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Document Details

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Author	[redacted]
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Name	[redacted]
Email	[redacted]
Company Name	DFID
Job Title	Procurement Manager
Contact Number	[redacted]
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Wed, 01 Nov 2017 [redacted]	The Document was Signed by **All Parties**
Wed, 01 Nov 2017 [redacted]	[redacted] Signed the Document

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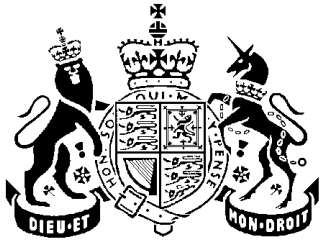


Secretary of State for International Development

- and -

AECOM Ltd

FRAMEWORK AGREEMENT
Contract Number: DIOCB1/073

Relating to Principal Support Providers

Within the Defence Infrastructure Organisation

TASK ORDER

In relation to
PO 8108 - Installation of IT upgrade and solar power backup systems for Ghana Forestry Commission – Phase C

Department for International Development
Abercrombie House
Eaglesham Road
East Kilbride
G75 8EA

October 2017

THIS DEED is made the ....27th..... day of October 2017

BETWEEN

(1) **Secretary of State for International Development** of Abercrombie House, Eaglesham Road, East Kilbride, Glasgow, G75 8EA (the "Employer"); and

(2) AECOM Limited (Company Number 1846493) of/whose registered address is at Saint George's House, 5 Saint George's Road, Wimbledon, London SW19 4DR (the "Consultant").

BACKGROUND

(A) The Secretary of State for Defence ("the AUTHORITY") selected service providers including the Consultant as Principal Support Providers for mult-disciplinary construction design and project management services overseas

(B) The Consultant undertook to provide the same on the terms set out in a framework agreement number **DIOCB1/073 dated 25 July 2017** (the Framework Agreement).

(C) The AUTHORITY has established a number of framework agreements, including the Framework Agreement, in consultation with and for the benefit of public sector bodies. The AUTHORITY has overall responsibility for the management of those framework agreements.

(D) The AUTHORITY and the Consultant agreed that public sector bodies may enter into contracts with the Consultant in the manner provided for in the Framework Agreement.

(E) The Employer is such a public sector body and has been granted rights by the AUTHORITY in accordance with the Contracts (Rights of Third Parties) Act 1999 to enter into a contract under the Framework Agreement pursuant to an order served by the Employer on the Consultant. In the Framework Agreement, the Employer is identified as Employer.

(F) The Employer served a Task Order for services on the Consultant dated 21st October 2016 in relation to the design and site installation of solar panels and associated equipment supplied by the Employer; design and construction of civil and electrical engineering works associated with the installation of the solar panels, all as more particularly described in the Scope annexed to this agreement.

(G) The Consultant accepted the Task Order and hereby duly executes this contract.

IT IS AGREED AS FOLLOWS:

1. Definitions and Interpretation

1.1 The contract means this agreement together with the terms and conditions attached at Schedule 1 to the Framework Agreement as those terms and conditions are supplemented, modified and amended as set out in the Contract Data annexed to and forming part of this agreement.

1.2 "Appendix" means an appendix annexed to this agreement.

1.3 Terms for which no interpretation is provided in this agreement shall have the meaning ordinarily given to them by the legal profession where appropriate but otherwise shall be interpreted in accordance with their dictionary meaning.

2. Entire Agreement

This contract is the entire agreement between the Parties in relation to the services and supersedes all prior representations, arrangements, understandings, agreements, statements, representations or warranties (whether written or oral) relating thereto.

3. Sub-Contracting

The Consultant and the Employer agree that, notwithstanding clause 24 of the *conditions of contract* attached at Schedule 1 to the Framework Agreement, the whole of the service may be subcontracted to the Approved Sub-Consultant.

Signed for and on behalf of the EMPLOYER

By : ……..

Name :……..

Title : Authorised signatory

Date : ……..

Signed for and on behalf of the CONSULTANT

By : ……..

Name :……..

Title : Authorised signatory

Date : ……..

APPENDIX A - CONTRACT DATA

PART ONE – Data provided by the *Employer*

Statements given in all Contracts

1 General **The *conditions of contract* are** the conditions attached at **Schedule 1** (including the additional conditions of contract set out in Contract Schedule B) to the Framework Agreement subject to the following modifications, amendments and supplementary provisions agreed by the Parties and specific to this contract:-

- ***In the said conditions of contract attached to Schedule 1 to the Framework Agreement, the following clauses shall not apply and are deleted:***

26G	Security Measures	*Delete Not used*
26J	Accounting for the Property of the Employer	*Delete Not used*
26N	Fair Employment (Northern Ireland) Act 1989	*Delete Not used*
X4	Parent company guarantee	*Delete Not used*
X13	Performance bond	*Delete Not used*
Z13	Official Secrets	*Delete Not used*
Z35	Performance Bond	*Delete Not used*
Z39	Copyright	*Delete Not used*
Z41	Employer's Property	*Delete Not used*
Z42	Security Measures	*Delete Not used*
Z43	Access to MOD Sites	*Delete Not used*
Z44	Criminal Records Bureau	*Delete Not used*
Z45	Contractors on Deployed Operations	*Delete Not used*

- ***The following additional clauses shall apply:***

Option Z 1A		**Identified and Defined Terms**
Supplementary to the *conditions of contract* clause 11	11.2(57)	The Defects Certificate is either a list of Defects that the Employer has notified before the defects date which the Consultant has not corrected or, if there are no such Defects, a statement that there are none.
	11.2(58)	Equipment is items provided by the Consultant and used by him to Provide the *services* and which the Scope does not require him to include in the *services*.
	11.2(59)	Plant and Materials are items intended to be included in the *services*.
	11.2(60)	The Site is the area within the boundaries of the site and the volumes above and

below it which are affected by work included in this contract.

11.2(61) Site Information is information which

- describes the Site and its surroundings and
- is in the documents which the Contract Data states it is in.

11.2(62) The Working Areas are those parts of the working areas which are

- necessary for Providing the *services* and
- used only for the works in this contract

11.2(63) Approved Sub-Consultant is Theodore Willie Intertrade GmBH, their sub-sub-consultant employee or agents.

11.2(64) Sub-Contract is the sub-contract entered into or to be entered into between the Approved Sub-Consultant and the *Consultant* for the performance of works and services in relation to the project.

Option Z 3A **Providing the Services**

Supplementary to the *conditions of contract* clause 21

21.3 In line one, delete "Without prejudice to" and replace with "*Notwithstanding*".

21.15 Insert new clause 21.15:

"The *Employer* may use and copy the *Consultant's* design for any purpose connected with construction, use, alteration or demolition of the project unless otherwise stated in the Scope and for other purposes as stated in the Scope."

21.16 Insert new clause 21.16:

"Where the *Consultant* is in breach of this contract which causes loss or damage to the *Employer*, then to the extent that such breach is caused or contributed to by any act, failure, no-performance or breach under the Sub-Contract by the Approved Sub-Consultant, the *Consultant*'s liability to the *Employer* in respect of such breach by the *Consultant* shall be limited to the extent that the *Consultant* is able to recover costs

loss or damages, exercising reasonable endeavours, from the Approved Sub-Consultant pursuant to the Sub-Contract, subject to the recovered costs, losses and or damages being paid to the Employer without deduction. This is without prejudice to any provision in this contract limiting the *Consultant's* total liability to the *Employer*"

21.17 Insert new clause 21.17:

"If the Approved Sub-Consultant makes a claim alleging a breach of the Sub-Contract by the *Consultant*, the *Consultant* shall immediately inform the *Employer* and, subject to any authorisation or direction by or on behalf of the *Employer*, take such action as may be necessary either to settle the claim or to defend it in proceedings and pay the amount of any settlement, decision, award or judgement including any costs agreed to be paid by the *Consultant* or awarded against it."

21.18 Insert new clause 21.18:

"The *Consultant* or its sub-consultant will inspect the Site before and during the performance of the *Services* and will take reasonable steps to ensure the Site is suitable for work to take place. If following such inspection the *Consultant or its sub-consultant* considers the Site is unsafe for the purposes of performing the *Services*, the *Consultant* or its sub-consultant will notify the *Employer*. The *Consultant* reserves the right not to enter the Site if the *Consultant* or its sub-consultant deems the Site unsafe. The *Consultant* or its sub-consultant will not be responsible in the event that there are time delays, changes or charges required in order to satisfy these safety requirements in line with the tolerances to pricing set out in Appendix D."

21.19 Insert new clause 21.19:

"Notwithstanding any other provision in this contract to the contrary, nothing in the contract shall be construed as imposing on the *Consultant* any obligation for fitness for purpose in relation to performance of the *service* and installation of any works

comprised in the *service*."

Option Z 9A **Access to and use of the Site**

35.1 The Employer provides access to and use of each part of the Site to the Consultant which is necessary for the work included in this contract. Access and use is allowed on or before the later of its *access date* and the date for access shown on the Accepted Programme.

Option Z 9B **Take Over**

36.1 The Employer need not take over the works before the Completion Date if it is stated in the Contract Data that he is not willing to do so. Otherwise the Employer takes over the works not later than two weeks after Completion.

36.2 The Employer may use any part of the works before Completion has been certified. If he does so, he takes over the part of the works when he begins to use it except if the use is

- for a reason stated in the Scope or
- to suit the Consultant's method of working.

36.3 The Employer certifies the date upon which the Employer takes over any part of the works and its extent within one week of the date.

Option Z 9C **Testing and Defects**

<u>Testing and Inspections</u>

37.1 This clause only applies to tests and inspections required by the Scope or the applicable law

37.2 The *Consultant* and the *Employer* provide materials, facilities and samples for tests and inspections as stated in the Scope.

37.3 The Consultant and the Employer each

notifies the other of each of his tests and inspections before it starts and afterwards notifies the other of its results. The Consultant notifies the Employer in time for a test or inspection to be arranged and done before doing work which would obstruct the test or inspection. The Employer may watch any test done by the Consultant.

37.4 If a test or inspection shows that any work has a Defect, the Consultant corrects the Defect and the test or inspection is repeated.

37.5 The Employer does his tests and inspections without causing unnecessary delay to the work or to a payment which is conditional upon a test or inspection being successful. A payment which is conditional upon the Employer's test or inspection being successful becomes due at the later of the defects date and the end of the last defect correction period if the Employer has not done the test or inspection and the delay to the test or inspection is not the Consultant's fault.

37.6 The Employer assesses the cost it incurred in repeating a test or inspection after a Defect is found. The Consultant pays the amount assessed.

Testing and inspection before delivery

37.7 The Consultant does not bring to the Working Areas those Plant and Materials which the Scope states are to be tested or inspected before delivery until the Employer has notified the Consultant that they have passed the test or inspection.

Search for and notifying Defects

37.8 Until the defects date, the Employer may instruct the Consultant to search for a Defect. He gives his reason for the search with his instruction. Searching may include

- uncovering, dismantling, re-covering and re-erecting work,
- providing facilities, materials and samples for tests and inspections done by the Employer and.
- doing tests and inspections which

the Works Information does not require.

37.9 Until the defects date, the Employer notifies the Consultant of each Defect as soon as he finds it and the Consultant notifies the Employer of each Defect as soon as he finds it.

Correcting Defects

37.10 The Consultant corrects a Defect whether or not the Employer notifies him of it.

37.11 The Consultant corrects a notified Defect before the end of the defect correction period. The defect correction period begins at Completion for Defects notified before Completion and when the Defect is notified for other Defects.

37.12 The Employer issues the Defects Certificate at the later of the defects date and the end of the last defect correction period. The Employer's rights in respect of a Defect which the Employer has not found or notified are not affected by the issue of the Defects Certificate.

37.13 The Employer allows the Consultant access to and use of a part of the works which the Employer has taken over if they are needed for correcting a Defect. In this case the defect correction period begins when the necessary access and use have been provided.

Accepting Defects

37.14 The Consultant and the Employer may each propose to the other that the Scope should be changed so that a Defect does not have to be corrected.

37.15 If the Consultant and the Employer are prepared to consider the change, the Consultant submits a quotation for reduced Prices or an earlier Completion Date or both to the Employer for acceptance. If the Employer accepts the quotation, he gives an instruction to change the \scope, the Prices and the Completion Date accordingly.

Uncorrected Defects

37.16 If the Consultant is given access in order to correct a notified Defect but he has not corrected it within its defect correction period, the Employer assesses the cost to it of having the Defect corrected by other people and the Consultant pays this amount. The Scope is treated as having been changed to accept the Defect.

37.16 If the Consultant is not given access in order to correct a notified Defect before the defects date, the Employer assesses the cost to the Consultant of correcting the Defect and the Consultant pays this amount. The Works Information is treated as having been changed to accept the Defect.

Option Z 11A

Compensation Events

Supplementary to the *conditions of contract* clause 60

60.1(10) The Employer gives an instruction for dealing with an object of value or of historical or other interest found within the Site.

60.1(11) The Employer instructs the Consultant to search for a Defect and no Defect is found unless the search is needed only because the Consultant gave insufficient notice of doing work obstructing a required test or inspection.

60.1(12) A test or inspection done by the Employer causes unnecessary delay.

60.1(13) The Consultant encounters physical conditions within the Site which is not weather conditions and which an experienced Consultant would have judged at the Contract Date to have such a small chance of occurring that it would have been unreasonable for him to have allowed for them. Only the difference between the physical conditions encountered and those for which it would have been reasonable to have allowed is taken into account in assessing a compensation event.

60.1(14) Unusual weather conditions; unusual in the sense that such weather condition has not, by comparison, occurred within the Site in the past 5years.

60.1(15) An event which is an Employer's risk stated in this contract.

60.1(16) The Employer certifies takeover of a part of the works before both Completion and the Completion Date.

60.1(17) Any act, omission, failure or non-performance by the Approved Sub-Consultant; or any accidental loss or damage to the *works* or Plant & Materials which

- stops the Consultant completing the services or
- delays or stops the Consultant completing the services by the date shown on the Accepted Programme,

and which

- neither Party could, acting reasonably, prevent, and
- is not one of the other compensation events stated in this contract.

60.1(18) "An event (including any act of terrorism, act of God and/or any other force majeure event) which stops the Consultant completing the services or completing the services by the date shown on the Accepted Programme to the extent that the event was not caused or contributed to by a breach of contract by the Consultant."

Option Z 12A **Title**

<u>The Employer's title to Plant and Materials</u>

70.5 Whatever title the Consultant has to Plant and Materials which is outside the Working Areas passes to the Employer if they are stored in a secured warehousing facility designated by the Employer and have been marked by or on behalf of the Employer as being for this contract.

70.6 Whatever title the Consultant has to Plant and Materials passes to the Employer if it

has been brought within the Working Areas. The title to Plant and Materials passes back to the Consultant if it is removed from the Working Areas with the Employer's permission.

Marking Equipment, Plant and Materials outside the Working Areas

70.7 The Employer marks Equipment, Plant and Materials which are outside the Working Areas if

- this contract identifies them for payment and
- the Consultant has prepared them for marking as the Scope requires.

Removing Equipment

70.8 The Consultant removes Equipment from the Site when it is no longer needed unless the Employer allows it to be left in the works.

Objects and materials within the Site

70.9 The Consultant has no title to an object of value or of historical or other interest within the Site. The Consultant notifies the Employer when such an object is found and the Employer instructs the Consultant how to deal with it. The Consultant does not move the object without instructions.

70.10 The Consultant has title to materials from excavation and demolition only as stated in the Scope.

Option Z 15A

Indemnity

Supplementary to the conditions of contract clause 80

80.1 In line 1, after the word 'against', insert "reasonably foreseeable".

80.2 Insert new clause 80.2:

"Each Party indemnifies the other against claims, proceedings, compensation and costs due to an event which is at his risk."

80.3 Insert new clause 80.3:

"The liability of each Party to indemnify the

other is reduced if events at the other Party's risk contributed to the claims, proceedings, compensation and costs. The reduction is in proportion to the extent that events which were at the other Party's risk contributed, taking into account each Party's responsibilities under this contract."

Option Z 15B

Employer's risks

Supplementary to the conditions of contract clause 80

80.4 Insert new clause 80.4:

"The following are Employer' ri k

- Claims, proceedings, compensation and costs payable which are due to
  - use or occupation of the Site by the works or for the purpose of the works which is the unavoidable result of the works,
  - negligence, breach of statutory duty or interference with any legal right by the Employer or by any person employed by or contracted to him except the Consultant or
  - a fault of the Employer that impede the Consultant in providing the Services.
- Loss of or damage to Plant and Materials supplied to the Consultant by the Employer, or by Others on the Employer's behalf, until the Consultant has received and accepted them.
- Loss of or damage to the works, Plant and Materials due to
  - war, civil war, rebellion, revolution, insurrection, military or usurped power,
  - strikes, riots and civil commotion not confined to the Consultant's employees.
  - radioactive contamination or
  - terrorism.
- Loss of or wear or damage to the parts of the works taken over by the Employer, except loss, wear or damage occurring before the issue of the Defects Certificate which is due to
  - a Defect which existed at takeover,
  - an event occurring before take over which was not itself an Employer's risk or
  - the activities of the Consultant on the Site after take over.
- Loss of or wear or damage to the works and any Equipment, Plant and Materials retained

on the Site by the Employer after a termination, except loss, wear or damage due to the activities of the Consultant on the Site after the termination.

- In respect to those Sites indicated in Appendix C as requiring ground installation of the solar panels, ground conditions.
- Withdrawal of security.

Option Z 15 **Insurance**

Amendment to clause 81

On pages 7 and 8 of Contract Schedule B annexed to Schedule 1 of the Framework Agreement, renumber clauses 81.3, 81.4 and 81.5 respectively as clauses 81.6, 81.7 and 81.8.

Option Z 16 **Professional indemnity insurance**

On pages 8 and 8 of Contract Schedule B annexed to Schedule 1 of the Framework Agreement, renumber clauses 81.6, 81.7, 81.8, 81.9 and 81.10 respectively as clauses 81.9, 81.10, 81.11, 81.12 and 81.13.

Option Z 17 **Public liability insurance**

On page 9 of Contract Schedule B annexed to Schedule 1 of the Framework Agreement, renumber this clause 81.11 as 81.14

Option Z 17A **Limitation of Liability**

Insert New clause 83

83.1 The Consultant is not liable for Defects in the works due to his design unless it is proved that he failed to use reasonable skill and care to ensure that his design complied with the Scope.

83.2 If the Consultant, on being instructed to do so by the Employer, corrects a Defect for which he is not liable under this contract it is a compensation event.

83.3 The *Consultant*'s total liability for all matters arising under or in connection with this contract whether arising in contract tort, delict, negligence, breach of statutory duty or otherwise is limited to the extent that the Consultant's breach or negligence caused or contributed to the matter and, subject to Clause 83.4, shall not exceed ***£1million*** in the aggregate.

83.4 Neither Party limits its liability for:

- death or personal injury caused by its negligence, or that of its employees, agents or Sub-Contractors (as applicable);
- fraud or fraudulent misrepresentation by it or its employees; or
- any liability to the extent that such liability cannot be limited or excluded by Law.

83.5 Subject to Clause 83.4, DFID's total aggregate liability in respect of all Losses (whether in tort, contract or otherwise) shall not exceed one hundred thousand pounds (£100,000).

83.6 Subject to Clause 83.4 neither Party be liable to the other for any:

- loss of profits, turnover, savings business opportunities, revenue or damage to goodwill (in each case whether direct or indirect); and/or
- indirect, special or consequential loss or damage of any nature and howsoever caused, even if the losses were reasonably foreseeable or the Party has been advised of the possibility of such losses occurring.

83.7 Subject to Clause 83.4, and notwithstanding Clause 83.6, the Supplier

acknowledges that DFID may, amongst other things, recover from the Supplier the following losses incurred by DFID to the extent that they arise as a result of a Default by the Supplier:

- any reasonable additional operational and/or administrative costs and expenses incurred by DFID, including costs relating to time spent by or on behalf of DFID in dealing with the consequences of the Default;
- any wasted expenditure or charges;
- the reasonable additional cost of procuring Replacement Services for the remainder of the Term, which shall include any incremental costs associated with such Replacement Services above those which would have been payable under this Contract;
- any commercially reasonable compensation or interest paid to a third party by DFID; and
- any fine, penalty or reasonable costs incurred by DFID pursuant to Law.

CONTRACT DATA

Part one – Data provided by the *Employer*

The *Employer* is:

Name: Department for International Development (DFID)

Address: Abercrombie House, Eaglesham Road, East Kilbride, Glasgow, G75 **8EA**

The *Adjudicator* is: *TBA by the Adjudicator nominating body as required*

The *services* are identified in the Scope.

The Scope is in Appendix C

The Site Information is in Appendix B. Each of the sites identified in Appendix B is referred to as a 'Site' and together 'Sites' unless the context otherwise requires.

The Boundaries of the Site are: *[to be agreed and set out in Appendix B in respect of each site]*

The *language of this contract* is English.

The *law of this contract* is the law of England

The *period for reply* is 2 weeks

The *period for retention* is 2 years following Completion or earlier termination.

The *Adjudicator nominating body* is the Technology and Construction Solicitors' Association (TeCSA).

The *tribunal* is arbitration.

The following matters will be included in the Risk Register:

- Security risks including terrorism, vandalism, assault and kidnapping threats;
- Construction risks including accidents, damage to persons or property, defective design and geotechnical conditions;
- Contractual risks including delayed dispute resolution, delayed payment and change order negotiation;
- Socio-political risks including, strike actions; and
-

2 The Parties' main responsibilities:

The Affected Property is identified in Appendix B as the same may vary from time-to-time, such changes will be introduced through the Change Management Process

The *Employer* provides access to the following persons, places and things

access to	***access date***
The Sites	No later than ***2 weeks*** prior to the date notified for start on each site.

3 Time **The *starting date* is 27TH OCTOBER 2017**

4 Quality **The quality policy statement and quality plan are provided within** - *quality policy statement and quality plan are not Required*

The *defects date* in respect of each Site is 26 weeks after Completion of the whole of the *services* in relation to the Sites.

The defects correction period is 6 weeks

5 Payment **The *assessment interval*** is 4 weeks

The *currency of this contract* is GBP (pounds sterling)

[redacted]

***For the purposes of clause 50.3*,** PACF is not required and does not apply

The Bill Paying Branch is [redacted]

The Commercial Officer is [redacted] **Procurement and Commercial Officer, DFID**

8 Indemnity, insurance and liability

The amounts of insurance and the periods for which the *Consultant* maintains insurance are:

Ref. Nr.	**event**	**cover**	**period following completion of the whole of the *services* or earlier termination**
01	failure of the *Consultant* to use the skill and care normally used by professionals providing services similar to the *services*	£2,000,000 in respect of each claim, without limit to the number of claims	2 years
02	death or bodily injury to a person (not an employee of the *Consultant*) or loss of or damage to property resulting from an action or failure to take action by the *Consultant*	£5,000,000 in respect of each claim, without limit to the number of claims	2 years
03	death or bodily injury to an employee of the *Consultant* arising out of and in the course of their employment in connection with this contract	£5,000,000 in respect of each claim, without limit to the number of claims	2 years

The *Employer* provides the following insurances:

Optional statements

If the *Employer* has decided the completion date for the whole of the *services*

- The completion date for the whole of the *services* is 30th April 2018

If no programme is identified in part two of the Contract Data

- The *Consultant* is to submit a first programme for acceptance within 6 weeks of the Contract Date.

If the *Employer* has identified work which is to meet a stated condition by a key date

Not used.

If the *Employer* states any *expenses* and *disbursements*

- The *expenses* and *disbursements* stated by the *Employer* are as defined in Appendix D (The Charges) and permitted *expenses* and *disbursements* shall be included within the *Consultant*'s Fee Proposal

If the *tribunal* is arbitration

- The *arbitration procedure* is the ICC Arbitration Rules 2017.
- The place where arbitration is to be held is London
- The person or organisation who will chose an arbitrator
    - If the Parties cannot agree a choice or
    - If the *arbitration procedure* does not state who selects an arbitrator is

    the Technology and Construction Solicitors' Association (TeCSA).

Option X18

- The *end of liability date* is (1) one year after Completion of the whole of the *services*.

Option Z

The additional conditions of contract are Z1 to Z45 of Contract Schedule B attached to the Framework Agreement as these are supplemented, modified and amendment in paragraph 1 of this Contract Data.

APPENDIX A - CONTRACT DATA

PART TWO – Data provided by the *Consultant*

Statements given in all contracts

The *Consultant* is:

Name: AECOM Limited

Address: Saint George's House, 5 Saint George's Road, Wimbledon, London SW19 4DR

The ***key persons*** are:

(1) Name [redacted]

Job Client Relationship Manager

Responsibilities Provide single point of contact for communications between DPSA and client.

Qualifications .....

Experience .....

(2) Name [redacted]

Job Project Manager & Solar Expert

Responsibilities Project management oversight and solar quality assurance

Qualifications See Scope.

Experience .See Scope

(3) Name

Job .....

Responsibilities .....

Qualifications .....

Experience .....

The ***staff rates*** are:

name / designation rate

N/A

Optional statements

If the *Consultant* proposes to subcontract work to any sub-consultant other than the Approved Sub-Consultant, the *Consultant* shall detail below such sub-consultants: *None*

Name and full contact details of Approved Sub-Consultant

Theodore Willie Intertrade

Confirmation of Approved Sub-Consultant's Professional Indemnity insurance cover in the amount of … General Liability at £5million and Umbrella Liability at £5million

Confirmation of Approved Sub-Consultant's Employers/Public Liability insurance cover in the amount of:

Employers Liability £5million per occurrence……

Public Liability …£5million per occurrence…

[redacted]

If the *Consultant* states any *expenses* and *disbursements*

- The *expenses* and *disbursements* stated by the *Consultant* are

item	amount
.....	.....
.....	.....

If the *Consultant* requires additional access

- The *Employer* provides access to the following persons, places and things

access to	*access date*
.....	.....
.....	.....

- The *activity schedule* is Appendix C Scope
- The tendered total of the Prices is as set out in Appendix D

APPENDIX B – SITE INFORMATION

The following Table shows the GPS co-ordinates and Office names. The Sites are grouped into three categories:

1. Large offices require upgrade of broadband connection, network infrastructure and server room.
2. Medium size offices require upgrade in broadband connection and network infrastructure.
3. Small offices require upgrade in connectivity using 3G and VPN (remote offices)

Further site information will be provided upon request to the Employer by the *Consultant* or approved sub-consultant within 4weeks of the Contract Date.

APPENDIX C - SCOPE

Procurement of Solar IT Backup Systems for Ghana Forestry Commission – Installation Terms of Reference

Procurement Supplier – AECOM

Supplier ID 53127

1. Background

DFID has been supporting the efforts of the Ghana Forestry Commission (GFC) to strengthen governance in the forest sector, and particularly to improve regulatory controls through the introduction of an electronic Wood Tracking Chain of Custody System, a key component of the Ghana Legality Assurance System (GhLAS). The GhLAS will enable Ghana to license all timber product exports as required under its bilateral trade treaty with the EU, known as the Voluntary Partnership Agreement (VPA). The development and the deployment of the GhLAS is currently in its final stages of completion. The first and second stage of the roll out of the electronic wood tracking system (WTS) has been completed. The final stage has just started. It aims to conclude all system development and deployment as well as bring on board the 44 relevant forest districts and the private sector constituents across the productive forest zone.

The GhLAS rollout has identified inadequate internet network infrastructure and connectivity as well as frequent power outages as critical problems that threaten to undermine the implementation and efficiency of Ghana's electronic WTS and the entire GhLAS. This is having negative knock on effects of reducing capacity to collect timber revenues and control illegal activity. It further risks putting in jeopardy the timing of the introduction of FLEGT licenses for the EU market planned for 2016.

An assessment of the problems and needs for system upgrade has been conducted. This procurement is guided by its findings and the option selected by the Ghana Forestry Commission as best meeting its current and future needs. An estimated budget of approximately 2.3 million GBP is available for the whole programme.

The day-to-day functioning of GFC's ICT infrastructure will be significantly enhanced by this procurement, leading to efficiency in regulatory controls, information management including monitoring of deforestation.

DFID is contracting DPSA as its Procurement Supplier to assist with the procurement and installation of new internet capacity and a solar backup energy system in 38 office locations across Ghana.

2. Objectives

DFID is contracting DPSA as its Procurement Supplier, who will be responsible for installation of solar equipment and internet connectivity to upgrade Forestry Commission systems in 38 office locations across Ghana.

3. Recipient

The contracting party is the Department for International Development (DFID) however the direct recipient of the goods and services will be the Ghanaian Forestry Commission. The procured items will enable the Forestry Commission to conduct planned control and export licensing activities.

4. Scope/Deliverables

Under the Supplier Framework Agreement, DPSA will install, commission and manage the installation of the required solar and IT equipment. DPSA will deliver the following activities:

Phase C

- *Manage and coordinate installation supplier*
- *Set and test user acceptance criteria*
- *Provide Project Management oversight and programme tracking services ensuring progress is maintained as scheduled.*
- *Provide Quality Assurance services from design to installation and project completion to ensure compliance with agreed Terms of Reference.*
- *Supplier management post-procurement, including enabling basic inspection of the delivered goods*
- *Invoicing and supplier payment.*

The above activities and other activities necessary for the fulfilment of the requirement will be developed and expanded at Annex C Procurement Plan.

5. Reporting

DPSA will be responsible for regular reporting of progress against project objectives.

6. Timing

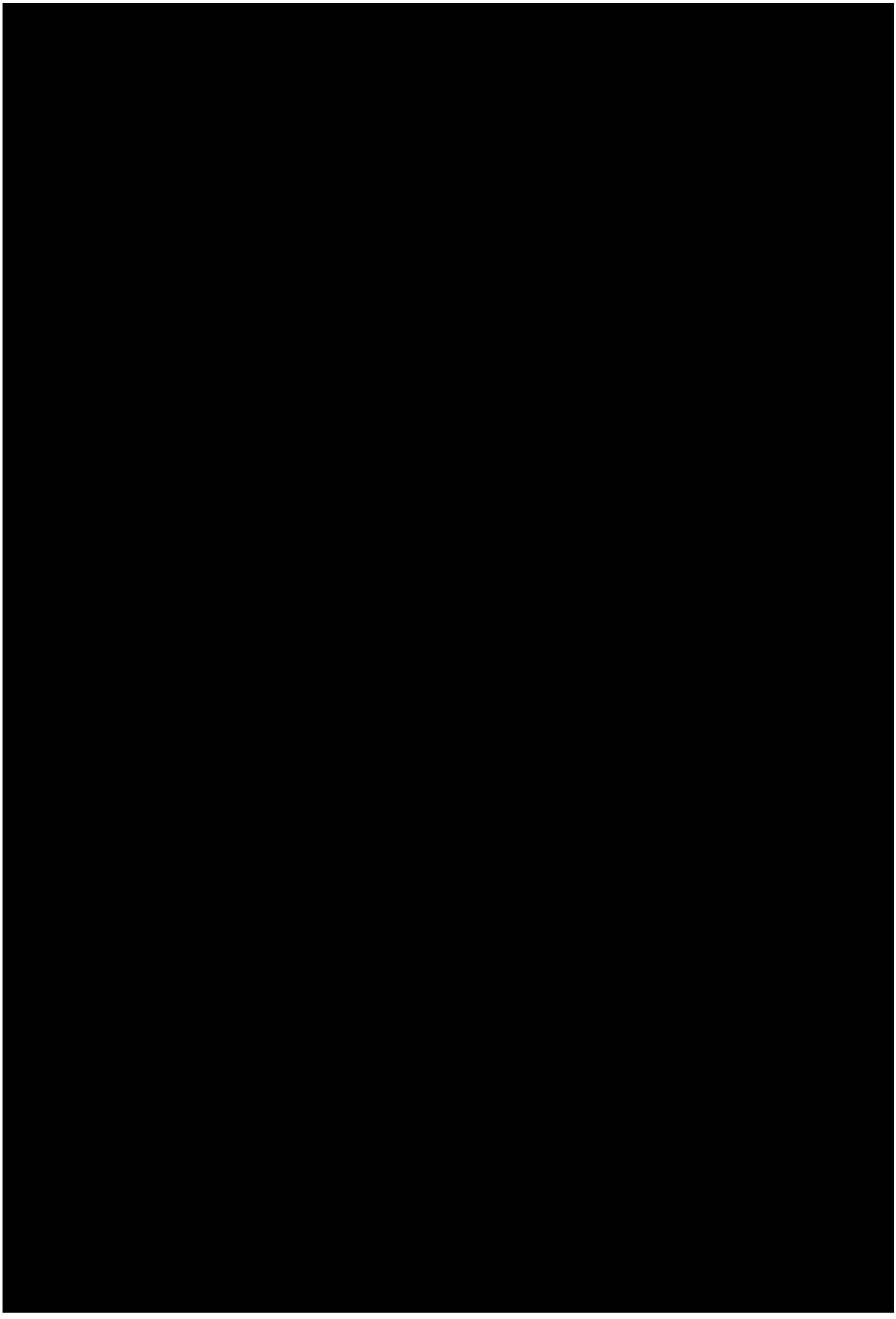
DPSA will be contracted from 27th October 2017 until 30th April 2018.

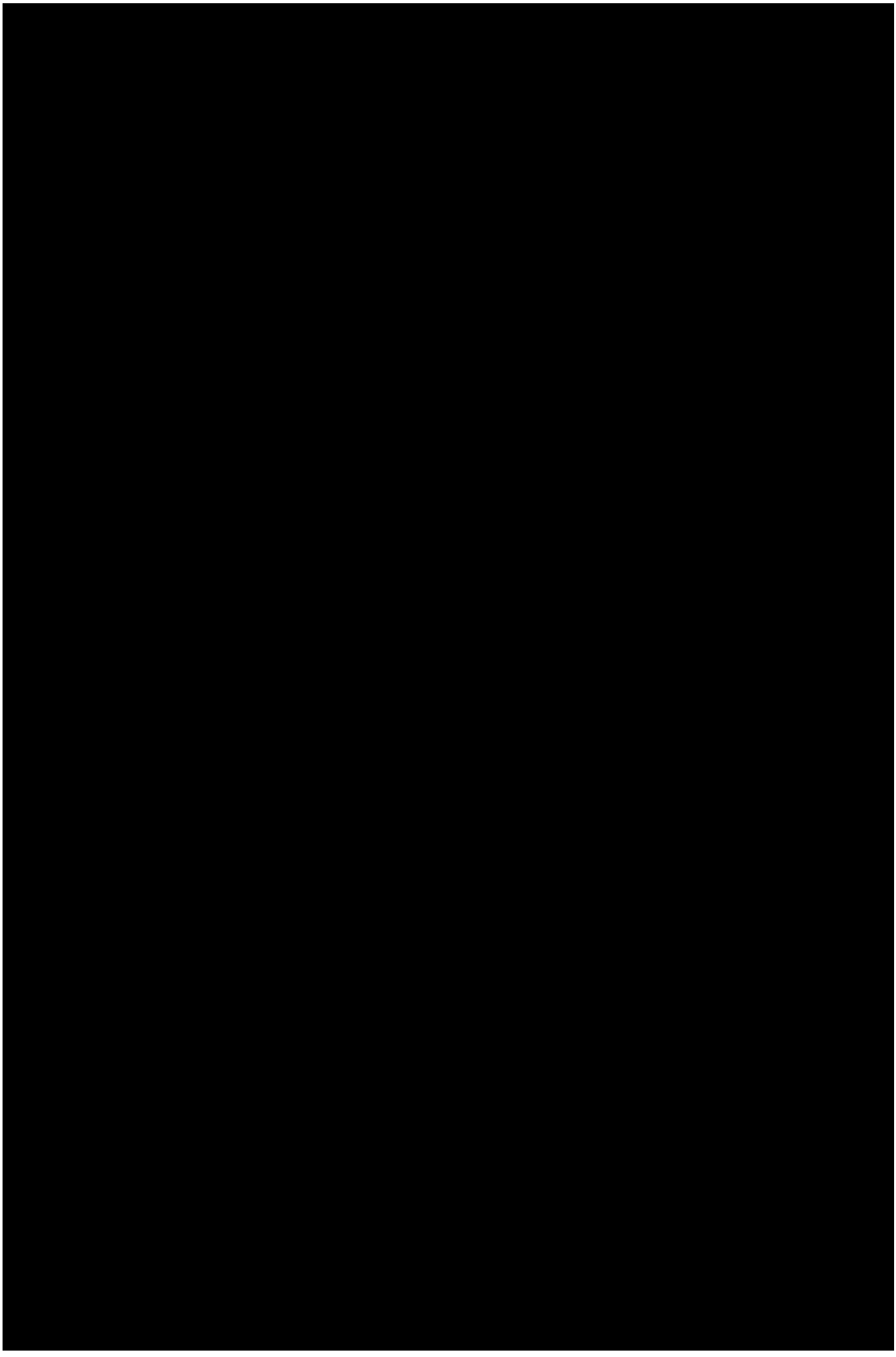
7. Duty of Care

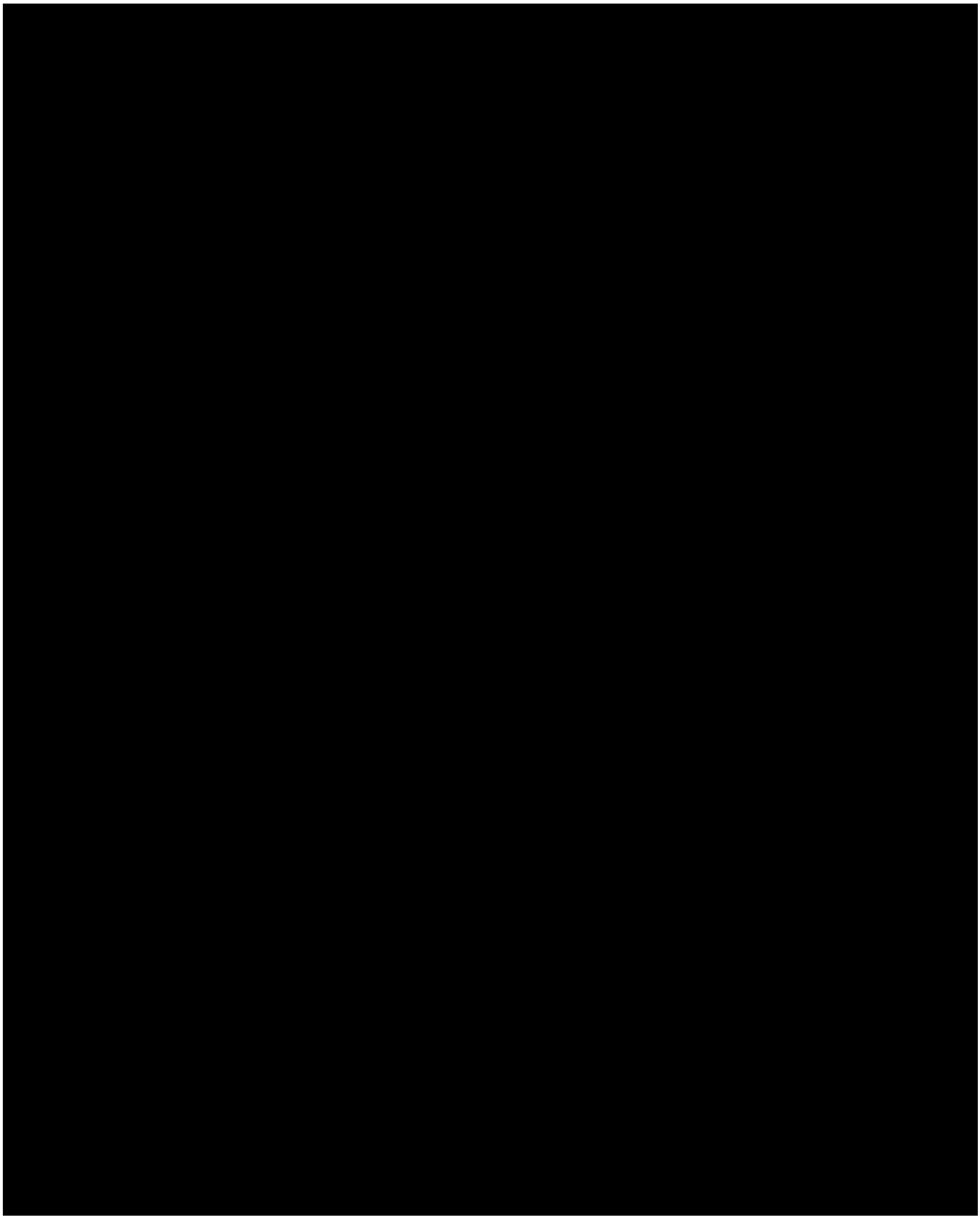
The Supplier is responsible for the safety and well-being of their Personnel (as defined in Section 2 of the Contract) and Third Parties affected by their activities under this contract, including appropriate security arrangements. They will also be responsible for the provision of suitable security arrangements for their domestic and business property.

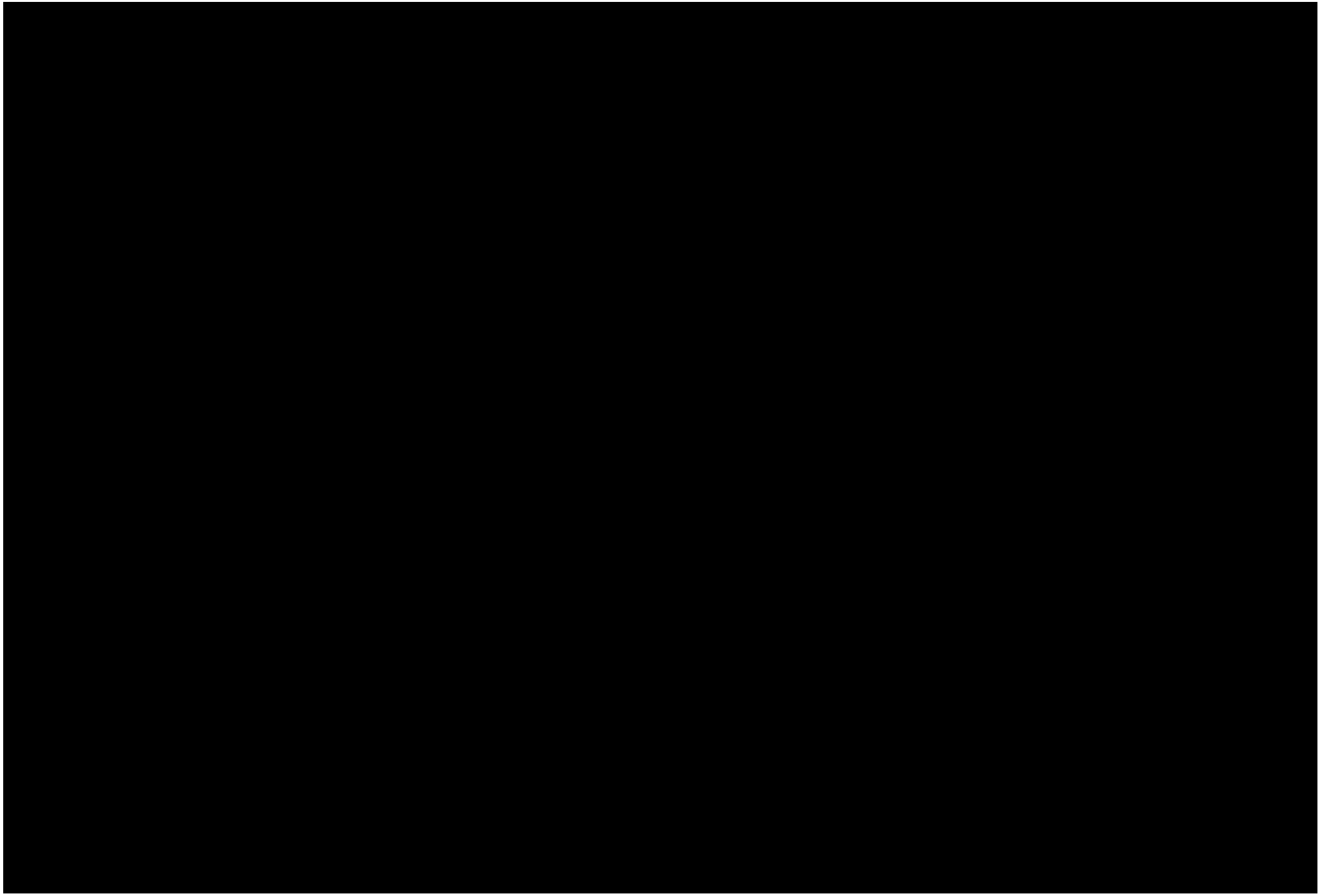
DFID will share available information with the Supplier on security status and developments in-country where appropriate.

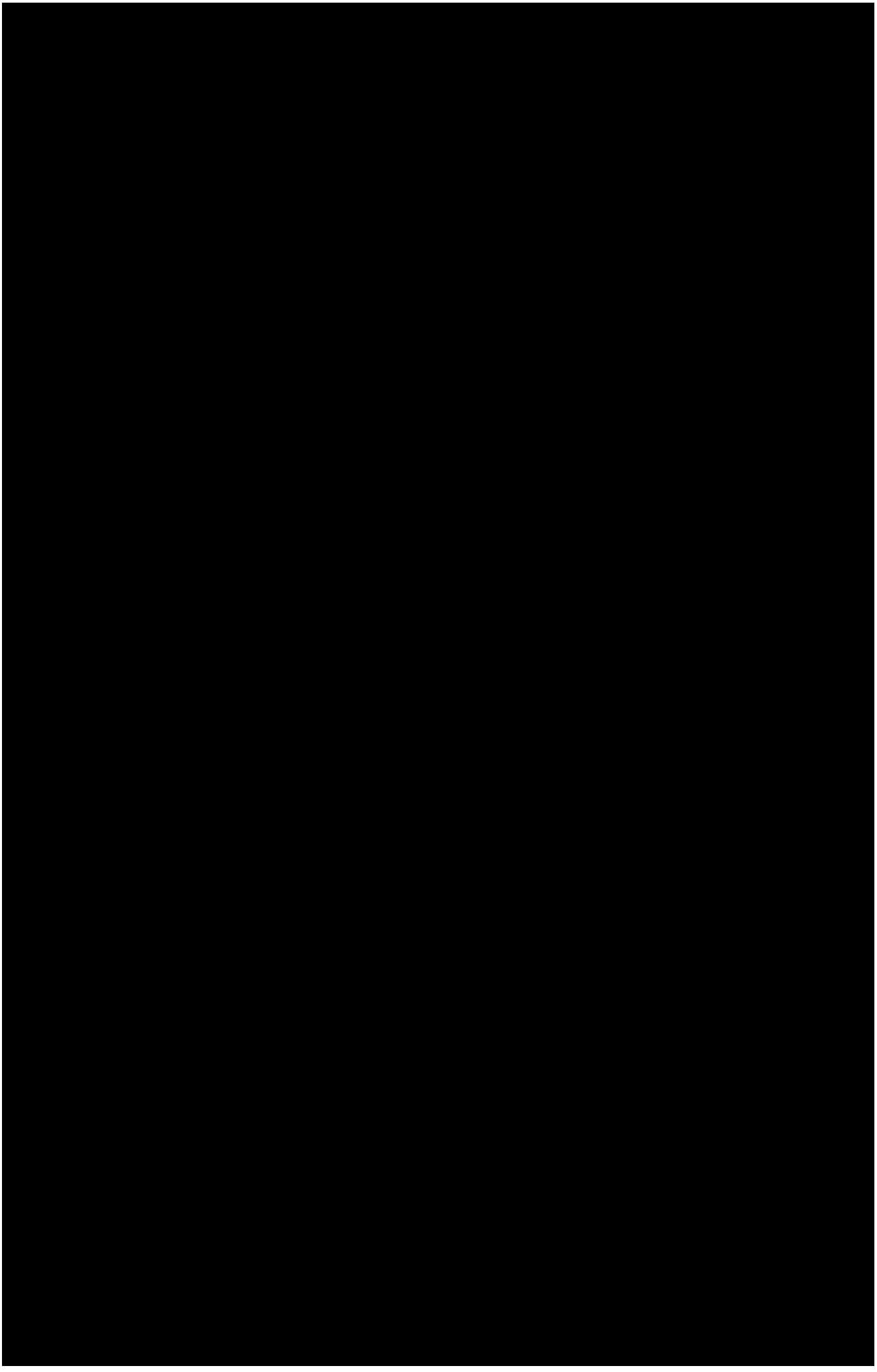
The Supplier is responsible for ensuring appropriate safety and security briefings for all of their Personnel working under this contract and ensuring that their Personnel register is up to date, and receives briefing as outlined above. Travel advice is also available on the FCO website and the Supplier must ensure they (and their Personnel) are up to date with the latest position.

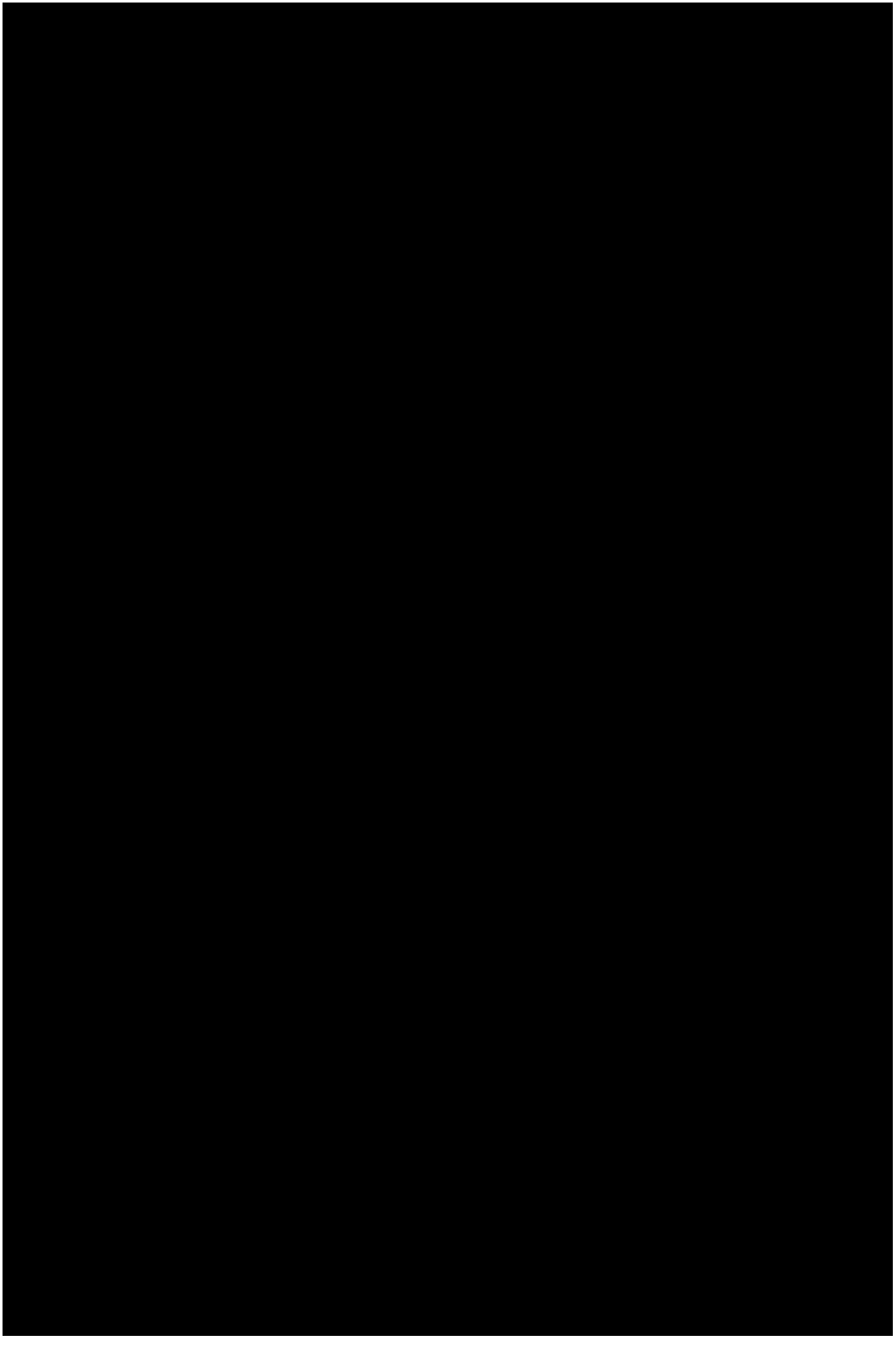


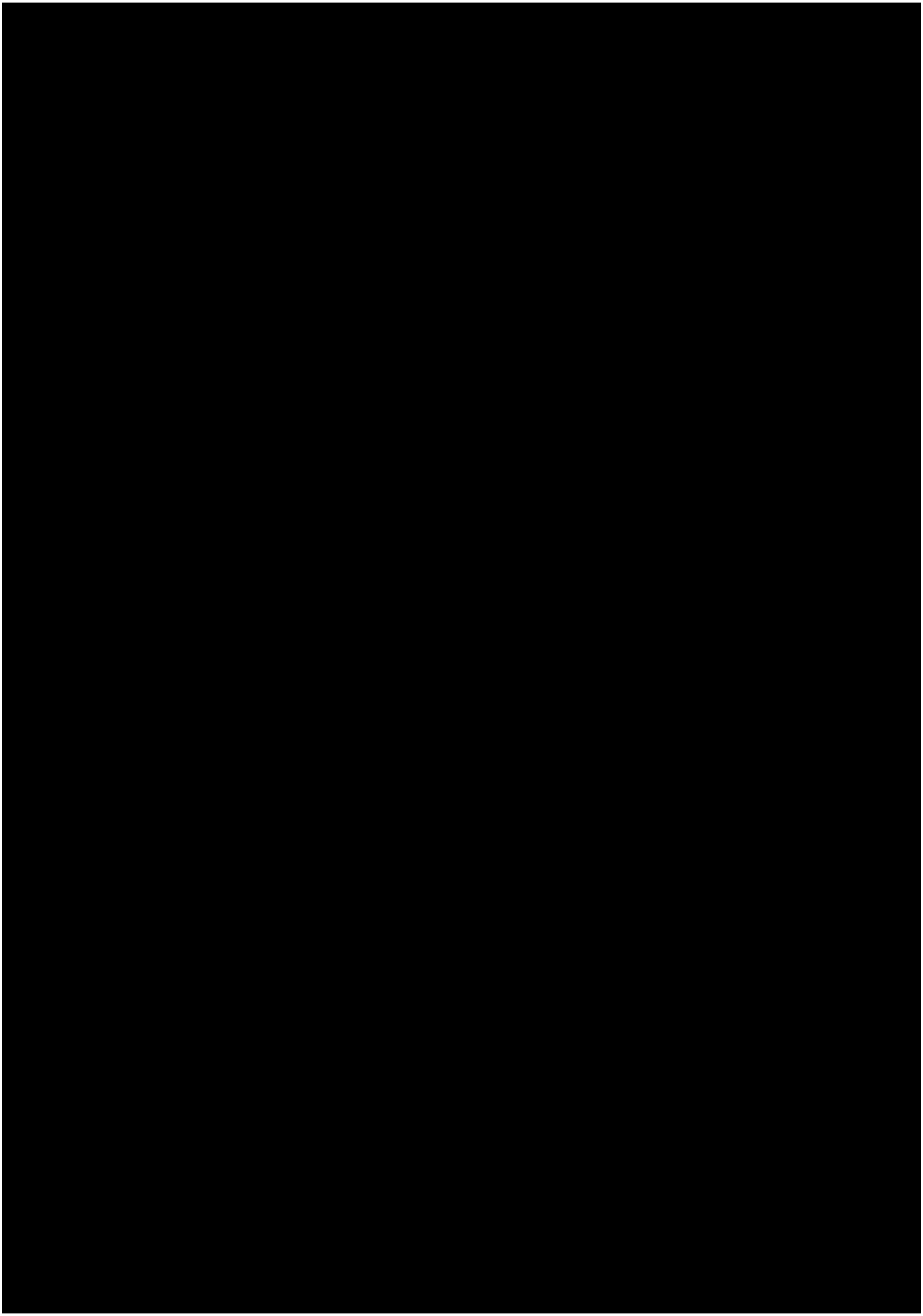


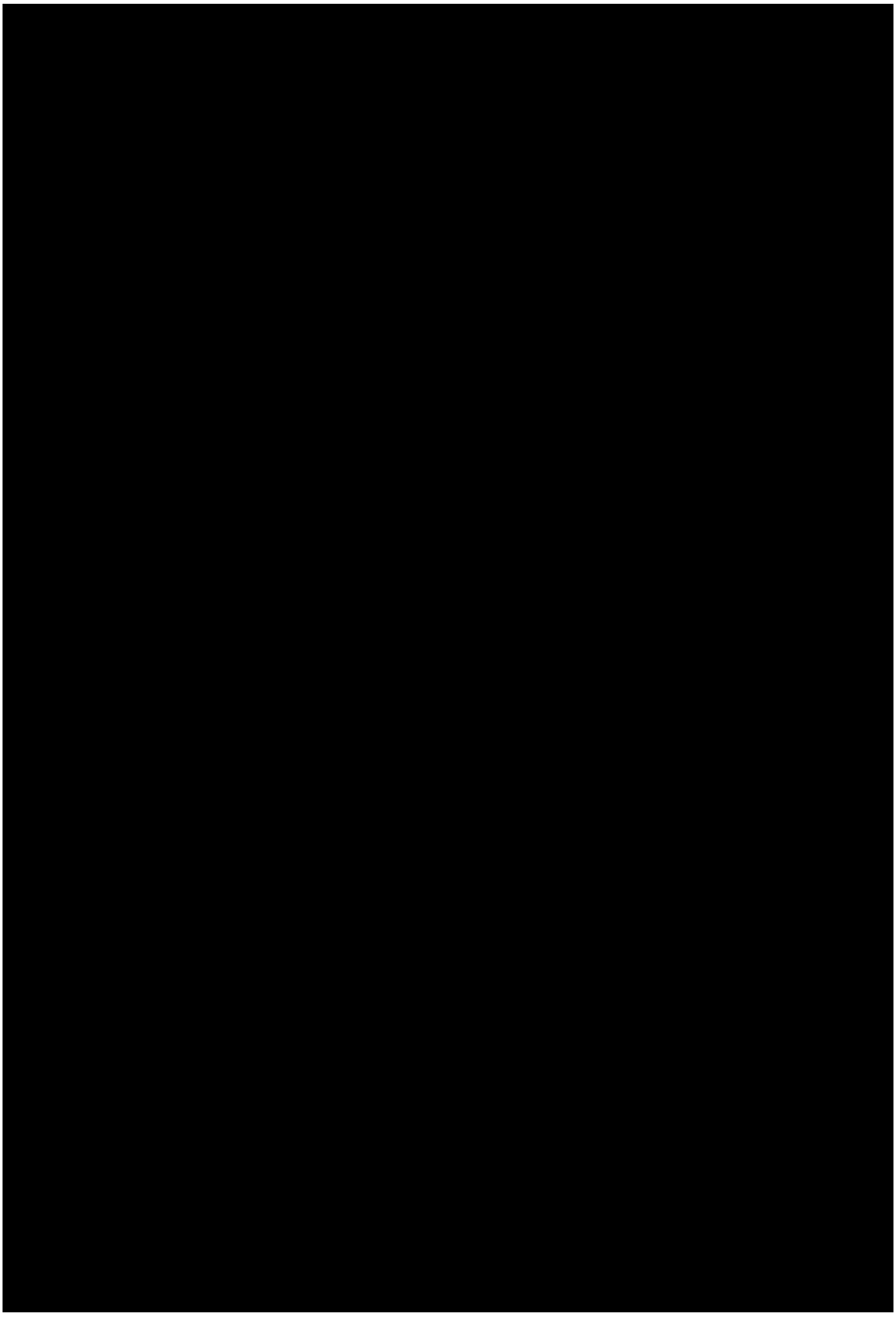


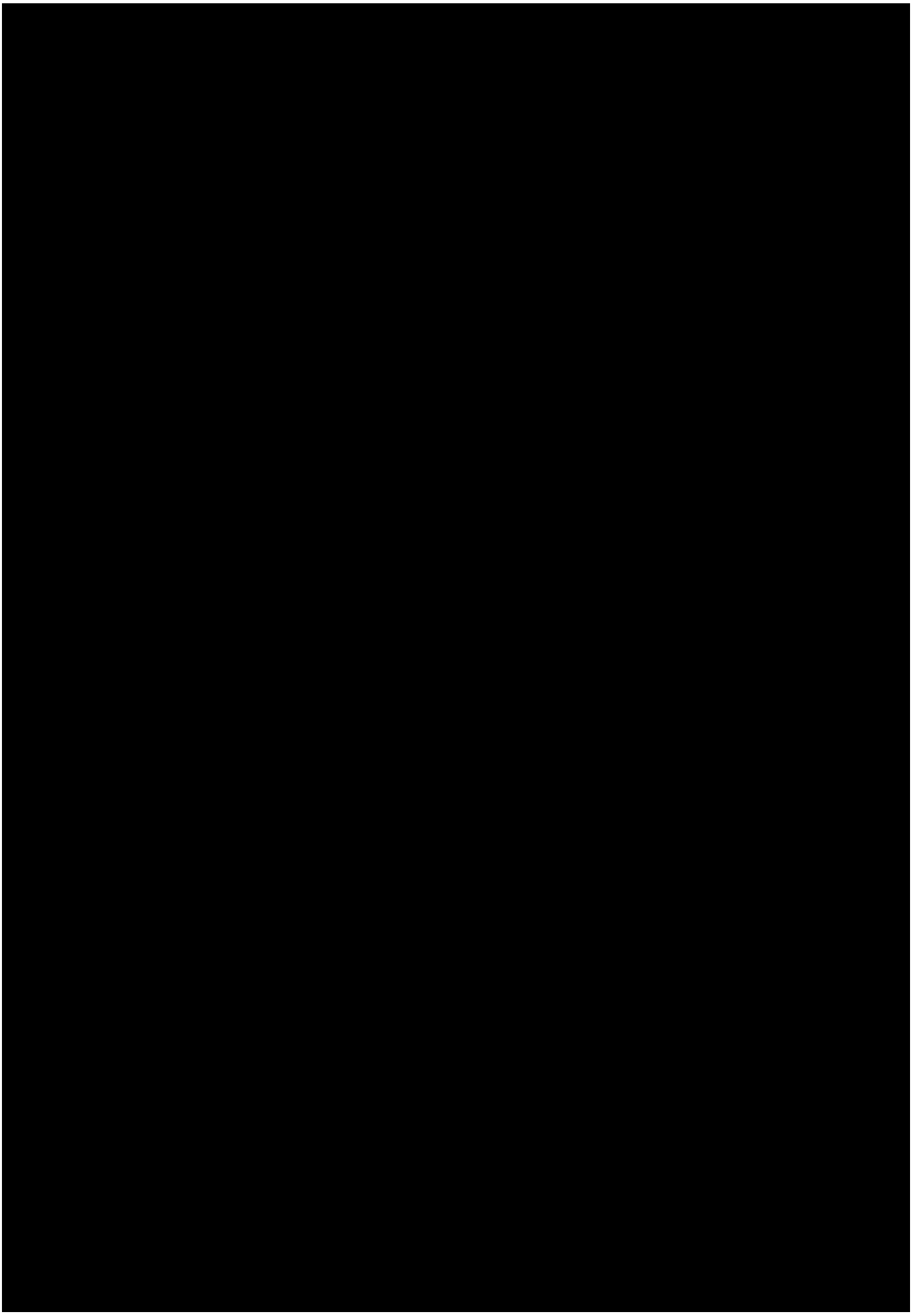


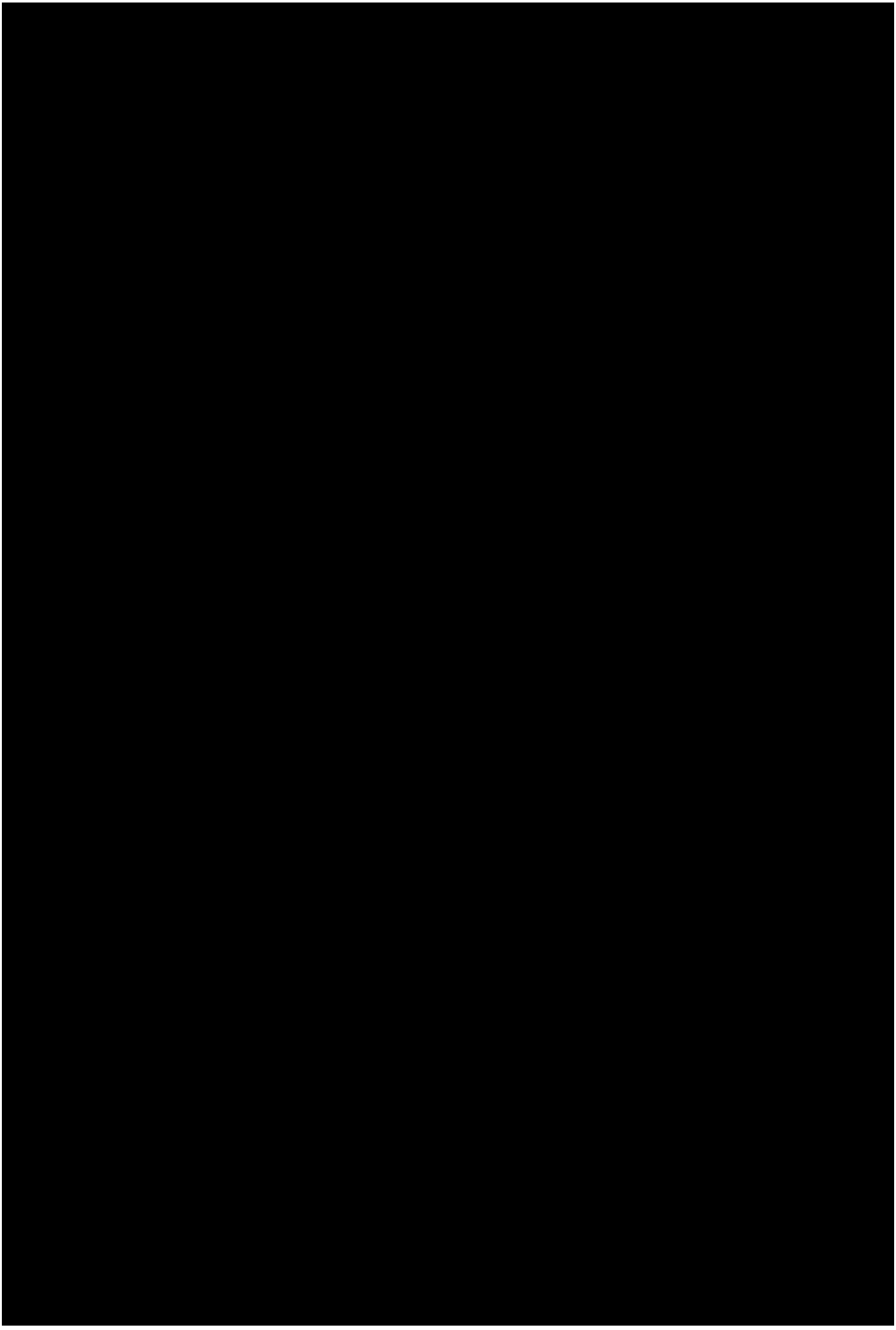


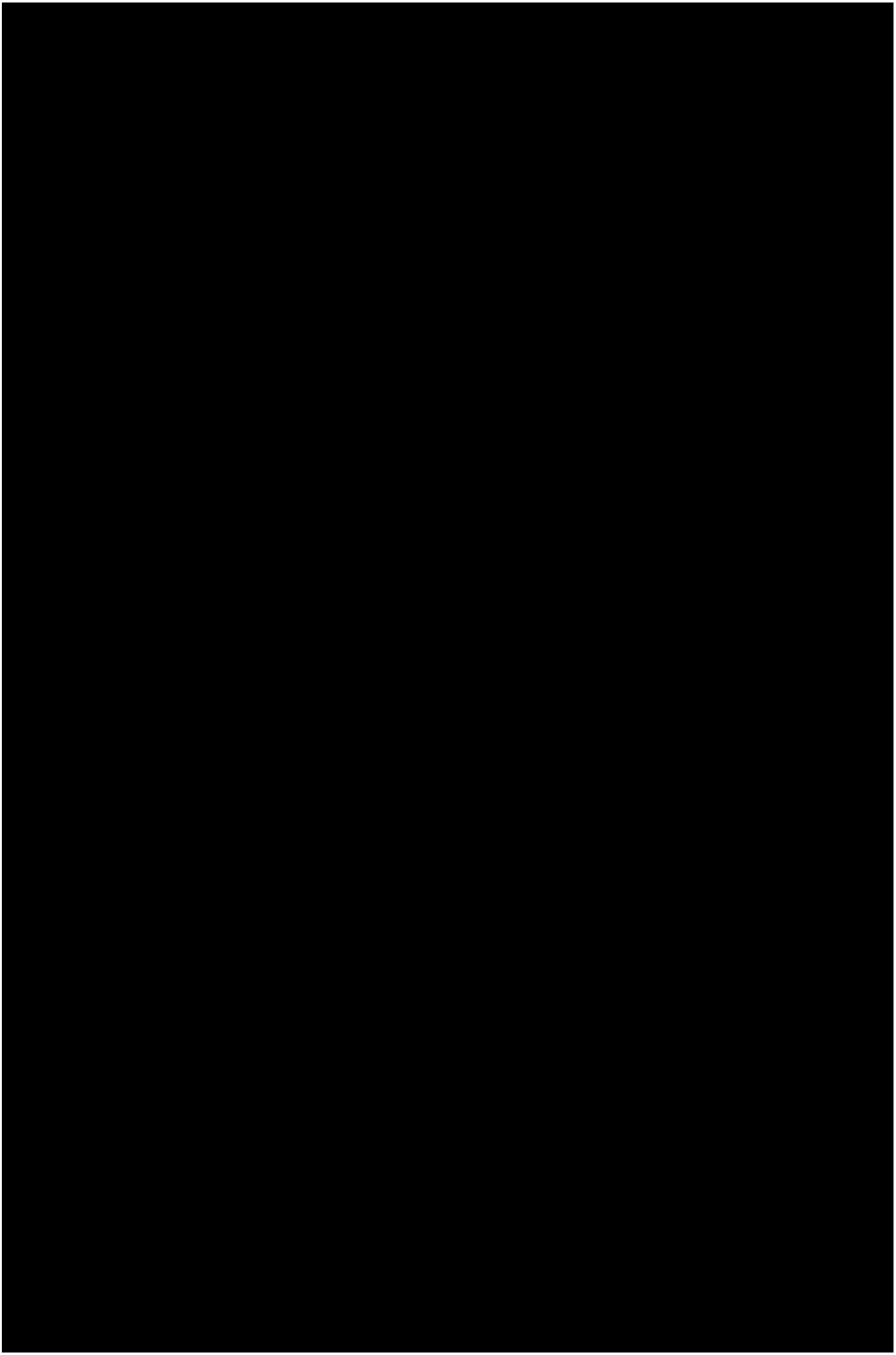


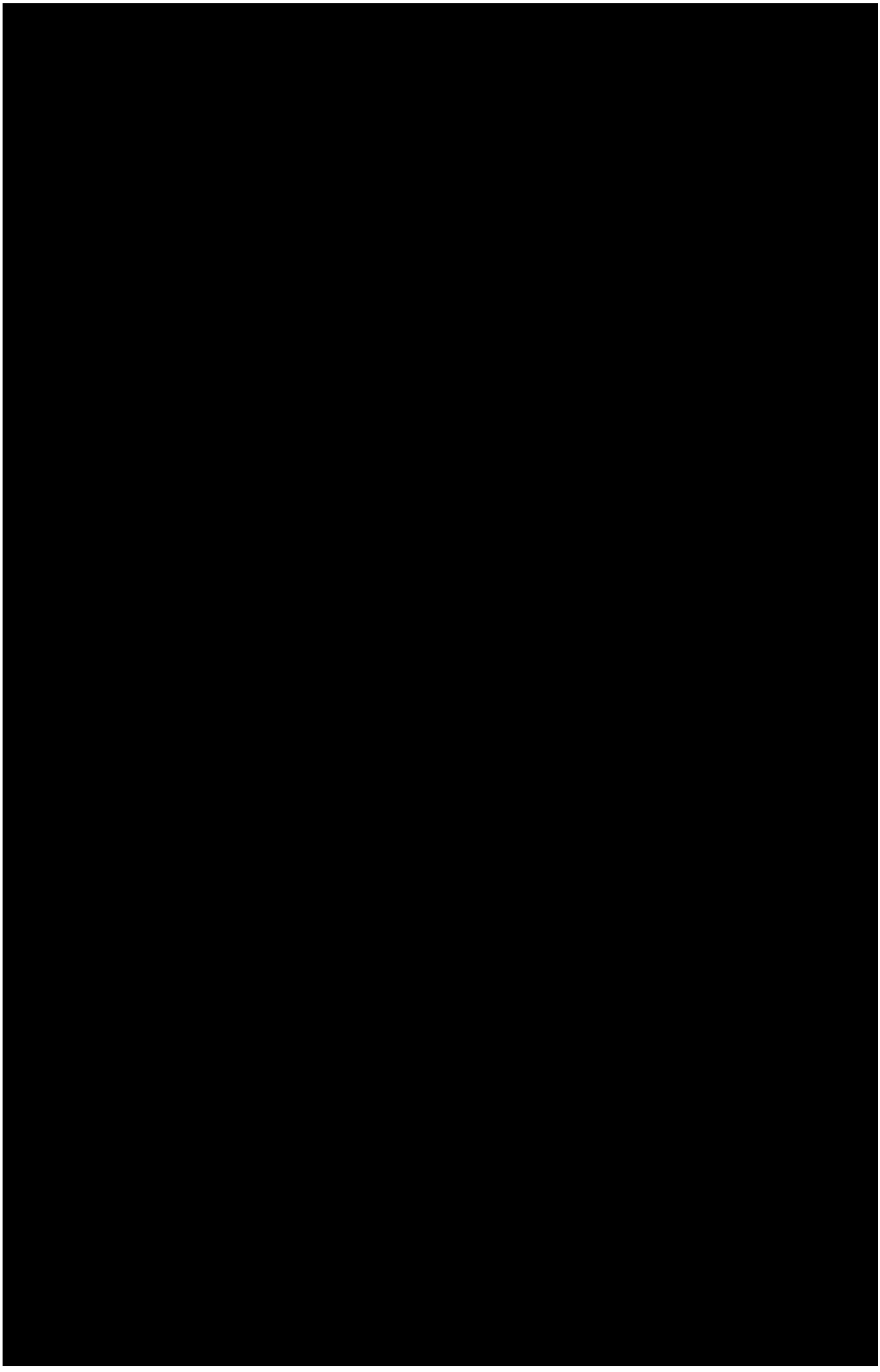


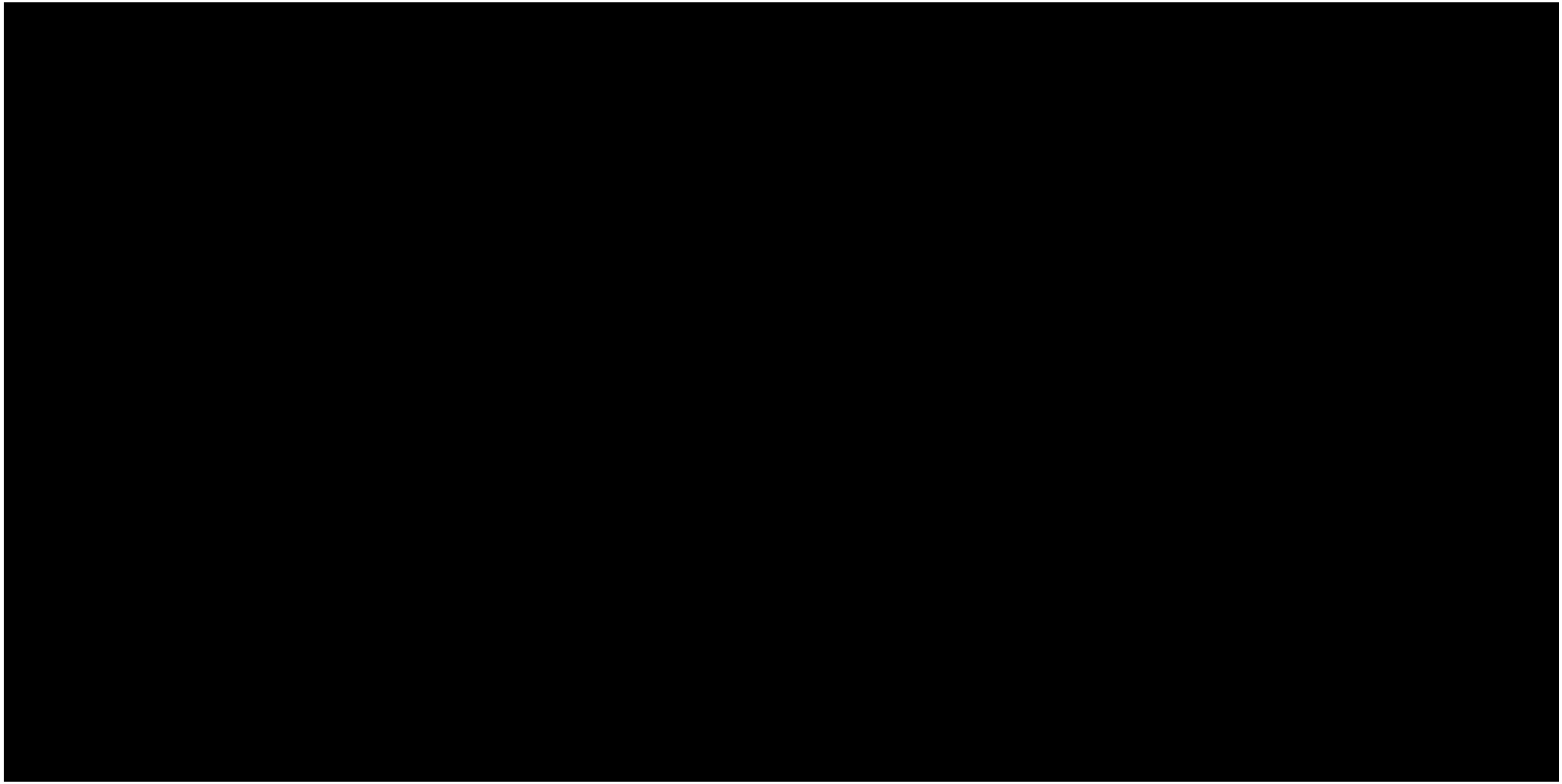


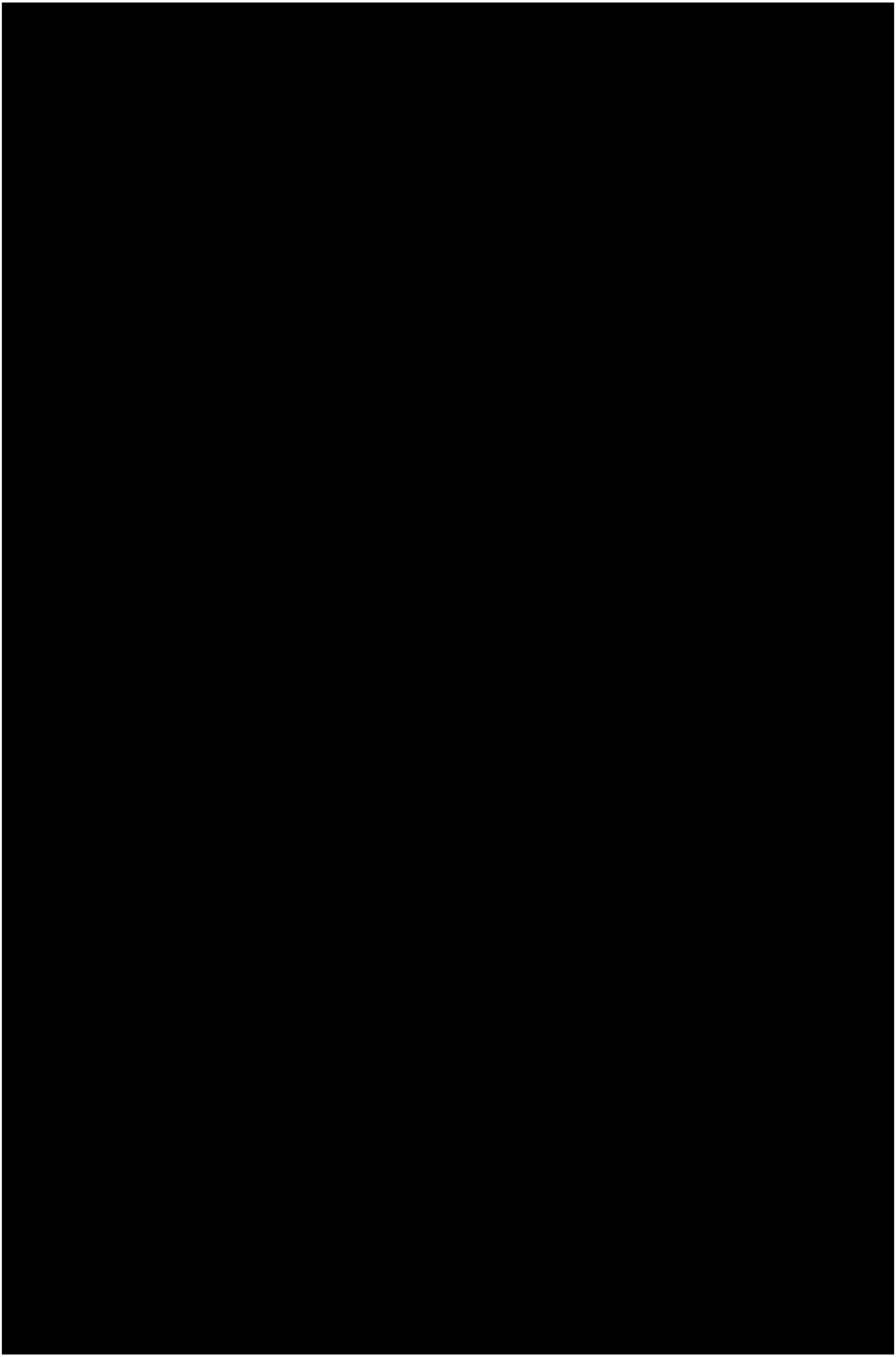


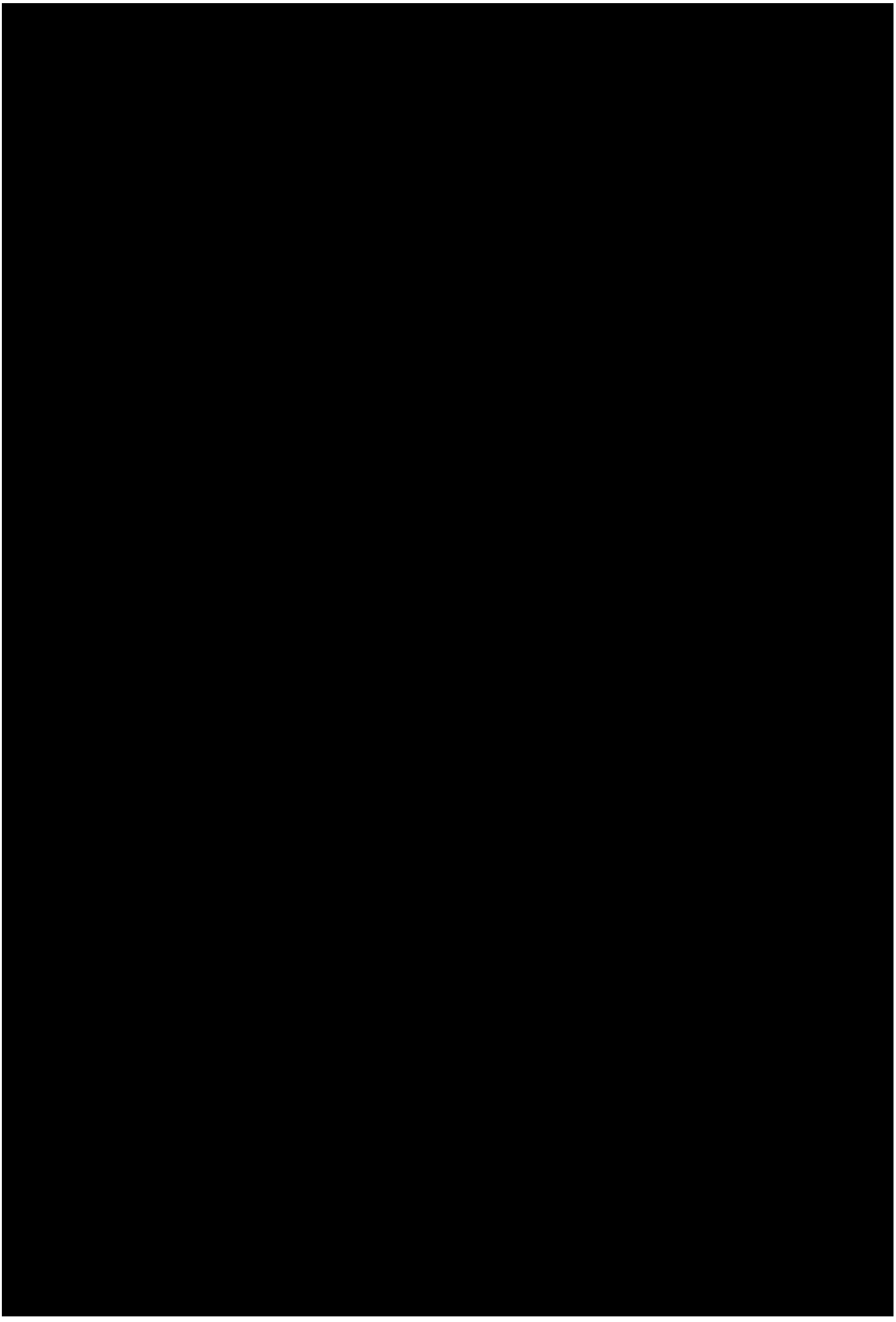












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Annexes

Annex 1- Terms of Reference for IT Upgrade

The Project to Strengthen Governance in the Forestry Sector in Ghana

The scope of the services shall be installation of new internet capacity and a solar backup energy system in 38 office locations (the Offices) across Ghana. The Offices are the operational centres of the Ghana Forestry Commission (the Beneficiary").

The procurement will be conducted using funds from the Forest Governance Markets and Climate programme (FGMC) as part of DFID support to Ghana for the implementation of the EU-Ghana Voluntary Partnership Agreement (VPA) governing the forest product trade as part of the Project to strengthen governance of the forestry sector in Ghana.. The Requirements

Technical Specifications

1 Project Background

The UK Government's Department for International Development (DFID) has been supporting the efforts of the Ghana Forestry Commission (GFC) to strengthen governance in the forest sector, and particularly to improve regulatory controls through the introduction of a electronic Wood Tracking Chain of Custody System, a key component of the Ghana Legality Assurance System (GhLAS). The GhLAS will enable Ghana to license all timber product exports as required under its bilateral trade treaty with the EU, known as the Voluntary Partnership Agreement (VPA). The development and the deployment of the GhLAS is currently in its final stages of completion. The first and second stage of the roll out of the electronic wood tracking system (WTS) has been completed. The final stage has just started. It aims to conclude all system development and deployment as well as bring on board the 34 relevant forest districts and the private sector constituents across the productive forest zone.

However, the GhLAS rollout has identified inadequate internet network infrastructure and connectivity as well as frequent power outages as critical problems that threaten to undermine the implementation and efficiency of Ghana's electronic WTS and the entire GhLAS. This is having negative knock on effects of reducing capacity to collect timber revenues and control illegal activity. It further risks putting in jeopardy the timing of the introduction of FLEGT licenses for the EU market planned for 2016.

An assessment of the problems and needs for system upgrade has been conducted. This procurement is guided by its findings and the option selected by the Ghana Forestry Commission as best meeting its current and future needs.

Overall, the day-to-day functioning of GFC's ICT infrastructure will be significantly enhanced leading to efficiency in regulatory controls, information management including monitoring of deforestation.
The Scope of Works defined in this User's Requirements ("the Requirements") covers the design, procurement, construction and installation of the Systems.

2 Scope of the Works

Forestry Commission of Ghana intends to upgrade existing corporate IT infrastructure by enhancing the connectivity between offices, upgrading LAN equipment (wired and wireless), implementing new security architecture and build 2 data centres. For simpler system management and utilization of existence competences, the hardware and software solutions must be compatible with the existing network infrastructure consisting of primarily Cisco devices.

The Scope of Works is based on the detailed designs completed as defined in these Requirements and its appendices. Table 1 shows a high-level breakdown of the Scope of Works for which the Contractor will be responsible. The table also highlights areas of responsibility for the Client and the Beneficiary.

DFID shall be responsible for the correctness of the following data and information related to the IT Upgrade provided by (or on behalf of) DFID or the Recipient:

(a) definitions of intended purposes of the Goods or any parts thereof; and

(b) Portions, data and information which cannot be verified by AECOM or its supplier(s).

Table 1. Scope of Works

Table 1 Scope of Works: Schedule of Activities and Responsibilities					
No.	**Description**	**FC**	**IT Contractor (Network)**	**IT Contractor (Data Centre)**	**Client**
1	Preliminary studies and site surveys	•	•		
2	**Network Upgrade**		•		
2.1	Network design, and configuration and commissioning		•		
2.2	WLAN infrastructure at Sites 1, 2, 3 & 4		•		
2.3	WAN Optimization, Firewalls, web caches and web proxies		•		
2.4	Broadband Connectivity upgrade at Sites 1,2,3 & 4		•		
3	**Physical upgrade of server rooms to Data Centres at Sites 1 and 2**			•	
3.1	Site Preparation	•	•	•	
3.2	Civil works			•	
3.3	Data Centre Environmental monitoring system		•	•	
3.4	Data Centre Cooling solution			•	
3.5	Data Centre Fire detection and suppression system			•	
3.6	Data Centre Access control system			•	
3.7	Data Centre Lighting system			•	
3.8	Data Centre Finalization	•	•	•	
3.9	Data Centre Commissioning	•	•	•	
'					
4	**Training**		•	•	
5	Review and approve applications for interim and final payments to the Contractor	•			
6	Execute interim and final payments to the contractor				•

3 Technical Requirements

3.1 Site Information

The prepared site data shall serve as a basis for the data verification. Site surveys and design activities shall be included in the Scope of Works:

1. List of Sites (Appendix A)
2. Bill of Materials, (Appendix B)
3. High level network diagrams, current and envisaged future (Appendix C)
4. Site layout diagrams (Appendix D)

3.3 Network Upgrade

To ensure smooth office upgrade, the network upgrade implementation work plan shall be coordinated with work plan of Solar Power Installation work plan.

3.3.1 Network Design, Configuration and Commissioning

Reference Documents:
Locations: Appendix A
Network Diagrams: Appendix C

The Contractor shall create detailed network architecture and design (physical and logical) incorporating the existing and new network elements. Network partitioning shall be required as well as establishing Virtual LAN's and VPN based WAN links.

Computer network upgrade shall be required in the following offices of Forestry Commission of Ghana:

1. Head office in Accra (Site 1)
2. RMSC office in Kumasi (Site 2)
3. TIDD office in Takoradi (Site 3)
4. TIDD office in Kumasi (Site 4)
5. 34 District/Regional offices across the country

The network design shall meet the following objectives:

- The network architecture and design shall follow current industry best practices for corporate IT networks.
- Remote access from district offices to Head office in Accra and RMSC Office in Kumasi (as backup) shall be IPSec Site to site VPN tunnels.
- WAN/Internet links in Sites 1, 2, 3 & 4 [see Appendix A: List of Sites] shall be redundant with auto failover.
- WLAN networks shall be configured to concurrently support multiple local SSID's and assigned to respective VLANs (e.g. separate WLAN for management, regular users, guests etc.). The same WLAN SSID's shall be available across the whole site.
- WLAN networks shall be configured to support seamless data roaming across access points.(local switching not through controllers)
- VLANs shall be defined and implemented across the network to allow separate traffic for network management, departmental users and guests, according to industry best practices.
- DNS configuration shall support fast outside and inside access to FC IT services using multi-WAN fail-over links.
- DMZ shall be established and appropriate network services configured respectively
- QoS shall be implemented in the network based on VLANs, application profiles, services and user groups, to allow traffic shaping and service performance optimization
- Firewalls shall be configured to block unwanted outgoing and incoming traffic from the WAN and Internet links.
- All web traffic shall be transparently proxied, filtered and cached (and compressed where applicable) in order to offload redundant traffic from the WAN and Internet links.
- Configuration of the Remote office VPN routers shall be centrally (remotely) managed using the network management solution installed at the head office.
- VPN routers at the remote offices shall be configured to implement Hybrid WAN topology with QoS so that (VPN) connections to the FC head office is handled with higher priority than traffic to public internet services.
- Firewalls in the main data centre will be deployed in Active/Standby failover mode and will thus need to be appropriately configured. Layer 3 switches to be used for layer 2 switching.

The Contractor shall be required to implement the changes in the network configuration.

3.3.2 Network Monitoring and Management Solution

Forestry Commission of Ghana (FC) intends to strengthen its network configuration management and monitoring capability and is thus seeking to obtain functionality equivalent to the following SolarWinds network management system products:

Mandatory functionalities:

- Network Performance Monitor (NPM)
- Network Configuration Manager (NCM)
- NetFlow Traffic Analyzer Module (NTA)
- Network Topology Mapper (NTM)
- Log & Event Manager (LEM)
- Engineer's Toolset

Optional functionalities:

- IP Address Manager (IPAM)
- Server and Application Management (SAM)
- Firewall Security Manager (FSM)
- Virtualization Manager

The preferred vendors for the above functionalities shall be SolarWinds.
The Contractor shall be responsible for ensuring that the offered licenses shall be sufficient to cover the entire FC network infrastructure and its elements.

The Contractor shall be responsible for, installation and configuration of necessary software and including 2 large energy-efficient LCD/IPS displays (40+ inches) for on-wall status monitoring.
The Contractor shall be responsible for, install and configuration of rack-mounted host server suitable for running the network management system and FirePOWER management virtual appliance as specified below in section 3.3.4.

3.3.3 Wireless Lan Infrastructure at Sites 1, 2, 3 & 4

(FC intends to upgrade its Wireless Network design. Building material used in FC offices is primarily concrete so access points shall be placed on each floor. As part of wireless LAN infrastructure update, a number of wired LAN switches shall also be installed.

The following items shall be required to be installed and configured (see Appendix B

1. 40 Cisco 2700e series Controller based 802.11ac Wireless access points with external antennae.
2. 40 sets of external dipole antennae for the said access points.
3. Five (5) Cisco 2500 series Wireless controllers for 15 access points each, including a spare unit
4. Three (3) Cisco 2500 series Wireless controller High Availability (HA) units.
5. SmartNet 5x8 NBD service 5 year subscription for the above equipment. Items 1 to 4 inclusive.
6. Six (6) Cisco SG-300 series 48 port switches (10) with 802.11at (PoE+) for access point and surveillance camera powering and upgrade of select facilities
7. Necessary Ethernet cabling (including double cabling for access points)

The Contractor shall be responsible for conducting thorough Wi-Fi site survey for establishing coverage maps and locating optimum placement of Wi-Fi access points throughout the 4 larger office sites (sites 1,2,3 & 4). The actual number of access points and respective antennae for each site shall be adjusted based on active Wi-FI site survey to achieve optimal Wi-Fi network coverage at the sites.
The Contractor shall be required to draw/sketch necessary site maps that can be used in WLAN site surveys.

3.3.4 WAN Optimization, Firewalls, Web Caches and Web Proxies

FC intends to upgrade its Core Network Security design and deploy WAN optimization techniques.. The upgraded Firewall shall serve the purpose of VPN Gateway with advance Firewalling, IPS and Application filtering features for the Internet as well as VPN traffic. These appliances shall be integrated with the FC Core Network and provide accessibility to the GWTS system as well as other FC Business Applications. In order to effectively manage utilization of WAN connectivity bandwidth, traffic shaping and transparent content proxy/cache shall be implemented to optimise bandwidth and eliminate redundant data transfer from the Internet.
Scope of work:

- Installation and configuration of firewalls: three (3) Cisco ASA5516-X Security appliances with FirePOWER services (of which one shall be configured as standby unit) and two (2) ASA5508-X Security appliances with FirePOWER services at select FC offices.
- install ASA FirePOWER services subscription licenses for IPS, URL Filtering and AMP, valid for 5 year term (e.g. Cisco L-ASA5508-TAMC-5PR, L-ASA5516-TAMC-5PR), considering the special license requirements for the standby unit.
- installation and configuration of FirePOWER Management Center virtual appliance (10 sensors), together with underlying VmWare ESXi.

- installation and configuration of rack-mounted host server suitable for running the above virtual appliance and the network management system as specified above in section 3.3.2.
- Annual Cisco support/maintenance contract for 5 years term, covering Cisco software updates.
- , Installation, and configuration of four (4) reliable WCCP/2 compliant web (content) proxies (open source such as Varnish or Squid or commercial such as Blue Coat) at select (4) offices as follows:
    - 1 Commercial appliance to the FC Head office in Accra (Site 1)
    - 1 Open Source appliance with underlying server hardware to each of the sites nr. 2, 3 and 4.
- Configuration of firewalls, relevant network switches and routers to support transparent web cache/proxy (i.e. using WCCP/WCCPv2), ensuring compatibility and interoperability with other firewall models in the FC network.
- Integration of the new networking devices with FC existing network.

3.3.5 Broadband Internet Connectivity Upgrade at Sites 1, 2, 3 and 4

In order to ensure that there is smooth internet service provision for FC, an alternative Internet Service Provider shall be necessary to augment that of existing connectivity provider (NITA). Therefore, as a part of the network upgrade, additional (i.e. redundant) Broadband WAN links shall be set up to operate in parallel with existing WAN connectivity at the following offices, according to the following minimum requirements:

- FC Headquarters in Accra (Site 1) shall be furnished with additional Fibre-optic connectivity with minimum speed of 10/10 Mbps
- RMSC office in Kumasi (Site 2) shall be furnished with additional Fibre-optic connectivity with minimum speed of 10/10 Mbps
- TIDD office in Takoradi (Site 3) shall be furnished with additional cost effective connectivity with minimum bandwidth of 5/1 Mbps
- TIDD office in Kumasi (Site 4) shall be furnished with additional cost effective connectivity with minimum bandwidth of 5/1 Mbps

The Contractor shall install the WAN connection services from a local connectivity provider and shall cover the cost of the service for the duration of warranty period of 1 year, commecing form date of Acceptance. After the warranty period the WAN service shall be signed over to the Beneficiary (or its appointed proxy).

3.3.6 The following services shall be delivered by the Contractor:

- Configuration of VPN and WLAN settings, ensuring reliable Site-to-Site IPSec VPN connection to the FC head office services in Accra
- Configuration of VPN fall-back Site-to-Site IPSec link to FC RMSC office in Kumasi
- Configuration of QoS to prioritize (VPN) traffic to FC Offices in Accra and Kumasi (over any other traffic that may be carried over the VPN router to and from the internet)

3.3.7

3.4 Physical Upgrade of Server Rooms to Data Centre Sites 1 and 2

Reference Documents:
Appendix B: Bill of Materials

The Contractor shall upgrade the physical data centres at Sites 1 and 2. The Contractor shall be responsible for verifying the background data presented here and for proposing a complete upgrade solution, including:

- verification of the Site;
- development of a methodology for the physical upgrades;
- design of the upgrades;
- preparation of the Sites;
- construction of the upgrades at the Sites;
- commissioning the upgraded data centres; and
- establishing contracts for the maintenance of data centres.

3.4.1 Background Information and Requirements

The server room at Site 1 is currently used for storage as well as for housing the datacentre networking and

server equipment. The server room shall be partitioned into two (2). One partition shall house the server racks and the other shall be suitable for use as a monitoring room that can still then be used for some level of storage. Partitioning the server room will decrease the amount of investment required to install fire detection and suppression system since the volume of space that shall be covered will be reduced approximately by half.

The server room currently has no fire detection and suppression system and such a system shall be installed together with an environmental monitoring system to protect the data centres, server equipment and FC personnel.

The under structure of the existing server room false floor is made of wood and not suitable for a datacentre because of it flammable nature. The false ceiling is also made up of tiles that are not fire rated and shall be changed to fire retardant tiles.
The windows within the datacentre shall be sealed, a fireproof access door shall be provided and adequate illumination shall be provided.

FC Head Office Server Room (Site 1):

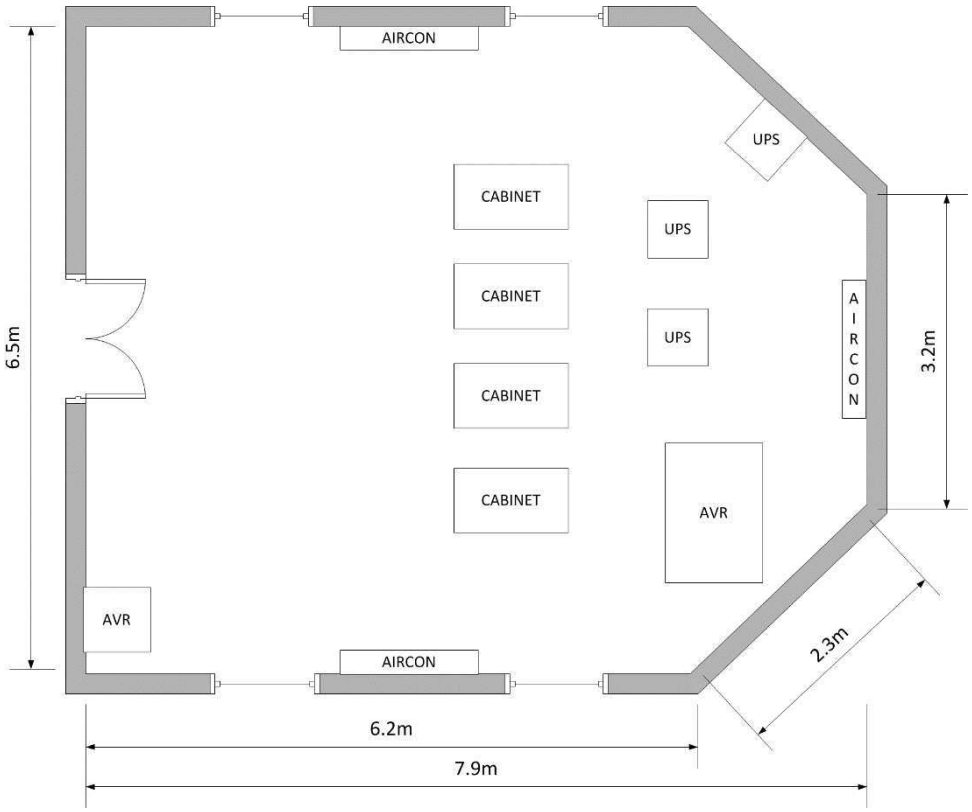


Figure 1 Server Room Floor Plan (Site 1, FC Head Office Accra)

Server room in Kumasi (Site 2):

Dimensions of the server room are 5.0m x 3.4m with a height of 2.9m. There is no ceiling void or raised floor. A diagram of this room is not available and the Contractor will be expected to have visited the the Site prior to tender to undertake a survey of the Server Room.

3.4.2 Preparation

As part of preparation for the server room upgrade, the following aspects shall be considered:

- Building temporary server room or partitioning the area in such a way that the existing network infrastructure shall be operational in the server room while being upgraded
- Temporary cabling in case a temporary server room shall be established

- Relocating network equipment and servers from old server room to temporary server room in case such will be needed.

3.4.3 Civil Works

The civil works required for upgrading the server room to industry standard data centre requirements shall include the delivery and installation of at least the following:

- Industry standard raised floor
- Fireproof False ceiling
- Sealing of windows with fireproof plasterboards
- Extra insulation of the room to reduce outside heating loads
- Fireproofing of walls
- Fire- and smoke resistant door(s)
- Mechanical automatic closing devices for doors

Contractor shall provide revised and detailed list of works and respective BOM and shall perform site survey prior to finalising their proposals and design.

3.4.4 Data Centre Environmental Monitoring System

The Contractor shall install environmental monitoring and video surveillance solutions including necessary hardware and software in both server rooms that shall be upgraded to data centres.

The video surveillance system shall be set up to monitor the server rooms with two (2) cameras in each server room.

3.4.5 Data Centre Cooling

The Contractor shall install in the data centre in Accra (Site 1) a cost and energy efficient cooling solution with humidity control (using methods such as underfloor cooling, hot-aisle/cold-aisle cooling, Hot Aisle Containment, cabinet based cooling, use of freestanding AC units or other suitable cooling type) for existing four (4) server racks and other equipment and shall as well as reposition/relocate one of the existing wall-mounted split-type air conditioning devices to control room.

The Contractor shall relocate/reposition as necessary the existing wall-mounted split-type air conditioning devices in Kumasi-RMSC (Site 2) that shall provide optimal cooling considering the lay-out of the data centre.

3.4.6 Data Centre Fire Protection and Suppression System

The Contractor shall install in data centres in Accra and Kumasi thelatest technology industry standard automatic (inert gas based) fire suppression system (AFSS) suitable for server room / data centre operation.

Necessary constructional pre-requisites such as sealing of doors and windows shall be ensured for the effective operation of the gas based fire suppression system.

The design, , testing and commissioning of various components of the AFSS shall comply with all currently applicable statutes, regulations, and safety codes in the locality where the equipment will be installed.
The system shall be complete in all ways. It shall include:

1. all mechanical and electrical installation,

The Contractor shall be responsible for the , installation, testing and commissioning and successful handing over of complete AFSS.

A statement of no objection to the Design by the Client shall be required prior to installation of the AFSS.

. The Contractor shall also furnish detailed completion drawings on a tracing paper to approved scale. The drawings shall be inclusive of control schematic, if any.

The AFSS shall be installed and serviced by authorised distributors that are trained by the manufacturer.

The Contractor shall train the Beneficiary's personnel in the operation and maintenance of the system.

3.4.8 Data Centre Lighting System Not seeking for specifics.

The upgrade of server rooms shall include replacement of the existing lighting system with an LED based or other appropriate effcient energy lighting system in order to increase the overall energy efficiency of the Data Centres and reduce demand on the PV Solar power systems. This shall be done only where replacement is necessary. The lighting system shall provide industry standard lighting level for the server room and the control room (considering the room size and placement of network cabinets etc.).

3.4.9 Data Centre Finalization

The Contractor shall:

- Relocate the network equipment and servers from temporary server room to upgraded server room
- Dismantle temporary server room

3.4.10 Data Centre Commissioning

At the completion of all works, upgrades, and installations, the Contractor shall ensure, verify and demonstrate that all systems operate according to specification (e.g. fire detection and suppression system, environmental monitoring system, cabling and wiring etc., excluding existing FC network and server equipment) and, subject to a statement of no objection by the Client, shall hand over the data centres in working order to the Beneficiary.

3.5 Training and Skills Transfer

As part of the project implementation, the Service Provider shall provide training and skills transfer in the applicable Network and Data Centre technologies. It is expected that this will be done through cost efficient hands-on training for a group of 10 FC staff, subject to a statement of no objection by the Client. The required outcome is for trained staff to have the requisite skills to manage the deployed solutions independently. This shall require knowledge transfer of all design, setup and configuration information of the solutions. In addition the Contractor shall design and deliver O&M training, in Ghana, to a group of 7 FC staff relating to all the delivered hardware, software and systems:
Basic classroom and online training (as feasible) on all provided network monitoring and management tools (network monitoring, network configuration management, IP address management, Fault detection and management etc. is required)

Please note that the objective is not to undertake any certification programs or extensive training programs.

As a minimum, the following following topics shall be covered in the training:

Networks and Communications

- Cisco ASA5500-X series and Firepower services, configuration and management
- Wireless LAN, controller based architecture, configuration and management.
- VLANs and QoS, configuration and management,
- IPSec VPN and remote offices, configuration and management
- Cisco Routing, Switching and Security, configuration and management
- WAN optimization and web cache/proxy configuration and management

Data Centre and Systems

- Vmware vSphere, configuration operation and management
- Environmental monitoring system
- Fire detection and suppression system

- Video surveillance system
- Access control system

The Contractor shall be required to provide detailed training plans and proposed schedules, topics that shall be covered and training methods that shall be used, subjec tto no objection by the Client.

The Beneficiary will arrange for the trainees to arrive to the training and the Contractor shall be required to provide the training at the venue provided by the Beneficiary.

The IT Training shall be provided in Accra area

The O&M Training shall be provided in Accra and Kumasi

4 Design Standards

The standards and codes with which the components, structures and installations shall comply with are determined by the laws and local/regional regulations in Ghana.

5 As-Built Documents

Prior to commencing the Tests on Completion the Contractor shall prepare a complete set of As-Built Documents and submit these to the Client for review and a statement of no objection. The As-Built Documents shall include the following:

1. Single-Line Diagrams (SLDs) for all System Installations
2. BOMs of the IT Systems as installed, highlighting any changes relative to the BOMs prepared with the Contractor's design.
3. Engineering Drawings of the Upgraded Server Rooms and Mounting Systems for all Systems
4. System configuration specifications for all installed and configured systems, including modifications made to original configuration (factory settings) of the systems

6 Tests on Completion

For the Computer network infrastructure upgrade works the test on completion shall be carried out as User Acceptance testing, including the following:

1. Commissioning checks and Tests
2. System Performance Tests

The Contractor shall conclude the Tests on Completion within the Time for Completion, subject to a statement of no objection by the Client.

7 Time for Completion and Programme of Works

The Time for Completion for the Works described in these Requirements shall be in accordance with the General Conditions of Contract, Clause 8.2.

The Contractor shall prepare detailed Schedules demonstrating compliance with the overall deadline for completion given above and with other critical milestone listed given in the Table below. The Schedule shall take into account other work to be performed by others at each site, and shall take into account identified risks.The Programme of Work shall be in accordance with the General Conditions of Contract.

Appendix A: List of Sites

The following Table shows the GPS co-ordinates and Office names. The Sites are grouped into three categories:

1. Large offices require upgrade of broadband connection, network infrastructure and server room.
2. Medium size offices require upgrade in broadband connection and network infrastructure.
3. Small offices require upgrade in connectivity using 3G and VPN (remote offices)

Appendix B: Estimated Bill of Materials

Extracted from proposal of IMPC

item #	Bom level	1	2	3	Description	Unit	TOTAL QTY	FC HO Accra	Kumasi RMSC	Kumasi TIDD	Takoradi TIDD	FC DO
1	1	x			**Server room upgrade Accra**							
1.1	2		x		**Construction**	Lot	**1**	1				
1.1.1	3			x	Raised Floor for Datacenter	sqm	**50**	50				
1.1.1	3			x	Carefully remove existing wooden raised floor	Lot	**1**	1				
1.1.2	3			x	Fire Retardant False Ceiling for Datacenter	sqm	**50**	50				
1.1.3	3			x	Partition of Datacentre to Server room and monitoring room	Lot	**1**	1				
1.1.4	3			x	Sealing of Windows with Fire Proof Plaster Boards	Lot	**1**	1				
1.1.5	3			x	Automatic closing devices for doors	Lot	**1**	1				
1.1.6	3			x	Installation Service	Lot	**1**	1				
1.1.7	3			x	Insulation of the Datacenter	Lot	**1**	1				
1.1.8	3			x	Data Centre Lighting System (LED or appropriate cost effective lighting system)	Lot	**1**	1				
2	1	x			**Server room upgrade at RMSC Kumasi (DRC)**							
2.1	2		x		**Construction**	Lot	**1**		1			
2.1.1	3			x	Raised Floor for Datacenter	sqm	**17**		17			
2.1.1	3			x	Carefully remove existing wooden raised floor	Lot	**1**		1			
2.1.2	3			x	Fire Retardant False Ceiling for Datacenter	sqm	**17**		17			
2.1.3	3			x	Partition of Datacentre to Server room and monitoring room	Lot	**1**		1			
2.1.4	3			x	Sealing of Windows with Fire Proof Plaster Boards	Lot	**1**		1			
2.1.5	3			x	Automatic closing devices for doors	Lot	**1**		1			
2.1.6	3			x	Installation Service	Lot	**1**		1			
2.1.8	3			x	Data Centre Lighting System (LED or apprpriate lighting solution)	Lot	**1**		1			
7	**1**	**x**			**IT Services**							
7.1	**2**		x		**Training**							
7.1.1	3			x	Cisco ASA5500-X series and Firepower services, configuration and management	person	**10**	10				
7.1.2	3			x	Wireless LAN, controller based architecture, configuration and management.	person	**10**	10				
7.1.3	3			x	VLANs and QoS, configuration and management,	person	**10**	10				
7.1.4	3			x	IPSec VPN and remote offices, configuration and management	person	**10**	10				
7.1.5	3			x	Cisco Routing, Switching and Security, configuration and management	person	**10**	10				
7.1.6	3			x	WAN optimization and web cache/proxy configuration and management	person	**10**	10				
7.1.7	3			x	Training on all provided network monitoring and management tools (network monitoring, network configuration management, IP address management, Fault detection and management etc.)	person	**7**	7				
7.1.8	3			x	Vmware vSphere configuration, operation and management	person	**7**	7				
7.1.9	3			x	Environmental monitoring system	person	**7**	5	2			
7.1.10	3			x	Fire detection and suppression system	person	**7**	5	2			

item #	Bom level	1	2	3	Description	Unit	TOTAL QTY	FC HO Accra	Kumasi RMSC	Kumasi TIDD	Takoradi TIDD	FC DO
7.1.11	3			x	Video surveillance system	person	**7**	5	2			
7.1.12	3			x	Access control system	person	**7**	5	2			
7.2	**2**		x		**Network design**							
7 2 1				x	WLAN N twork planning and D ign, incl ite urv y	m day	**20**	8	4	4	4	
7.2.2	3			x	Network design with VLAN's and configuring of devices	m.days	**20**	8	4	4	4	
7.3	**2**		x		**Broadband link set-up cost for 2 larger offices Site 1 & Site 2 - Fiber link**	**lots**	**2**	**1**	**1**			
7.4	**2**		x		**Broadband link set-up cost for 2 larger offices Site 3 & Site 4- Radio link**	**lots**	**2**			**1**	**1**	
9	**1**	**x**			**Installation and Other Services**							
					Installation of IT Hardware for Sites 1,2,3 & 4	Lot	**1**	1				
					Installation of Fire Detection and Suppression System, clean Agent based in Accra H/Office & Kumasi- RMSC	Lot	**2**	1	1			
					Installation of Data centre cooling solution in Accra H/Office & Kumasi	Lot	**2**	1	1			
					Installation of Fingerprint based access control system to server room in Accra H/Office & Kumasi	Lot	**2**	1	1			
					Relocation of Existing AC Units in Kumasi-RMSC	Lot	**1**		1			
					As-Built Drawings & Manuals for all sites	Lot	**1**					
					Testing and Commissioning Systems for All sites	Lot	**1**					
Additional					5KVA Solateck SVS 5000 AVR	units	**34**					

Appendix C – Network Diagrams

Volume III Appendix Bi: Equipment Lists and cooling capacity requirement for sites 1 and 2

Table B. 2 Summary of Expected Daily Demand at Site 1 FCHQ Accra (kWh/day)		
Equipment	**Peak Power (W)**	**kWh in 24 h**
Rack 1	[redacted]	
Freestanding servers		
Rack 2		
Rack 3		
Rack 3 UPS (APC)		
Other UPS's		
2nd server room		
Cooling		
Total FCHQ Server room		

Table B.3 Expected Daily Demand at Site 1 FCHQ Accra				
Equipment	**Peak Power (W)**	**Run hrs/ 24 h**	**kWh/24 h**	**Location**
Dell PowerEdge AS180	[redacted]			
HP Proliant ML350				
Dell PowerEdge 2900				
Dell PowerEdge 2900				
Dell PowerEdge 2900				
Dell PowerEdge 2900				
Dell PowerEdge 2900				
Dell PowerEdge 2900				
Dell PowerEdge 2900				
Cisco SF100-24 switch				
Total for FC office servers				
2 Dell workstations				
Total for Free-standing units in FC Server Ro				
Discovery ATM G.shdsl.bis router/modem (Vodafone)				
Cisco 2901 integrated services router				
Cisco ASA 5520 Firewall				
Cisco SF300P-48				
Cisco SF300P-48				
Cisco SF300P-48				
Cisco SF300P-48				
NITA modem				
Huawei Quidway S3700 series router				
Total for switching equipment				

Table B.3 Expected Daily Demand at Site 1 FCHQ Accra				
Equipment	**Peak Power (W)**	**Run hrs/ 24 h**	**kWh/24 h**	**Location**
Dell PowerEdge 2950	[redacted]			
Dell PowerEdge 1950 (3 pc)				
Dell PowerEdge R710				
Dell Equallogic PS6110x				
Dell KVM 1082DS				
Dell PowerEdge M610 (9pc)				
Dell PowerEdge M910 (2pc)				
Dell PowerVault TL2000				
Dell PowerConnect M8024-k (2pc)				
Dell PowerConnect 6220 FI (2 pc)				
Cisco Catalyst 2960G-28				
Total for Rack 3 (GWTS) Servers				
APC Symmetra LX 12 kVA (6 min runtime), charging time 8 hours [1]				
Total for GWTS UPS				
Comet EX 7 RT 3:1 6000 VA, charging 8h				
Socomec Netsys RT 11000 VA, charging 8h				
Total UPS (excl. GWTS UPS)				
3 Air conditioning units				
Total cooling in server room				
Cisco SF300-24				
Cisco Catalyst 2960G-28				
Total 2nd server room				

[1] Typical UPS Power Factor is 0.9

Site 2: RMSC Office Kumasi

Table B.4 Summary of Expected Daily Demand at Site 2 RMSC Kumasi (kWh/day)		
Description	**Peak Power (W)**	**kWh in 24 h**
Server room existing equipment	[redacted]	
Server room Cooling		
GWTS rack servers		
GWTS UPS		
Total		

Table B.5 Expected Daily Demand at RMSC Kumasi (kWh/day)					
Name	**Qty**	**Peak Power (W)**	**Peak Power Total (W)**	**hrs run in 24 h**	**kWh in 24 h**
Dell PowerEdge 2900	[redacted]				
Dell PowerEdge R510					
Dell PowerEdge R710					
Cisco 2960 Switch					
Huawei Switch					
KVM Dell					
Cisco 2900 Router					
Cisco ASA5520					
D-Link DES 1024D					
UPS					
TOTAL Existing Server Room Equipment					
Cooling					
Total server room cooling					
Cisco 2901 integrated services router					
Dell Equallogic PS6110x					
Dell KVM 1082DS					
Dell PowerEdge M610 (9pc)					
Dell PowerEdge M910 (1pc)					
Dell PowerVault TL2000					
Dell PowerConnect M8024-k (2pc)					
Dell PowerConnect 6220 FI (2 pc)					
Cisco Catalyst 2960G-28					
Total for GWTS DRS Servers					
APC Symmetra LX 12 kVA (typical power factor 0.9) (6 min runtime), charging time 8 hours					
Total for GWTS UPS					

Appendix Y: Indicative list of equipment for determining Network Monitoring tool licensing requirements

Site No.	Site Name
1	FCHQ Accra
2	RMSC Kumasi
3	TIDD Kumasi
4	TIDD Takoradi
5 to 38	FC District Office (x 34 offices)

This indicative list of equipment is provided to aid the tenderers to derive the network monitoring and management solution licensing requirements. The equipment list includes existing equipment in the server rooms as well as client devices (as described in tables B.1 through B5). The impact of new equipment (procured in the context of this tender) to licensing requirement shall be determined by the tenderers. Please note that the new equipment (and respective interface/port quantities) are not included in the tables below and shall be required to be added to the calculations by the tenderer.

In addition to the active networking equipment there are also a number of client devices included in the FC network accoring to the table below:

Table B.1 Client equipment existing connected to Forestry commission network.	
Equipment	**Qty**
Desktops	[redacted]
Laptops	
Network Printers	
Wireless routers	
Servers	

Note: A number of the servers appearing in the tables below (B.2 through B.4) are also included in the table above (B.1).

Table B.2 Networking equipment list at Site 1 FCHQ Accra			
Equipment	**Qty**	Number of ethernet ports	**Location**
Dell PowerEdge AS180	[redacted]		
HP Proliant ML350			
Dell PowerEdge 2900 (7 pc)			
Cisco SF100-24 switch			
Dell workstations (2pc)			
Discovery ATM G.shdsl.bis router/modem (Vodafone)			
Cisco 2901 integrated services router			
Cisco ASA 5520 Firewall			
Cisco SF300P-48			
Cisco SF300P-48			
Cisco SF300P-48			
Cisco SF300P-48			
NITA modem			
Huawei Quidway S3700 series router			
Dell PowerEdge 2950			
Dell PowerEdge 1950 (3 pc)			
Dell PowerEdge R710			
Dell Equallogic PS6110x			
Dell KVM 1082DS			
Dell PowerEdge M610 (9pc)			
Dell PowerEdge M910 (2pc)			
Dell PowerVault TL2000			
Dell PowerConnect M8024-k (2pc)			
Dell PowerConnect 6220 FI (2 pc)			
Cisco Catalyst 2960G-28			
UPS APC Symmetra LX 12 kVA			
UPS Comet EX 7 RT 3:1 6000 VA			
UPS Socomec Netsys RT 11000 VA,			
Cisco SF300-24			
Cisco Catalyst 2960G-28			

Site 2: RMSC Office Kumasi

Table B.3 Networking equipment list at RMSC Kumasi		
Equipment	**Qty**	Number of ethernet ports
Dell PowerEdge 2900	[redacted]	
Dell PowerEdge R510		
Dell PowerEdge R710		
Cisco 2960 Switch		
Huawei Switch		
KVM Dell		
Cisco 2900 Router		
Cisco ASA5520		
D-Link DES 1024D (3pc)		
UPS (6pc)		
Cisco 2901 integrated services router		
Dell Equallogic PS6110x		
Dell KVM 1082DS		
Dell PowerEdge M610 (9pc)		
Dell PowerEdge M910 (1pc)		
Dell PowerVault TL2000		
Dell PowerConnect M8024-k (2pc)		
Dell PowerConnect 6220 FI (2 pc)		
Cisco Catalyst 2960G-28		
UPS APC Symmetra LX 12 kVA		

Table B.4 Equipment list at Sites 3 and 4 TIDD Takoradi		
Equipment	Qty	Number of ethernet ports
Dell PowerEdge 2900 (3pc)	[redacted]	
Cisco 2960 Switch		
Huawei Switch		
KVM Dell		
UPS (3pc)		

Table B.5 Networking equipment list at each of the District Offices (Sites 5 to 38)		
Equipment	Qty	Number of ethernet ports
Desktop (3 pc)	[redacted]	
Laptop pc		
Network printer		
VPN Wireless router (to be procured with this tender)		

Please note that the table B.5 above is indicative for a single district office and there are total of 34 offices to be considered.

Annex 2- Terms of Reference for Solar

The Project to Strengthen Governance in the Forestry Sector in Ghana
The scope of the services is installation of new internet capacity and a solar backup energy system in 38 office locations across Ghana. The offices are the operational centres of the Ghana Forestry Commission (the Beneficiary").

The procurement will be conducted using funds from the Forest Governance Markets and Climate programme (FGMC) as part of DFID support to Ghana for the implementation of the EU-Ghana Voluntary Partnership Agreement (VPA) governing the forest product trade as part of the Project to strengthen governance of the forestry sector in Ghana.

Technical Specifications

1 Project Background

The UK Government's Department for International Development (DFID) has been supporting the efforts of the Ghana Forestry Commission (GFC) to strengthen governance in the forest sector, and particularly to improve regulatory controls through the introduction of a electronic Wood Tracking Chain of Custody System, a key component of the Ghana Legality Assurance System (GhLAS). The GhLAS will enable Ghana to license all timber product exports as required under its bilateral trade treaty with the EU, known as the Voluntary Partnership Agreement (VPA). The development and the deployment of the GhLAS is currently in its final stages of completion. The first and second stage of the roll out of the electronic wood tracking system (WTS) has been completed. The final stage has just started. It aims to conclude all system development and deployment as well as bring on board the 40 relevant forest districts and the private sector constituents across the productive forest zone.

However, the GhLAS rollout has identified inadequate internet network infrastructure and connectivity as well as frequent power outages as critical problems that threaten to undermine the implementation and efficiency of Ghana's electronic WTS and the entire GhLAS. This is having negative knock on effects of reducing capacity to collect timber revenues and control illegal activity. It further risks putting in jeopardy the timing of the introduction of FLEGT licenses for the EU market planned for 2016.

An assessment of the problems and needs for system upgrade has been conducted. This procurement is guided by its findings and the option selected by the Ghana Forestry Commission as best meeting its current and future needs.

Overall, the day-to-day functioning of GFC's ICT infrastructure will be significantly enhanced leading to efficiency in regulatory controls, information management including monitoring of deforestation.
The Scope of Works defined in this User's Requirements ("the Requirements") covers the design, construction and installation of the Systems.

2 Scope of the Works

The Scope of Works is defined in these Requirements and its appendices. Table 1 shows a high-level breakdown of the Scope of Works for which the Contractor will be responsible for Component 2: Solar back-up system. The table also highlights areas of responsibility for the Employer and the Beneficiary.

Table 2 Scope of Works: Schedule of Activities and Responsibilities

No.	Description	Consultant	Contractor	Employer
1	Conduct Detailed Site Surveys		•	
2	Prepare PV System detailed Designs, incl. PV array location/mounting options and system performance report (e.g. simulation results, etc.)		•	
3	Prepare designs for minor civil works and physical infrastructure modifications at the Sites		•	
7	Undertake all required minor civil works and physical infrastructure modifications at the Sites.		•	

Table 2 Scope of Works: Schedule of Activities and Responsibilities				
No.	**Description**	**Consultant**	**Contractor**	**Employer**
8	Install PV Systems at Sites		•	
9	Integrate PV Systems with FC Offices		•	
10	Solar Tests on Completion 1 (Pre-Commissioning)		•	
11	Solar Tests on Completion 2 (Commissioning)		•	
12	Solar Systems – Issue of Preliminary Acceptance Certificates	•		
13	Solar Tests on Completion 3 (Performance Testing – one year)		•	
14	Solar Systems - Issue of Taking-Over Certificates	•		
15	Review and approve applications for interim and final payments to the Contractor	•		
16	Execute interim and final payments to the Contractor			•
18	O&M Training - Workshops and Field Training		•	
19	Monitoring System Performance & Reporting (prior to Taking-Over)		•	
20	Correction of Defects in Defect liability Period		*	
20	Monitoring System Performance & Reporting (after Taking-Over)	•		

3 Technical Requirements

3.1 Site Information

The prepared site data shall serve as a basis for the data verification, Site surveys and design activities included in the Scope of Works:

1. List of Sites (Appendix A)
2. Lists of Equipment to be powered by the Systems (Appendix B)

3.2 Sites

The Sites vary with respect to grid power availability; sophistication of facilities; availability of services; availability of space for Energy Storage Systems and PV Panel arrays; and shading. All of these factors must be assessed and taken into account by the Contractor in the designs for each site.

3.3 System Performance Requirements

3.3.1 System Sizing

For every Forestry Commission (FC) office listed in Appendix A, a discrete PV solar generating system shall be designed, , installed and commissioned. The Systems must be designed to provide sufficient power and energy to cover the operational profile for all items of equipment listed for each Site in Appendix B. The total daily energy demands at each site are summarised in the following table:

Table 3 Summary of Daily Energy Demand by Site		
Site No.	**Site Name**	**kWh/day**
1	FCHQ Accra	[redacted]
2	RMSC Kumasi	
3	TIDD Kumasi	
4	TIDD Takoradi	
5 to 38	FC District Office (34 offices @ 4.5 kWh/day)	
	TOTAL Daily Demand for All Systems	

The Contractor shall prepare the System designs on the following bases:

1. Customised Systems shall be designed for Sites 1 and 2;
2. The Systems for Sites 3 and 4 shall be based on the same design;
3. The Contractor shall prepare one design to cover the requirements for all 34 District Office Sites

The Contractor shall assess shading at all Sites and select array mounting locations to balance array installation costs with shading losses. Shading of the arrays shall be avoided wherever possible. If this is not possible, shading losses shall be accounted for in system design.

3.3.2 Functional Guarantees and Guarantee Tests

The completed Systems shall be subjected to Guarantee Tests to benchmark the performance of each System against the required power output of the Systems. The required outputs for each System listed in Table 2 (above) constitute the functional guarantees which the Contractor is committed to deliver for the lifetime of the System.

The Guarantee Tests shall measure the System capacities (kWh/day) over a complete discharge-recharge-discharge cycle, and be linked to a month with the worst yield.

3.3.2 System Architecture

For all 38 Sites, the Systems shall be based on Photovoltaic (PV) panel generators coupled to a battery bank and providing alternating current (AC) power output to the Site users.

The probability, frequency/duration of grid outages can only be estimated by the grid operator from their historical performance statistics. For this reason we are making the following assumptions/requirements:

- Backup generators are installed and in working order to assist with charging/sustaining the batteries during a grid outage.
- Installed PV capacity shall be such that it can sustain the load during the worst sun day of the year for the entire lifetime of the Systems.
- Simulation Examples listed above can be used as a guide for installed capacity, but the Contractor ultimately takes reponsibility for the validity of the design.
- Simulation Examples do not take shading into account.
- Simulation Examples do not take array mismatch into account.

- Simulation Examples assume all roof structures are capable of handling the additional weight.
- Autonomy: Storage system shall be suitably sized so as to (as a minimum) continue to operate for 24 hours without sun, grid and generator, alternative offer shall be for 9 hours, based on the demand in Appendix B. Bidders must provide one costed offer for each storeage option.

The storage system shall be designed according to the following:

- Battery DOD shall be no more than 80% for an extended outage. Daily DOD shall not be more than 30%.

Charge time (from fully discharged) shall be no more than 15 hours.
The Contractor shall prepare System designs for all of the Sites as follows:

1. For Sites 1 to 4:
    i. The solar PV system shall be sized to achieve a solar share of the energy demand of the site users between 70 and 90%.
    ii. PV energy usage shall be maximised.
    iii. Public grid power shall be used as a fallback option to prevent load shedding and thus ensure continuous system operation. The Systems shall be designed to optimise the use of public grid power for battery charging. Frequent public grid blackout periods shall not interfere with the system's performance and continuous supply of power to the site users.
    iv. Systems shall be sized to achieve an average daily depth of (battery) discharge (DOD) no more than 30%; If vendors favour Li-Ion battery solutions, a suitable higher DOD could be accepted if the performance warranty can be kept;
    v. The Systems shall be AC- coupled.
    vi. Where applicable, provision shall be made for maintenance and/or repairs to generators installed on site.
    vii. Two proposals shall be provided; one for a 1 day battery autonomy, and the second shall be for a 9-hour battery autonomy with a maximum DOD of 80%.
    viii. Main Site office system should be 100% Rooftop

2. For the 34 District Office Sites (Sites 5 to 38):
    i. The solar PV Systems shall be designed for stand-alone operation, regardless of whether grid power is available at the District Offices.
    ii. Battery autonomy shall be 3 days (based on a maximum DOD of 80%). This shall ensure a system uptime greater than 95%.
    iii. The Systems shall be DC- coupled.
    iv. District offices system should be 100% ground based.

3.3.3 Procurement of System Components

The Contractor shall work with manufacturers of the inverters, charge controllers, batteries and any other components deemed necessary, to provide training to the Client on appropriate installation, integration, operation and maintenance of the products which they will supply for the Systems. The Contractor shall submit a proposal for such trainings to the Client

The Contractor shall ensure the quality of manufacturing for all of the components purchased for the installation and construction of the works.

3.3.4 System Design Life

The Contractor shall optimise the design life of the whole System. At minimum, the design life of the whole System shall be based on the following minimum component design lives:

1. PV Panels– 25 years
2. Power electronics and other electronic equipment – 10 years
3. Battery Bank – 10 years

The System design shall minimise maintenance requirements.

3.3.5

3.3.6

3.3.7 Energy Storage System Housings

To the extent possible, the ESS shall be housed and secured within existing buildings at the Sites. Together with the Client, the Contractor shall identify suitable locations which benefit from passive cooling features, including avoidance of exposure to direct solar irradiance and good free air circulation. Battery inverters shall be placed so as to minimise cable length on the DC-side of the inverters.
It would be expected that acceptable battery operating conditions (to achieve the required battery life) can be achieved without the use of air conditioning. If the design requires cooling of the ESS housing, the cooling load power shall be serviced by the Systems themselves and the Systems shall be sized accordingly.

The ESSs shall incorporate physical security features to restrict access to the batteries and battery connection points.

3.3.9 Load Limiting

The purpose of the Systems is to ensure uninterrupted electrical power supply to all of the computing, network and associated equipment required to operate the Ghana Wood Tracking System (GWTS) (listed in the tables in Appendix A) first. It is acceptable to supply non-essential loads with any excess generation available. The battery storage system shall be prevented from supplying non-essential loads at all times.

Suitable measures shall be put in place to ensure that excess generation is not exported to the grid.
The Contractor shall provide a solution (whether mechanical, electrical, or logical, or a combination of these) to minimise the possibilities for the connection and operation of unapproved loads.

3.3.10 Remote Monitoring Systems (RMS)

The Contractor shall identify the data volume and frequency of data transmissions required to operate the RMS for all Sites.

Up to the final acceptance of the Systems, it shall be the responsibility of the Contractor to collect the data and make it available through an online portal.

3.4 Mandatory Spare Parts

The Mandatory Spare Parts to be provided by the Contractor shall include the following:

- **Power Electronics** (Inverters, Charge Controllers, etc.): Dependent on the type of electronics proposed for the Systems. The Contractor shall recommend a set of spare parts for these components to facilitate repair and change out of faulty components in the field.
- **Electrical Installation Equipment:** For equipment such as large breakers and fuses, which may be difficult to source locally, the Contractor shall provide 5% of the total installed quantity of these items as spares.

4 As-Built Documents

Prior to commencing the Tests on Completion the Contractor shall prepare a complete set of As-Built Documents and submit these to the Client for review and approval. The As-Built Documents shall include the following:

1. Single-Line Diagrams (SLDs) for all System Installations
2. BOMs of the PV Systems as installed, highlighting any changes relative to the BOMs prepared with the Contractor's tender.
3. Engineering Drawings of the Enclosures and Mounting Systems for all Systems

5 Tests on Completion

For the Electrical Works and Solar Installations, Tests on Completion will include the following:

1. Pre-Commissioning System Inspections
2. Commissioning Checks and Tests
3. System Performance and Guarantee Tests

The Contractor shall satisfactorily conclude the Tests on Completion within the Time for Completion.

6 Indicative Inputs to be provided by the Contractor

The Contractor shall have the experience and capacity to successfully deliver the Works described in these Technical Requirements. The Client would expect the Contractor to provide, at minimum the following inputs for the execution of the Works.

Indicative technical staff

1. Project Manager with proven experience successfully managing similar design and installation projects in Ghana or similar working environments. The Project Manager shall act as the principal point of contact with the Client.
2. Design Engineer(s) with proven expertise in the design of off-grid PV generating systems for Ghana or similar environments.
3. Engineering support staff to assist with the verification of energy audit and site survey data, as required.

Indicative Facilities

1. Project Vehicle and drivers
2. Project Management Office facilities
3. Computers, plotters, and printers, software, high speed internet and other Project Management Office (PMO) equipment as required to execute the Works
4. Accommodation for the Contractor's staff

7 Time for Completion and Programme of Works

The Time for Completion for the Works described in these Requirements shall be no longer than six months from date of contract signature.

The Contractor shall prepare detailed Schedules demonstrating compliance with the overall deadline for completion given above and with other critical milestone listed given in the Table below. The Schedule shall take into account other work to be performed by others at each site, and shall take into account identified risks.

Appendix A: List of Sites

Please see Appendix A of the Terms of Reference for IT upgrade

Appendix B: Equipment List and daily demand by site

Table B.1 Daily Energy Demand Summary		
Site No.	**Site Name**	**kWh/day**
1	FCHQ Accra	[redacted]
2	RMSC Kumasi	
3	TIDD Kumasi	
4	TIDD Takoradi	
5 to 38	FC District Office (x 34 offices)	
	TOTAL	

Table B. 2 Summary of Expected Daily Demand at Site 1 FCHQ Accra (kWh/day)		
Equipment	**Peak Power (W)**	**kWh in 24 h**
Rack 1	[redacted]	
Freestanding servers		
Rack 2		
Rack 3		
Rack 3 UPS (APC)		
Other UPS's		
2nd server room		
Cooling		
Total FCHQ Server room		

Table B.3 Expected Daily Demand at Site 1 FCHQ Accra				
Equipment	**Peak Power (W)**	**Run hrs/ 24 h**	**kWh/24 h**	**Location**
Dell PowerEdge AS180	[redacted]			
HP Proliant ML350				
Dell PowerEdge 2900				
Dell PowerEdge 2900				
Dell PowerEdge 2900				
Dell PowerEdge 2900				
Dell PowerEdge 2900				
Dell PowerEdge 2900				
Dell PowerEdge 2900				
Cisco SF100-24 switch				
Total for FC office servers				
2 Dell workstations				
Total for Free-standing units in FC Server Room				

Table B.3 Expected Daily Demand at Site 1 FCHQ Accra				
Equipment	**Peak Power (W)**	**Run hrs/ 24 h**	**kWh/24 h**	**Location**
Discovery ATM G.shdsl.bis router/modem (Vodafone)	[redacted]			
Cisco 2901 integrated services router				
Cisco ASA 5520 Firewall				
Cisco SF300P-48				
Cisco SF300P-48				
Cisco SF300P-48				
Cisco SF300P-48				
NITA modem				
Huawei Quidway S3700 series router				
Total for switching equipment				
Dell PowerEdge 2950				
Dell PowerEdge 1950 (3 pc)				
Dell PowerEdge R710				
Dell Equallogic PS6110x				
Dell KVM 1082DS				
Dell PowerEdge M610 (9pc)				
Dell PowerEdge M910 (2pc)				
Dell PowerVault TL2000				
Dell PowerConnect M8024-k (2pc)				
Dell PowerConnect 6220 FI (2 pc)				
Cisco Catalyst 2960G-28				
Total for Rack 3 (GWTS) Servers				
APC Symmetra LX 12 kVA (6 min runtime), charging time 8 hours [1]				
Total for GWTS UPS				
Comet EX 7 RT 3:1 6000 VA, charging 8h				
Socomec Netsys RT 11000 VA, charging 8h				
Total UPS (excl. GWTS UPS)				
3 Air conditioning units				
Total cooling in server room				
Cisco SF300-24				
Cisco Catalyst 2960G-28				
Total 2nd server room				

[1] Typical UPS Power Factor is 0.9

Site 2: RMSC Office Kumasi

Table B.4 Summary of Expected Daily Demand at Site 2 RMSC Kumasi (kWh/day)		
Description	**Peak Power (W)**	**kWh in 24 h**
Server room existing equipment	[redacted]	
Server room Cooling		
GWTS rack servers		
GWTS UPS		
Total		

Table B.5 Expected Daily Demand at RMSC Kumasi (kWh/day)					
Name	**Qty**	**Peak Power (W)**	**Peak Power Total (W)**	**hrs run in 24 h**	**kWh in 24 h**
Dell PowerEdge 2900	[redacted]				
Dell PowerEdge R510					
Dell PowerEdge R710					
Cisco 2960 Switch					
Huawei Switch					
KVM Dell					
Cisco 2900 Router					
Cisco ASA5520					
D-Link DES 1024D					
UPS					
TOTAL Existing Server Room Equipment					
Cooling					
Total server room cooling					
Cisco 2901 integrated services router					
Dell Equallogic PS6110x					
Dell KVM 1082DS					
Dell PowerEdge M610 (9pc)					
Dell PowerEdge M910 (1pc)					
Dell PowerVault TL2000					
Dell PowerConnect M8024-k (2pc)					
Dell PowerConnect 6220 FI (2 pc)					
Cisco Catalyst 2960G-28					
Total for GWTS DRS Servers					
APC Symmetra LX 12 kVA (typical power factor 0.9) (6 min runtime), charging time 8 hours					
Total for GWTS UPS					

Table B.6 Estimated Daily Demand at Sites 3 and 4 (TIDD Takoradi and TIDD Kumasi)

Equipment	Qty	Peak Power (W)	Peak Power Total (W)	hrs run in 24 h	kWh in 24 h
Dell PowerEdge 2900	[redacted]				
Cisco 2960 Switch					
Huawei Switch					
KVM Dell					
UPS (charging)					
Total server room equipment					
Cooling					
Total server room cooling					
TOTAL for TIDD Takoradi / TIDD Kumasi					

Table B.7 Estimated Daily Demand at the District Offices (Sites 5 to 38)			
Name	**Peak Power (W)**	**hrs run in 24 h**	**kWh in 24 h**
All-in-one desktop PC	[redacted]		
Laptop pc			
Printer (Laser, small) printing			
Printer (Laser, small) on standby[1]			
Networking equipment			
Total			

[1] Standby power not taken into account in Peak Power calculation, but only in daily energy consumption

Appendix C: PV Panel Manufacturing Quality Standards

The PV panels supplied by the Contractor must be designed and manufactured in accordance with the following quality standards:

1	**WARRANTY** **Note:** STC refers to PV panel standard test conditions as follows: Irradiation: 1000 W/m2; Cell temperature: 25oC; Air Mass: 1.5
1.1	**Workmanship and Materials** The PV modules shall be warrantied against material and workmanship defects for a minimum period of 10 years from the date of installation.
1.2	**Peak Performance:** The warranty shall be on the basis that within a period of 25 years from date of installation, none of the PV modules will exhibit a power output less than 80% of the minimum peak power at Standard Test Conditions (i.e. 25O C, 1000 W/m2, and air mass 1.5)
2	**TECHNICAL DETAILS**
2.1	STC Power Rating (Pmax, Watts), manufacturing tolerance shall be – 0/+5W or better
2.2	The IV curve should by smooth without stepped fluctuations. The manufacturer shall provide a 3rd party verified PAN file that shows the IV curve characteristics
2.3	Fill Factor (FF): **Please specify value**
2.4	Panel Efficiency: **Please specify value**
2.5	**Module Construction:**
2.5.1	Minimum glass thickness: 3.2 mm. The tenderer needs to demonstrate stability and micro-crack resistance in the cells and will pass the required static and dynamic load tests. (IEC61215 & IEC61730)
2.5.2	Every module must have a unique and permanent serial label that is embedded underneath the glass.
2.5.3	The modules are to be protected using Class II insulation.
2.6	**Frame Construction:** The Contractor shall confirm that the manufacturer will meet the following requirements.
2.6.1	Frame material: corrosion resistant anodised aluminium.
2.6.2	Corner gap: <=0.25mm
2.6.3	Vertical offset at corners: <=0.5mm
2.6.4	Distance between cell and frame edge: >=5mm
2.6.5	Slant (difference between diagonal measurements across the frame): <1%
2.7	**Output Cables & Junction Box:**
2.7.1	PV panels should include output cables, junction box, diodes and plug-in connectors at the end of the cables.
2.7.2	The Junction box must contain at least one Bypass Diode per 24 solar cells.
2.7.3	Junction Box protection to be at least IP-65 rated.
2.7.4	All junction boxes and cable trunking should be made from non-conductive material.
3	**Panel & Manufacturer Certifications:** Panels to meet the requirements of the following standards: The Contractor shall provide copies of certifications including the full module specification to which the certification is applied.

3.1	Performance Standard: IEC 61215 (certified by either TÜV or VDE)
3.2	Safety Standard: IEC 61730 (certified by either TÜV or VDE)
3.3	IEC 62804 for PID Resistance (certified by either TÜV or VDE)
3.4	IEC 61701 including salt spray test
3 5	**Solder Pull Strength Test:** String solder pull tests on cell strings must be conducted using an automated, non-manual tester at 45 degrees, on a minimum of 2 pieces per shift per soldering machine / workstation. Pull test control limit to be a minimum of 1.5N/mm x 2mm
3.6	Where appropriate, components shall have "CE marking" for low voltage equipment and electromechanical compatibility such as:
3.6.1	73/23/EEC
3.6.2	93/68/EEC
3 6 3	2004/108/EC (replaces 89/336/EEC)
3.6.4	91/31/EEC
3.7	All cases must have IP65 or IP67 protection
3.8	Panel manufacturing processes must be certified under ISO 9001 and IS0 14001.
4	**TESTS WHICH THE MANUFACTURER SHALL APPLY TO EVERY MODULE PRODUCED UNDER THE SUPPLY CONTRACT (SHOULD IT BE AWARED TO THE TENDERER):** The tenderer shall confirm and demonstrate that the panel manufacturer is equipped and experienced to carry out all of the following tests and analyses.
4.1	**Frame hi-pot test**
4.2	**Electroluminescence (EL) Imaging Test:** 100% of modules to be tested and pass all of the following EL imaging tests.
4.2.1	**Cell micro-crack / break detection:** For one solar module, micro-cracks / breaks per cell to be not more than 3 lines, and a maximum of 3 cells with such micro-cracks, and failure area per solar cell due to micro cracks to be not more than 5%.
4.2.2	**Same classes of cell in one solar module:** in one module, not more than 3 cells of a different class from the others, evidenced by no obvious difference in brightness on the EL image
4.2.3	**Grid defect:** For one solar module not more than 5% failure area per solar cell due to grid defect. No more than 3 cells with grid defects
4.2.4	**Fuel:** For one solar module, failure area per solar cell due to fuel to be not more than 5%, and solar cells with diesel fuel to be not more than 2 pieces, and without influence on the I-V curve.
4.2.5	**Cell pollution:** For one solar module the failure area per cell due to pollution to be not more than 5%, and not more than 3 such polluted cells
4.2.6	**Short circuit:** No cells are to be inactive or bypassed due to short circuit or other unknown reason
4.2.7	**Inclusions:** Cell debris laminated on module /cell rupture: Indicated on EL image by shaded areas with sharp edges: For one solar module, failure area per cell due to debris or rupture to be less than 5%, and on no more than 3 cells
4.3	**Flash Test** Purpose: To assure that the equipment and process used by the manufacturer to flash test the modules meets the stated requirements.
4.3.1	Flash tester classification
4.3.2	Flash tester to be classified as AAA and certified annually
4.3.3	Flash tester internal calibration
4.3.4	Calibration modules to be labelled and stored in a restricted access area
4.3.5	Secondary calibration module must be checked against the certified module once per month
4.3.6	Flash tester to be calibrated against the secondary calibration module every 2 hours
4.3.7	Flash tester external calibration

4.3.8	Master panel to be calibrated by a recognised testing body (e.g. TUV) once per year.
4.3.9	FLASH DATA RETENTION:
4.3.9.1	Flash data including image of IV curve available in electronic (database) form for every module linked by serial number

Notes on Solar RFP

General design considerations:

1. The probability, frequency/duration of grid outages can only be estimated by the grid operator from their historical performance statistics. For this reason we are making the following assumptions/requirements:
   - Backup generators are installed and in working order to assist with charging/sustaining the batteries during a grid outage.
   - Installed PV capacity shall be such that it can sustain the load during the worst sun day of the year for the entire lifetime of the Systems.

2. Simulation Examples listed above can be used as a guide for installed capacity, but the Contractor ultimately takes reponsibility for the validity of the design.

3. Simulation Examples do not take shading into account.

4. Simulation Examples do not take array mismatch into account.

5. Simulation Examples assume all roofstructures are capable of handling the additional weight.

6. Autonomy: Storage system shall be suitably sized so as to (as a minimum) continue to operate for 24 hours without sun, grid and generator. Alternative offer shall be for 9 hours, based on the demand in Appendix B.

The storage system shall be designed according to the following:

- Battery DOD shall be no more than 80% for an extended outage. Daily DOD shall not be more than 30%.

Charge time (from fully discharged) shall be no more than 15 hours.
For pricing purposes, The Contractor shall prepare the System designs and prices on the following basis:

4. Customised Systems shall be designed for Sites 1 and 2.
   a. Option (a) should include for 24 hour autonomy
   b. Option (b) should include for 9 hour autonomy
5. The Systems for Sites 3 and 4 shall be based on the same design;
   a. Option (a) should include for 24 hour autonomy
   b. Option (b) should include for 9 hour autonomy
6. The Contractor shall prepare one design to cover the requirements for all 34 District Office Sites, and include for 72 hours autonomy.

All as per the demand listed in Appendix B.

The Contractor is also welcome to provide alternative bids for consideration.
The Contractor shall assess shading at all Sites and select array mounting locations to balance array installation costs with shading losses. Shading of the arrays shall be avoided wherever possible. If this is not possible, shading losses shall be accounted for in system design.

The following guidance is provided in terms of the PV installation.

- FCHQ Accra:
  - 100% rooftop
- RMSC Kumasi:
  - 100% rooftop
- TIDD Kumasi and TIDD Takoradi:
  - 100% rooftop

- District offices:
  - 100% ground based

The tenderers are requested to identify and provide cost estimates for any structural strengthening works required to the roof structures of the 4 large buildings. These prices will be excluded from the tender evaluation.

The Contractor shall make provision for all required upgrades, modifications, repairs, or anything the Contractor deems necessary; of the existing electrical installations to integrate the System into the existing installations.

Annex 3- Warranty Statement

Friday, March 17, 2017

Warranty Statement

Item	Description	Manufacturer Warranty
1	Fire detection and suppression system	12 Months Manufacturer warranty
2	cooling solution	12 Months Manufacturer warranty
3	Anviz Access control system	12 Months Manufacturer warranty
4	StruxureWare Environmental monitoring system	12 Months Manufacturer warranty
5	Dell PowerEdge R230 Server	12 Months Manufacturer warranty
6	Dell PowerEdge R430 Server	12 Months Manufacturer warranty
7	Dell PowerEdge R530 Server	12 Months Manufacturer warranty
8	Dell Compellent SCv2020	36 Months Manufacturer warranty
9	HP Thin Client	12 Months Manufacturer warranty
10	Samsung Screen	24 Months Manufacturer warranty
11	Cisco ASA 5516	60 Months Manufacturer warranty
12	Cisco ASA 5508	60 Months Manufacturer warranty
13	Cisco Aironet 2700	60 Months Manufacturer warranty
14	Cisco 2504	60 Months Manufacturer warranty
15	HP ProOne 400 G2 20-in Non-Touch All-in-One	12 Months Manufacturer warranty
16	CheckPoint 5600 Next Generation Threat Prevention Appliance	12 Months Manufacturer warranty

Definition of IPMC SLA (Service Level Agreement)

a) 2 hours response time within Accra, Tema, Kumasi, Takoradi & Tamale

b) Free Spare parts during manufacturer warranty period

c) Guaranteed avialability of spare parts for 5 years

d) Dedicated Account Manager

e) Optional availability of on site engineer for immediate response

f) Optional internal IT Helpdesk management

[redacted]

Place of Origin of items :-Ireland/Germany/China

Declaration :- We undertake to stand by & fulfill the manufacturer warranty including IPMC SLA as provided under these terms & condition.

Signed

Amar Deep S Hari
In the capacity of CEO IPMC

Annex 4- Vendor Quotations - Audit Trail.

Summary of Best and Final Offer - Combined

Pricing Summary:	[redacted]	[redacted]	[redacted]	[redacted]
Cost of Materials (Solar + IT)	[redacted]			
Cost of Freight				
Cost of Insurance				
CIF Cost				
Installation Cost for Solar				
Cost of Inland Transport				
Sub Total Cost of Material Delivered				
Duties, taxes, levies				
VAT				
Cost with Duties, taxes and VAT				

Summary of Best and Final Offers- IT

Pricing Summary	[redacted]	[redacted]	[redacted]	[redacted]
Cost of Materials	[redacted]			
Cost of Freight				
Cost of Insurance				
CIF Cost				
Cost of Inland Transport				
Sub Total Cost of Material Delivered				
Duties, taxes, levies				
VAT				
Cost with Duties, taxes and VAT				

Summary of Best and Final Offers - Solar

Pricing Summary:	[redacted]	[redacted]	[redacted]
Cost of Materials	[redacted]		
Cost of Freight			
Cost of Insurance			
CIF Cost			
Cost of Inland Transport			
Sub Total Cost of Material Delivered			
Duties, taxes, levies			
VAT			
Cost with Duties, taxes and VAT			
Installation Cost			
Total Project Cost with 24 Hours			

Note: [redacted] solar proposal was considered to be technically unacceptable. There financial proposal for Solar was therefore not evaluated.

Summary of negotiated Prices – [redacted]

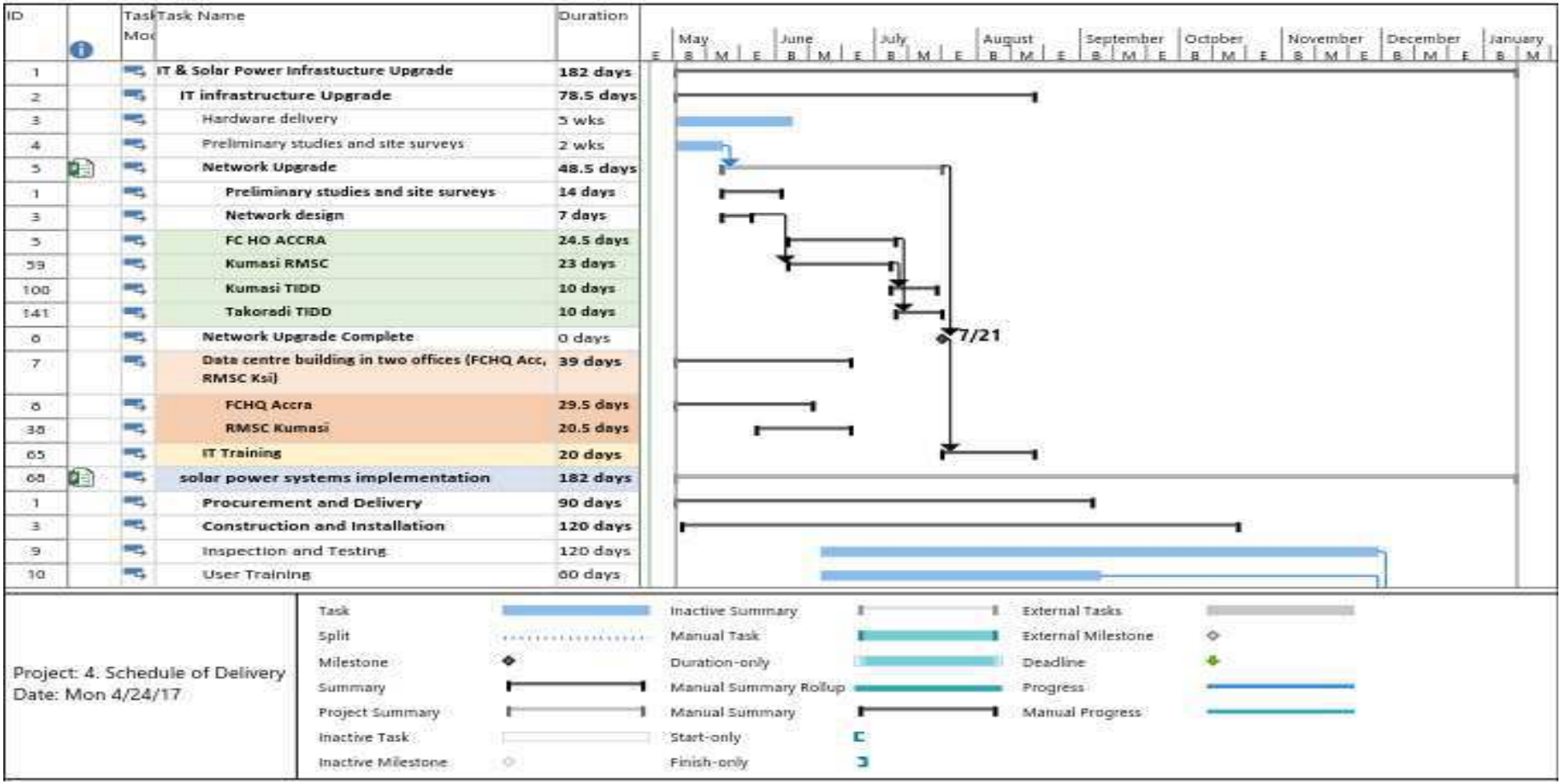
	(Solar and IT combined)	
1	Cost of Materials (Solar + IT)	[redacted]
2	Cost of Freight	
3	Cost of Insurance	
4	**CIF Cost**	
5	Installation Cost	
6	Cost of Inland Transport	
7	**Sub Total Cost of Material Delivered**	
8	Duties, taxes, levies	
9	VAT	
10	**Total Cost with Duties, taxes and VAT**	

	Summary for IT Component	
1	Cost of Materials	[redacted]
2	Cost of Freight	
3	Cost of Insurance	
4	**CIF Cost**	
5	Installation Cost	
6	Cost of Inland Transport	
7	**Sub Total Cost of Material Delivered**	
8	Duties, taxes, levies	
9	VAT	
10	**Cost with Duties, taxes and VAT**	

	Summary for Solar Component	
1	Cost of Materials	[redacted]
2	Cost of Freight	
3	Cost of Insurance	
4	**CIF Cost**	
5	Installation Cost	
6	Cost of Inland Transport	
7	**Sub Total Cost of Material Delivered**	
8	Duties, taxes, levies	
9	VAT	
10	**Cost with Duties, taxes and VAT**	

Annex 5 - Implementation Time Line

(to be updated and provided within 6 weeks of Contract Date)



Annex 6

Proposal for Project Management and Oversight

Annex 6 – PROPOSAL FOR PROJECT MANAGEMENT AND OVERSIGHT

1. Scope

To deliver this project, a joint Renewables / IT and Communications team from AECOM's Edinburgh office in Scotland has been brought together to support Delivering Procurement Services for Aid (DPSA). Primary responsibilities include delivering the Project Management (PM) and Quality Assurance (QA) roles for the duration of the 24 week programme.

Due to the client's budget constraints, AECOM has reduced the scope of works to fit within the funding available.

1.1. Project Management

A Project Manager (PM) will be required for two days a week for the duration of project. Within the role of the PM the following services will be carried out:

- **Meeting Attendance:** The PM will attend key project meetings, which will include the following:
  - Project kick off on site (Accra) – 5 day trip including travelling
  - Initial quality review - teleconference
  - Project close on site (Kumasi) – 7 day trip including travelling. This will be combined with the inspections on completion.
  - Others - teleconference

  Two visits to Ghana have been allowed for the PM for meeting attendance, the first one on Accra site and the second one in Kumasi site.
  All other meetings will be completed using web or telephone based tools.

- **Project programme tracking:** The PM will measure the progress of the contractor against the proposed contractor's project programme; the PM will provide initial comments on the programme. If identified the PM will highlight any discrepancies between the scheduled activities and work in progress to the client and the contractor. The PM will provide suggestions to the contractor to address these issues. It is understood that the PM will have the fulltime support of a Project Coordinator (PC) in Ghana who will report all the required information to the PM.

- **Logistics:** As some of the regional offices are in remote parts of Ghana, the PM will provide an overview on the contractor's proposed logistic arrangements. This will include identifying which party is responsible for the equipment at key handover points, for example this would include, delivery to port and storage, transport to site, storage, and installation on site.
- **Issue Certificates:** The PM will perform an administration role throughout the project they will issue certificates at various stages according to the contract. The PC will carry out site supervision to oversee the completions of tasks.

1.2. Quality Assurance

1.2.1. Solar and Energy Storage

The Quality Assurance role will be required at key stages of the project; the QA team will carry out the following activities:

- **Initial site review (1st visit to Ghana):** AECOM will carry out the review of the Accra site during this visit, this review will happen on completion of onsite works. The aim is to identify the contractor's system of working and highlight at an early stage any potential issue. If time is available a nearby smaller installation, will be reviewed. 5 days including travelling have been allowed for this visit to Ghana. Post site visit, back in the UK, one day has been allowed for discussions with the contractor about findings on this site visit.

- **Inspection on completion (2nd visit to Ghana):** AECOM will carry out the review of one Kumasi site during this visit. The purpose of this activity is to identify where, the installation deviates from the reviewed design and industry good practise. 7 days including travelling have

been allowed for this visit to Ghana. If there is time available, AECOM will attempt to visit the other large Kumasi site. Post site visit, back in the UK, one day has been allowed for discussions with the contractor about findings on this site visit.

1.2.2. IT

The Quality Assurance role will be required at key stages of the project; the QA team will carry out the following activities:

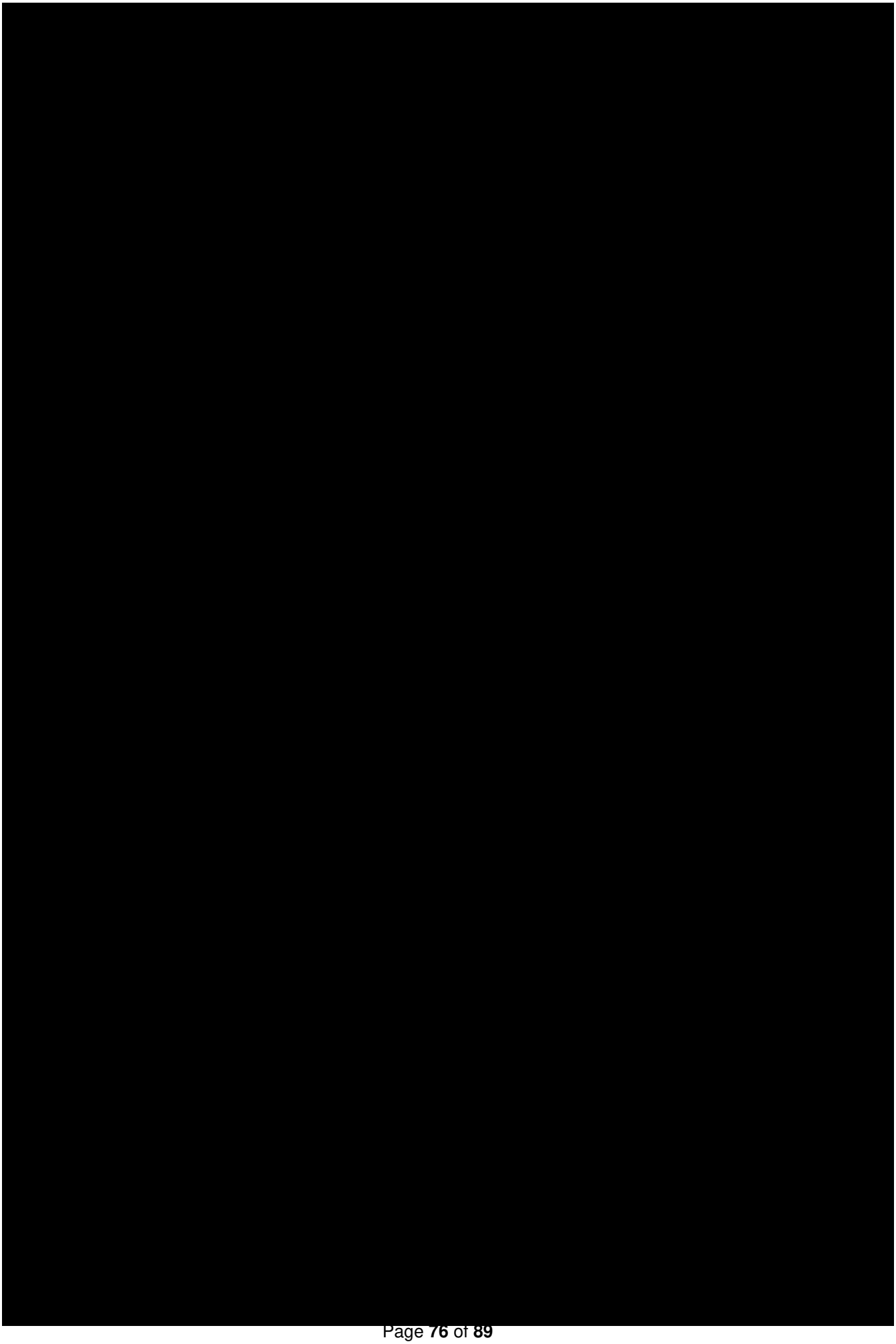
- **Initial site review (1st visit to Ghana):** AECOM will carry out the review of the Accra site during this visit, this review will happen on completion of onsite works. The aim is to identify the contractor's system of working and highlight at an early stage any potential issue. If time is available a nearby smaller installation, will be reviewed. 5 days including travelling have been allowed for this visit to Ghana. Post site visit, back in the UK, one day has been allowed for discussions with the contractor about findings on this site visit.
- **Inspection on completion (2nd visit to Ghana):** AECOM will carry out the review of one Kumasi site during this visit. The purpose of this activity is to identify where, the installation deviates from the reviewed design and industry good practise. 7 days including travelling have been allowed for this visit to Ghana. If there is time available, AECOM will attempt to visit the other large Kumasi site. Post site visit, back in the UK, one day has been allowed for discussions with the contractor about findings on this site visit.

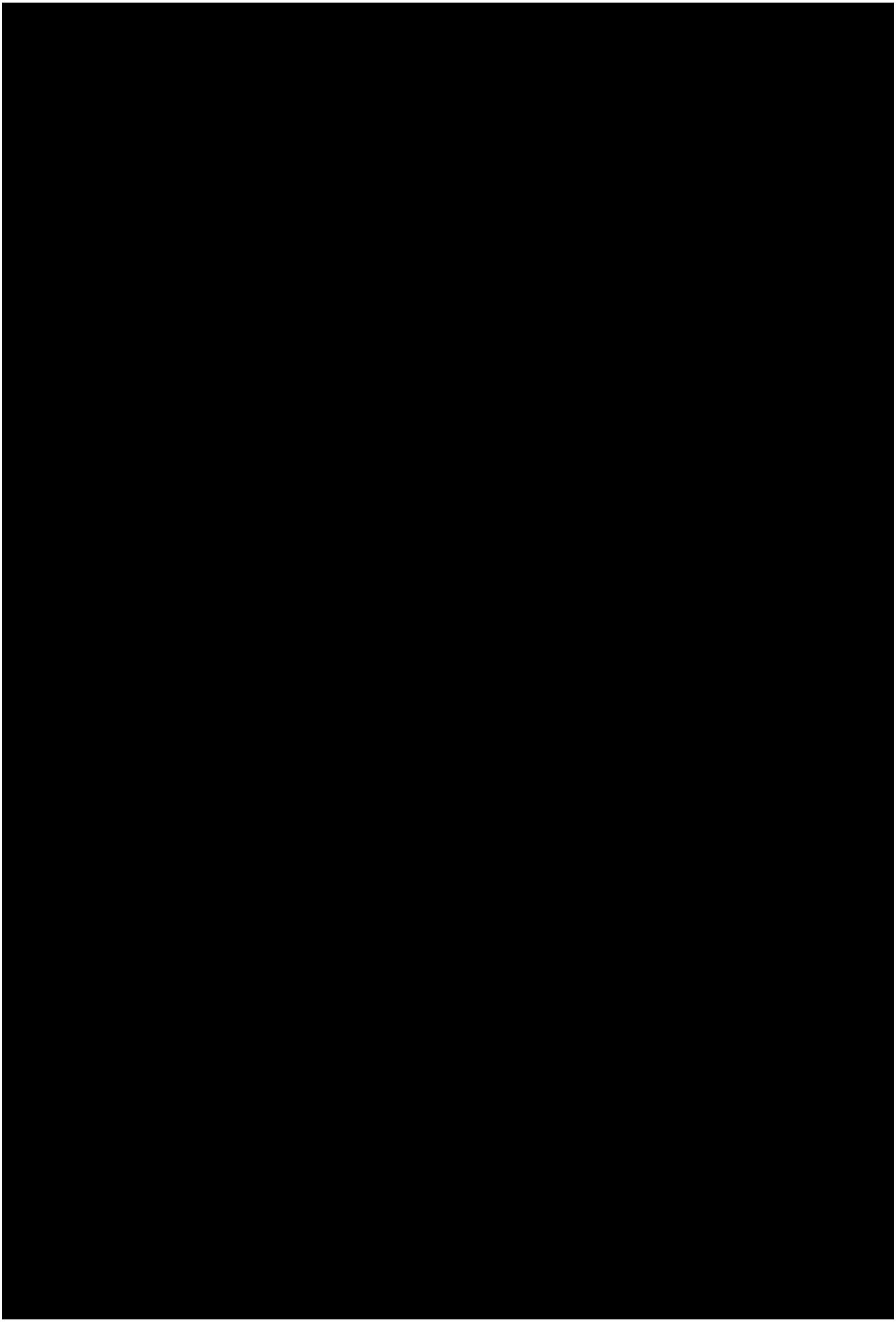
2. Proposed Fee

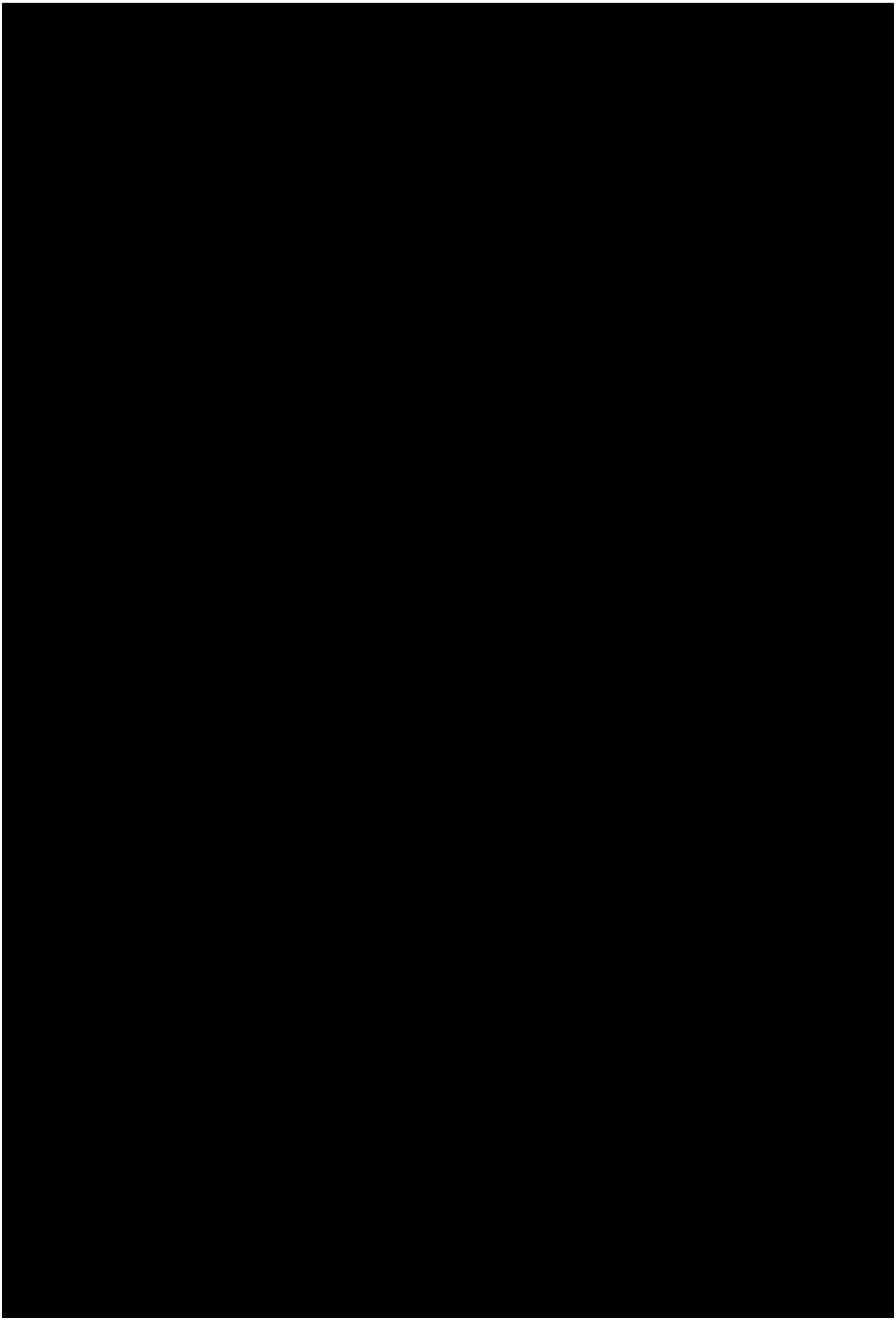
The proposed Fee can be found in Appendix D

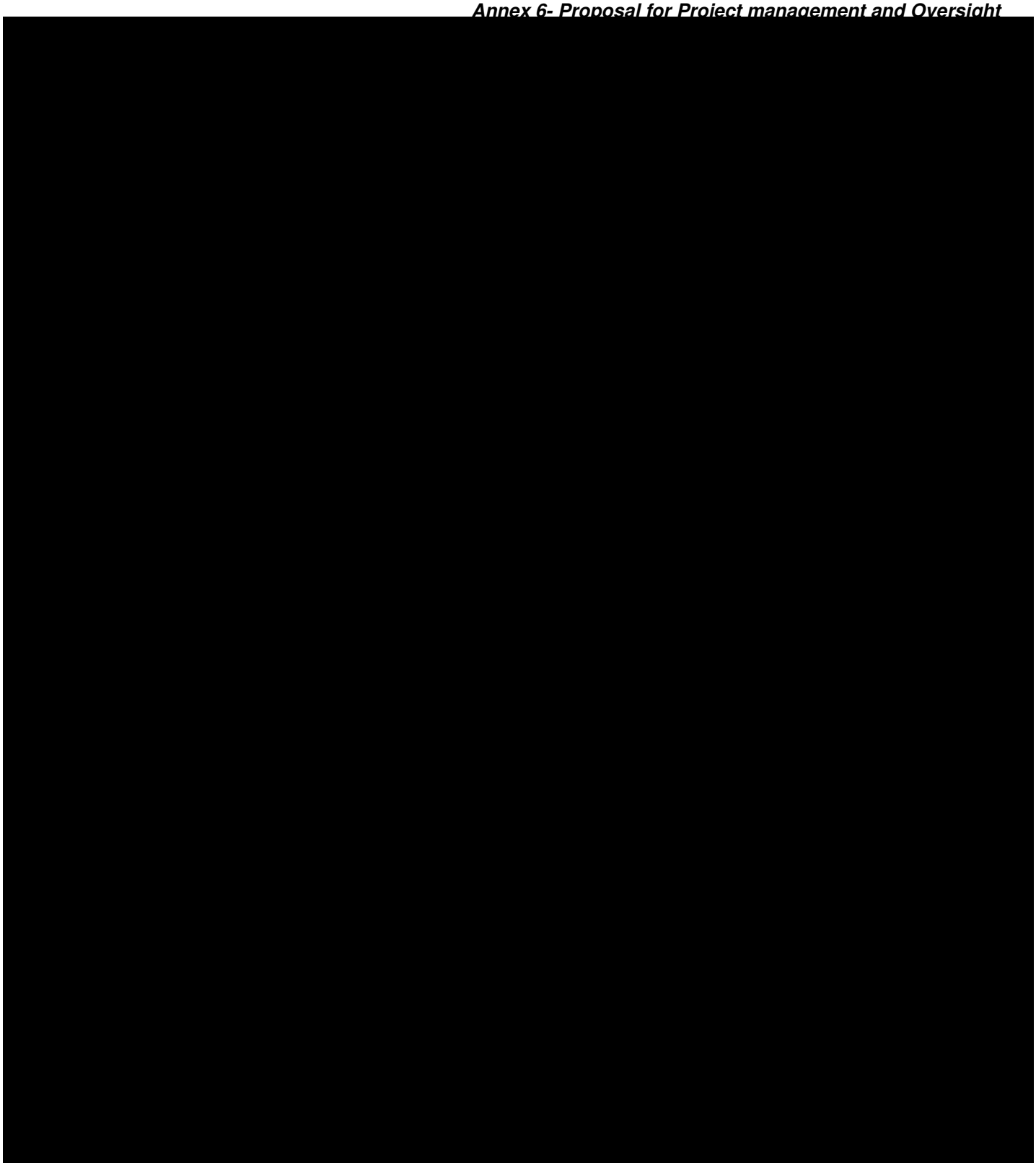
3. Proposed Programme /example Programme

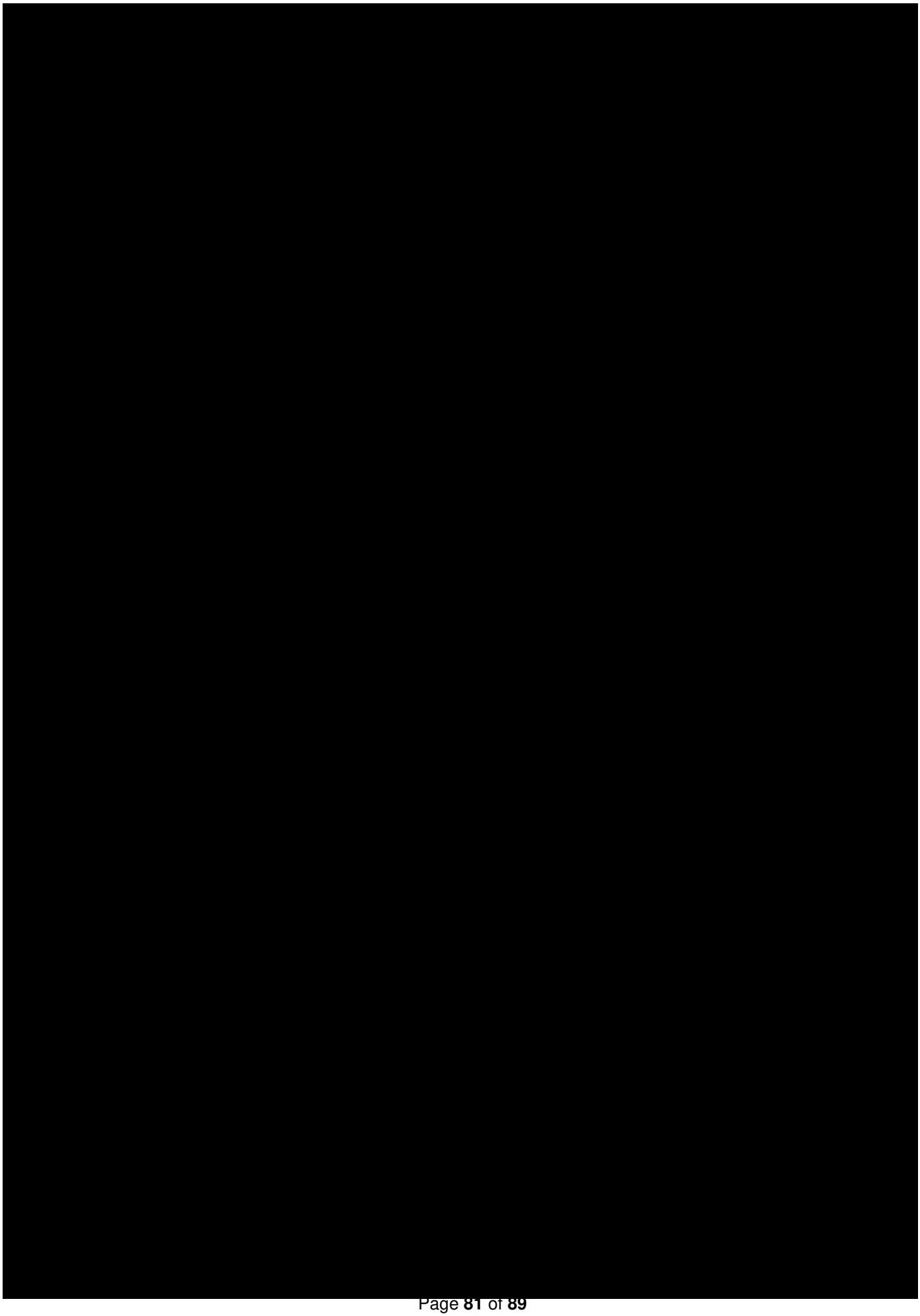
Solar Installations	Duration	April 2017	May 2017	June 2017	July 2017	Aug 2017	Sept 2017	Oct 2017	Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018
Preparation and Design					x								
Detailed ite urvey					X								
Preparation of PV system detailed designs					X								
Preparation of Civil works and infrastructure modification designs					X								
Review and Approve designs					X								
Procurement and Delivery													
Procurement and delivery of PV Components and Materials						X	X						
Construction and Installation													
Construction and Installation at 40 District and Regional Offices	16 weeks						X	X	X	X			
Construction and Installation at FCHQ Accra	6 weeks						X	X					
Construction and Installation at RMSC Kumasi	6 weeks							X	X				
Construction and Installation at TIDD Kumasi	4 weeks								X				
Construction and Installation at TIDD Takoradi	4 weeks								X				
Training													
Solar Systems O&M training and workshops	4 weeks								X	X			

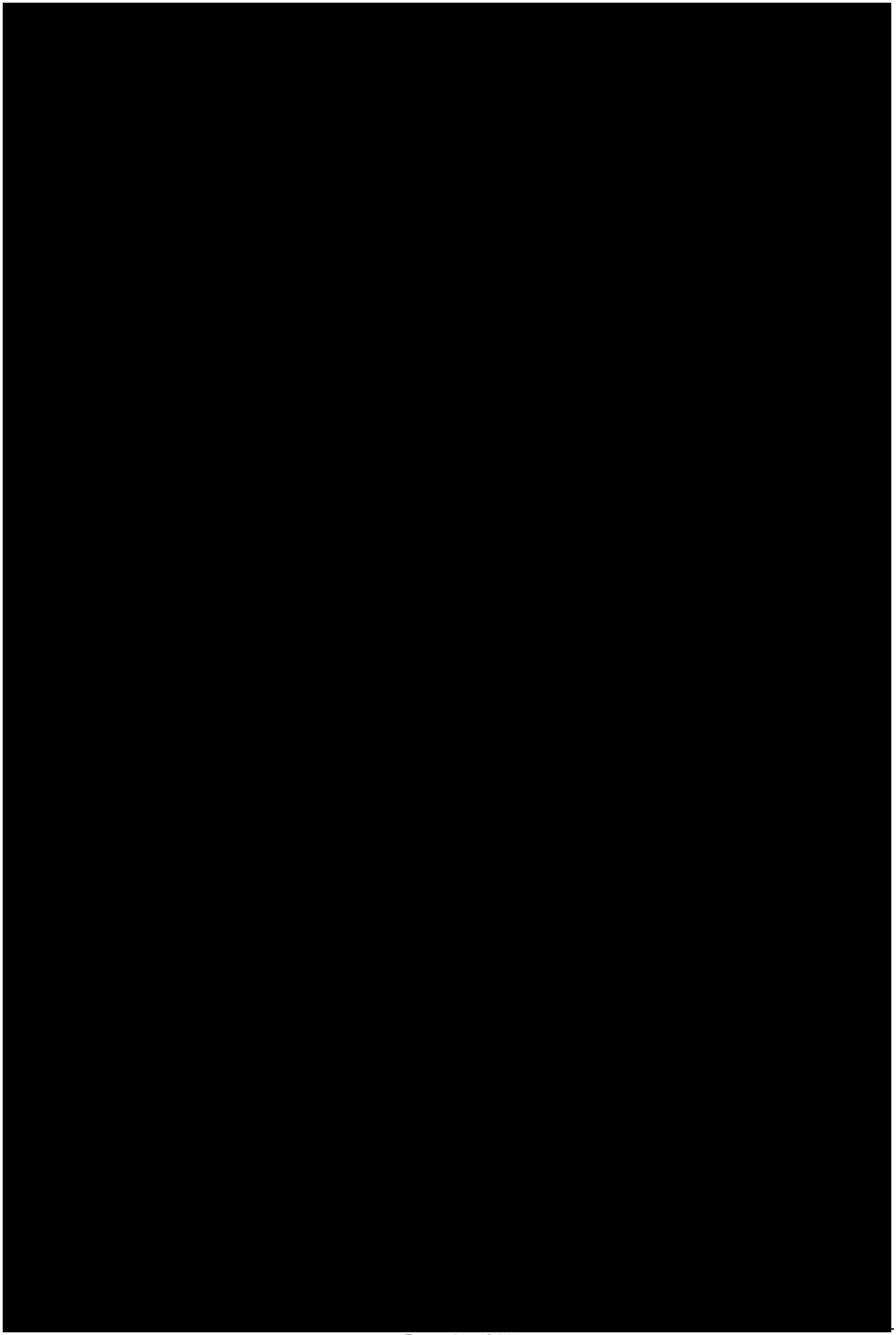


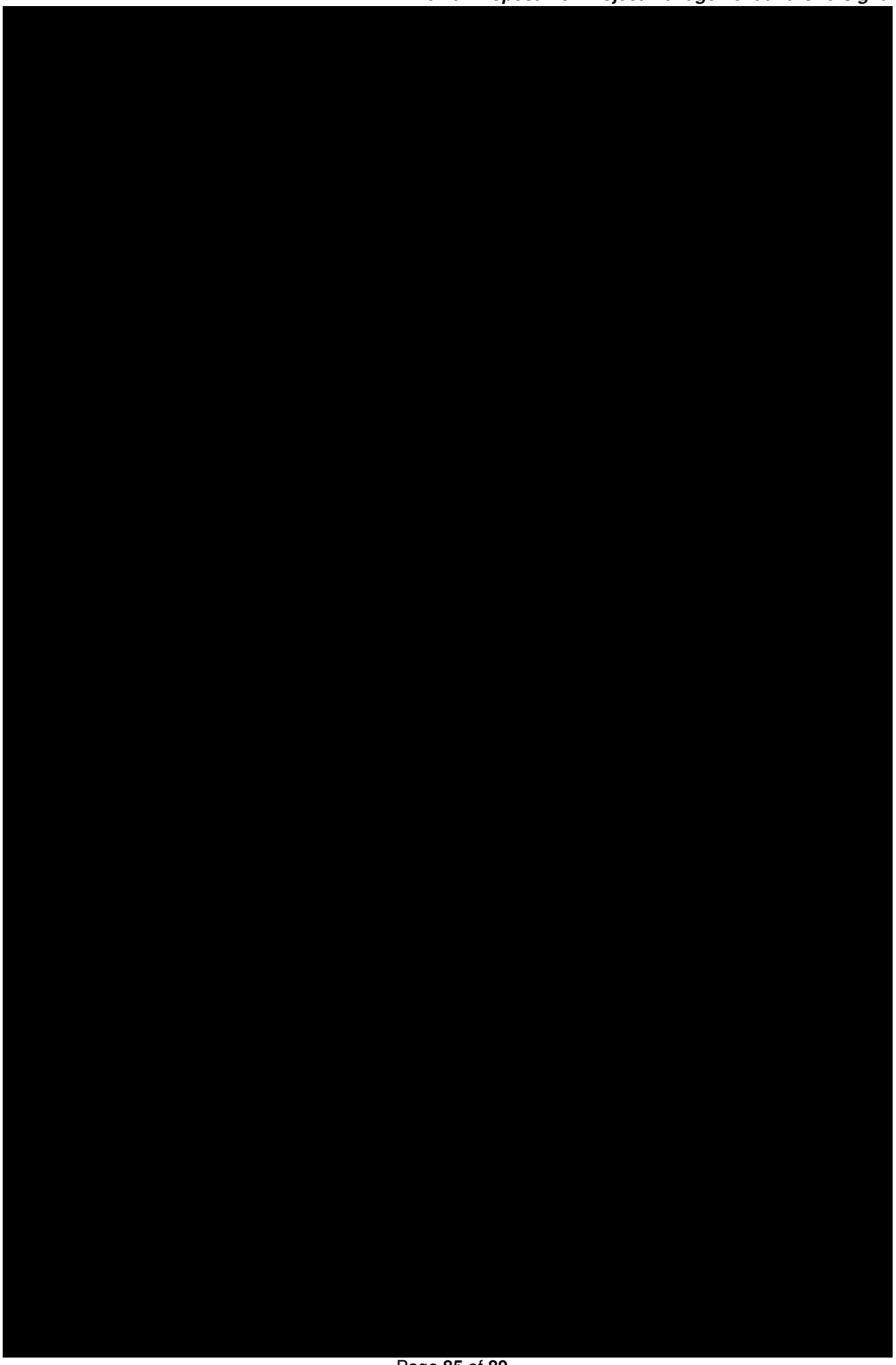


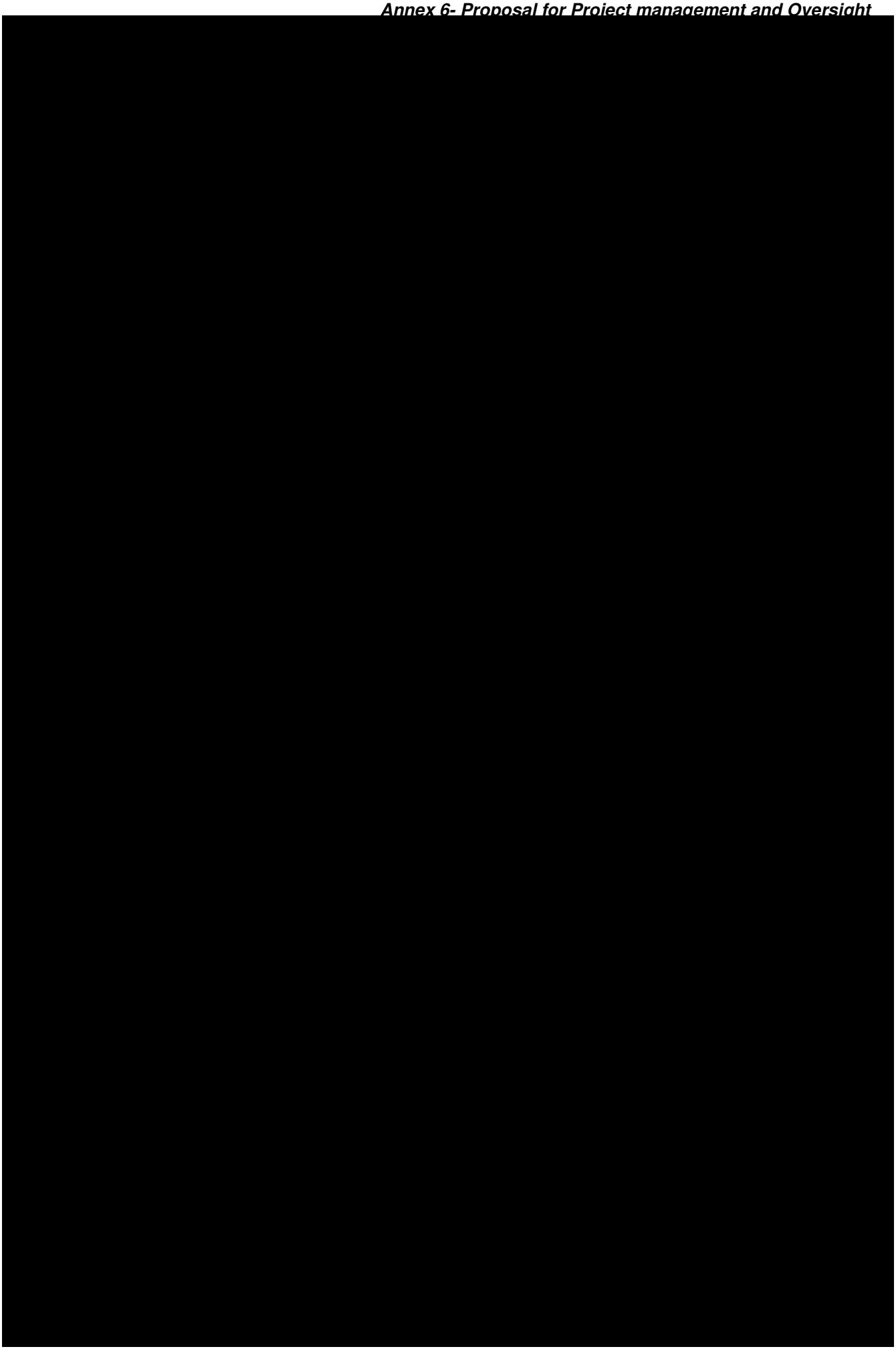












IPMC	**Ghana Forestry Commission (GFC)** **Sign-off Form for Completion of** **Network / Security Refresh Project**	Forestry Commission

Document Information

Project Name:	IT UPGRADE / OPTIMIZATION OF NETWORK & SECURITY INFRASTRUCTURE		
Prepared By:	David Saade	**Document Version No:**	V1
Title:	Project Manager	**Document Version Date:**	May 19, 2017

1 IT Network & Security Systems Infrastructure Upgrade / Improvement Project

The following acknowledges the acceptance of completion of the Network and Security Systems infrastructure installation and configuration as developed in agreement between Intercom Programming & Manufacturing Company Limited (IPMC) and Ghana Forestry Commission (GFC), summarized as follows...

Item	Description	Work Status	Date Completed
Site 1 - Accra			
1	Equipment Racking, Mounting & Cabling – Firewalls, APs, Routers, Switches		
2	Network Installation, configuration and commissioning		
3	Network monitoring and management solution		
4	WLAN upgrade		
5	Broadband Connectivity Upgrade		
6	WAN Optimization, Firewalls, web caches and web proxies		
7	Training		
Site 2 – Kumasi RMSC			
1	Equipment Racking, Mounting & Cabling – Firewalls, APs, Routers, Switches		
2	Network Installation, configuration and commissioning		
3	WLAN upgrade		
4	Broadband Connectivity Upgrade		
5	WAN Optimization, Firewalls, web caches and web proxies		
6	Training		
Site 3 – Kumasi TIDD			
1	Equipment Racking, Mounting & Cabling – Firewalls, APs, Routers, Switches		
2	Network Installation, configuration and commissioning		

3	WLAN upgrade		
4	Broadband Connectivity Upgrade		
5	WAN Optimization, Firewalls, web caches and web proxies		
6	Training		
Site 4 – Takoradi TIDD			
1	Equipment Racking, Mounting & Cabling – Firewalls, APs, Routers, Switches		
2	Network Installation, configuration and commissioning		
3	WLAN upgrade		
4	Broadband Connectivity Upgrade		
5	WAN Optimization, Firewalls, web caches and web proxies		
6	Training		

2 Reference

[redacted]

3 Acceptance

In witness thereof, the parties, in signing this milestone acceptance, have agreed that IPMC has fulfilled its obligations with respect to the project deliverables as described in the above Statement of Work.

Name:	[redacted]	**Name:**	
Title:		**Title:**	(ICT Department)
Date:		**Date:**	_____ April 2017
Signature:		**Signature:**	

APPENDIX D – THE CHARGES/PRICE

SCHEDULE OF PRICES	***Total in GBP***
Installation work	[redacted]
Value of Transportation (including freight, in-country distribution, insurance, customs clearance, etc.)	-
Import Duties	-
Other local levies	-
VAT on Imports	-
Sub-total - (Cost with duties, taxes and VAT excluding fees)	[redacted]
Project Management Cost	[redacted]
Total charges	***£ 263,336.20***

Summary of Civil Works Cost

Civil Works Cost	
Civil Work (IT)	[redacted]
Civil Work (Solar)	[redacted]
Total Cost excluding any fee	[redacted]

IT Civil Work

item #	Bom level	1	2	3	Description	Unit	TOTAL QTY	Goods Unit Cost	International Freight per Unit	Insurance per Unit	Duties, taxes, levies, etc. per Unit	VAT per Unit	Inland Transport per Unit	Total Cost DAP	Total Cost (DDP)
1	1	x			**Server room upgrade Accra**										
1.1	2		x		**Construction**	Lot	1	[redacted]						[redacted]	
1.1.1	3			x	Raised Floor for Datacenter	sqm	50								
1.1.1	3			x	Carefully remove existing wooden raised floor	Lot	1								
1.1.2	3			x	Fire Retardant False Ceiling for Datacenter	sqm	50								
1.1.3	3			x	Partition of Datacentre to Server room and monitoring room	Lot	1								
1.1.4	3			x	Sealing of Windows with Fire Proof Plaster Boards	Lot	1								
1.1.5	3			x	Automatic closing devices for doors	Lot	1								
1.1.6	3			x	Installation Service	Lot	1								
1.1.7	3			x	Insulation of the Datacenter	Lot	1								
1.1.8	3			x	Data Centre Lighting System (LED or appropriate cost effective lighting system)	Lot	1								
2	1	x			**Server room upgrade at RMSC Kumasi (DRC)**										
2.1	2		x		**Construction**	Lot	1								
2.1.1	3			x	Raised Floor for Datacenter	sqm	17								
2.1.1	3			x	Carefully remove existing wooden raised floor	Lot	1								
2.1.2	3			x	Fire Retardant False Ceiling for Datacenter	sqm	17								
2.1.3	3			x	Partition of Datacentre to Server room and monitoring room	Lot	1								
2.1.4	3			x	Sealing of Windows with Fire Proof Plaster Boards	Lot	1								
2.1.5	3			x	Automatic closing devices for doors	Lot	1								
2.1.6	3			x	Installation Service	Lot	1								
2.1.8	3			x	Data Centre Lighting System (LED or apprpriate lighting solution)	Lot	1								
														[redacted]	

Solar Civil Work

Ref	Description	Unit	Price per Unit	Quantity	Total Price
		a	b	c	d = b x c
1	**Design including Site Surveys for Each Office**				
1.1	Design of Solar Power System for FC HC Accra Office	Lot	[redacted]	1	[redacted]
1.2	Design of Solar Power System for RMSC Kumasi Office	Lot		1	
1.3	Design of Solar Power System for TIDD Kumasi Office	Lot		1	
1.4	Design of Solar Power System for TIDD Takoradi Office	Lot		1	
1.5	Design of Solar Power System for 34 District Offices	Lot		34	
2	**Design Approval of Systems for all Offices**	Lot		1	
3	**Building Works required at Each Office**				
3.1	Works at FC HC Accra Office	Lot		1	
3.2	Works at RMSC Kumasi Office	Lot		1	
3.3	Works at TIDD Kumasi Office	Lot		1	
3.4	Works at TIDD Takoradi Office	Lot		1	
3.5	Works at 34 District Offices	Lot		34	
4	**Solar Panel Mounting Installation**				
4.1	FC HC Accra Office	Lot		1	
4.2	RMSC Kumasi Office	Lot		1	
4.3	TIDD Kumasi Office	Lot		1	
4.4	TIDD Takoradi Office	Lot		1	
4.5	34 District Offices	Lot		34	
5	**Installation and Connection of Battery Banks, Inverters, Charge Controller, Remote Monitoring System, PDPs, Earthing System and LLDs**				
5.1	System Installation at FC HC Accra Office	Lot		1	
5.2	System Installation at RMSC Kumasi Office	Lot		1	
5.3	System Installation at TIDD Kumasi Office	Lot		1	
5.4	System Installation at TIDD Takoradi Office	Lot		1	
5.5	System Installation at 34 District Offices	Lot		34	
6	**System Testing and Commissioning**				
6.1	FC HC Accra Office	Lot		1	
6.2	RMSC Kumasi Office	Lot		1	
6.3	TIDD Kumasi Office	Lot		1	
6.4	TIDD Takoradi Office	Lot		1	
6.5	34 District Offices	Lot		34	
7	**As Built Drawings and Manuals**	Lot		1	
8	**Operation and Maintenance Training and Workshops for FC Personnel**	Lot		1	
9	**Contractors All Risk Insurance**	Lot		1	
				Total	[redacted]

Summary of Project Management Costs

FEES							
	Activity	**Resource**	**Description**	**Role / Grade**	**Days**	**Unit Rate (GBP)**	**Total (GBP)**
2	Solar QA	[redacted]	Liaise with GFC, manage DPSA team to deliver output	Solar QA Expert / Consultant	15	[redacted]	
4	Project Management Oversight & Solar QA Reviewer		Project Manager & IT Expert	Project Manager / Senior Consultant	56		
5	IT QA Review		IT QA review	IT QA Principal / Principal Consultant	16		
8	In-country project administration and management		Project Admin, equipment inspection, documentation and site visits reporting to the PM	Project Coordinator (in-country) Senior Consultant	57		
9						**Total FEES**	[redacted]
10						Expenses (see table below)	[redacted]
11						**Grand Total Fees and Expenses**	[redacted]

	Expense Type	**Notes**	**Estimated QTY**	**Estimated Cost**	**Total Cost**
QA and Project Oversight					
1	International air travel and transfers	IT & Solar QA, PMO + Proc Advisory Lead	8	[redacted]	
2	Hotel accommodation and local expenses	36 days in-country	36		
			Total expenses		[redacted]