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Date: 25 September 2023

Dear National Grid Electricity System Operator Limited,

**SIF Project Direction ref:** NGESO/Scenarios for Extreme Events/SIFIESRR/Rd2\_Alpha  
National Grid Electricity System Operator Limited submitted Scenarios for Extreme Events (the Project) to be considered for funding through the Alpha Phase of round 2 of the Strategic Innovation Fund (SIF). As explained in greater detail below, this Project previously received SIF Funding and completed a Discovery Phase for round 2 of the SIF. In our<sup>1</sup> SIF Funding Decision issued on 22 September 2023, we selected the Project<sup>2</sup> for conditional funding for the round 2 Alpha Phase and as a result we are now issuing this SIF Project Direction to implement that decision.

National Grid Electricity System Operator Limited must comply with the conditions contained in this SIF Project Direction as a condition of the Project receiving funding through the SIF. These conditions can be found in the Schedule to this document.

### **Progression through SIF Phases**

The SIF consists of a multi-phase approach for Projects in order to mitigate the risk associated with innovations. The Discovery Phase focuses on feasibility, the Alpha Phase on experimental development, and the Beta Phase on deployment and demonstration.

The Project previously received SIF Funding for the round 2 Discovery Phase<sup>3</sup> and submitted an Application for the Project to be considered for SIF Funding for the round 2

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<sup>1</sup> The terms 'we', 'us', 'our' refer to the Gas and Electricity Markets Authority. Ofgem is the office of the Authority.

<sup>2</sup> Unless otherwise specified, defined terms in this SIF Project Direction have the meaning given to them in Appendix 1 of the SIF Governance Document.

<sup>3</sup> The Project Directions for round 2 of the Discovery Phase are available at: <https://www.ofgem.gov.uk/publications/strategic-innovation-fund-round-2-discovery-projects-approved-funding>

Alpha Phase of the SIF. As stated above, the Project has been selected by Ofgem to receive SIF Funding for the Alpha Phase of round 2.

### **Role of UK Research & Innovation (UKRI)**

As per Chapter 1 of the SIF Governance Document<sup>4</sup> the role of UKRI is to deliver the SIF in line with the SIF Governance Document - administering the funding programme, monitoring the delivery of Projects, collating data from Projects on benefits, making recommendations to Ofgem on operational matters, supporting third-party innovators and, where possible, successful Projects to become 'business as usual' activities. To support the success of the Projects and the SIF programme, we expect that the Funding Party and Project Partners collaborate with Ofgem and UKRI.

### **SIF Project Direction**

Paragraph 5.14 of the SIF Governance Document states that a SIF Project Direction will:

- Set out the Project-specific conditions, to which the Funding Party is committing in accepting SIF Funding.<sup>5</sup>
- Require the Funding Party to undertake the Project in accordance with the commitments made in the Application. Where appropriate, the SIF Project Direction may therefore include extracts from the Application or refer to specific sections of the SIF Application.<sup>6</sup>
- Where applicable, set out conditions (such as Project stage gates) linked to milestones and deliverables, which Projects must meet.<sup>7</sup>
- Set out the SIF Approved Amount for the Project, that will form part of the calculation contained in the SIF Funding Direction issued by the Authority under chapter 7 of the SIF Governance Document.<sup>8</sup>
- Set out the Project budget that the Funding Party must report against and how variations in the Project budget will be reported.<sup>9</sup>
- Where applicable, set out special information sharing requirements applicable to the Project.<sup>10</sup>
- Set out the mechanism for the Funding Party receiving the SIF Approved Amount as set out in the SIF Funding Direction.<sup>11</sup>

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<sup>4</sup> <https://www.ofgem.gov.uk/publications/sif-governance-document>

<sup>5</sup> 'Project specific conditions' detailed under Point 3 – 'Condition President' of this SIF Project Direction.

<sup>6</sup> 'Project specific conditions' detailed under Point 3 – 'Condition President' of this SIF Project Direction.

<sup>7</sup> 'Project specific conditions' detailed under Point 3 – 'Condition President' of this SIF Project Direction.

<sup>8</sup> 'SIF Funding Amount' detailed under Point 5 – 'Condition President' of this SIF Project Direction.

<sup>9</sup> Annex 1 – Project Budget.

<sup>10</sup> 'Project specific conditions' detailed under Point 3 – 'Condition President' of this SIF Project Direction.

<sup>11</sup> 'SIF Funding Amount' detailed under Point 5 – 'Condition President' of this SIF Project Direction.

All SIF Project Direction requirements are detailed in the Schedule to this SIF Project Direction.

### **Decision**

Provided the Funding Party complies with the SIF Governance Document and with the Schedule to this SIF Project Direction, the Project is deemed to be an Eligible SIF Project<sup>12</sup>.

This SIF Project Direction constitutes notice pursuant to section 49A (Reasons for decisions) of the Electricity Act 1989.

**Marzia Zafar**

**Deputy Director, Decentralisation & Digitalisation**

**For and on behalf of the Authority**

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<sup>12</sup> The meaning 'Eligible SIF Project' is described in Chapter 2 of the SIF Governance Document.

## Schedule to SIF Project Direction

### 1. PROJECT DETAILS

SIF Project Direction reference: NGESO/Scenarios for Extreme Events/SIFIESRR/Rd2\_Alpha

Application number: 10078787

Project title: Scenarios for Extreme Events

Innovation Challenge/Project Phase: Improving energy system resilience and robustness / Alpha Phase round 2

Project start date: 01 October 2023

Project end date: 31 March 2024

SIF Approved Amount for SIF Funding: £457,899.00

### 2. PREAMBLE

This SIF Project Direction is issued by the Gas and Electricity Markets Authority (the "Authority") to National Grid Electricity System Operator Limited (the "Funding Party") pursuant to the SIF Governance Document issued pursuant to Special Condition 3.4 of the Electricity Transmission Licence (the "Licence"). It sets out the conditions to be complied with in relation to Scenarios for Extreme Events (the "Project") as a condition of it being funded under the SIF Funding Mechanism.<sup>13</sup>

Unless otherwise specified, defined terms in this SIF Project Direction have the meaning given to them in the Licence or Appendix 1 of the SIF Governance Document.

References to specific sections of the Funding Party's Application in this SIF Project Direction are, for ease of reference, made by referring to the section number in the Funding Party's Application.

### 3. PROJECT SPECIFIC CONDITIONS

In accepting funding for the Project, the Funding Party is subject to the following Project-specific condition(s):

#### **Condition 1**

The Funding Party must not spend any SIF Funding until contracts are signed with the Project Partners named in Table 1 for the purpose of completing the Project.

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<sup>13</sup> The SIF Funding Return Mechanism is defined in the SIF Governance Document.

**Table 1. Project Partners**

SCOTTISH HYDRO ELECTRIC TRANSMISSION PLC
UNIVERSITY OF STRATHCLYDE
MET OFFICE
FRAZER-NASH CONSULTANCY LIMITED
CADENT GAS LIMITED
NATIONAL GAS TRANSMISSION PLC

**Condition 2**

The Funding Party must report on the financial contributions made to the Project as set out in its Application. Any financial contributions made over and above that stated in its Application should also be reported and included within the Project costs template.

**Condition 3**

The Funding Party must make reasonable endeavours to participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and DESNZ during the Alpha Phase.

**Condition 4**

The Funding Party must provide to its monitoring officer by the end of the Alpha Phase a clarification as to under what specific circumstances the Project's anticipatory assessment would be utilised by the Funding Party. As part of this, the Funding Party must include details on how the proposed assessment focus compares to existing processes or methods and the additional capabilities or tools the proposed solution is expected to provide in these scenarios.

**Condition 5**

The Funding Party must provide to its monitoring officer by the end of the Alpha Phase an explanation of how the interdependencies with other infrastructure networks will be explored and incorporated into the proposed model. As part of this, the Funding Party must also include an explanation as to how the proposed model would incorporate changes or fluctuations in these networks to ensure that the proposed model can evolve as it progresses.

#### **4. COMPLIANCE**

The Funding Party must comply with Special Condition 3.4 of the Electricity Transmission Licence (the “Licence”), the SIF Governance Document and with this SIF Project Direction.

#### **5. SIF APPROVED AMOUNT**

The SIF Approved amount of £457,899.00 (as detailed under Section 1: Project details of this Project Direction) will be recovered by National Grid Electricity System Operator from GB customers and transferred to the Funding Party. The Funding Party is responsible for notifying National Grid Electricity System Operator of the bank account details to which transfers must be made, in addition to completing Annex 2 of this SIF Project Direction. If a Funding Party is required to return funding to National Grid Electricity System Operator, the reverse applies. The Funding Party must provide bank account details to National Grid Electricity System Operator within two weeks of accepting this SIF Project Direction.

#### **6. PROJECT BUDGET**

The Project Budget is set out in Annex 1 of this SIF Project Direction.

The Funding Party must report on expenditure against each line under the category total in the Project Budget and explain any projected variance against each line as part of its detailed report which will be provided, in accordance with Chapter 7 of the SIF Governance Document. The Funding Party must report variations in the Project budget as outlined in Chapter 6 of the SIF Governance Document.

#### **7. PROJECT IMPLEMENTATION**

The Funding Party must undertake the Project in accordance with the commitments it has made in the Application and with the conditions of this SIF Project Direction. These include (but are not limited to) the following:

- (i) undertake the Project in accordance with its Application,
- (ii) complete the Project on or before the Project completion date as detailed under section 1 of the schedule of this SIF Project Direction, and
- (iii) disseminate the learning from the Project at least to the level described in chapter 3 of the SIF Governance Document. Dissemination of learning must be carried out whether the Project was concluded successfully or otherwise.

## **8. REPORTING**

Ofgem and UKRI may issue guidance (and amend it from time to time) about the structure and content of the Project reporting required by Chapter 6 of the SIF Governance Document. The Funding Party must follow this guidance in preparing the reports.

As set out in chapter 6 of the SIF Governance Document, the Funding Party may be required to submit an end of Phase report to the UKRI monitoring officer for the round 2 Alpha Phase. An end of Phase report is required for the round 2 Alpha Phase if the Project is not planning on submitting an Application to the round 2 Beta Phase and, if the Funding Party submits an Application for the Project for the round 2 Beta Phase but is not successful. Within this report, the Funding Party must submit information related to questions on Project delivery as detailed in chapter 6, table 6 of the SIF Governance Document.

## **9. MONITORING**

The Funding Party must comply with any reasonable request for information by its monitoring officer at UKRI and related deadlines. Ofgem, with the support of UKRI, will together monitor Project delivery, impacts and benefits. Throughout the term of the Project, progress is monitored by UKRI through a monitoring officer. The monitoring officer is the first point of contact for official notifications, queries and correspondence with UKRI and the Authority, unless otherwise required by this SIF Project Direction.

As detailed in Chapter 6 of the SIF Governance Document, meetings with the monitoring officer will take place at regular intervals, as advised by Ofgem or the monitoring officer during the delivery of the Project, and at the end of each Project Phase.

## **10. EVALUATION**

The Funding Party has acknowledged when it submitted its Application for this Project, that reporting information and data gathered during the Project's timescales (as detailed in Section 1 of this SIF Project Direction) will be used to evaluate Project performance. In addition, the Funding Party may be required to provide requested information outside of the Project timescales and, in particular, for the period from the Project end date to the end of the SIF Programme. Further data and reporting information may be requested (frequency and method based on requirement) outside of standard monitoring and reporting requirements as deemed necessary. Further data and information requirements must be complied with by the Funding Party and Project Partners.

## 11. DATA SHARING

As set out in Chapter 3 of the SIF Governance Document, the Funding Party must follow Data Best Practice Guidance with regards to all data gathered or created in the course of a Project. We expect the Funding Party to document any reasons, such as commercial sensitivities, for desensitising data. As defined by, and in accordance with, Data Best Practice Guidance, Funding Parties must have a data triage process. Where multiple Project Partners are collaborating on a Project, the consortium must adopt a consistent Open Triage Process for the data related to the Project. Ofgem may require that Project information and data is also shared with other specified parties, such as parties working on complementary innovation funding programmes (subject to redaction of sensitive data).

## 12. CYBER SECURITY

It is the responsibility of the Funding Party and all Project Partners to implement and maintain appropriate security measures to protect personal data in accordance with The GDPR (General Data Protection Regulation)<sup>14</sup> and DPA (Data Protection Act) 2018<sup>15</sup>. Protection of computer systems from unauthorised access or being otherwise damaged or made inaccessible must be in place alongside effective working practices. These must be maintained in line with the Funding Party's IT Management Strategies and policies.

## 13. PROJECT MILESTONES

The Funding Party must provide an outline in its end of Project Phase meeting with its UKRI monitoring officer that verifies the Project milestones have been achieved or explains why they have not.

Project milestones are outlined below in Table 3, based upon details contained within Question 7 and Appendix Question 9 in the Funding Party's.

<sup>14</sup> [https://ec.europa.eu/info/law/law-topic/data-protection/data-protection-eu\\_en](https://ec.europa.eu/info/law/law-topic/data-protection/data-protection-eu_en)

<sup>15</sup> <https://www.legislation.gov.uk/ukpga/2018/12/contents/enacted>



**Table 3. Project milestone<sup>16</sup>**

Reference	Project milestone	Deadline	Overall objectives and key tasks	Summary of milestones	SIF Funding Request
Milestone 1	Basis of design	31 March 2024	<p>Overall Work Package Objectives:</p> <ol style="list-style-type: none"> <li>1. Develop a common definition of requirements a future model needs to satisfy.</li> <li>2. Develop a common definition of how a future model will be used.</li> </ol> <p>Key Tasks:</p> <ol style="list-style-type: none"> <li>1. Initial workshop preparation to outline the “strawman” approach to be developed, building on Discovery phase results.</li> <li>2. In person workshop with all project partners to:</li> <li>3. Establish model users and use cases</li> <li>4. Agree modelling requirements</li> <li>5. Agree modelling philosophy</li> </ol>	<p>M1: Basis of Design report (£20,800.00).</p> <p>M2: Basis of design contribution and review (£29,135.00).</p> <p>M3: Basis of design contribution and review (£8,442.00).</p> <p>M4: Basis of design contribution and review (£10,000.00).</p>	£68,377.00

<sup>16</sup> As outlined in in the Application or Project Plan appendix.

			6. Agree modelling outputs 7. Capture workshop output in a basis of design report, to be reviewed and commented on by project partners.		
Milestone 2	Information Collation and Scenario Building	31 March 2024	Overall Work Package Objectives: 1. Understand existing data sources / existing network models that could be leveraged as inputs for the representation. 2. Identify data sources for historic events and future conditions. 3. Identify, classify and categorise event information that will be used to understand expected impacts of extreme events. 4. Develop a conceptual model of the GB Energy system, using a modular block-diagram approach with dependency logic capturing key interactions between different energy vectors and other key infrastructures, e.g. telecommunications.	M1: Information collation and scenario building (£29,135.00).  M2: Information collation and scenario building (£29,500.00).  M3: Cadent Gas - SME input (£4,050.00).  M4: National Gas Transmission - SME input (£4,980.00).  M5: SSEN transmission - SME input (£4,354.00).	£115,798.00

			<p>Key Tasks:</p> <ol style="list-style-type: none"> <li>1. Investigate use of existing available models currently used by the networks being developed by other projects in the Innovation Challenge: 'Improving Energy System Resilience and Robustness'.</li> <li>2. Develop archetypal weather scenarios that can be used in a future model (include mapping of different severities and spatial extents)</li> <li>3. Develop archetypal non-weather scenarios that can be used in a future model (include scaling parameters of severity)</li> <li>4. Conduct workshops with network operators to understand asset classes, enablers and dependencies.</li> <li>5. Understand system recovery responses and existing approaches.</li> </ol>	<p>M6: Information collation and scenario building (£33,779.00).</p> <p>M7: Information collation and scenario building (£10,000.00).</p>	
Milestone 3	Development of inter-network dependencies	31 March 2024	<p>Overall Work Package Objectives:</p> <p>Develop the required methodology for mapping cross-sector dependencies</p>	<p>M1: Development of inter-network dependencies (£20,000.00).</p>	£38,361.00

	and resilience measures		<p>across the energy systems and other supporting utilities</p> <p>Key Tasks:</p> <ol style="list-style-type: none"> <li>1. Build upon risk assessment framework (developed in Discovery) to capture the impact characteristics of event types.</li> <li>2. Develop a Model Based System Engineering (MBSE) representation of the GB energy system</li> <li>3. Identify and explore cascade failure risks and pathways</li> <li>4. Define and develop suite of impact scores associated with system failures</li> <li>5. Identification and development of resilience measures and metrics.</li> </ol>	<p>M2: Development of inter-network dependencies (£8,361.00).</p> <p>M3: Development of inter-network dependencies (£10,000.00).</p>	
Milestone 4	Prototype model development	31 March 2024	<p>Overall Work Package Objectives:</p> <ol style="list-style-type: none"> <li>1. Agree upon an exemplar region / area to be modelled as a test case</li> <li>2. Define the scenario(s) to be assessed within the model as a test case</li> </ol>	<p>M1: Prototype model development (£83,000.00).</p> <p>M2: Contribution and support to prototype model development (£29,135.00).</p>	£150,419.00

			<p>3. Develop a prototype model capable of representing and exemplar region subject to a defined scenario</p> <p>4. Develop a modular representation of the exemplar region within an agreed software package (e.g. Simulink)</p> <p>Key Tasks:</p> <p>1. Workshops to be held with ESO, FNC, Met Office, UoS to review and agree a modular modelling approach.</p> <p>2. Development of prototype model to represent an exemplar region.</p> <p>3. Capture learning and development plan to further develop model in Beta phase.</p>	<p>M3: Contribution and support to prototype model development (£13,284.00).</p> <p>M4: Contribution and support to prototype model development (£25,000.00).</p>	
Milestone 5	Project value and benefits analysis	31 March 2024	<p>Overall Work Package Objectives:</p> <p>To present the value case for developing a Scenario of Extreme Events model</p> <p>Key Tasks:</p> <p>Postulate a number of scenarios of varying degree of impact.</p>	<p>M1: Project value and benefits analysis (£23,585.00).</p>	£23,585.00

Milestone 6	Project management and communications	31 March 2024	<p>Overall Work Package Objectives:</p> <ol style="list-style-type: none"> <li>1. Maintain regular communication across the project team, monitoring progress against plan and addressing risks and issues that may arise through delivery</li> <li>2. Satisfy UKRI reporting requirements.</li> <li>3. Support wider project communications – e.g. show and tell</li> </ol> <p>Key Tasks:</p> <ol style="list-style-type: none"> <li>1. Weekly catch-up meetings with core delivery team</li> <li>2. Monthly progress update meetings with wider network partners</li> <li>3. • Coordination and tracking of project deliverables</li> </ol>	<p>M1: ESO Management of project (£15,342.00).</p> <p>M2: Mid point review (£20,000.00).</p> <p>M3: Project completion (£22,000.00)</p> <p>M4: Project delivery management (£4,017.00).</p>	£61,359.00
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#### **14. USE OF LOGO**

The Funding Party and the Project Partners, External Funders and Project Supporters or subcontractors<sup>17</sup> must not use the Innovate UK/UKRI and/or Ofgem logo for purposes associated with the Project in any circumstances.

As an alternative for use of both Ofgem and UKRI logos, all external Project communications must include the following standard form of wording:

- (i) "this project is funded by network users and consumers under the Strategic Innovation Fund, an Ofgem programme managed in partnership with UKRI."

For additional guidance, refer to the communications and media guidelines for competition winners, detailed as part of your delivery pack. These guidelines are designed to help with some suggestions and encourage you to take a proactive approach to communicating about your Project.

#### **15. SHARING OF LESSONS LEARNED**

The Funding Party is required to ensure that the sharing of lessons learned and the facilitation of knowledge transfer is conducted as effectively as possible, to ensure that all parties, and therefore all consumers including future consumers, can benefit from Projects.

As contained within Chapter 3 of the SIF Governance Document, we require the Funding Party to work collaboratively to maintain the ENA Smarter Networks Portal so that all reporting and dissemination of learnings on Projects (as required by chapter 6 of the SIF Governance Document) is available via the ENA Smarter Networks Portal.

#### **16. COLLABORATION**

The Funding Party must collaborate with third-party innovators as Project Partners, as well as work closely with other parties in the energy supply chain, as set out in Chapter 3 of the SIF Governance Document.

The Funding Party must collaborate with other parties and with UKRI to organise an annual conference in a format appropriate to enabling the building of consortiums and disseminating learning widely. The conference may be a single event for gas and electricity, or more than one event, as appropriate.

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<sup>17</sup> As detailed in the Application.

## **17. AMENDMENT OR REVOCATION**

As set out in Chapter 7 of the SIF Governance Document, this SIF Project Direction may be amended or revoked under the following circumstances:

- (i) if the Funding Party considers that there has been a material change in circumstance that requires a change to the SIF Project Direction, and the Authority agrees; or
- (ii) to reflect amendments made to the Licence.

## **18. HALTING OF PROJECTS**

This SIF Project Direction is subject to the provisions contained in Chapter 7 of the SIF Governance Document relating to the halting of Projects. By extension, this SIF Project Direction is subject to any decision by the Authority to halt the Project to which this SIF Project Direction relates and to any subsequent relevant SIF Funding Direction issued by the Authority pursuant to Special Condition 3.4 of the Electricity Transmission Licence (the "Licence").

Further to the requirements in Chapter 7 of the SIF Governance Document, in the event the Authority decides to halt the Project, to which this SIF Project Direction relates, the Authority may issue a statement to the Funding Party clarifying the effect of that halting decision as regards to the status and legal force of the conditions contained in this SIF Project Direction.

### **NOW THEREFORE:**

In accordance with the SIF Governance Document issued pursuant to Special Condition 3.4 of the Electricity Transmission Licence (the "Licence") of the Licence the Authority hereby issues this SIF Project Direction to the Funding Party in relation to the Project.

This constitutes notice of reasons for the Authority's decision pursuant to section 49A (Reasons for decisions) of the Electricity Act 1989.

Failure to comply with the conditions of this SIF Project Direction means that Ofgem may treat all or part of the SIF Approved Amount received by the Funding Party as SIF Disallowed Expenditure.



## ANNEX 1: PROJECT BUDGET

SIF Project Direction costs	
Cost Category	Total Project costs (£)
Labour	497,559
Materials	0
Subcontracting	0
Travel and subsistence	10,700
Other costs	723
<b>Total</b>	<b>£508,982</b>

Project Partner	Total project costs (£)	Project contribution (£)	Total SIF Funding requested (£)	Project contribution (%)
NATIONAL GRID ELECTRICITY SYSTEM OPERATOR LIMITED	£78,158.00	£7,816.00	£70,342.00	
SCOTTISH HYDRO ELECTRIC TRANSMISSION PLC	£4,838.00	£484.00	£4,354.00	
University of Strathclyde	£97,328.00	£9,923.00	£87,405.00	
Met Office	£75,972.00	£8,089.00	£67,883.00	
FRAZER-NASH CONSULTANCY LIMITED	£243,206.00	£24,321.00	£218,885.00	
CADENT GAS LIMITED	£4,500.00	£450.00	£4,050.00	
National Gas Transmission PLC	£4,980.00	£-	£4,980.00	
<b>Total</b>	<b>£508,982.00</b>	<b>£51,083.00</b>	<b>£457,899.00</b>	<b>11%</b>

**ANNEX 2 TO SCHEDULE: TEMPLATE OF BANK ACCOUNT DETAILS TO BE PROVIDED TO EITHER NGT ([BOX.GSOSETTLEMENTS@NATIONALGRID.COM](mailto:BOX.GSOSETTLEMENTS@NATIONALGRID.COM)) OR NG ESO ([revenue.invoice@nationalgrideso.com](mailto:revenue.invoice@nationalgrideso.com))**

**Company name:**

**Primary Contact Details (only one contact permitted)**

First Name:

Last Name:

Email address:

Mobile phone number:

Work phone number:

**Address details**

Address name:

Street address:

City:

State / region:

Post code:

PO box: (if applicable)

PO box post code: (if applicable)

**Banking details**

These should be evidenced in non-editable format. The evidence provided must show company name and bank details and it should be dated within the last 6 months.

Any of the below documents will suffice:

- Bank statement (scanned document)
- Void cheque
- Paying in slip
- Screenshot of online banking (showing a logged in account with bank account and sort code, with browser visible)