to ensure value for money.

For those sites reaching Stage 3 the consultant will assess in detail the structural integrity and produce full designs including panel configuration, mechanical and electrical designs, programme outline, and include options for the delivery of solar supporting biodiversity such as integrated green roofs. The biodiversity elements should be identified as add-on opportunities so they can be included in the design depending on funding and structural/operational/maintenance constraints.

TfL reserves the right to remove or add sites to this commission up to a maximum of 100 sites. The relevant work for each additional site added during the commission will be priced according to the cost estimate provided in section 5.3.

Full business cases will be produced for those sites that move through to Phase 3. This will enable the prioritisation of the rooftop asset portfolio and support the elaboration of a programme of solar installations.

3.1 **Buildings for assessment**

The following buildings will be included in this commission. TfL reserves the right to amend this list or add further sites as the study progresses according to the conditions included in this tender. Likewise, TfL may prioritise this list at the start of the commission.

Site Ref	Site Name	Likely PV capacity (kWp)	Location (Lat Long)
C77	Acton blue roof building	64	51.499609,-0.277155
C39	Ash Grove Bus Garage / depot	527	51.535350,-0.059134
C40	Cockfosters depot shed (west)	64	51.648850,-0.140045
C31	6Ealing common depot	421	51.506733,-0.285121
C34	Golders Green depot main shed	249	51.572744,-0.192762
C27	7Hainault depot	157	51.608182,0.093261
C20	7Hainault depot	144	51.605937,0.093163
C28	5Hammersmith Depot	749	51.497580,-0.225409
C14	5N/A	123	51.496795,-0.225995
C76	Hatton Cross station	67	51.466807,-0.423137
C50	Highgate depot main shed	307	51.582315,-0.155306

C16	7N/A	148	51.582717,-0.154174
C43	Lillie Bridge depot, long shed	148	51.489347,-0.201576
C68	Lillie Bridge depot, north shed	80	51.490730,-0.202416
C54	Lillie Bridge depot, west shed	117	51.489697,-0.202329
C17	3London Road	96	51.498034,-0.105325
C32	2Neasden	443	51.557718,-0.260403
C25	5Neasden	170	51.556662,-0.257160
C49	New Cross Gate Overground depot main shed (Manufacturing Building)	78	51.483505,-0.043677
C71	New Cross Gate Overground depot wheel lathe and heavy cleaning building	97	51.480770,-0.043552
C37	Northumberland Park depot main shed	677	51.600480,-0.053505
C07	1Northumberland Park	69	51.601519,-0.053656
C29	8Northumberland Park depot	742	51.598725,-0.053497
C65	Poplar DLR depot main shed	76	51.507756,-0.015272
C59	Queens Park, north shed	58	51.534733,-0.201689
C64	Queens Park, south shed	66	51.533504,-0.208345
C30	2Ruislip Depot	173	51.564547,-0.425286
C78	Shepherd's Bush station (underground)	89	51.504764,-0.218675
C24	7Stonebridge depot	299	51.547802,-0.287987
C21	3Stonebridge depot	135	51.547803,-0.285073
C45	Stratford Station	134	51.540952,-0.003231
C26	7Upminster depot	348	51.561200,0.264493
C22	1Upminster depot	81	51.560287,0.265134
C51	Uxbridge Station	67	51.546443,-0.478029
C66	West Ham bus garage	242	51.523950,0.003396
C23	5Ruislip Depot	231	51.565079, -0.425784
C15	6Northumberland Park depot	106	51.599052, -0.053999
C12	7Neasden	88	51.556029, -0.253900
C09	8Hammersmith Depot	68	51.498046, -0.225087
C08	8Neasden	86	51.556336, -0.256898

3.2 **Assessment phases**

The process outlined below is TfL's proposed view of a phased approach and possible assessment criteria. However, alternative approaches will be considered provided they align with the following principles:

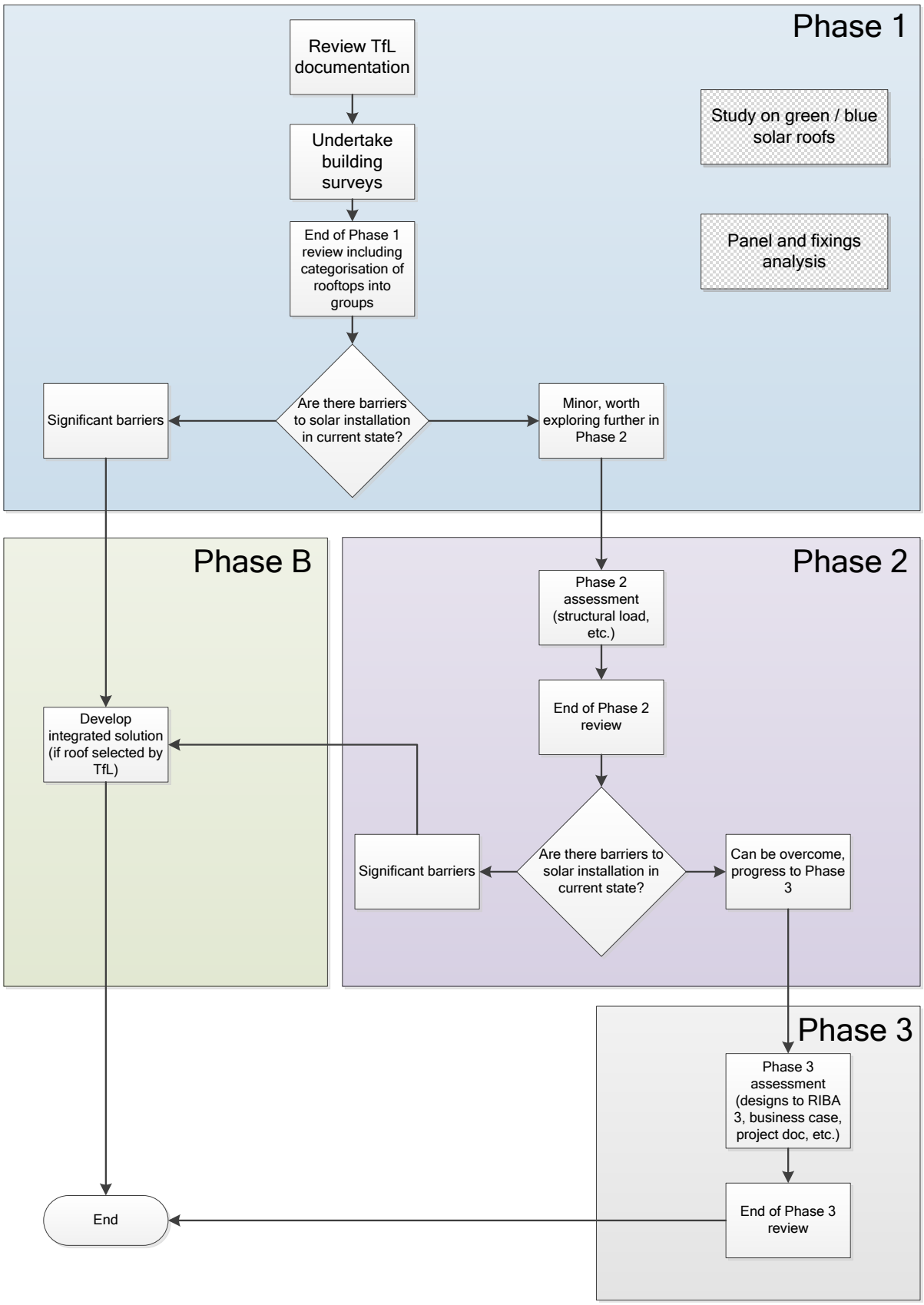
- Unsuitable sites are eliminated from consideration as soon as possible. The consultant is required to provide assessment criteria for suitability of solar development on roofs according to each phase
- Sufficient surveys, structural assessments and design work is undertaken to ensure outputs are deliverable
- London Underground standards are adhered to

Sites will move swiftly from one Phase to another. This means as the commission is carried out a number of sites could be finishing phase 3 whilst others may still be in phase 1, depending on the level of resource provided by the consultant. An interim deadline of October 2019 has been set to complete phase 1 for the first 10 sites (see section 4.3).

The end of Phase review for each site[2] will consist of a meeting between the Consultant and TfL to agree whether the site/s is progressed to the next Phase.

The outline of the proposed assessment process is shown below. More detail is available in each subsequent section (3.2.1-3.2.3).

[2] TfL is open to grouping sites for the end of the stage review as long as this doesn't substantially delay overall progress. The consultant should include proposals on how to do this as part of their bid.


Phase 1
Review TfL documentation
Undertake building surveys
End of Phase 1 review including categorisation of rooftops into groups
Are there barriers to solar installation in current state?
Significant barriers
Minor, worth exploring further in Phase 2
Study on green / blue solar roofs
Panel and fixings analysis
Phase B
Develop integrated solution (if roof selected by TfL)
Phase 2
Phase 2 assessment (structural load, etc.)
End of Phase 2 review
Are there barriers to solar installation in current state?
Significant barriers
Can be overcome, progress to Phase 3
Phase 3
Phase 3 assessment (designs to RIBA 3, business case, project doc, etc.)
End of Phase 3 review
End

The output of each stage is expected to be as follows:

Phase 1 (see section 3.2.1)

1. Study to benchmark costs for green or blue solar roofs to enable the comparison of the different types of design
2. Recommendations regarding alternative panel and fixing options to the standard TfL product with Pro / Con analysis
3. Review of available TfL asset information on the 40 sites
4. Completion of Building Surveyor reports to RICS current standard bearing in mind the classification of suitability for each roof
5. Simple assessment of access for construction and maintenance
6. Categorisation of the 40 sites into broad types based on construction type, condition, ranking in terms of most suitable for installation and future solar potential

Decision point: sites that may support solar PV, either in current condition or with minimal remedial works, will pass to Phase 2.

Phase 2 (see section 3.2.2)

1. Detailed safe load assessment and principal inspection of the roof and associated supports for its current and proposed future loadings; both will be undertaken by the assessor. The LU assessment report for each roof structure will comprise the following:
    i. Principle Inspection report to S1060 A9 standard (refer to Appendix B for report templates)
    ii. LU assessment report to S1061 A6 (included in Appendix B). This standard requires the following inclusions: Approval in Principle (AIP), Principal inspection proformas for a roof structure and complete set of approved category 2 checked calculations
    iii. An assessment certification
2. Maintenance concept
3. Initial risk register
4. Mechanical and electrical (M&E) surveys & reports including an update of the position in the suitability ranking
5. Site plan, outlining the access and worksites required for construction

Decision point: sites still deemed suitable for solar PV will pass to Phase 3.

Phase 3 (see section 3.2.3)

1. Solar PV design to RIBA 3 standards (without planning application work), including inverter locations, connection method and cable routing. Design to include costed options for biodiversity enhancement opportunities or blue roof where applicable.
2. Financial appraisal (see more detail in Appendix A)
3. Risk Register for project delivery
4. Solar Life Cycle Assessment (LCA)
6. Ranking of solar sites assessed based on economic assessment

Phase B (only applicable to 3 roofs requiring full replacement)

1. Basic design for 'integrated' solar PV solution including cost – i.e. one that would be implemented alongside roof replacement. TfL will select 3 sites from those discarded during the assessment process to be used as scope for this phase. The consultant will develop feasibility level designs for these sites (RIBA 2).

Due to the age and construction of the buildings, TfL envisages sites dropping out of the phased assessment process as outlined below. This is purely indicative, but the following number of sites through each stage will be used to estimate the total cost of the commission. It is highly unlikely that all the sites will reach phase 3, but consultants should be prepared to undertake this work if required. Similarly, TfL reserves the right to add more sites during the commission, up to a maximum of 100 sites.

Indicative number of buildings through phases

Phase 1: 40 buildings assessed
Phase 2: 25 buildings assessed
Phase 3: 10 buildings assessed
Phase B: 3 feasibility studies (RIBA 2) on roof integrated solar solutions for poor condition buildings.

3.2.1 **Phase 1**

Proposed Phase 1 will be applicable to all roof top sites provided by TfL (initially 40). Further sites may be added at a later stage, up to a maximum of 100.

The aim of this phase is to identify barriers / constraints to the installation of solar PV at each site. In addition the consultant will carry out a benchmark for green or blue solar roofs to enable the comparison of the different types of design and provide recommendations regarding alternative panel and fixing options to the standard TfL product. Once the sites have been assessed, the consultant will categorise them into broad types based on construction type, condition and future solar potential

The analysis of sites will be completed through an assessment of available information held by TfL and the delivery of site surveys where required. Completion of this work will allow the consultant to identify those sites that should not proceed to Phase 2 because of factors such as poor roof condition, unsuitable building structure or difficult access. It is envisaged that these factors could render solar PV installation uneconomic. Consultants are urged to propose the factors that they consider pertinent to assess whether sites should progress beyond Phase 1.

Suggested assessment criteria for Phase 1:

- Building construction and roof type: is it designated “fragile roof”? Is it envisaged that the structure will support additional loading? Is there asbestos or any other deleterious material? How are roof panels fixed? Will reinforcement be required? Assessment of remaining roof covering life.
- Roof top accessibility and space for solar panels without affecting existing walkways, skylights and other rooftop assets
- Assessment of access for construction and maintenance, including storage of materials and plant etc.
- Roof condition: are there any issues e.g. water ingress
- Signs of condensation inside building
- Date and details of last major remedial works
- Means and location of access and escape
- Fire Safety and evacuation requirements
- Frequency of inspection/cleaning for roof and other assets on roof
- Type of man safe system – date of last test (if applicable)
- Presence of lightning protection
- Current power distribution and supply (location of DNO / LU substation, distribution boards, switchgear, cable routes)
- Condition of electrical systems
- Capacity for additional cables
- Current situation regarding wildlife, in particular Seagulls which may impact on the performance of the solar panels

Some of the information above may be available through information held by TfL. Any gaps in this information will be gathered by the consultant via completion of a Building Surveyor’s report to RICS required standard. This will include visual inspections of the roof (where permitted), otherwise will be completed via other means (such as drone surveys).

Phase 1 will conclude with a review meeting (along with the deliverables) to agree which locations move to the next phase. This meeting can be programmed to enable assessment of sites in batches.

Phase 1 deliverables – for each site

1. Summary database with all the sites ranked based on the assessment criteria developed for phase 1. This document will be updated as sites progress throughout the commission. The format of this is to be agreed with TfL at the start of the commission. Consultants are welcomed to include their proposals as part of their response.
2. Site survey reports that addresses Phase 1 assessment criteria. This may include documentation, photographic evidence pack and drone survey data / video.

Phase 1 additional deliverables

1. Study to benchmark costs for green or blue solar roofs to enable the comparison of the different types of design
2. Recommendations regarding alternative panel and fixing options to the standard TfL product with Pro / Con analysis
3. Categorisation of the 40 sites into broad types based on construction type, condition and future solar potential

3.2.2 **Phase 2**

It is envisaged that Phase 2 will take the most promising sites from Phase 1 and carry out more detailed assessments of constructability, structural loading and electrical and mechanical aspects. Again, the aim to identify any barriers to solar installation at an early stage to avoid unnecessary work and therefore cost. Proposals should clearly outline the most effective means of achieving this, but suggested assessment criteria are outlined below.

Suggested assessment criteria for Phase 2:

- Detailed structural analysis that includes safe load assessment to S1061 A6 standard
- An inspection to S1060 A9 standard. The procedure to follow to achieve the desired outcome, PR0822 A1, will need to be adopted using competent assessment engineers, complying with PR0781 A1.
- Detailed mechanical and electrical (M&E) surveys that include:
    a. fixings strength calculations
    b. Solar panel connection/mounting method
    c. Cabling and connection routes
    d. Inverter location
    e. battery location (if applicable; consuming generated power by nearby assets preferred)
    f. Existing electrical installation with photographic evidence
- Site plan, outlining the access for construction and highlights any issues which may arise with respect to constructability from an access perspective, including CDM and Safety aspects.
    a. Are there any significant enabling works required – i.e. trenches/ducts for cable routes?
    b. High level access in building – are there areas which are restricted for space or by operations within it?
    c. Access road to site – are there any restrictions on width or load?
    d. Will significant temporary works (scaffolding etc.) be required – is this permissible with building operation?
    e. Is there enough space in and around building for crane (if applicable)?
    f. Does site have space for storage (if applicable)
- Maintenance concept that includes access, safe systems of work, special tool requirements and options for remote monitoring.

Phase 2 will conclude with a review meeting (along with the deliverables) to agree which locations move to the next phase. This meeting can be programmed to enable assessment of sites in batches.

Phase 2 deliverables – for each site

1. Updated summary database with relevant information from phase 2.

2. A LU assessment report for each roof structure that comprises of the following:
    i. Principle Inspection report to S1060 A9 standard (refer to Appendix B for report templates)
    ii. LU assessment report to S1061 A6, included in Appendix B for reference. This standard requires the following inclusions: Approval in Principle (AIP), Principal inspection proformas for a roof structure and complete set of approved category 2 checked calculations
    iii. An assessment certification

3. Mechanical and Electrical surveys

4. Proposed construction site plan, including access, spatial requirements and potential locations for equipment

5. Maintenance concept

6. Confirmation of useful roof area and associated yield

7. Initial risk assessment: including impact on functions within building during construction and final configuration, constructability, maintainability, impact on building structure due to fixings, consents required, high level failure mode consequence assessment

3.2.3 **Phase 3**

Proposed Phase 3 will consist of development of designs and detailed supplementary documentation for those sites that have successfully passed Phase 2. The consultant will include itemised biodiversity enhancement options for each design to allow TfL to consider the inclusion of such opportunities on a site by site basis.

Phase 3 will consist of:

- Design (commensurate with RIBA stage 3 without planning application related work) for the solar PV system (including outline structural, electrical diagrams, module mounting system details, cable route management, method and connection, inverter and battery storage locations, etc.)
    a) To ensure that TfL consumes as much of the generated power as possible, the design should consider connection/s to the most appropriate assets in the vicinity of the site. A large roof area may allow peak generation to be higher than the site consumption. Therefore the following three options should be considered as a minimum:
        a. Connection to building upon which solar install is being investigated

    b. Connection to other TfL assets including LU's private power network
    c. Connection to incorporate a battery
  b) Design to include itemised costed options for biodiversity enhancement where applicable i.e. Blue / Green solar roof types.
- Financial appraisal of updated design as outlined in Appendix A, including an OPEX cost plan (based on maintenance schedules, RAM assessments, asset population and skills)
    a. Cost of the available connection options and the single preferred solution based on economic appraisal
    b. Cost options on the biodiversity enhancement type
- Development of key project documentation
    a. Programme in Gantt format including project duration, highlighting any site access requirements / required changes to operations that the site owner will need to be aware of
    b. Equivalent to project execution plan / project management plan according to TfL Pathway governance guidelines
    c. Provide the documents needed for LU load application or DNO grid connection (as appropriate)
    d. Solar Life Cycle Assessment (LCA) should be undertaken to understand the long-term impact of the system
    e. Waste management plan should be defined to understand the long-term impact of end of system life disposal
    f. Detailed risk Assessment of developing a solar PV scheme at the site(s), and how these risks are best mitigated going forward. This work will build from the initial risk registered produced in phase 2
- Updated summary of key information for each of the sites developed during this stage, including a ranking of sites by economic assessment

Phase 3 will conclude with a review meeting (along with the deliverables) to discuss the viability of sites. This meeting can be programmed to enable assessment of sites in batches.

Phase 3 deliverables

Key deliverables for each site:

1. Design up to RIBA 3, including bio-solar options when feasible
2. Full financial appraisal
3. Key Project documentation
    a. Programme
    b. Project execution plan / project management plan
    c. Documentation for LU load application or DNO grid connection
    d. Solar Life Cycle Assessment (LCA) Report
    e. Waste Management plan
    f. Detailed risk assessment register
4. Updated summary database which addresses each of the points listed in the scope and includes a concluding section that highlights the recommended way forward for solar install. The database will also include a ranking of sites.

3.3 Information to be provided by TfL

Where appropriate or required by the consultant, TfL will make available more information, expertise and additional datasets, providing TfL agrees they would help the delivery. Requests for such information should be included within the technical bid.

Inputs from TfL to the consultant

3.3.1 Bid Documentation

TfL will provide the following documentation as part of the procurement process

- Estimate template – Appendix A
- PI templates – Appendix B
- Civils competency framework - PR0781, Appendix B
- Example of a completed Principal Inspection report, Appendix B
- Example of output from pre-feasibility used to prioritise the 40 rooftops – Appendix B

3.3.2 Information to be supplied at the start of the commission

In addition to the documentation provided during the procurement process TfL will supply the following data to be used during the commission (where available).

- Risk register log template
- GIS data
- Civils DRGs when available
- Area A & Passport to Depots training
- Our preferred Panel and fixings datasheets
- Operational Standards / Guidance
- Shortlisted sites following pre-feasibility phase
- Where applicable existing civils drawings, GIS and E&M data
- Data template

4. DELIVERABLES / MILESTONES

4.1.1 **Outputs**

TfL requires the outputs of each phase as indicated below:

- The consultant will provide TfL the results of the investigation in the format of a database (linked to GIS shape files). This will provide a summary of the findings for all sites that can be uploaded to TfL's GIS system.
- In addition the consultant will provide a folder of relevant phase-specific deliverables for each rooftop site (surveys, risk register, etc.) linked to the GIS

The final format of the key deliverables will be discussed and agreed during the initiation workshop.

4.1.2 **Reporting**

Bidders are requested to submit a template for a weekly progress report within their tender submission, but it should be noted the final progress report structure will be agreed at the inception meeting.

The reporting of progress of this commission will be carried out through:

- Weekly technical progress meetings; Consultant and members of TfL technical team will discuss progress and resolve any critical issues and specific questions emerging from the assessment process

- Monthly progress meeting between the Consultant's broader team and relevant TfL contacts; review of work done to date, review of progress report, cost forecast and programme review

Additional stakeholders will be invited to the meetings as required.

4.2 **Final deliverables**

The following table below outlines the deliverables for this commission.

ID	Deliverable for each site in scope of each phase	Relevant Phase
1a	High level research study to benchmark unit costs for green or blue solar roofs to enable the comparison of the different types of design	Phase 1
1b	Categorisation of the 40 rooftops into broad types – with a view to this study being applicable to further sites	Phase 1
1c	Recommendations regarding alternative panel and fixing options to the standard TfL product with Pro / Con analysis	Phase 1
1d	Summary database with all the sites ranked based on the assessment criteria developed for phase 1.	Phase 1
1e	Site survey reports that addresses Phase 1 assessment criteria, these may include photographic evidence pack, drone video survey, etc.	Phase 1
2a	Updated summary database with outputs from Phase 2.	Phase 2
2b	A load assessment report for each roof structure complying with LU assessment standard S1061 A6	Phase 2
2c	Principal inspection reports and associated documentation	Phase 2
2d	Per site an mechanical and Electrical Survey report, including Microstation CADs	Phase 2
2e	Proposed construction site plan	Phase 2
2f	Maintenance concept	Phase 2
2g	Confirmation of useful roof area and associated yield	Phase 2
2h	Initial risk assessment	Phase 2

3a	Design up to RIBA 3 including drawing register, GIS shapefiles for each site	Phase 3
3b	Full business case including economic appraisal of site, including CAPEX, OPEX, yield, LCA and waste management plan, etc.	Phase 3
3c	Programme for each site	Phase 3
3d	Equivalent to project execution plan / project management plan	Phase 3
3e	Documentation for LU load application or DNO grid connection as relevant for each site	Phase 3
3f	Solar Life Cycle Assessment (LCA) Report	Phase 3
3g	Waste Management plan	Phase 3
3h	Detailed risk assessment	Phase 3
3i	Updated summary database which addresses each of the points listed in the scope and includes a concluding section that highlights the recommended way forward for solar install and ranking of sites	Phase 3
B0	3 Basic designs (RIBA 2) for 'integrated' solar PV solution including cost – i.e. one that would be implemented alongside roof replacement	Phase B

4.3 **Milestones**

The phases should progress alongside each other, with the best sites from phase 1 moving through to phases 2 and 3, before completion of all phase 1 assessments.

The following key milestones and outputs have been defined for this commission:

Deadline	Description
3 September	Suppliers day
13 September	Tenders back
20 September	Contract award
30 September	Initiation workshop and start of commission
29 October	Completion of phase 1 for first 10 sites; commence phase 2
15 January	Completion of phase 1 for all sites
15 January	Completion of cost benchmarks for green, blue, brown solar roofs and categorisation of roof types
12 February	Completion of Phase 2 for all applicable sites
11 March	Completion of Phase 3 and Phase B for all applicable sites

The deadlines above are in addition to the reporting and communications requirements defined in the scope of this document.

5. TENDER SUBMISSION REQUIREMENTS

5.1 Proposed management structure

The consultant will nominate a senior member of their project team as a single point of contact to act as the contract manager, manage the proposed project team and facilitate communications during the commission.

This person will meet weekly with TfL's programme steering group to report progress, issues and risks.

5.2 Consultant resources

Proposals should identify which consultants will form the project team and the resource allocation breakdown during the consultancy period.
TfL will also evaluate the CVs in relation to the competency framework provided.

5.3 Cost estimate

The consultant is required to provide pricing for:

1) Cost per site to complete phase 1
2) Cost per site to complete phase 2
3) Cost per site to complete phase 3
4) Cost per site to complete phase B

The initial value of the commission will be calculated by multiplying the cost of assessing a site through each stage by the indicative number of sites expected to be assessed through each stage (see section 3.2).

Should TfL add further sites, the additional costs would be calculated applying the same method.

5.4 Invoicing

The Consultant will be paid on a monthly basis based on evidence of the work completed towards delivery of each site through each phase of work.

6. APPENDIX A – FINANCIAL APPRAISAL GUIDANCE

The consultant should;

1. Present all costs and revenues in April 2019 prices (i.e. no application of inflation for future years)

2. Use the green book rate of return of 3.5% for discounting cash flows

3. Provide financial calculations and outputs in excel format. The excel spreadsheet shall be transparent: formulae not hard coded; inputs, calculations and outputs clearly identifiable; format and layout follow a logical flow

4. Present the financial outputs in a simple cash flow (example attached[3]), which shall;
   a. Evaluate the costs and financial benefits of individual sites on a annual basis over a 25 year period
   b. Be split into the following categories; capital costs, operating costs, asset replacement costs and TfL avoided electricity costs (based on the electricity price forecast supplied by TfL)
   c. Calculate the following;
      1. Net cost / benefit on an annual basis
      2. Net present value (note 2 above)
      3. Internal rate of return
      4. Payback year

5. Provide a detailed breakdown of all inputs to the cash flows. Including, but not limited to;
   a. Capital costs – the cost of solar panels, structures, inverters, enabling works
   b. Operating costs – the cost of maintenance, including any additional requirements to current roof maintenance
   c. Asset Replacement costs – inverters
   d. TfL avoided electricity costs – the annual output in MWh accounting for any drops in panel efficiency, the cost avoided using TfL's cost forecasts

Simple Cash Flow Example.xlsx

[3] Note that the example is provided for illustration purposes only and the consultant may use their preferred format

7. APPENDIX B - ADDITIONAL DOCUMENTATION

- PI templates


LU Assessment Report Template


Roof Proforma Template

- Civils competency framework - PR0781


PR0781

- Example of a completed Principal Inspection report


Example PIR

- LU assessment standard S1061 A6 and S1060 A9


S1061 A6


S1060 A9

- Example of pre-feasibility output


Pre feas example output.xlsx

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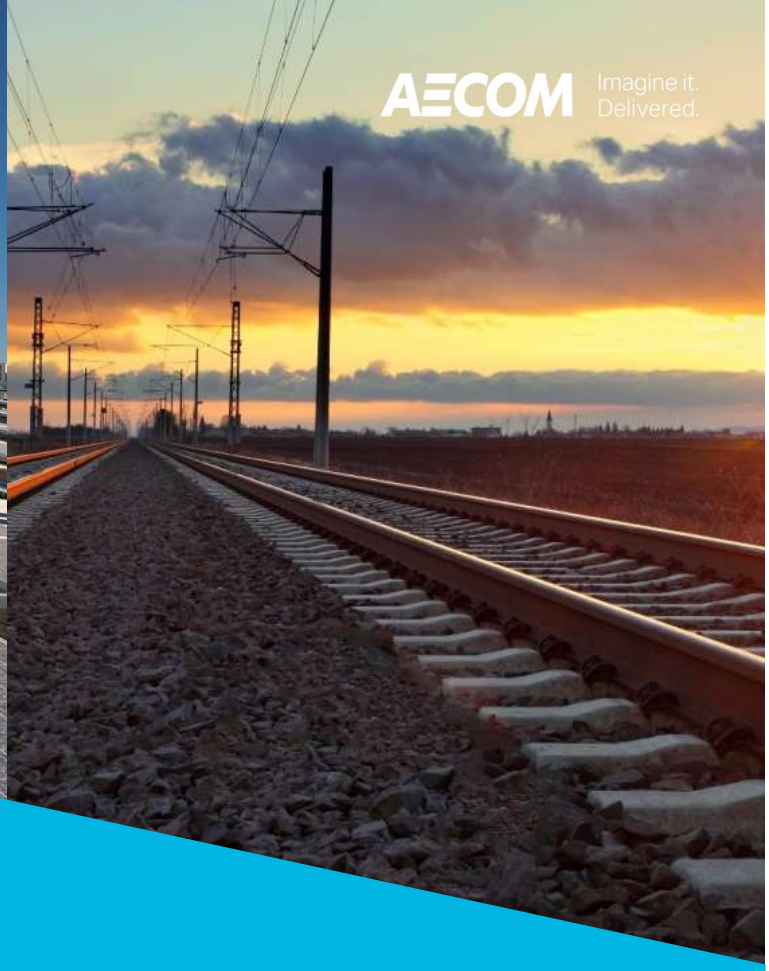

Rooftop solar feasibility study for Transport for London Estate

GLA 80814 / Task 12
Technical Submission and Methodology

For Transport for London

17 September 2019

Quality information

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