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Document Details

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Name	[redacted]
Email	[redacted]
Company Name	DFID
Job Title	Procurement Manager
Contact Number	[redacted]
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Department for International Development

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CALLDOWN CONTRACT

Framework Agreement with:	**AECOM Ltd**
Framework Agreement for:	**DFID Goods & Equipment Procurement Supplier**
Framework Agreement Purchase Order Number:	**PO 7387**
Call-down Contract For:	**Procurement of Solar IT Backup Systems for Ghana Forestry Commission – Technical Assistance – Phase B**
Contract Purchase Order Number:	**PO 8107**

I refer to the following:

1. The above mentioned Framework Agreement dated 29th March 2016.

2. Your proposal of 18th September 2017.

and I confirm that DFID requires you to provide the Services (Annex A), under the Terms and Conditions of the Framework Agreement which shall apply to this Call-down Contract as if expressly incorporated herein.

1. Commencement and Duration of the Services

1.1 The Supplier shall start the Services no later than 27th October 2017 ("the Start Date") and the Services shall be completed by 30th April 2018 ("the End Date") unless the Call-down Contract is terminated earlier in accordance with the Terms and Conditions of the Framework Agreement.

2. Recipient

2.1 DFID requires the Supplier to provide the Services to the Forestry Commission in Ghana. ("the Recipient").

3. Financial Limit

3.1 Payments under this Call-down Contract shall not, exceed £ 2,009,429.17 ("the Financial Limit") and is inclusive of any government tax, if applicable as detailed in Annex B.

4. DFID Officials

4.1 The Senior Project Officer is:

[redacted] Programme Manager, DFID Natural Resources & Resilience Team

4.2 The Contract Officer is:

[redacted] Procurement and Commercial Officer, DFID East Kilbride.

5. Key Personnel

The following of the Supplier's Personnel cannot be substituted by the Supplier without DFID's prior written consent:

Not used.

6. Reports

6.1 The Supplier shall submit project reports in accordance with the Terms of Reference/Scope of Work at Annex A.

7. Duty of Care

All Supplier Personnel (as defined in Section 2 of the Agreement) engaged under this Call-down Contract will come under the duty of care of the Supplier:

7.1 The Supplier will be responsible for all security arrangements and Her Majesty's Government accepts no responsibility for the health, safety and security of individuals or property whilst travelling.

7.2 The Supplier will be responsible for taking out insurance in respect of death or personal injury, damage to or loss of property, and will indemnify and keep indemnified DFID in respect of:

7.2.1 Any loss, damage or claim, howsoever arising out of, or relating to negligence by the Supplier, the Supplier's Personnel, or by any person employed or otherwise engaged by the Supplier, in connection with the performance of the Call-down Contract;

7.2.2 Any claim, howsoever arising, by the Supplier's Personnel or any person employed or otherwise engaged by the Supplier, in connection with their performance under this Call-down Contract.

7.3 The Supplier will ensure that such insurance arrangements as are made in respect of the Supplier's Personnel, or any person employed or otherwise engaged by the Supplier are reasonable and prudent in all circumstances, including in respect of death, injury or disablement, and emergency medical expenses.

7.4 The costs of any insurance specifically taken out by the Supplier to support the performance of this Call-down Contract in relation to Duty of Care may be included as part of the management costs of the project, and must be separately identified in all financial reporting relating to the project.

7.5 Where DFID is providing any specific security arrangements for Suppliers in relation to the Call-down Contract, these will be detailed in the Terms of Reference.

8. Call-down Contract Signature

8.1 If the original Form of Call-down Contract is not returned to the Contract Officer (as identified at clause 4 above) duly completed, signed and dated on behalf of the Supplier within 15 working days of the date of signature on behalf of DFID, DFID will be entitled, at its sole discretion, to declare this Call-down Contract void.

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For and on behalf of The Secretary of State for International Development	Name: Position: Signature: Date:
For and on behalf of AECOM Limited, Aecom House, 63-77 Victoria Street, St. Albans, Hertfordshire, AL1 3ER	Name: Position: Signature: Date:

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Table of Annexes per Calldown Contract

Annex	Description
Annex A	Terms of Reference
Annex B	Specifications
Annex C	Procurement Plan
Annex D	Schedule of Prices
Annex E	KPIs and SLAs
Annex F	Saving management
Annex G	Communication Matrix
Annex H	Duty of Care country assessment

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ANNEX A
Terms of Reference

Procurement of Solar IT Backup Systems for Ghana Forestry Commission – Technical Assistance – Phase B

Procurement Supplier – AECOM Limited

[redacted]

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 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 overseeing the procurement of solar equipment and internet connectivity to upgrade Forestry Commission systems in 38 office locations across Ghana.

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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 Goods and Equipment Procurement Supplier Framework Agreement, DPSA will procure and manage the procurement of the required solar and IT equipment. DPSA will deliver the following activities:

Phase B

- Finalise Terms of Reference for procurement, specifying coherent solution to Forestry Commission's IT network infrastructure and solar power backup requirements
- Provide technical advisory assistance to review the design specifications of the goods
- Perform and manage a detailed tender for the provision of the required IT network infrastructure and solar backup power upgrades
- Perform supplier outreach and engagement activities
- Develop and issue requests for quotations and conduct price negotiations
- Complete enhanced evaluation exercise with expert inputs.
- Perform supplier due diligence
- Perform analysis of quotations and proposal preparation
- Call down finalization and order placement
- Management and communication of logistics and delivery timelines

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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ANNEX B
Specifications

DFID require DPSA to supply Goods and Equipment and provide Services as required to fulfil the Terms of Reference at Annex A. This contract requires DPSA to fulfil these obligations in respect of the supply of Goods & Equipment and the provision of Technical Assistance services only.

Schedule 1: IT Equipment

item #	Description	Unit	TOTAL QTY	FC HO Accra	Kumasi RMSC	Kumasi TIDD	Takoradi TIDD	FC DO	Manufacturer	Man part #
2.2	**Fire detection and suppression system, clean agent based**	Lot	**1**		1					
2.3	**Cooling solution for data centre**	Lot	**1**		1					
	Electrical Materials for cooling & UPS System									
2.1.1	25 mm² x 5 Core Copper Autoflex Copper Cable	units	**60**		60					
2.1.1	10 mm² x 5 Core Copper Autoflex Copper Cable	units	**30**		30					
2.1.2	4 Way MCB Distribution Board	units	**1**		1					
2.1.3	4 mm² x 3 Core Copper Autoflex Copper Cable	units	**1**		1					
2.1.4	2.5 mm² x 3 Core Copper Autoflex Copper Cable	units	**1**		1					
2.1.5	AC Switch	units	**2**		2					
2.1.6	13A Switched Socket	units	**6**		6					
2.1.8	3X6 Socket Plate	units	**6**		6					

2.2	50X100mm Trunking	units	**3**		3					
2.3	Cable Tray 200mm	units	**3**		3					
3	**Access control and environmental monitoring system**	sets	**2**	1	1				ANVIZ	
3.1	Fingerprint based access control system to server room	set	**2**	1	1					
4	**Environmental monitoring system**	sets	**2**	1	1				APC	NetBotz
4.1	Environmental monitoring system + software + hardware	pc	**1**	1						
4.2	Environmental monitoring sensors and accessorites	set	**1**	1						
4.2.0	Environmental monitoring sensors and accessorites	set	**1**		1					
4.2.1	Smoke detector	units	**4**	2	2					
4.2.2	Humidity sensor	units	**2**	1	1					
4.2.3	Temperature sensor	units	**20**	12	8					
4.2.4	Water sensor	units	**7**	4	3					
4.2.5	Power/current sensor	units	**5**	3	2					
4.2.6	Voltage sensor	units	**8**	4	4					
4.2.7	Door open/close sensor (e.g. dry contact)	units	**4**	2	2					
4.2.8	Airflow sensor	units	**9**	5	4					
4.3	Video surveillance camera	units	**4**	2	2					
5	**IT Hardware**									
5.1	Dell PowerEdge R230 (E3-1240 v5 3.5GHz, 32GB, 2X 600GB 10K SAS)server for Power efficient Server for network management and monitoring system and Cisco FirePOWER virtual management server appliance	units	**1**	1					Dell	

	Vmware vShpere 6.0 Standard	units	**1**	1					Vmware	
5.2	Management console / thin client supporting multiple screens	units	**1**	1					HP	
5.3	Monitoring screens, LCD/IPS, 40+ inches, energy efficient	units	**2**	2					Samsung	
5.4	Cabling									
5.4.1	Cat6 Cabling for WLAN Acces points (305m per box)	Box	**10**						Excel	
5.4.2	Cat6 Patch cables	units	**200**						Excel	
5.4.3	Cat6 RJ45 connectors	pack	**2**						D-Link	
5.5	**Firewalls**									
5.5.1	ASA 5516-X Security Appliance with FirePOWER services, 8GE Data, 1GE Mgmt, AC, 3DES/AES		**3**	2	1				Cisco	ASA5516-K9
										ASA5516-FPWR-BUN
5.5.2	ASA 5508-X Security Appliance with FirePOWER services, 8GE Data, 1GE Mgmt, AC, 3DES/AES		**2**			1	1		Cisco	ASA5508-K9
										ASA5508-FPWR-BUN
5.5.3	Cisco ASA 5516-X TAMC Firepower services subscription, 5Y		**2**	1	1				Cisco	L-ASA5516-TAMC-5Y
										L-ASA5516-TAMC-5PR
5.5.4	Cisco ASA 5508-X TAMC Firepower services subscription, 5Y		**2**			1	1		Cisco	L-ASA5508-TAMC-5Y
										L-ASA5508-TAMC-5PR
5.5.5	SmartNet support for Cisco ASA 5516-X, 5Y subscription		**2**						Cisco	CON-SNT-ASA556F9
5.5.6	SmartNet support for Cisco ASA 5508-X, 5Y subscription		**2**						Cisco	CON-SNT-ASA5508K
5.5.7	Cisco FireSIGHT Management Center,(VMWare) for 10 devices		**1**	1					Cisco	FS-VMW-10-SW-K9

5.5.8	SW APP SUPP + UPGR Cisco FireSIGHT Mana		**1**	1					Cisco	CON-SAU-VMWSW10
5.6	**Wi-Fi Access Points**									
5.6.1	Cisco Aironet 2700 series, indoor with external antennas	units	**40**	20	8	6	6		Cisco	AIR-CAP2702E-E-K9
5.6.2	Cisco Aironet external antennas	sets	**40**	20	8	6	6		Cisco	AIR-ANT2524DW-R
5.6.3	SmartNet 5x8 service contract for Access points, 5Y	units	**40**						Cisco	CON-SNT-AIRCAPE2
5.7	**WLAN Controllers**									
5.7.1	Cisco 2504 series Wireless controller 15 access points	units	**5**	2	1	1	**1**		Cisco	AIR-CT2504-15-K9,
										AIR-AP2702E-UX-WLC
5.7.2	Rack mount adapter kit for 2504 wireless controller	units	**8**	3	2	1	2		Cisco	AIR-CT2504-RMNT
5.7.3	Cisco 2504 series Wireless controller HA unit	units	**3**	1	1		1		Cisco	AIR-CT2504-HA-K9
5.7.4	SmartNet 5x8 service contract for Wireless controllers, 5Y	units	**8**						Cisco	CON-SNT-CT2515,
										CON-SNT-CT2504HA
5.8	**PoE+ Switches**									
5.8.1	Layer 3 Switches: Cisco SG300 series PoE+ switches, 48 ports	units	**6**	2	2	1	1		Cisco	SG300-52P-K9-UK
5.9	**Routers and modems**									
5.9.1	Small Business Wi-Fi VPN router Cisco RV180W, RV130W or similar		**38**					38	Cisco	
5.9.2	Huawei E5172 Huawei E5172s-22 3g/4g modem / Router		**38**					38	Huawei	

5.9.3	Directional high-gain 3G/4G external antenna		**38**					38		
5.9.4	60 foot coax cable with suitable connectors		**38**					38		
5.9.5	Mountring structures (wall mountingwith pole expected)		**38**					38		
5.1	**Computing devices for FC branch offices**									
5.10.1	HP 20C007NH Non-Touch All-in-One	pc	**112**					112	HP	
5.10.2	Targus Defcon Combination Security Lock Cable	pc	**102**					102	Targus	
5.11	**Web (content) proxies**									
5.11.1	5600 Next Generation Threat Prevention Appliance	pc	**1**	1					CheckPoint	CPAP-SG5600-NGTP
5.11.2	Open source web proxy + appropriate power efficient PC/server hardware	pc	**3**		1	1	1		Squid with Dell Servers	
6	**Management software and hardware**									
6.1	**Network, systems and environmental management and monitoring software suite (3year License)**									
6.1.1	SolarWinds Network management software		**1**	1						
6.1.1.1	SolarWinds Network Performance Monitor SL2000 (up to 2000 elements) - License with 3-year Maintenance		**1**	1					SolarWinds	NPM
6.1.1.2	SolarWinds NetFlow Traffic Analyzer Module for SolarWinds Network Performance Monitor SL2000 - License with 3-year Maintenance		**1**	1					SolarWinds	NCM
6.1.1.3	SolarWinds Network Configuration Manager DL100 (up to 100 nodes) - License with 3-year Maintenance		**1**	1					SolarWinds	NTA
6.1.1.4	SolarWinds Network Topology Mapper - License with 3-Year Maintenance		**1**	1					SolarWinds	NTM
6.1.1.5	SolarWinds Log & Event Manager LEM500 (up to 500 nodes) - License with 3- Year Maintenance		**1**	1					SolarWinds	LEM

6.1.1.6	SolarWinds Engineer's Toolset Per Seat License (includes one desktop install & one Web named user) - License with 3-Year Maintenan ce		**1**	1					SolarWinds	
6.1.1.7	SolarWinds Server & Application Monitor AL700 (up to 700 monitors) - License with 3-year Maintenance		**1**	1					SolarWinds	SAM
6.1.1.8	olarWind Virtualization Manag r VM8 (up to 8 sockets) - License with 3-Year Maintenance		**1**	1					SolarWinds	SAM
6.1.2	ManageEngine Network Management software		**0**	0					ManageEngine	Opmanager Plus 1000
7	**IT Services**									
7.1	**Training**									
7.1.1	Cisco ASA5500-X series and Firepower services, configuration and management	pers on	**10**	10						
7.1.2	Wireless LAN, controller based architecture, configuration and management.	pers on	**10**	10						
7.1.3	VLANs and QoS, configuration and management,	pers on	**10**	10						
7.1.4	IPSec VPN and remote offices, configuration and management	pers on	**10**	10						
7.1.5	Cisco Routing, Switching and Security, configuration and management	pers on	**10**	10						
7.1.6	WAN optimization and web cache/proxy configuration and management	pers on	**10**	10						
7.1.7	Training on all provided network monitoring and management tools (network monitoring, network configuration management, IP addre management, Fault detection and management etc.)	pers on	**7**	7						
7.1.8	Vmware vSphere configuration, operation and management	pers on	**7**	7						

7.1.9	Environmental monitoring system	person	**7**	5	2					
7.1.10	Fire detection and suppression system	person	**7**	5	2					
7.1.11	Video surveillance system	person	**7**	5	2					
7.1.12	Access control system	person	**7**	5	2					
7.2	**Network design**									
7.2.1	WLAN Network planning and Design, incl site survey	m.days	**20**	8	4	4	4			
7.2.2	Network design with VLAN's and configuring of devices	m.days	**20**	8	4	4	4			
7.3	**Broadband link set-up cost for 2 larger offices Site 1 & Site 2 - Fiber link**	**lots**	**2**	**1**	**1**				Busy Internet	
7.4	**Broadband link set-up cost for 2 larger offices Site 3 & Site 4- Radio link**	**lots**	**2**			**1**	**1**		Busy Internet	
8	**Power efficient Rackmount Server Hardware**									
8.1	Dell PowerEdge R430 Server	units	**4**	4					Dell	
	Power efficiency optimized Rack server (DELL PowerEdge R430), 32GB mem, Dual Intel® Xeon® E5-2650L V4 Processor (14 cores), 4x2TB HDD, Raid 10, Quad 1GB NIC, Dual hot-plug power supplies		**4**	4					Dell	PowerEdge R430 or equivalent
	Microsoft Windows Server 2016		**4**	4					Microsoft	
	Micro oft Window Server 2016 U er CALs		**20**	4					Microsoft	
8.2	Dell PowerEdge R530 Server	units	**2**	2					Dell	

	Power efficiency optimized rack server (DELL PowerEdge R530), 128GB mem, Dual Intel® Xeon® E5-2650L v4 Processors (14 cores), 4x4TB HDD, Raid 10, Quad 1GB NIC, Dual hot-plug power supplies		**2**	2					Dell	PowerEdge R530, R630 or R730 or equivalent
	Microsoft Windows Server 2016		**2**	2					Microsoft	
	Microsoft Windows Server 2016 User CALs		**10**	10					Microsoft	
8.3	Storage									
8.3.1	Dell Compellent SCv2020	units	**1**	1					Dell	Compellent SCv2020 with 25.2TB
8.4	SW Licenses									
8.4.1	Vmware vSphere Standard	units	**1**	1					Vmware	VS6-STD-AK-C & VS6-STD-3P-SSS-C
9	**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**							
	5KVA Solateck SVS 5000 AVR	units	34							

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SCHEDULE 2: Solar Equipment and Balance of System - 24 Hour Battery Scenario

Ref	Description	Unit	**Manufacturer** (Vendor to specificy)	**Manufacturer Part #** (Vendor to specify)
1	**Supply of PV Solar Panels**			
1.1	PV Solar Panels for FC HC Accra Office (Site 1)	Each	Jinko Solar	JKM265PP
1.2	PV Solar Panels for RMSC Kumasi Office (Site 2)	Each	Jinko Solar	JKM265PP
1.3	PV Solar Panels for TIDD Kumasi Office (Site 3)	Each	Jinko Solar	JKM265PP
1.4	PV Solar Panels for TIDD Takoradi Office (Site 4)	Each	Jinko Solar	JKM265PP
1.5	PV Solar Panels for 34 District Offices (Sites 5 to 38)	Each	Jinko Solar	JKM265PP
2	**Batteries**			
2.1	Batteries for FC HC Accra Office	Each	HENGYANG RITAR POWER	OPZv2 3000Ah
2.2	Batteries for RMSC Kumasi Office	Each	HENGYANG RITAR POWER	OPZv2 2500Ah
2.3	Batteries for TIDD Kumasi Office	Each	HENGYANG RITAR POWER	OPZv2 2000Ah
2.4	Batteries for TIDD Takoradi Office	Each	HENGYANG RITAR POWER	OPZv2 2000Ah
2.5	Batteries for 34 District Offices	Each	HENGYANG RITAR POWER	OPZv2 770Ah
3	**Battery Racks and Fused Disconnector including any required housing**			
3.1	FC HC Accra Office	Lot	HENGYANG RITAR POWER	
3.2	RMSC Kumasi Office	Lot	HENGYANG RITAR POWER	
3.3	TIDD Kumasi Office	Lot	HENGYANG RITAR POWER	

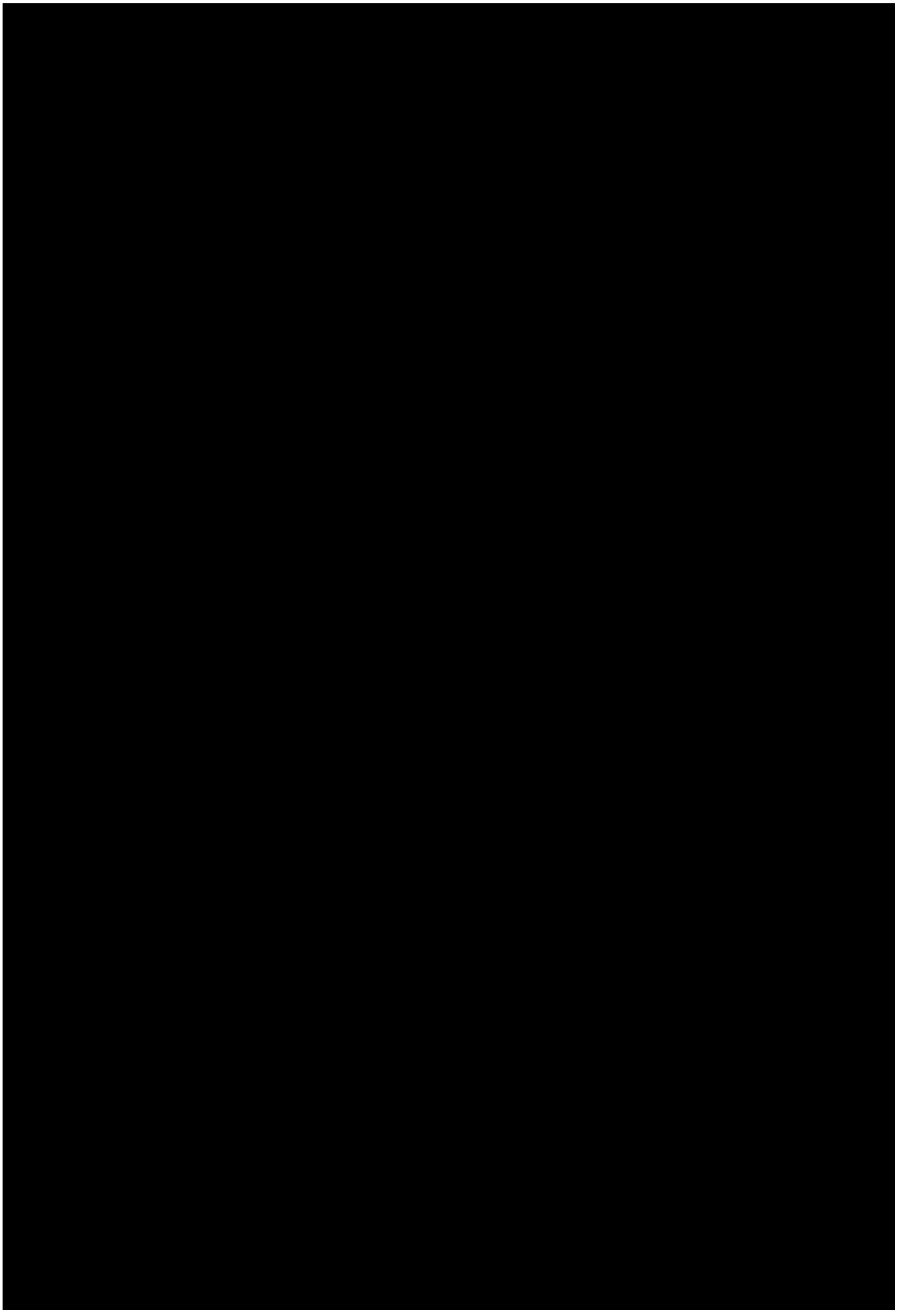
3.4	TIDD Takoradi Office	Lot	HENGYANG RITAR POWER	
3.5	34 District Offices	Lot	HENGYANG RITAR POWER	
4	**Battery Inverters with Management System**			
4.1	Battery Inverter for FC HC Accra Office	Each	SMA	SUNNY ISLAND 6.0H
4.2	Battery Inverter for RMSC Kumasi Office	Each	SMA	SUNNY ISLAND 8.0H
4.3	Battery Inverter for TIDD Kumasi Office	Each	SMA	SUNNY ISLAND 6.0H
4.4	Battery Inverter for TIDD Takoradi Office	Each	SMA	SUNNY ISLAND 6.0H
4.5	Battery Inverter for 34 District Offices	Each		
5	**Charge Controllers and/or Grid-Interactive Inverters**			
5.1	Charge Controller for FC HC Accra Office	Each	SMA	SMA STP 15000TL-30
5.2.1	Charge Controller for RMSC Kumasi Office	Each	SMA	SMA STP 25000-30
5.2.2	Charge Controller for RMSC Kumasi Office	Each	SMA	SMA STP 15000TL-30
5.3.1	Charge Controller for TIDD Kumasi Office	Each	SMA	SMA STP 20000TL-30
5.3.2	Charge Controller for TIDD Kumasi Office	Each	SMA	SMA STP 12000TL-20
5.3.3	Charge Controller for TIDD Kumasi Office	Each	SMA	SMA SB 3000TL-21
5.4	Charge Controller for TIDD Takoradi Office	Each	SMA	SMA STP 15000TL-30
5.5	Charge Controller for 34 District Offices	Each	Goodwe (Jiangsu) Power Supply Techn. Co. Ltd.	Goodwe Hybrid GW3648D-ES
6	**Remote Monitoring System (RMS) with Data Transfer via LAN**			
6.1	RMS for FC HC Accra Office	Lot		
6.2	RMS for RMSC Kumasi Office	Lot		
6.3	RMS for TIDD Kumasi Office	Lot		
6.4	RMS for TIDD Takoradi Office	Lot		

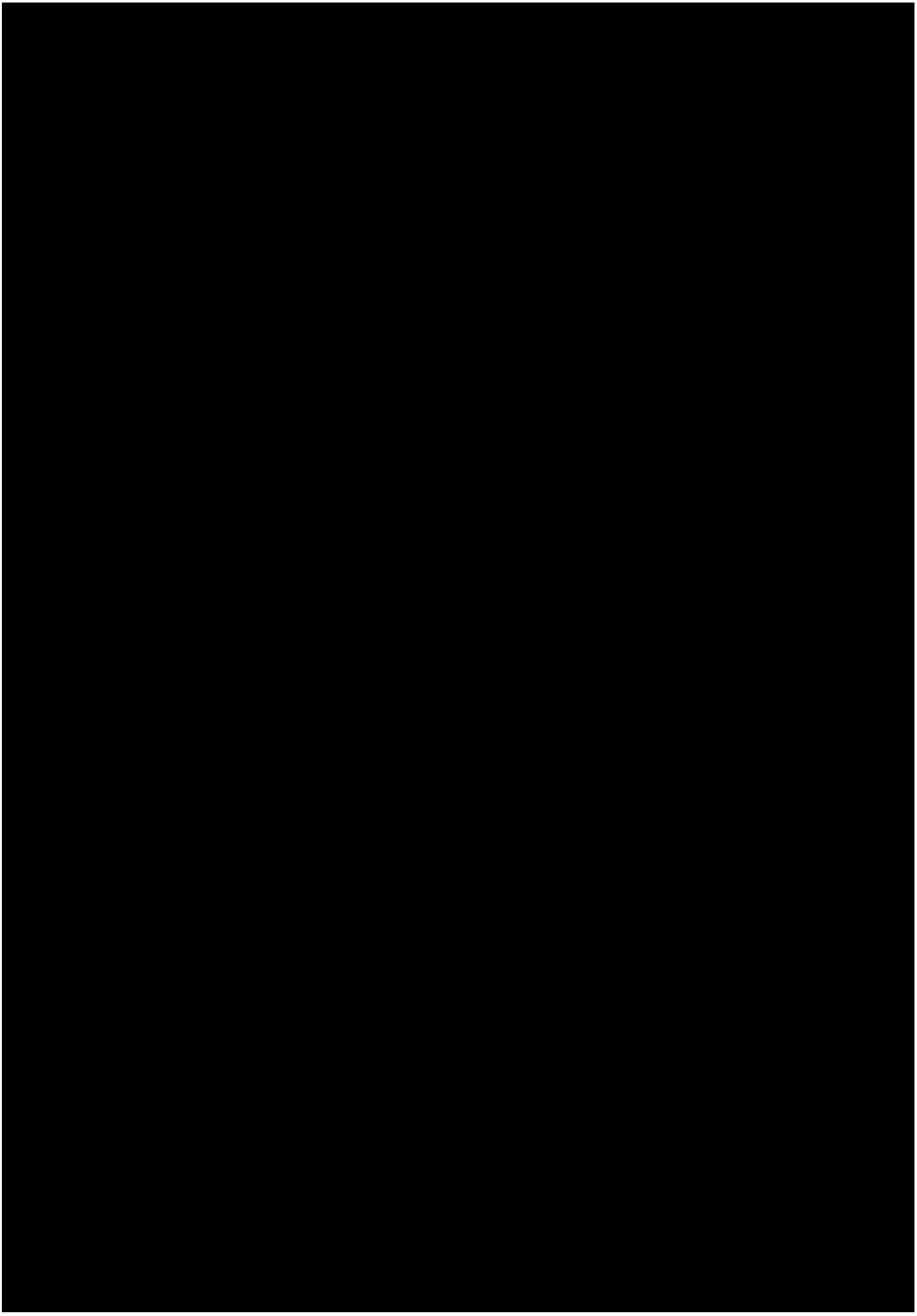
6.5	RMS for 34 District Offices	Lot		
7	**Earthing Systems and Ground Fault Protection & Surge Protection Devices**			
7.1	Earthing System for FC HC Accra Office	Lot	Local Purchases	
7.2	Earthing System for RMSC Kumasi Office	Lot	Local Purchases	
7.3	Earthing System for TIDD Kumasi Office	Lot	Local Purchases	
7.4	Earthing System for TIDD Takoradi Office	Lot	Local Purchases	
7.5	Earthing System for 34 District Offices	Lot	Local Purchases	
8	**Power Distribution Panels (PDP)**			
8.1	PDP for FC HC Accra Office	Lot	Local Purchases	
8.2	PDP for RMSC Kumasi Office	Lot	Local Purchases	
8.3	PDP for TIDD Kumasi Office	Lot	Local Purchases	
8.4	PDP for TIDD Takoradi Office	Lot	Local Purchases	
8.5	PDP for 34 District Offices	Lot	Local Purchases	
9	**Load Limiting Devices (LLD)**			
9.1	LLD for FC HC Accra Office	Lot	Local Purchases	
9.2	LLD RMSC Kumasi Office	Lot	Local Purchases	
9.3	LLD TIDD Kumasi Office	Lot	Local Purchases	
9.4	LLD for TIDD Takoradi Office	Lot	Local Purchases	
9.5	LLD for 34 District Offices	Lot	Local Purchases	
10	**Complete Electrical Balance of System (BOS), including Wiring System c/w Connectors, Fuses and Breakers**			
10.1	BOS for Accra Office	Lot	Local Purcahses	
10.2	BOS System for RMSC Kumasi Office	Lot	Local Purcahses	

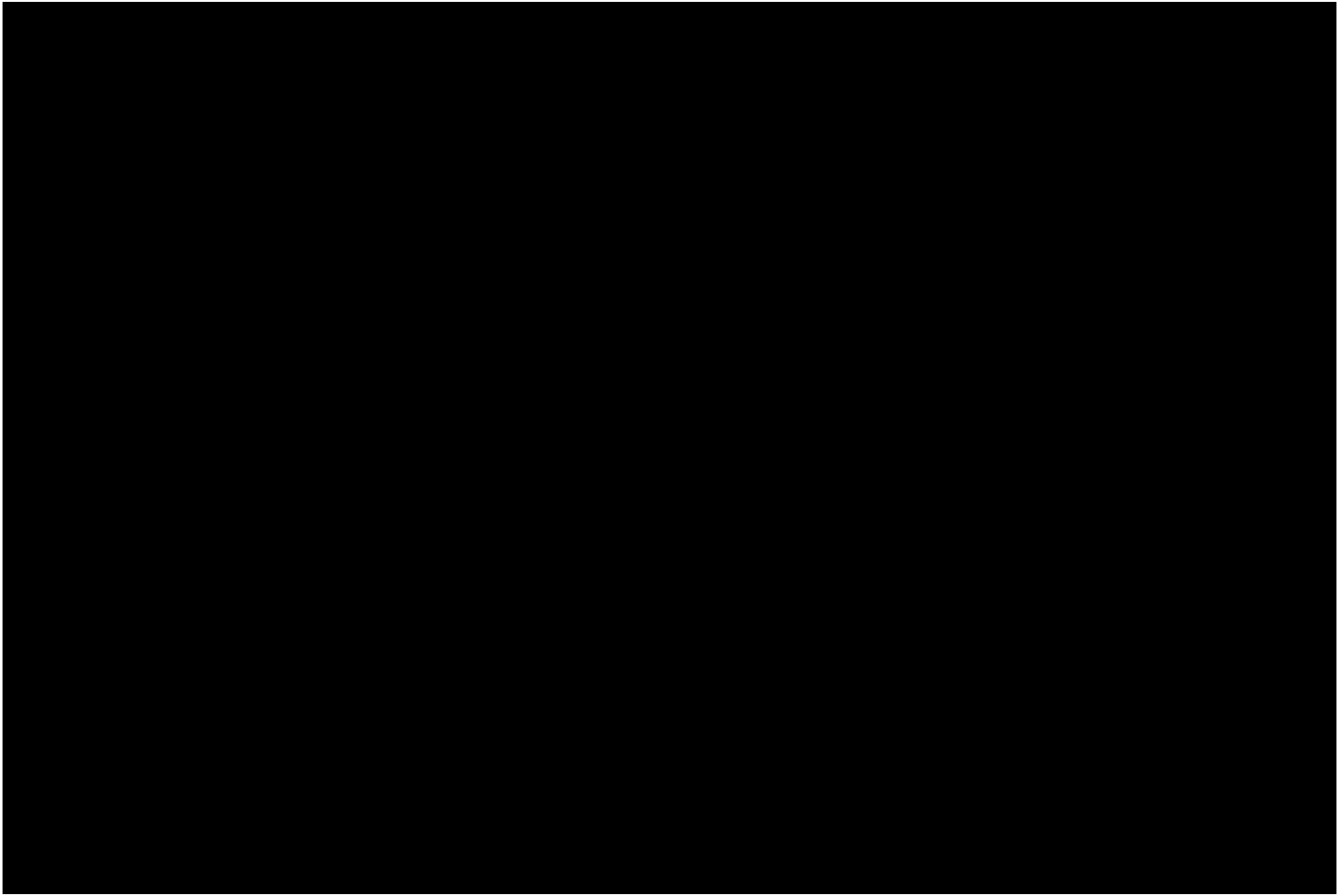
10.3	BOS System for TIDD Kumasi Office	Lot	Local Purcahses	
10.4	BOS System for TIDD Takoradi Office	Lot	Local Purcahses	
10.5	BOS System for 34 District Offices	Lot	Local Purcahses	
11	**Supply of Mandatory Spare Parts**	**Lot**		

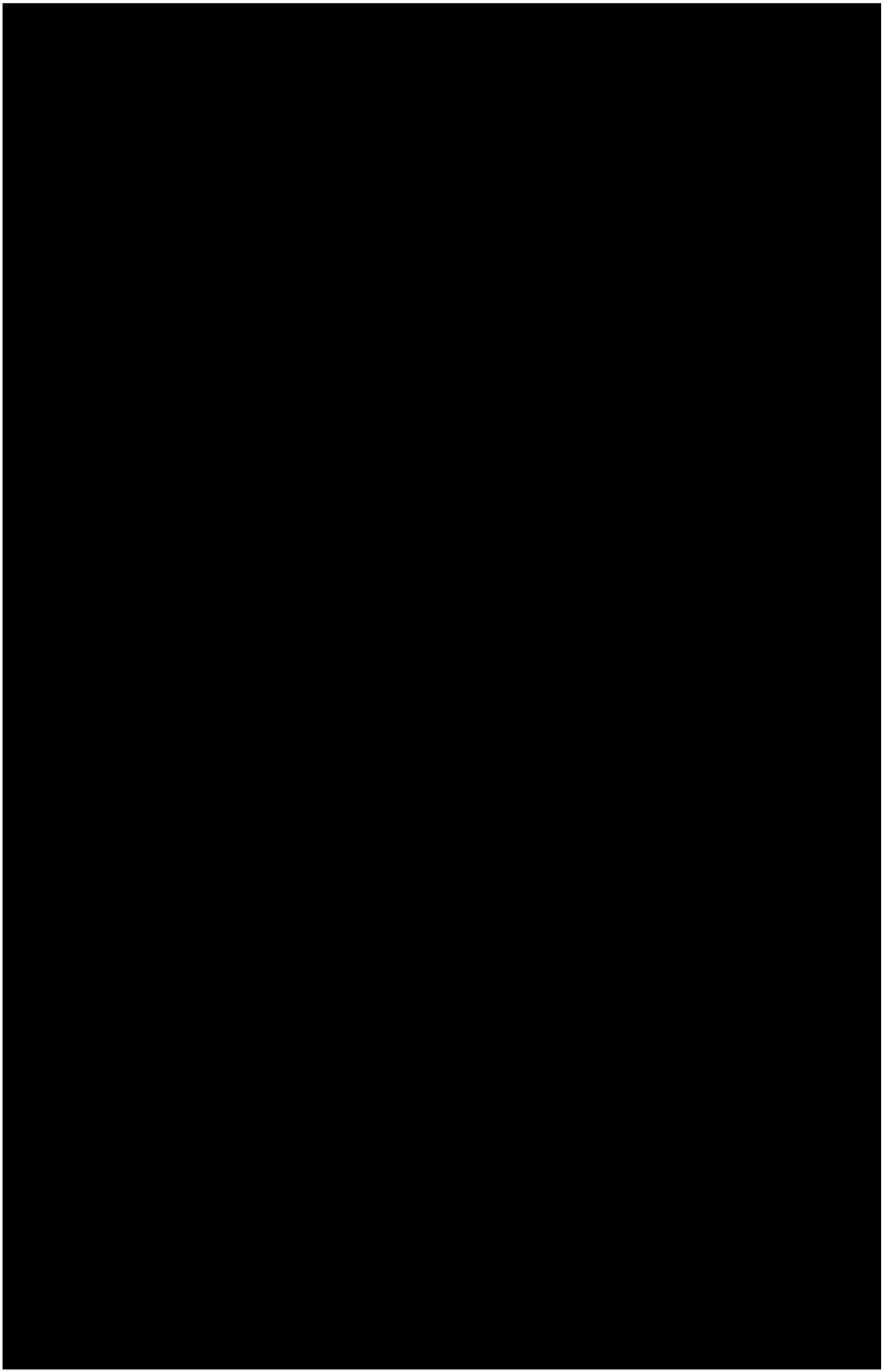
Department for International Development

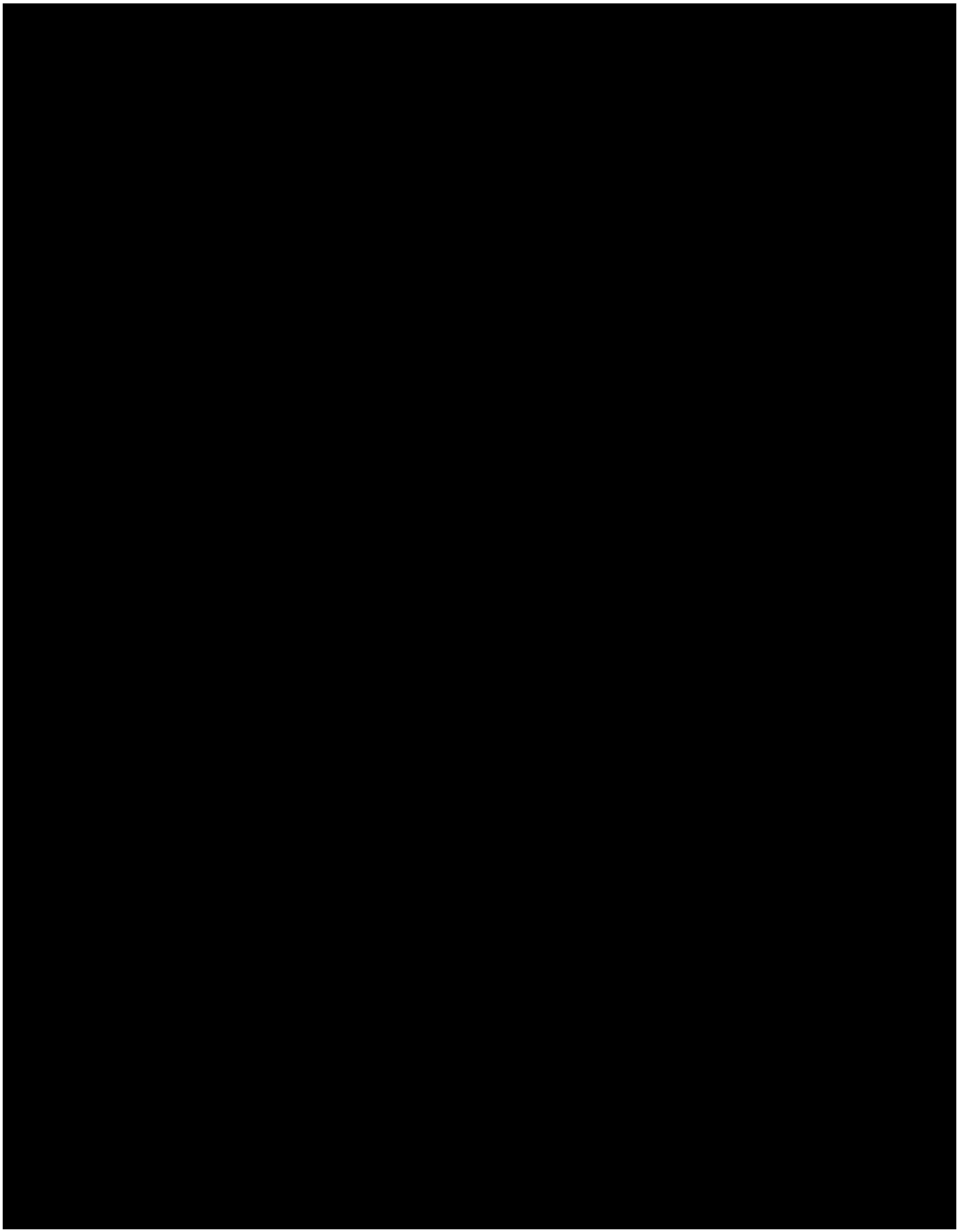
ANNEX C
Procurement Plan
Provided by AECOM/DPSA

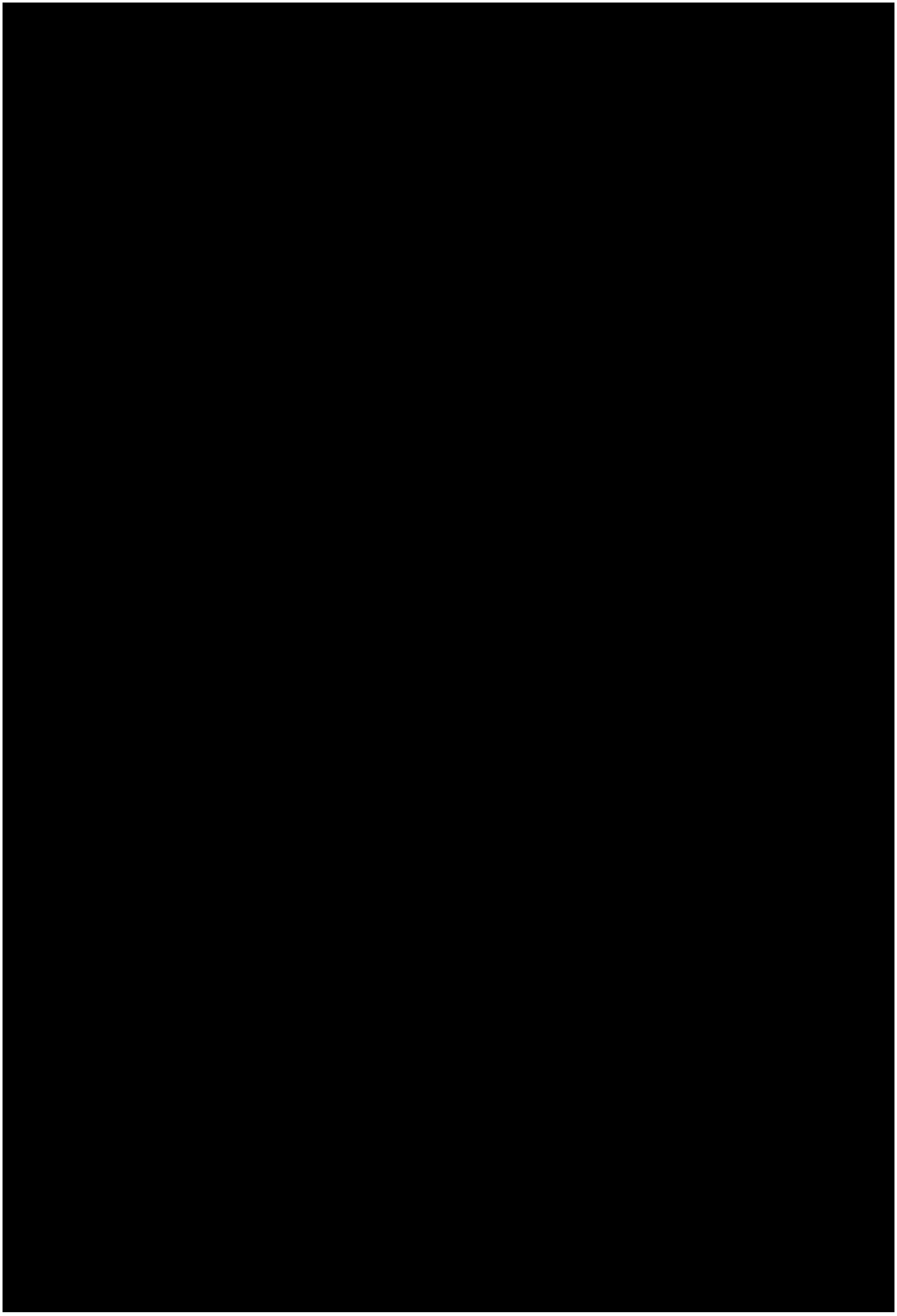


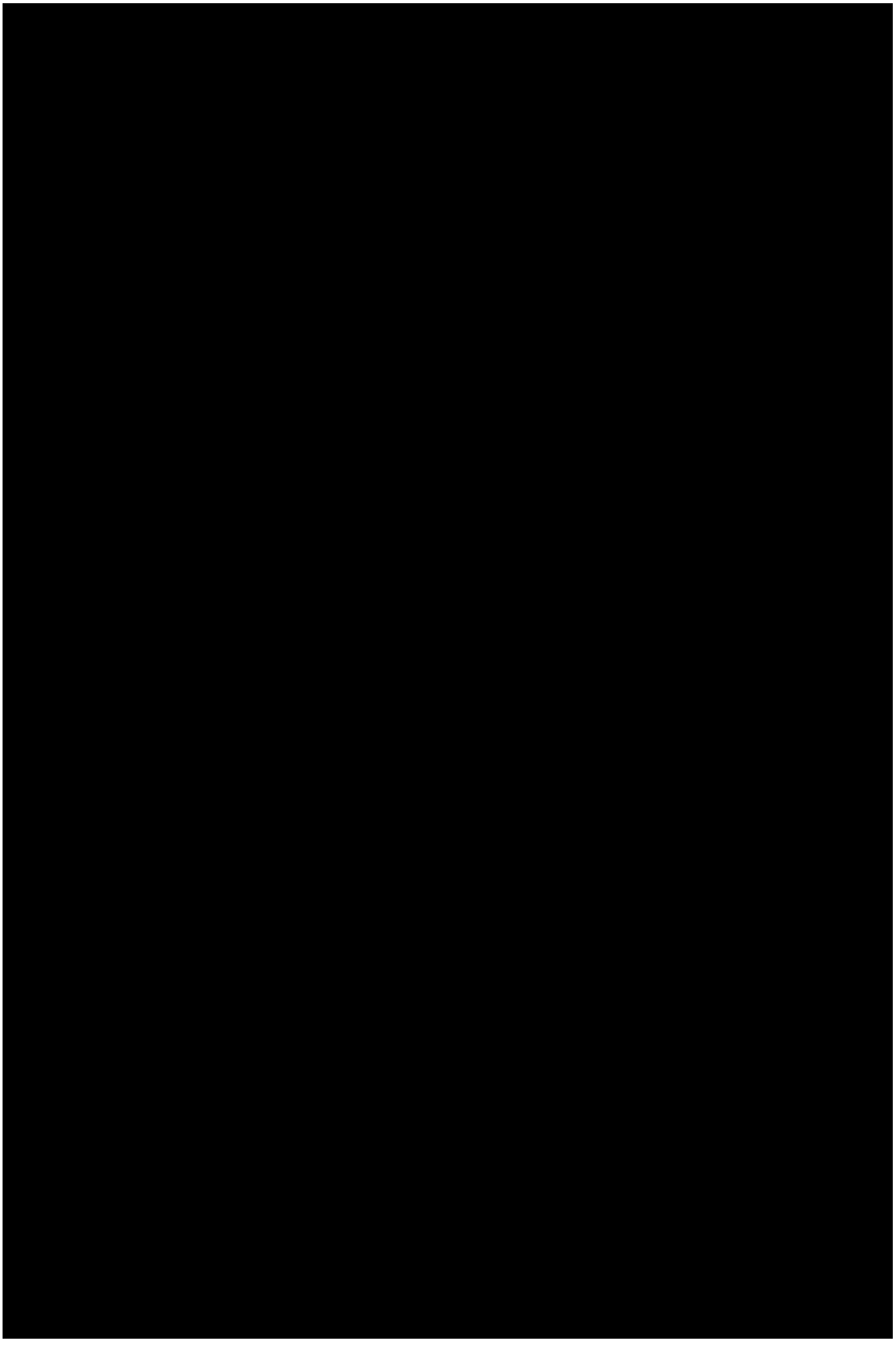


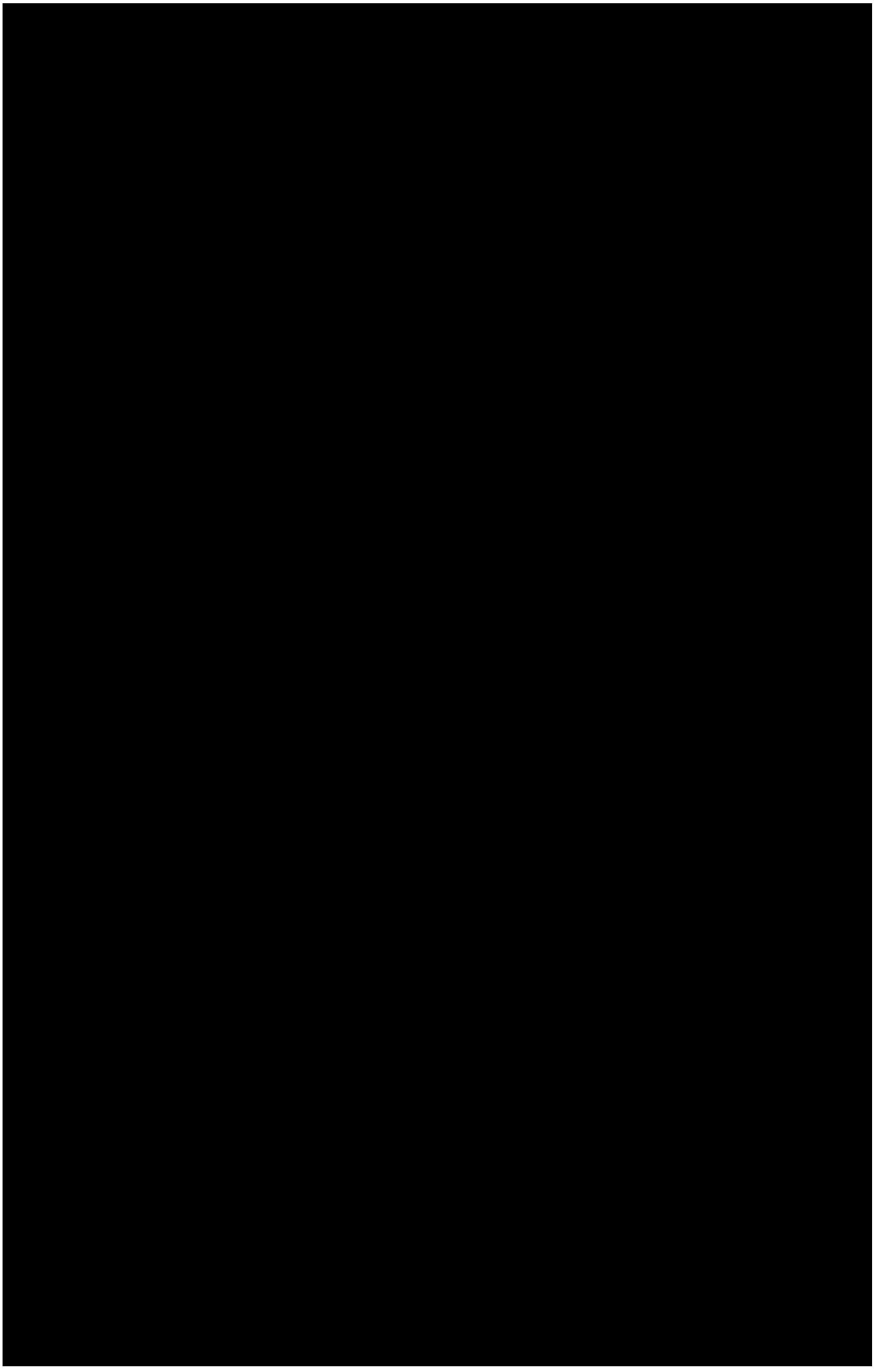


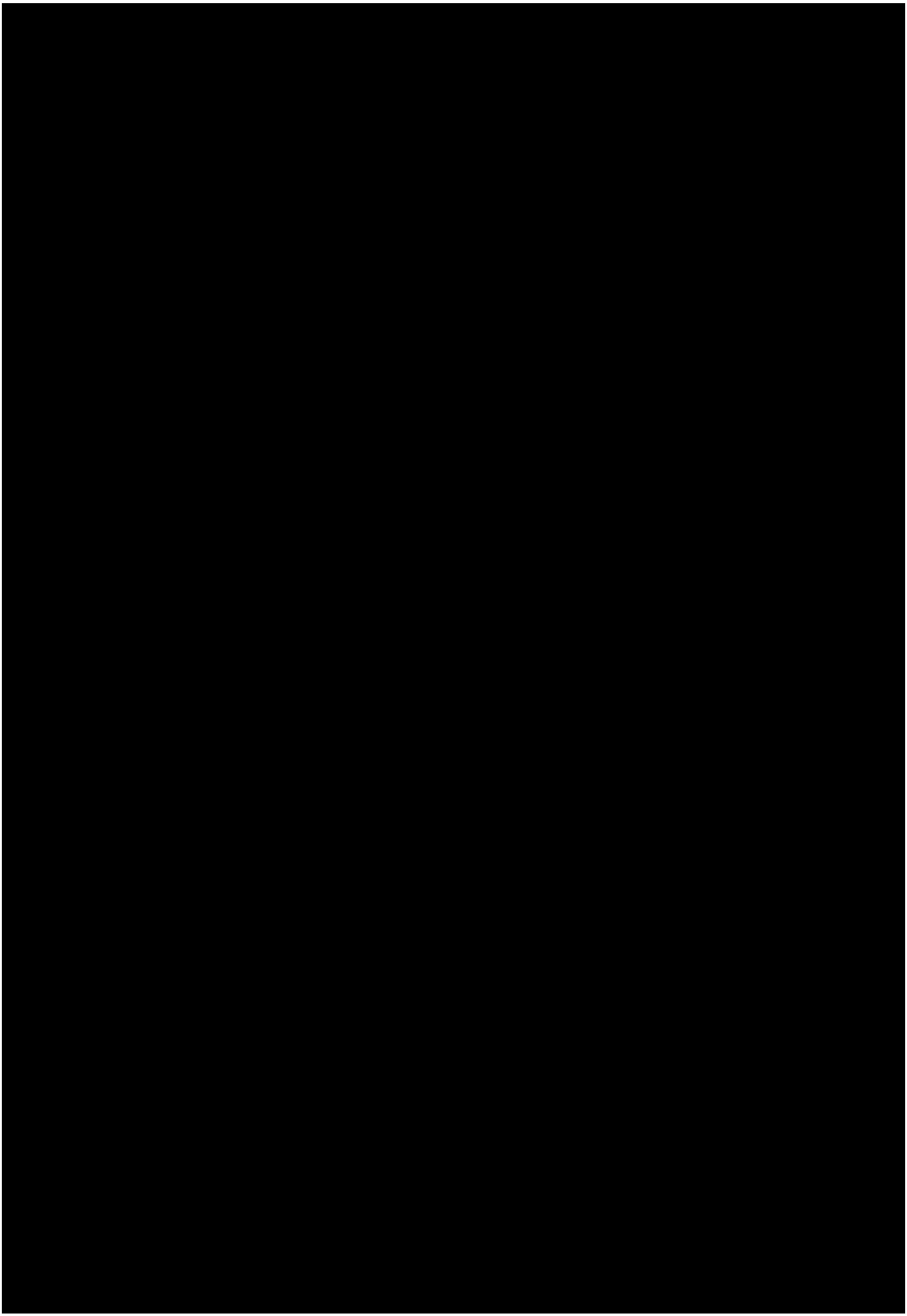


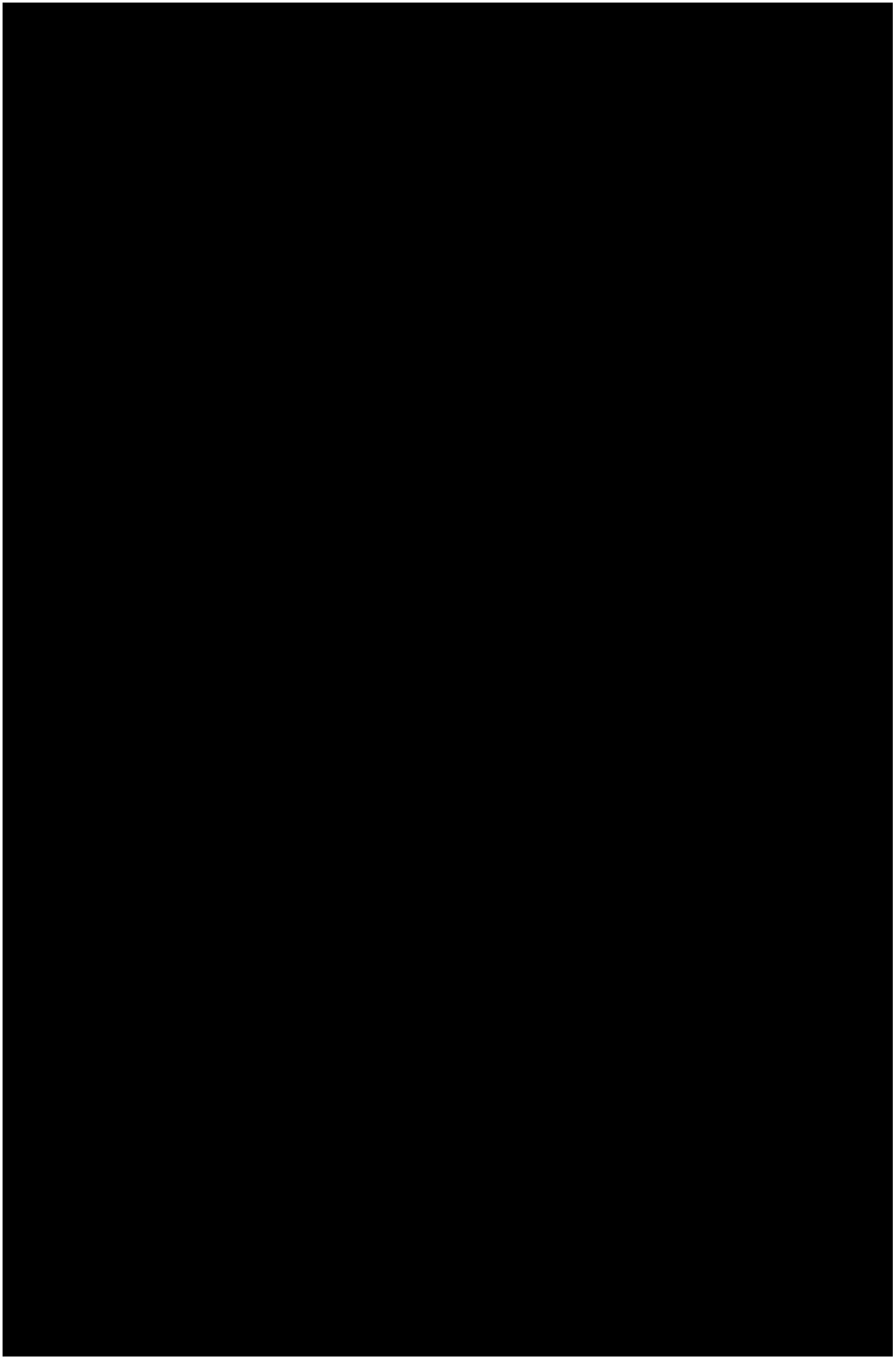


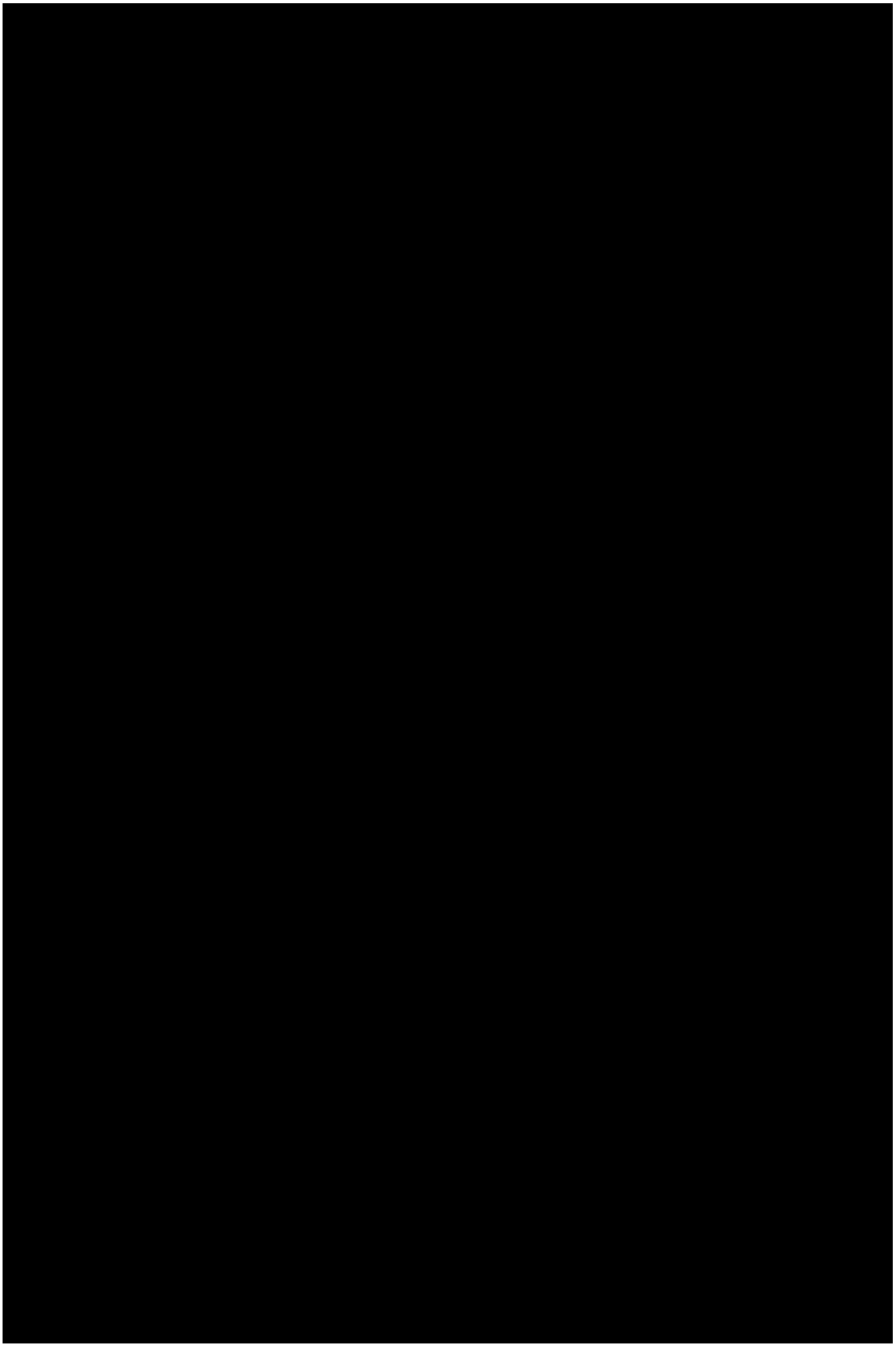


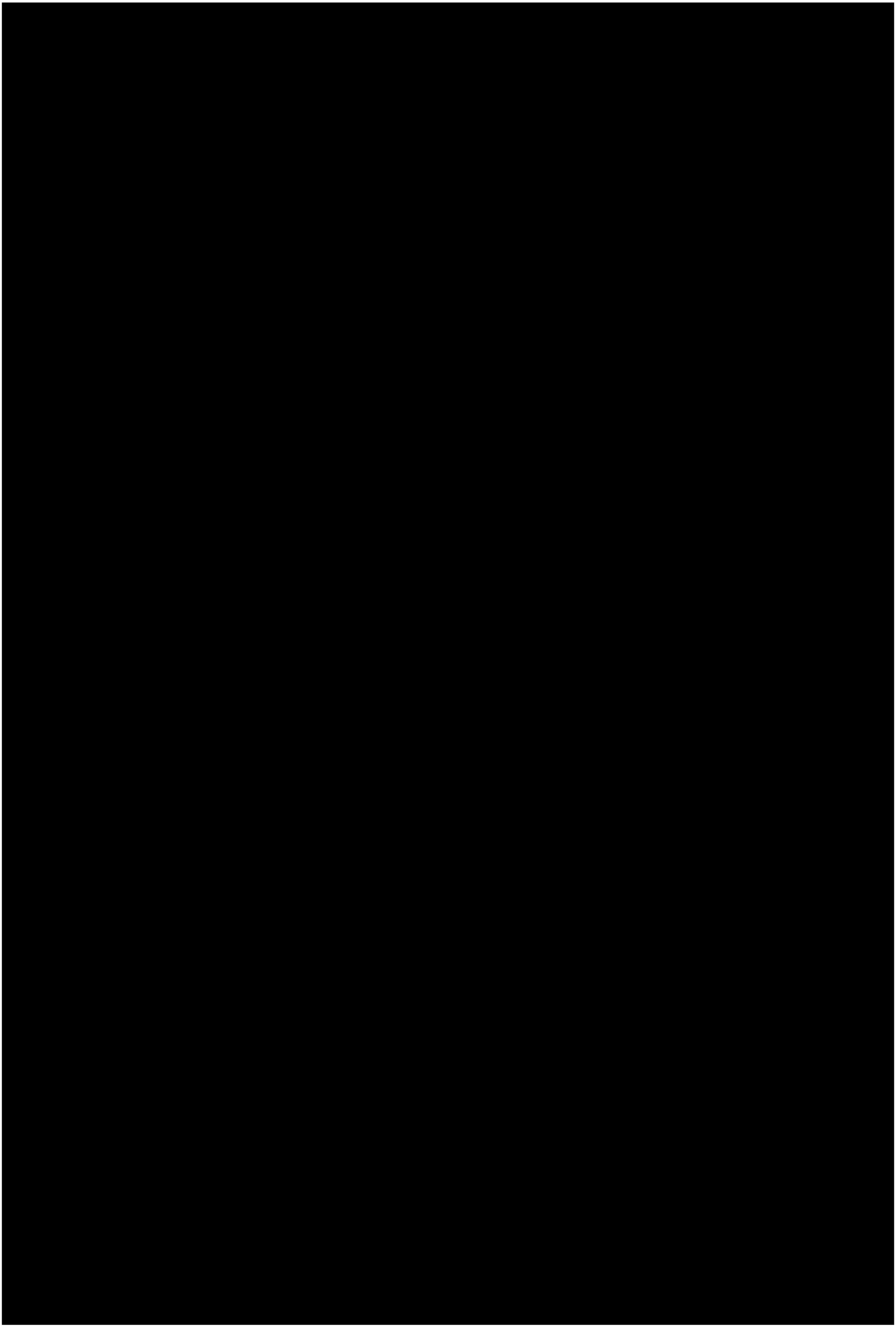


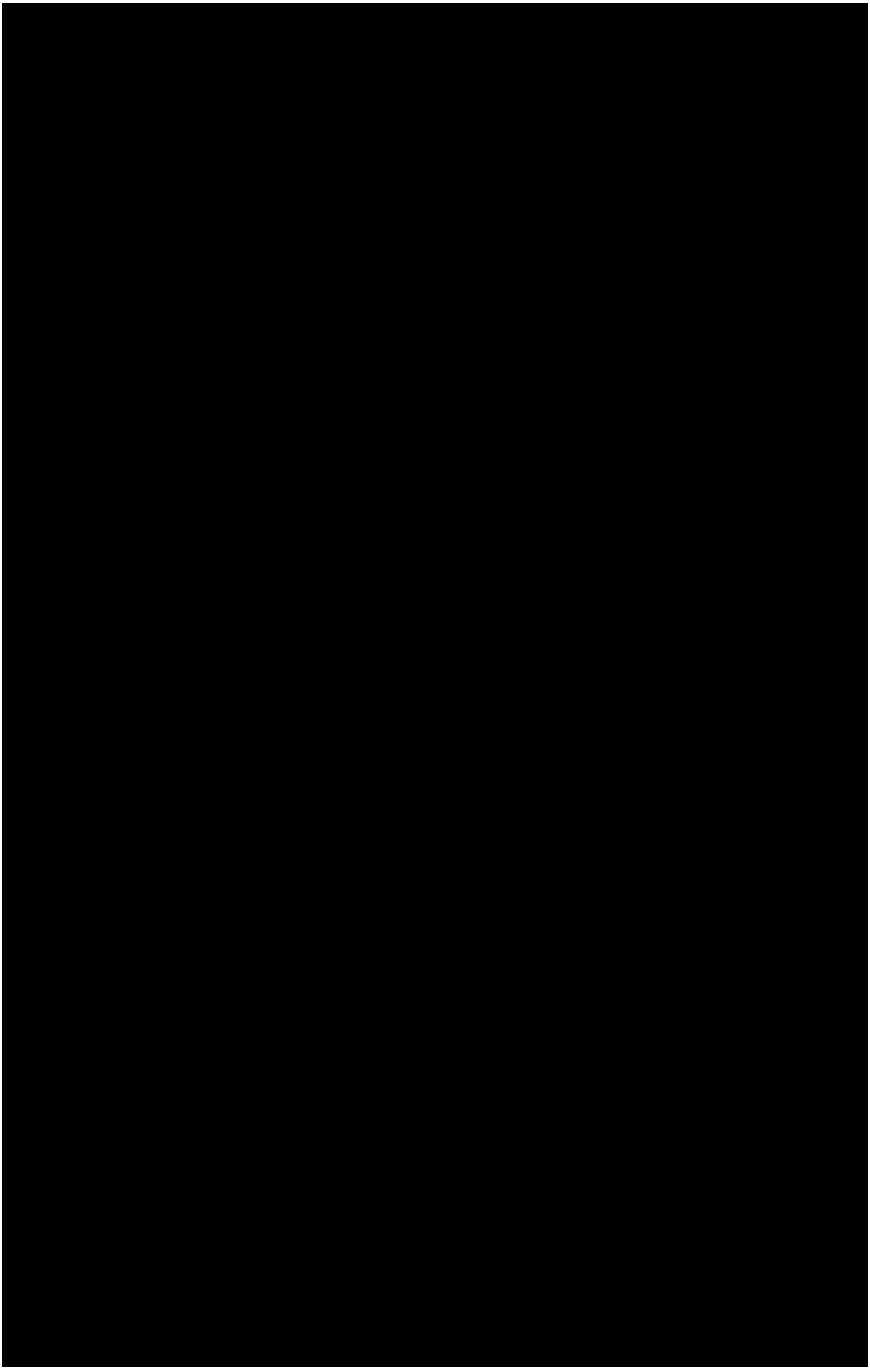


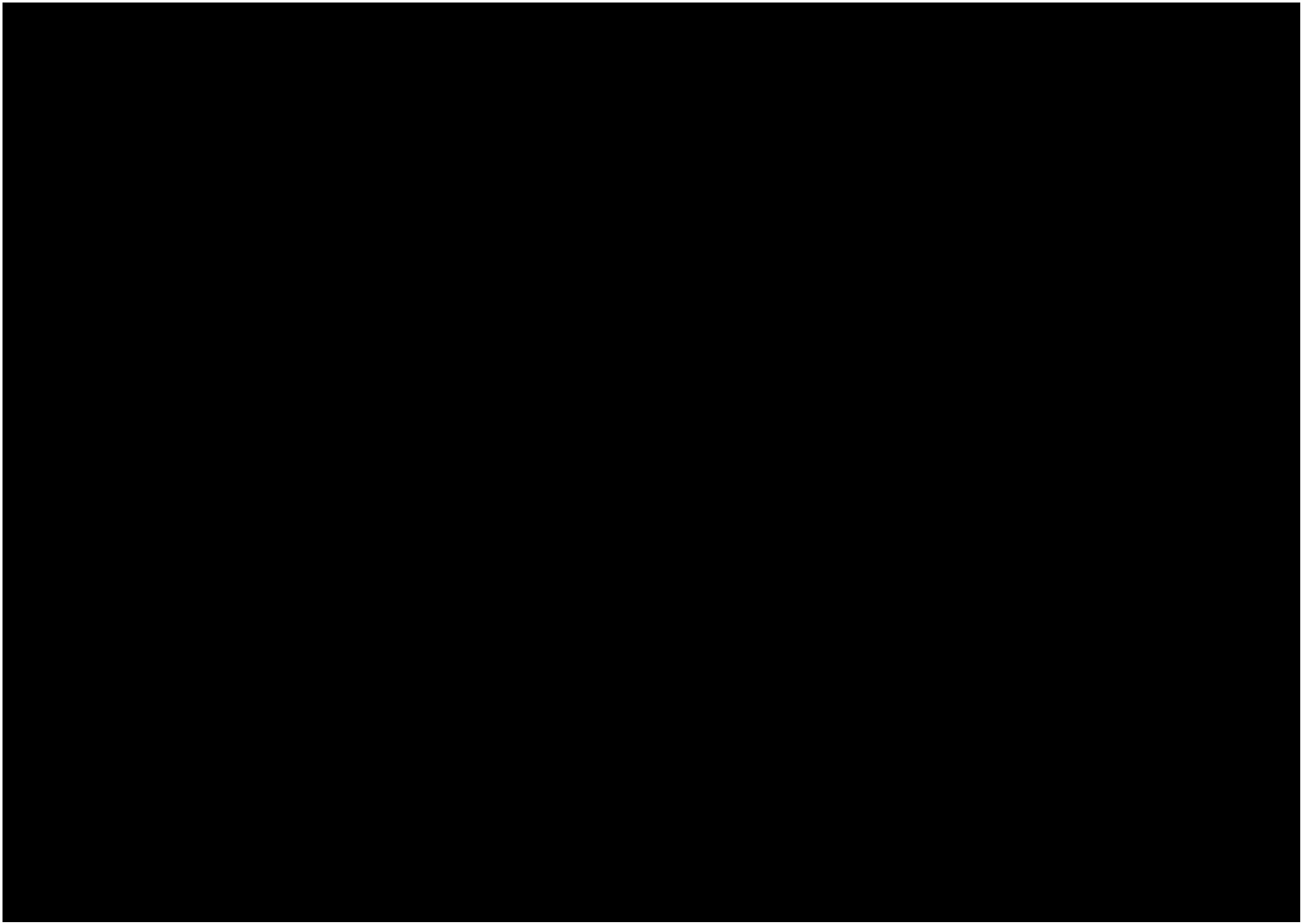


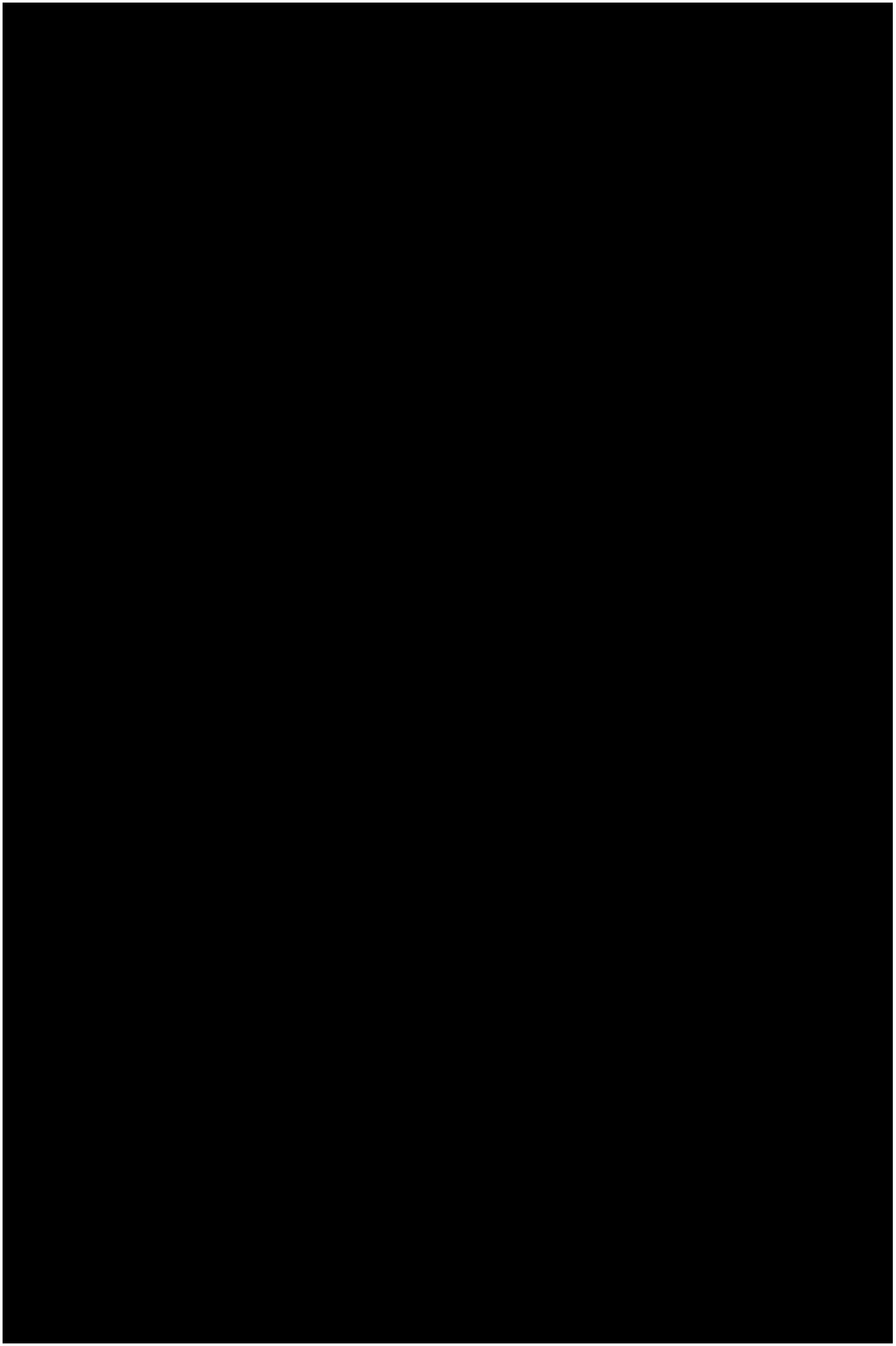












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-End-

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 procurement 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 and procurement 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..

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 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**
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		•		
2.5	Connectivity upgrade in 34 district and regional offices	•	•		
2.6	Computing hardware in 34 district and regional offices	•	•		
2.7	Network monitoring and management solution		•		
2.8	Powe efficient server hardware	•	•		
'					

3 Technical Requirements

3.1 Site Information

The prepared site data shall serve as a basis for the data verification.

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

3.3

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 as well as provisioning the management and monitoring software accordingly. The VLAN and WLAN configuration changes shall be done using the configuration management software procured and delivered in the context of this project.

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 number of devices, interfaces etc. shall be provided upon request.

The Contractor shall be responsible for supply of necessary software and including 2 large energy-efficient LCD/IPS displays (40+ inches) for on-wall status monitoring. The network monitoring and management system shall be provided with licenses and annual maintenance subscription valid for a 5 year term.

The Contractor shall be responsible for supply 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. As the existing wired network design and equipment is based on Cisco products, the Cisco products shall be selected to complement the existing design and equipment.As part of wireless LAN infrastructure update, a number of wired LAN switches shall also be delivered.

The following items shall be required to be supplied (see Appendix B – BOM for reference on detailed quantities).

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
7. Necessary Ethernet cabling (including double cabling for access points)

The Contractor shall be a Cisco Registered Partner.

The Contractor shall have at least one certified resource in the following discipline.

1. CCNP Wireless

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. As the existing design and equipment is based on Cisco products, the Cisco products shall be selected to complement the existing design and equipment. 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:

- Supply, 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.
- Supply 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.
- Supply, of FirePOWER Management Center virtual appliance (10 sensors), together with underlying VmWare ESXi.
- Supply, 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.
- Supply, 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.
- Implementing the security best practices as per requirements of FC.

The Contractor shall be a Cisco Registered Partner.

1. The Contractor shall have at least one certified resource in each of the following disciplines. CCNP Routing and Switching,
2. CCNP Security.

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

These shall be procured from a reliable local communication provider (e.g. Vodafone, Comsys or equivalent). The Contractor shall procure 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 Connectivity Upgrade in 34 District Offices

Required at thirty four (34) FC branch offices (Sites 5 to 38 Appendix A). Thirty four (34) sets (+ spares) of the following equipment shall be supplied for the purpose of setting up VPN over mobile broadband connectivity (3G/4G) as an integral part of the FC Network. (Refer also to BOM in Appendix B).

- Cisco RV130W series VPN Wi-Fi routers.
- 3G/4G routers compatible with VPN router and using external antenna.
- External directional all-band 3G/4G high gain antennae (min 11dBi) for maximizing signal strength and mobile broadband connection quality.
- Antenna coax cables with sufficient length – keeping the length of antenna cable to its practical minimum is required to avoid unnecessary signal attenuation.
- Antenna adapters for connecting to 3G/4G router (if required).
- Antenna mounting structures, poles etc. for mounting on building wall or roof depending on location.

3.3.7 Computer Hardware for 34 District Offices

Each of the 34 FC Branch offices (sites 5 to 44 with 34 in scope)shall be equipped with 3 power efficient All-in-one computers each (total of 102 computers) meeting or exceeding the following minimum specifications:

- Maximum power consumption 65 Watts or less
- 19” or larger HD LED screen
- 1 TB HDD or SDD
- 4 GB Memory, with at least 1 empty SO-DIMM slot for provisioning additional memory module(s)
- minimum of 2 CPU cores, at least 1.4 GHz (Intel or AMD)
- Wireless LAN 802.11b/g/n (2.4 GHz)
- 10/100/1000 Gigabit Ethernet LAN
- DVD Burner
- Integrated Webcam, microphone and speakers
- Computer Case: All-in-One
- Corded(USB) Keyboard
- Corded (USB) Mouse
- Security Slot (aka. Kensington slot)
- Microsoft Windows 10 64bit Operating System (or later) license (preinstalled)

In addition, for each of the above PCs a high strength steel security cable compatible with the security slot shall be provided (102 pc in total). For information, these cables are generally known as Kensignton security locks (Keyed or Combination)

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

3.4.4 Data Centre Environmental Monitoring System

The Contractor shall provide environmental monitoring and video surveillance solutions including necessary hardware and software to be installed in both server rooms that shall be upgraded to data centres. At least the following shall be provided:

Digital Relative Humidity & Temperature Monitoring Instrument

- Environmental monitoring system (software + hardware)
- Environmental monitoring sensors and accessories

Video surveillance system (including cameras + cost effective video server software and hardware)
The environmental monitoring system shall comprise at least the following sensors (see BOM in Appendix B item #4 for reference):

- Smoke detectors - 2 for each server room
- Humidity sensors - 1 for each server room
- Temperature sensors - 2 for each server room + 2 for each rack + 2 for each AC unit
- Water sensors - 1 for each server room, 1 for each AC condensation tray
- Power/current sensors - 1 for each data centre
- Voltage sensors - for each server room: 1 for Grid Power, 1 for AVR, 1 for Solar, 1 for genset
- Door open/close sensors (e.g. dry contact) - 1 for each door leaf
- Airflow sensors - 1 for each rack, 1 for each AC unit
- Video surveillance cameras 2 for each server room (front + back)

3.4.5 Data Centre Cooling

The Contractor shall shall provide a 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

3.4.6 Data Centre Fire Protection and Suppression System

The Contractor shall provide latest technology industry standard automatic (inert gas based) fire suppression system (AFSS) suitable for server room / data centre operation along with:

1. all necessary accessories for fire detection (addressable smoke and heat detectors etc.),
2. manual actuation (manual call point / push button),
3. handheld extinguishers and
4. spare gas canisters for automatic suppression system.

The design, manufacture, 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. Compliancy to laws of Ghana and industry standard shall be required. Nothing in this specification shall be construed to relieve the tenderer of his responsibility in this regard.

The system shall be complete in all ways. It shall include:

1. all mechanical and electrical installation,
2. all detection and control equipment,
3. storage cylinders,
4. discharge nozzles, pipe and fittings
5. manual release and abort stations,
6. audible and visual alarm devices,

7. auxiliary devices and controls,
8. shutdowns,
9. alarm interface,
10. advisory signs,
11. functional checkout and testing,
12. training and
13. any other operations necessary for a functional Ghana Fire Service (Head Office) clean agent suppression system, subject to a statement of no objection by the Client.

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

The system shall have 100% filled standby cylinders, (i.e. A reserve bank of Clean Agent filled cylinders with manifold, and automatic/manual change over to any of the two banks after actuation of main cylinders to be provided in each risk area i.e. 100% reserve).

The agent shall be environmentally friendly and shall be and in strict accordance with Kyoto Protocol. The agent shall be derived from gases present in the earth's atmosphere, it exhibits no ozone depleting potential, shall not contribute to global warming, nor shall it contribute unique chemical species with extended atmospheric lifetimes.

The agent shall be a mixture of gases: 52% nitrogen, 40 % argon, and 8% carbon dioxide (IG541, aka Inergen) OR 50% of Nitrogen and 50% Argon (IG55). The gas extinguishes fire by lowering the oxygen content below the level that supports combustion.
The system shall be actuated by detection and control equipment for automatic system operation along with providing local and remote manual operation as needed. Accessories shall be used to provide alarms, ventilation control, door closures, or other auxiliary shutdown of equipment in the data centre.

A system installation and maintenance manual shall be made available prior to acceptance for a statement of no objection by the Client containing information on system components and procedures concerning design, operation, inspection, maintenance and recharge. The Contractor shall supply three sets of instruction manuals detailing all the circuit diagrams, component, specifications, operational instructions, routine and periodical test methods and Frequencies.

Back-up fire suppression system appropriate for and matching the size of the data centres shall also be proposed. (e.g. appropriate quantity of portable extinguishers with agent type suitable for server room operation) for a statement of no objection by the Client.

3.4.7 Data Centre Access Control

Access control system shall be provided for doors to data centres. The system shall contain at least:

- Fingerprint readers
- Electrically operated locks
- Control hardware and software

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. . 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.).

3.6 Maintenance Contract (Optional Provision)

The Contractor shall provide annual maintenance contract for all equipment installed for the duration of 3 year term for consideration by the Client and subject to a statement of no objection. .

3.7 Supply of Power efficient Server Hardware and Software

Reference Documents:
Appendix B: Bill of Materials

The Contractor shall supply power efficiency optimized rack mounted server and storage configurations with the following minimum configuration. The maximum power efficiency shall be paramount due to solar power used for the source for server power (see also Appendix B, BOM):

a) **Standalone application servers (i.e. low spec), 4 (four) units:**
Power efficiency optimized Rack server (e.g. DELL PowerEdge R430 or equivalent):
32GB memory,
Dual Intel® Xeon® E5-2630LV Processor (10 cores),
4x2TB HDD, Raid 10,
Quad 1GB NIC,
Dual hot-plug power supplies

b) **Virtualization host servers (i.e. high-spec), 2 (two) units:**
Power efficiency optimized rack server (e.g. DELL PowerEdge R530, R630 or R730 or equivalent):
128GB memory,
Dual Intel® Xeon® E5-2650L v3 Processors (12 cores),
4x4TB HDD, Raid 10,
Quad 1GB NIC,
Dual hot-plug power supplies

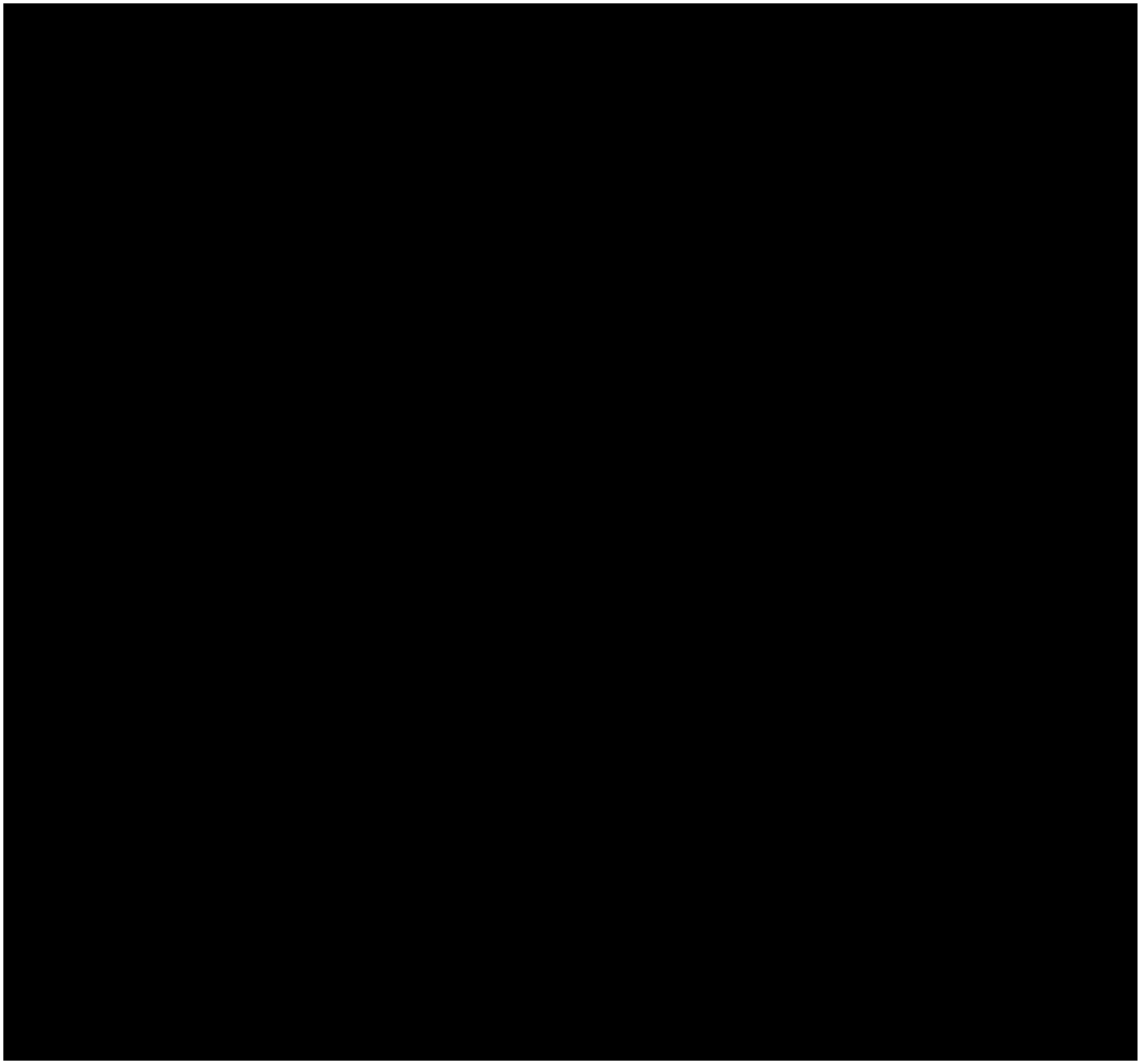
c) **Storage**
Rack mounted iSCSI SAN device with 24 TB storage capacity, (e.g.. Dell EqualLogic PS4100E 24TB SAN or equivalent)

d) **SW Licenses**
VMware vSphere Essentials Plus (includes license for 6 CPU's)

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

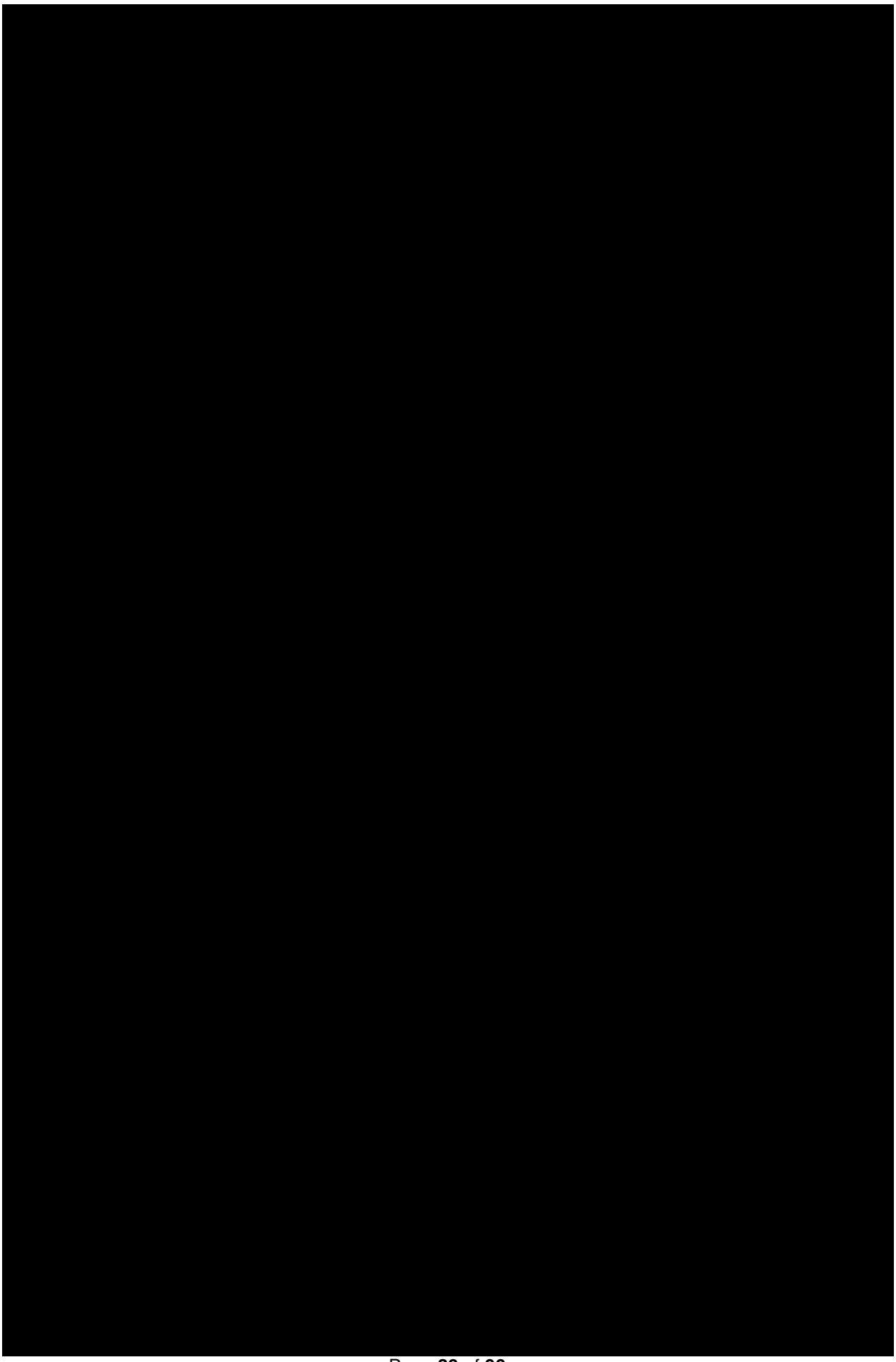
Extracted from proposal of IMPC

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**							
1.2	2		x		**Fire detection and suppression system, clean agent based**	Lot	**1**	1				
1.3	2		x		**Appropriate cost efficient cooling solution for data centre**	Lot	**1**	1				
					Electrical Materials for cooling & UPS System							
					35 mm² x 5 Core Copper Autoflex Copper Cable	units	**60**	60				
					10 mm² x 5 Core Copper Autoflex Copper Cable (100Mtr Coil)	units	**1**	1				
					200A 4 Pole MCCB wth Enclosure	units	**1**	1				
					200A Manually Operated Bypass Isolator	units	**1**	1				
					4 Way MCB Distribution Board	units	**1**	1				
					4 mm² x 3 Core Copper Autoflex Copper Cable (100Mtr Coil)	units	**1**	1				
					2.5 mm² x 3 Core Copper Autoflex Copper Cable (100Mtr Coil)	units	**2**	2				
					50X100mm Trunking	units	**2**	2				
					13A Switched Socket	units	**8**	8				
					3X6 Socket Plate	units	**8**	8				
					AC Switch	units	**2**	2				
2	1	x			**Server room upgrade at RMSC Kumasi (DRC)**							
2.1	2		x		**Construction**	Lot	**1**		1			
2.2	2		x		**Fire detection and suppression system, clean agent based**	Lot	**1**		1			
2.3	2		x		**Cooling solution for data centre**	Lot	**1**		1			
					Electrical Materials for cooling & UPS System							
2.1.1					25 mm² x 5 Core Copper Autoflex Copper Cable	units	**60**		60			
2.1.1					10 mm² x 5 Core Copper Autoflex Copper Cable	units	**30**		30			
2.1.2					4 Way MCB Distribution Board	units	**1**		1			
2.1.3					4 mm² x 3 Core Copper Autoflex Copper Cable	units	**1**		1			
2.1.4					2.5 mm² x 3 Core Copper Autoflex Copper Cable	units	**1**		1			
2 1 5					AC witch	unit	**2**		2			
2.1.6					13A Switched Socket	units	**6**		6			
2.1.8					3X6 Socket Plate	units	**6**		6			
2.2					50X100mm Trunking	units	**3**		3			
2.3					Cable Tray 200mm	units	**3**		3			
3	1	x			**Access control and environmental monitoring system**	sets	**2**	1	1			
3.1	2		x		Fingerprint based access control system to server room	set	**2**	1	1			
4	1	x			**Environmental monitoring system**	sets	**2**	1	1			

item #	Bom level	1	2	3	Description	Unit	TOTAL QTY	FC HO Accra	Kumasi RMSC	Kumasi TIDD	Takoradi TIDD	FC DO
4.1	2		x		Environmental monitoring system + software + hardware	pc	**1**	1				
4.2	2		x		Environmental monitoring sensors and accessorites	set	**1**	1				
4.2.0	2		x		Environmental monitoring sensors and accessorites	set	**1**		1			
4.2.1	3			x	Smoke detector	units	**4**	2	2			
4.2.2	3			x	Humidity sensor	units	**2**	1	1			
4.2.3	3			x	Temperature sensor	units	**20**	12	8			
4.2.4	3			x	Water sensor	units	**7**	4	3			
4.2.5	3			x	Power/current sensor	units	**5**	3	2			
4.2.6	3			x	Voltage sensor	units	**8**	4	4			
4.2.7	3			x	Door open/close sensor (e.g. dry contact)	units	**4**	2	2			
4.2.8	3			x	Airflow sensor	units	**9**	5	4			
4.3	2		x		Video surveillance camera	units	**4**	2	2			
5	1	x			**IT Hardware**							
5.1	2		x		Dell PowerEdge R230 (E3-1240 v5 3.5GHz, 32GB, 2X 600GB 10K SAS)server for Power efficient Server for network management and monitoring system and Cisco FirePOWER virtual management server appliance	units	**1**	1				
	2		x		Vmware vShpere 6.0 Standard	units	**1**	1				
5.2	2		x		Management console / thin client supporting multiple screens	units	**1**	1				
5.3	2		x		Monitoring screens, LCD/IPS, 40+ inches, energy efficient	units	**2**	2				
5.4	2		x		Cabling							
5.4.1	3			x	Cat6 Cabling for WLAN Acces points (305m per box)	Box	**10**					
5.4.2	3			x	Cat6 Patch cables	units	**200**					
5.4.3	3			x	Cat6 RJ45 connectors	pack	**2**					
5.5	2		x		**Firewalls**							
5.5.1	3			x	ASA 5516-X Security Appliance with FirePOWER services, 8GE Data, 1GE Mgmt, AC, 3DES/AES		**3**	2	1			
5.5.2	3			x	ASA 5508-X Security Appliance with FirePOWER services, 8GE Data, 1GE Mgmt, AC, 3DES/AES		**2**			1	1	
5.5.3	3			x	Cisco ASA 5516-X TAMC Firepower services subscription, 5Y		**2**	1	1			
5.5.4	3			x	Cisco ASA 5508-X TAMC Firepower services subscription, 5Y		**2**			1	1	
5.5.5	3			x	SmartNet support for Cisco ASA 5516-X, 5Y subscription		**2**					
5.5.6	3			x	SmartNet support for Cisco ASA 5508-X, 5Y subscription		**2**					
5.5.7	3			x	Cisco FireSIGHT Management Center,(VMWare) for 10 devices		**1**	1				
5.5.8	3			x	SW APP SUPP + UPGR Cisco FireSIGHT Mana		**1**	1				
5.6	2		x		**Wi-Fi Access Points**							
5.6.1	3			x	Cisco Aironet 2700 series, indoor with external antennas	units	**40**	20	8	6	6	
5.6.2	3			x	Cisco Aironet external antennas	sets	**40**	20	8	6	6	
5.6.3	3			x	SmartNet 5x8 service contract for Access points, 5Y	units	**40**					
5.7	**2**		x		**WLAN Controllers**							
5.7.1	3			x	Cisco 2504 series Wireless controller 15 access points	units	**5**	2	1	1	**1**	

item #	Bom level	1	2	3	Description	Unit	TOTAL QTY	FC HO Accra	Kumasi RMSC	Kumasi TIDD	Takoradi TIDD	FC DO
5.7.2	3			x	Rack mount adapter kit for 2504 wireless controller	units	**8**	3	2	1	2	
5.7.3	3			x	Cisco 2504 series Wireless controller HA unit	units	**3**	1	1		1	
5.7.4	3			x	SmartNet 5x8 service contract for Wireless controllers, 5Y	units	**8**					
5.8	**2**		x		**PoE+ Switches**							
5.8.1	3		x		Layer 3 Switches: Cisco SG300 series PoE+ switches, 48 ports	units	**6**	2	2	1	1	
5.9	**2**		x		**Routers and modems**							
5.9.1	3			x	Small Business Wi-Fi VPN router Cisco RV180W, RV130W or similar		**38**					38
5.9.2	3			x	Huawei E5172 Huawei E5172s-22 3g/4g modem / Router		**38**					38
5.9.3	3			x	Directional high-gain 3G/4G external antenna		**38**					38
5.9.4	3			x	60 foot coax cable with suitable connectors		**38**					38
5.9.5	3			x	Mountring structures (wall mountingwith pole expected)		**38**					38
5.1	2		x		**Computing devices for FC branch offices**							
5.10.1	3			X	HP 20C007NH Non-Touch All-in-One	pc	**112**					112
5.10.2	3			x	Targus Defcon Combination Security Lock Cable	pc	**102**					102
5.11	2		x		**Web (content) proxies**							
5.11.1	3			x	5600 Next Generation Threat Prevention Appliance	pc	**1**	1				
5.11.2	3			x	Open source web proxy + appropriate power efficient PC/server hardware	pc	**3**		1	1	1	
6	**1**				**Management software and hardware**							
6.1	**2**				**Network, systems and environmental management and monitoring software suite (3 Year License)**							
6.1.1	3			x	SolarWinds Network management software		**1**	1				
6.1.1.1					Network Performance Monitor (NPM)							
6.1.1.2					Network Configuration Manager (NCM)							
6.1.1.3					NetFlow Traffic Analyzer Module (NTA)							
6.1.1.4					Network Topology Mapper (NTM)							
6.1.1.5					Log & Event Manager (LEM)							
6.1.1.6					Engineer's Toolset							
6.1.1.7					Server and application management							
6.1.1.8					Virtualization management							
6.1.2	3			x	ManageEngine Network Management software		**1**	1				
8	**1**	**x**			**Power efficient Rackmount Server Hardware**							
8.1	2		x		Dell PowerEdge R430 Server	units	**4**	4				
					Power efficiency optimized Rack server (DELL PowerEdge R430), 32GB mem, Dual Intel® Xeon® E5-2650L V4 Processor (14 cores), 4x2TB HDD, Raid 10, Quad 1GB NIC, Dual hot-plug power supplies		**4**	4				
					Microsoft Windows Server 2016		**4**	4				
					Microsoft Windows Server 2016 User CALs		**20**	4				
8.2	2		x		Dell PowerEdge R530 Server	units	**2**	2				

item #	Bom level	1	2	3	Description	Unit	TOTAL QTY	FC HO Accra	Kumasi RMSC	Kumasi TIDD	Takoradi TIDD	FC DO
					Power efficiency optimized rack server (DELL PowerEdge R530), 128GB mem, Dual Intel® Xeon® E5-2650L v4 Processors (14 cores), 4x4TB HDD, Raid 10, Quad 1GB NIC, Dual hot-plug power supplies		**2**	2				
					Microsoft Windows Server 2016		**2**	2				
					Microsoft Windows Server 2016 User CALs		**10**	10				
8.3	2		x		Storage							
8.3.1	3			x	Dell Compellent SCv2020	units	**1**	1				
8.4	2		x		SW Licenses							
8.4.1	3			x	Vmware vSphere Standard	units	**1**	1				



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)	[redacted]
Equipment	
Rack 1	
Freestanding servers	
Rack 2	
Rack 3	
Rack 3 UPS (APC)	
Other UPS's	
2nd erver 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				
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	3	[redacted]			
Dell PowerEdge R510	1				
Dell PowerEdge R710	1				
Cisco 2960 Switch	1				
Huawei Switch	1				
KVM Dell	1				
Cisco 2900 Router	1				
Cisco ASA5520	1				
D-Link DES 1024D	3				
UPS	6				
TOTAL Existing Server Room Equipment					
Cooling	3				
Total server room cooling					
Cisco 2901 integrated services router	1				
Dell Equallogic PS6110x	1				
Dell KVM 1082DS	1				
Dell PowerEdge M610 (9pc)	1				
Dell PowerEdge M910 (1pc)	1				
Dell PowerVault TL2000	1				
Dell PowerConnect M8024-k (2pc)	1				
Dell PowerConnect 6220 FI (2 pc)	1				
Cisco Catalyst 2960G-28	1				
Total for GWTS DRS Servers					
APC Symmetra LX 12 kVA (typical power factor 0.9) (6 min runtime), charging time 8 hours	1				
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 procurement 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, procurement and construction 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
4	Review and Approve PV system detailed design, PV array location/mounting and minor civil works designs	•		
5	Procure PV Components and Materials		•	
6	Conduct Quality Assurance on Selected PV Components		•	

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)

3.3 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 procured.

3

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.

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.

1. All Systems shall incorporate the following components:
    i. PV Panels with complete mounting system
    ii. Battery Bank mounted in suitable racks with fused disconnector
    iii. Battery Inverters with battery management system and suitable to fulfil system energy management requirements
    iv. Charge Controllers and/or Grid-Interactive Inverters (depending on coupling)
    v. Remote Monitoring System (data transfer via LAN, irradiance sensor)
    vi. Complete system wiring with adequate cross-sections, connectors, fuses and breakers
    vii. Earthing System and Ground Fault ProtectionSurge protection devices (type 2)
    viii. Power Distribution Panels (PDPs)
    ix. Load limiting devices

3.3.3 Procurement of System Components

The Contractor will be responsible for the procurement of all PV components and it is critical that the Contractor identifies long-lead components and manages all procurements to meet the timelines. The Contractor shall prepare and submit for review to the Client a **PV Component Procurement Plan** detailing the expected timelines for procurement of all key components. The Plan shall address delivery, inspections, clearance at Ghanaian port, inland transport, storage and delivery to Sites.

The Contractor shall ensure the quality of manufacturing for all of the components purchased for the installation and construction of the works. The Contractor shall be responsible for arranging and managing the following, paying special attention to the quality assurance tests for PV panels and for the solar batteries:

1. Pre-shipment inspections
2. Inspections on delivery

3.3.5 PV Panels

The PV panels for the Systems shall be either Monocrystalline or Polycrystalline types. The Contractor shall justify their choice of panel(s) by balancing the panel unit cost; associated System costs (such as panel mounting structures and electrical balance of system); and panel quality.
The panel(s) supplied by the Contractor shall be manufactured by a company listed as Tier 1 on the Bloomberg New Energy Finance PV Module for the last 2 quarters in succession.
The PV panels shall also be designed and manufactured in accordance with the quality standards and specifications given in Appendix C. The Contractor shall provide copies of all certifications listed in the technical specification and shall provide documented evidence that the panel manufacturer(s) comply with the Appenix C requirements.

3.3.6 Energy Storage Systems (ESS)

The batteries supplied by the Contractor shall be suitable for solar applications and have the following basic characteristics:

1. Performance: Minimum of 3000 cycles at 50% DOD at 25°C, equivalent to a life time of at least 10 years
2. Resilience to occasional deeper discharge with an 80% DOD limit.
3. Resilience to frequent times of partial charging/discharging/SOC

For Sites 1 to 4, the Contractor may provide advanced lead-acid (OPzS or OPzV types) or Lithium-Ion energy storage systems (ESS). OPzS batteries, if offered, shall include gas recombiner plugs and an electrolyte circulation system.

For the District Office Sites (5 to 38) advanced lead-acid OPzV batteries are preferred.
All batteries supplied shall be certified by the manufacturer as compliant with IEC 61427 (Secondary cells and batteries for photovolataic energy systems (PVES)-General requirements and test methods).

3.3.7

3.3.8 Electrical Cabling

The System shall utilise cabling meeting the following requirements:

- UV-resistant, double-insulated cables for solar array wiring and any other cabling which shall run outdoors and above ground.
- Double-insulated cables for battery wiring at least up to the main battery fused disconnect.

3.3.9

3.3.10 Remote Monitoring Systems (RMS)

All Systems at all Sites shall be monitored with Remote Monitoring Systems (RMS) and the RMS shall be managed through an online portal. The RMSs shall be capable of transmitting data via LAN connections.
At minimum, the RMS shall monitor the following parameters at intervals of 5 minutes or less:

Batteries (for every cluster/string of batteries):

- State of charge (SOC)
- Voltage and current
- Battery temperature

The Contractor shall agree with the battery manufacturer (and document the agreement in writing) the battery monitoring parameters and monitoring intervals required to ensure that sufficient data is available to support any warranty claims against faulty battery cells.

Power and Panels:

- Power output at the end-user connection
- Power output of the solar panels (either from the charge controllers or the grid-interactive inverters, depending on the system coupling)
- Solar irradiance
- Ambient temperature
- Solar panel temperature (measured at the back of one panel per each physically separated PV array)

3.4 Mandatory Spare Parts

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

- **PV Panels:** 3% of the total installed quantity of panels

4

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 Di trict Office (x 34 office)	
	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.3 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.4 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.5 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.6 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. 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.

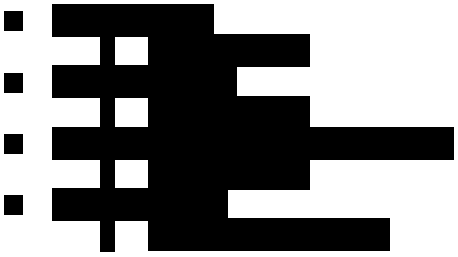
The storage system shall be designed according to the following:

- 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:

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.



Annex 3- Warranty Statement

Friday, March 17, 2017

Warranty Statement

Item	Description	Manufacturer Warranty
[redacted]		

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

Location of IPMC Authorized Service Center: (Authorized service center for HP, IBM,Dell, Epson)

[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.

[redacted]

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				
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]
Cost of Materials	
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]
Cost of Materials	
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	

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

[redacted]

	(Solar and IT combined)	
1	Cost of Materials (Solar + IT)	[redacted]
2	Cost of Freight	
3	Cost of Insurance	
4	**CIF 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**	
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**	
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 6

Proposal for Quality Assurance – Design Review

Annex 6 – PROPOSAL FOR PROJECT MANAGEMENT AND OVERSIGHT

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 Quality Assurance (QA) roles.

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

1.1. Quality Assurance

1.1.1. 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:

- **Detailed design review:** The full detailed design will be reviewed for 2 of the four large Solar PV and Energy Storage systems (Accra FCHQ, and Kumasi RMSC) and 1 of the small systems. The contractor should take the feedback from these reviews and apply them to the rest of their designs for the large and small systems as it is anticipated that they will largely be identical. AECOM has only allowed for providing one set of comments on the design review and one clarification call with the contractor if needed.

1.1.2. IT

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

- **Detailed design review:** The full detailed design will be reviewed of the IT systems associated with 2 of the large sites and 1 of the small sites, including:
  - Data Centre / Server Room layout
  - Cabinet Layouts
  - Bill of Materials
  - Infrastructure Schematics
  - Network Topology Design

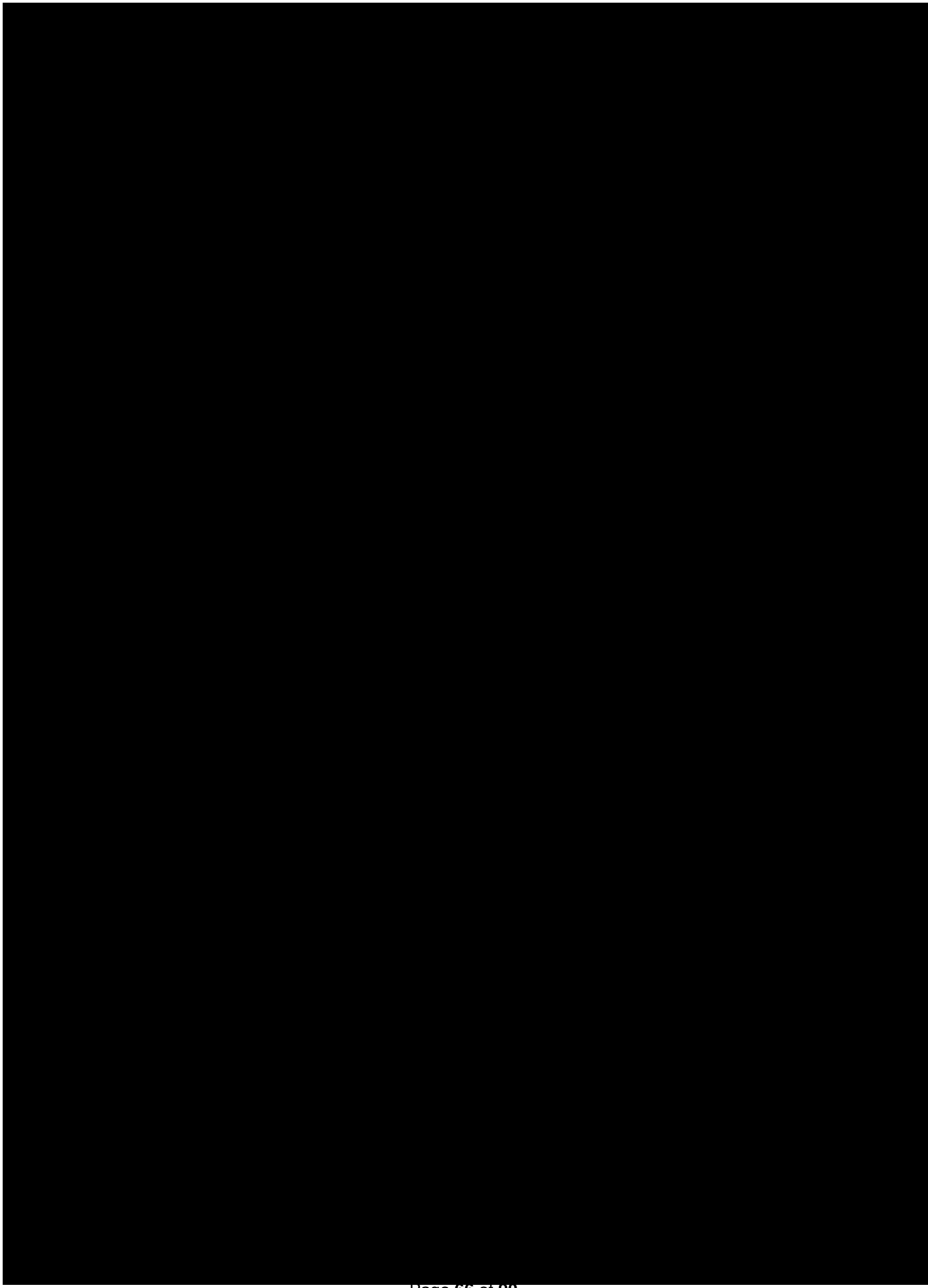
  The contractor should take the feedback from these reviews and apply them to the rest of their designs for the large and small systems as it is anticipated that they will largely be identical. AECOM has only allowed for providing one set of comments on the design review and one clarification call with the contractor if needed.

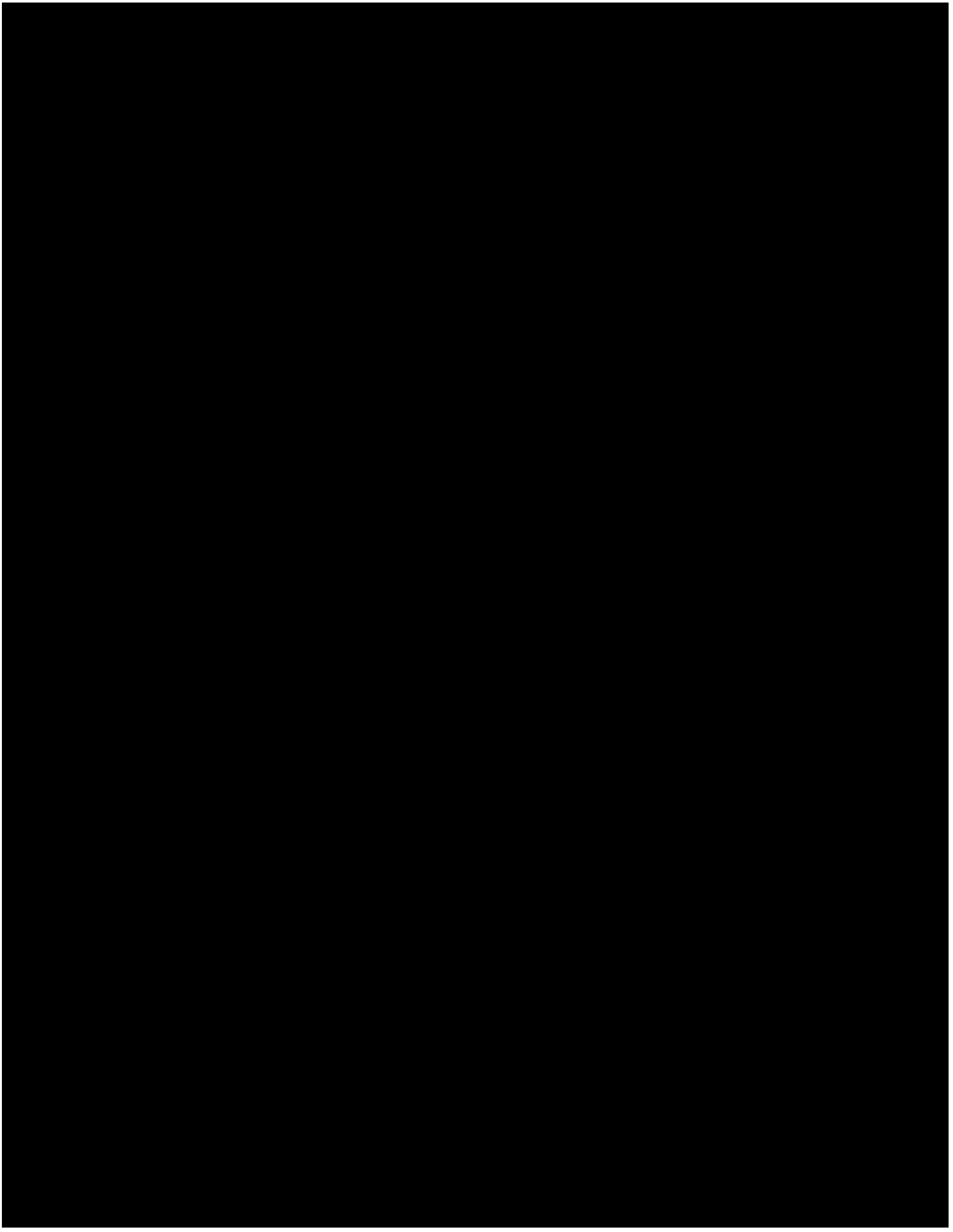
The proposed Fee excluding VAT to undertake this work is £106,425.00. VAT. This is broken down as follows:

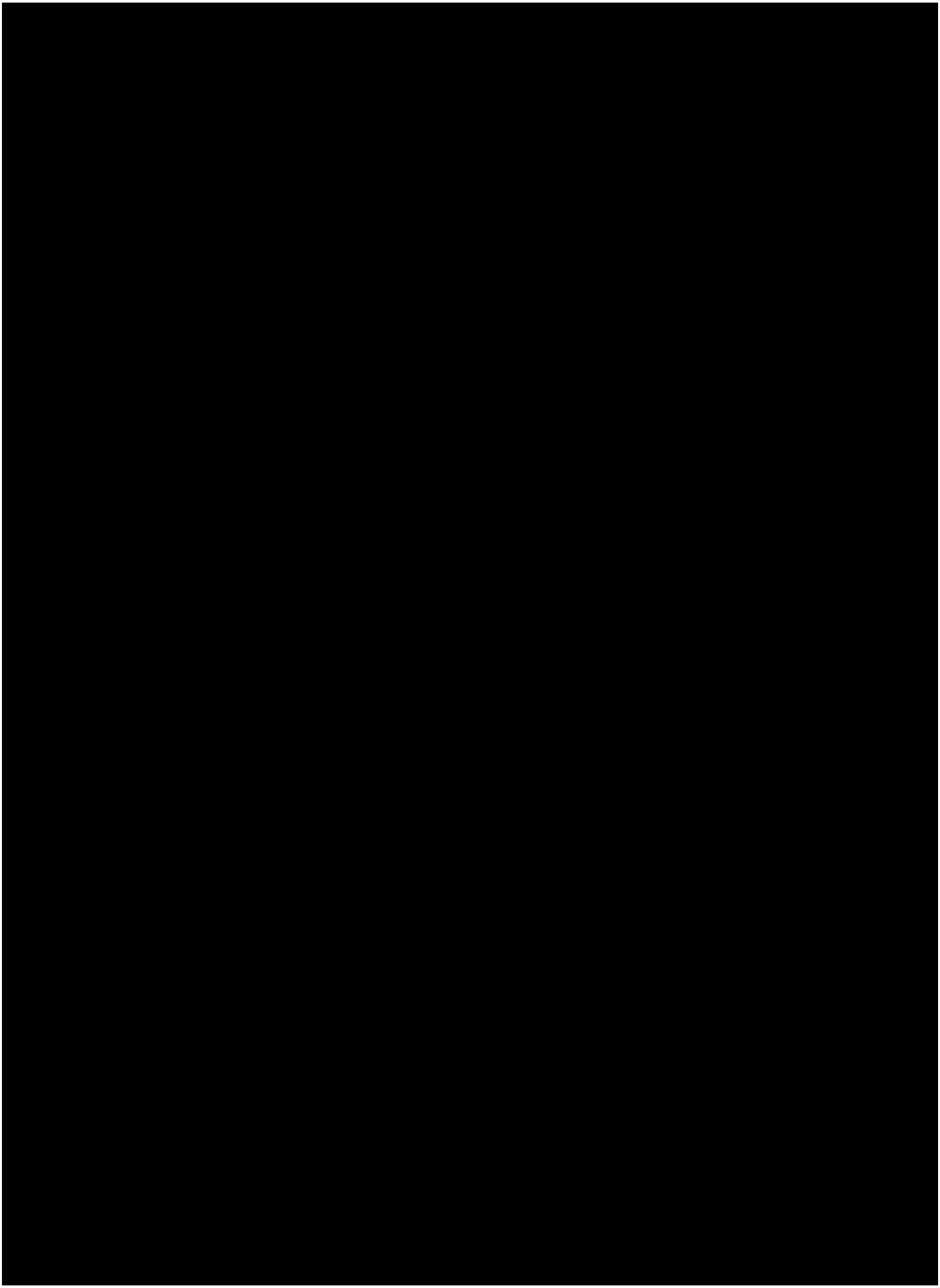
FEES							
	Activity	**Resource**	**Description**	**Role / Grade**	**Days**	**Unit Rate (GBP)**	**Total (GBP)**
1	Remote/In-country procurement advice	[redacted]	Direct & Oversee entire project, facilitate start up meeting and project close out meeting and provide final reporting to client	Technical Assistance Lead	4	[redacted]	[redacted]
2	Solar QA		Liaise with GFC, manage DPSA team to deliver output	Solar QA Expert	6		
3	IT QA		Liaise with GFC and DPSA team, in-country	IT QA Expert	4		
4	Project Management Oversight & Solar QA Reviewer		Project Manager & IT Expert	Project Manager	4		
5	IT QA Review		IT QA review	IT QA Principal	4		
6	Solar QA Sign-off		Solar QA review & sign-off	Solar QA Principal	3		
7	IT QA Sign-off		IT QA Sign-off	IT QA Principal	2		
8	In-country project administration and management		Project Admin, equipment inspection, documentation and site visits reporting to the PM	Project Coordinator (in-country)	15		
9						**Total FEES**	**£20,475.00**
10						Expenses (see table below)	£11,200.00

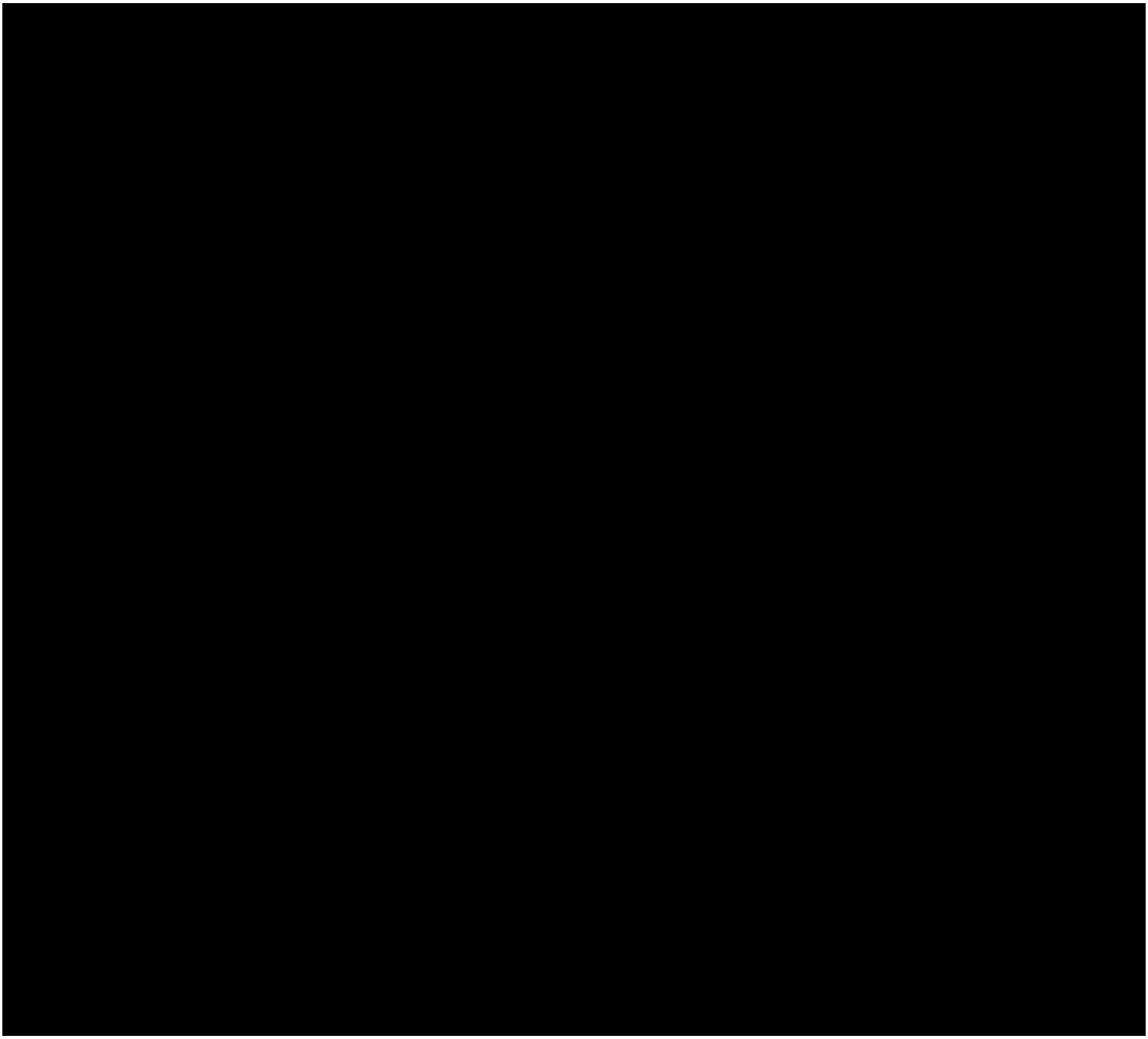
11	**Grand Total Fees and Expenses**	**£31,675.00**

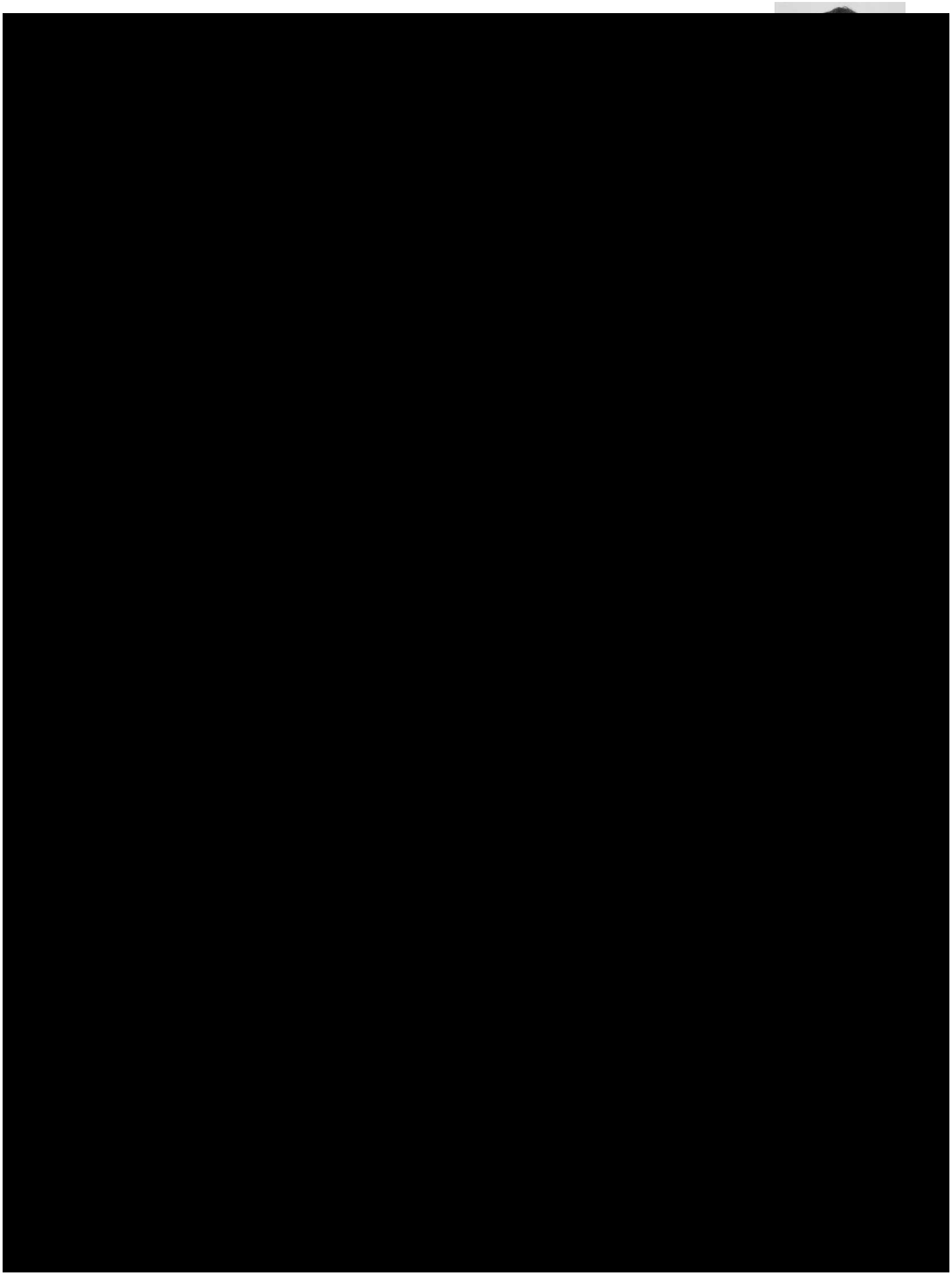
Expense Type		Notes	Estimated QTY	Estimated Cost	Total Cost
QA and Project Oversight					
1	International air travel and transfers	IT & Solar QA, PMO + Proc Advisory Lead	[redacted]		
2	Hotel accommodation and local expenses	36 days in-country			
		Total expenses			**£11,20000**

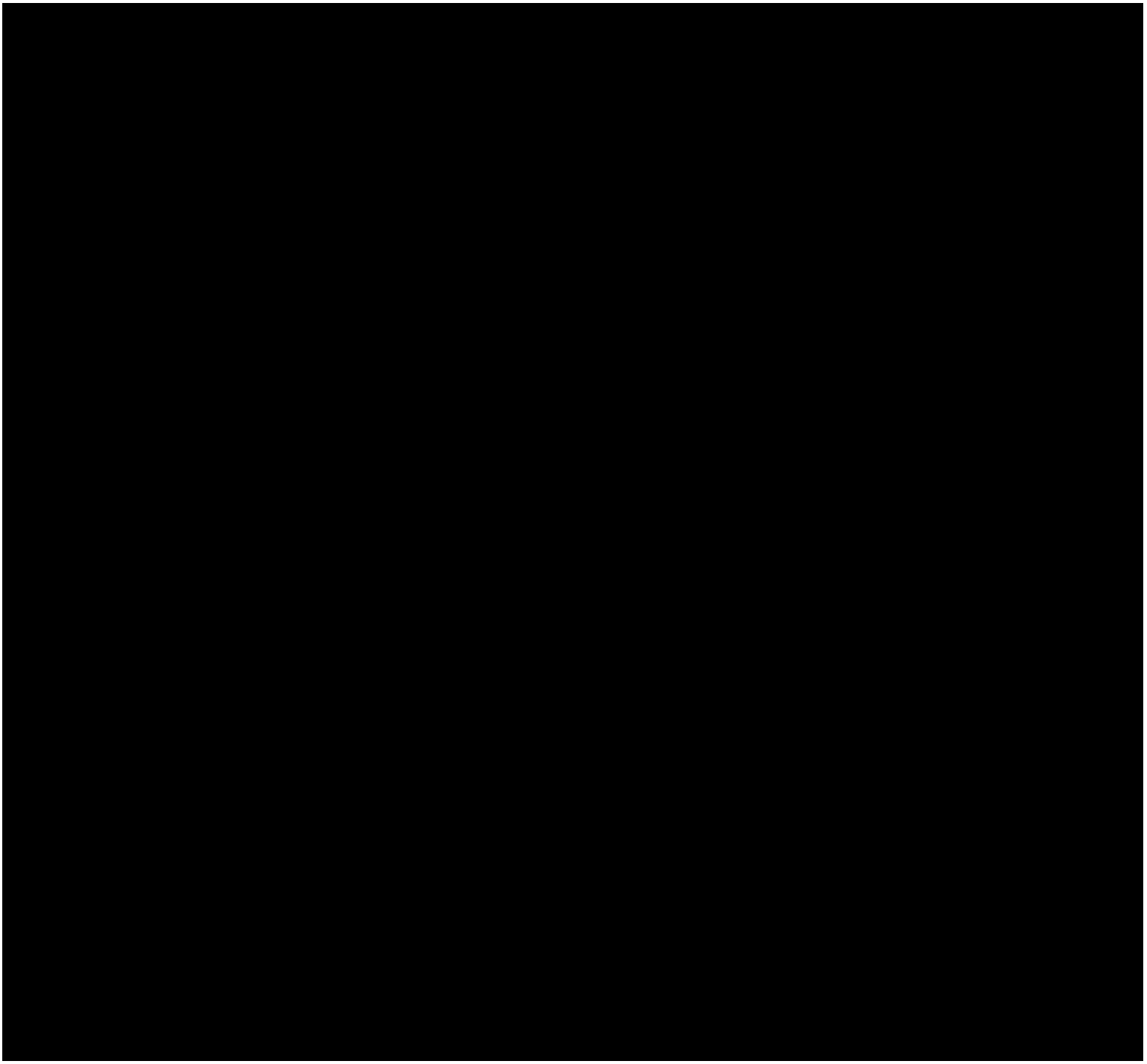


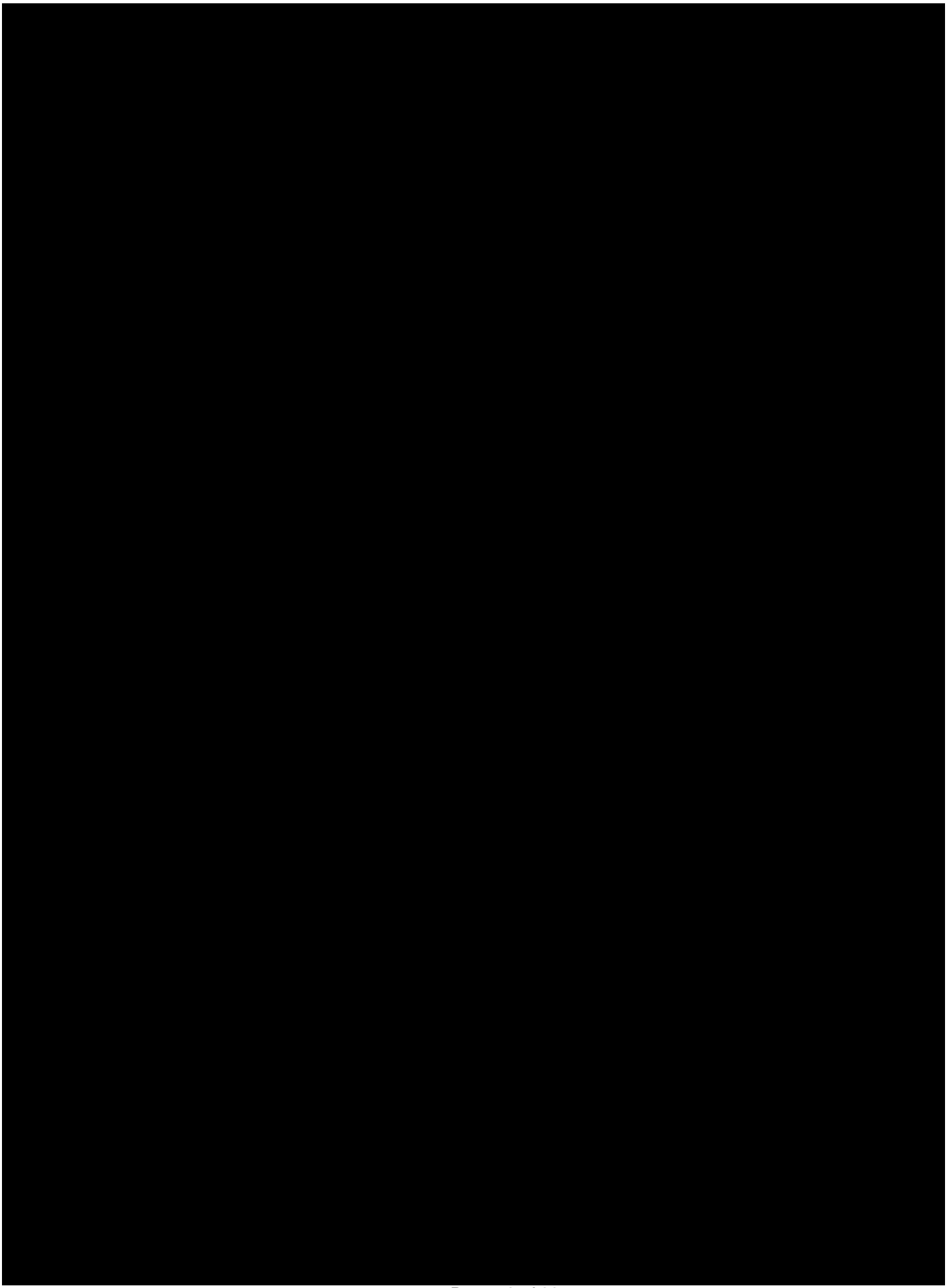


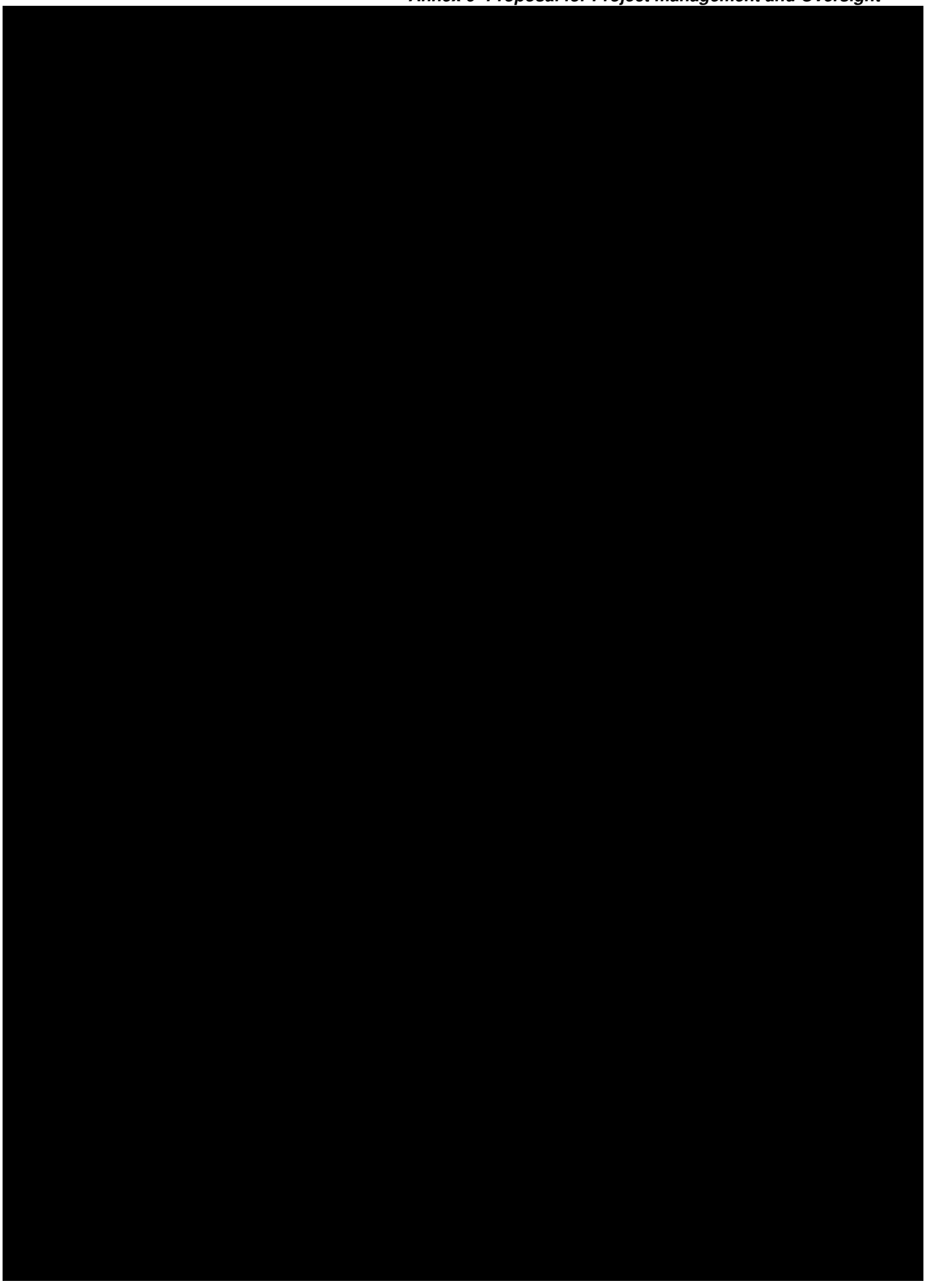


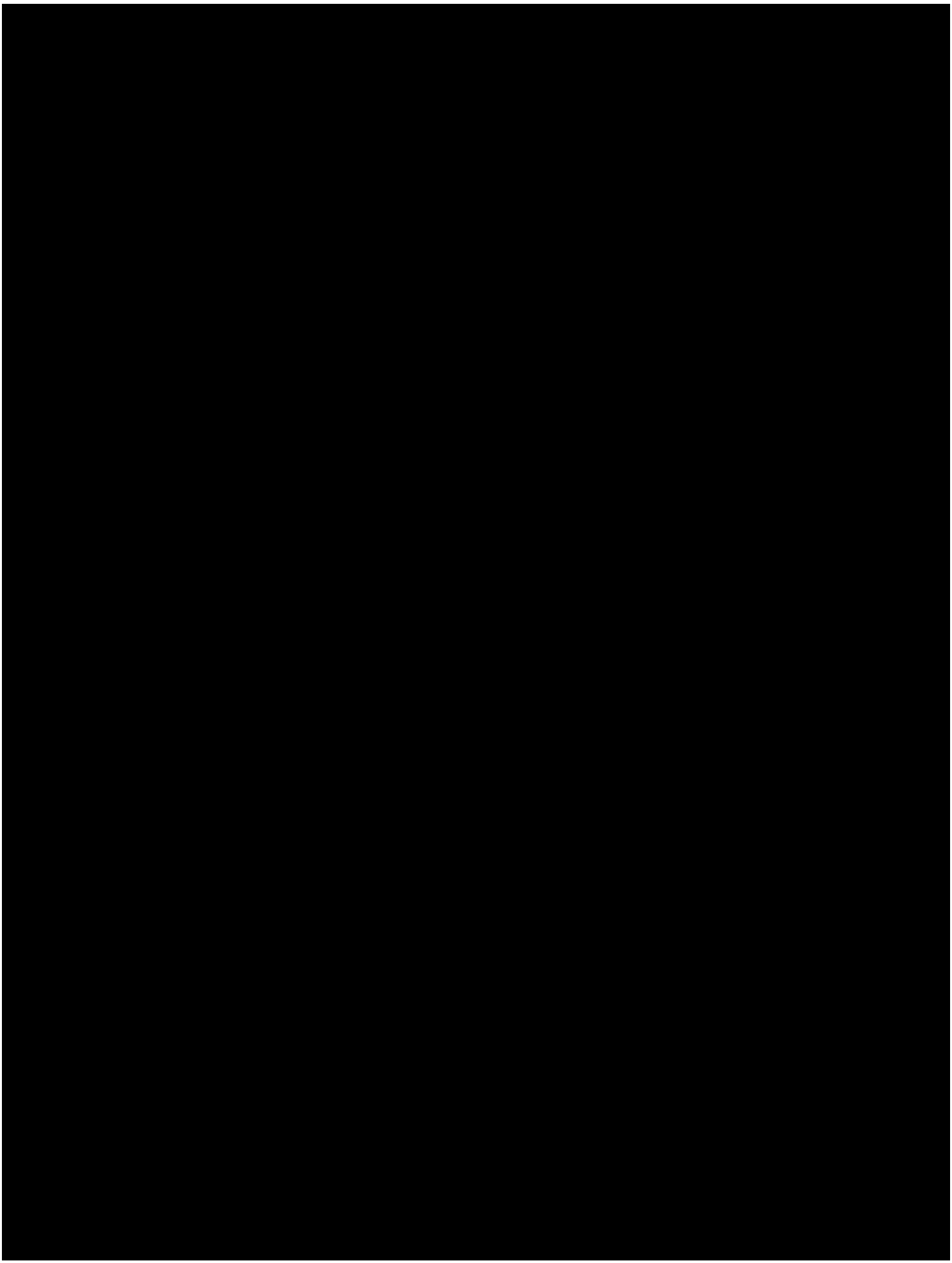


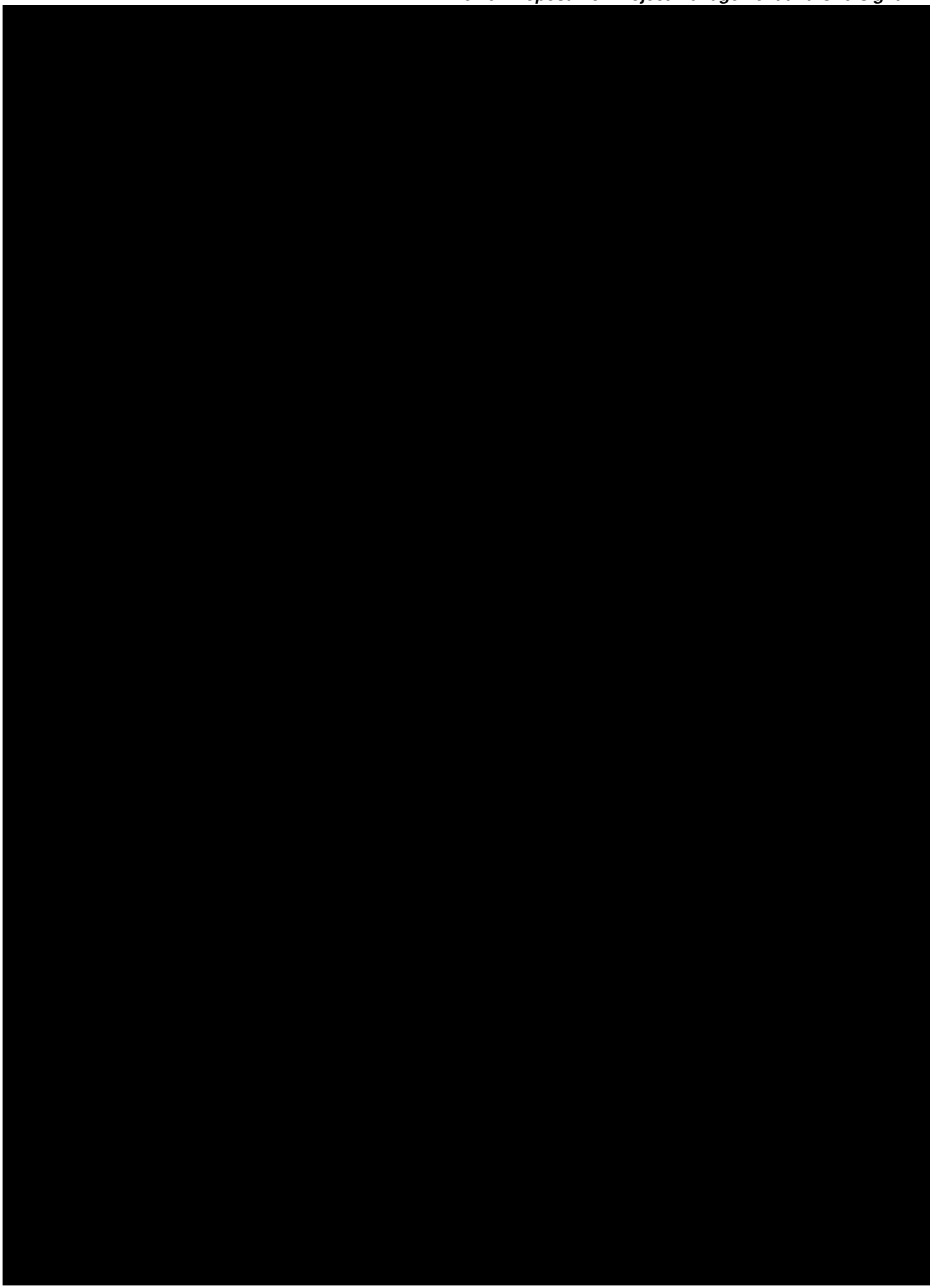


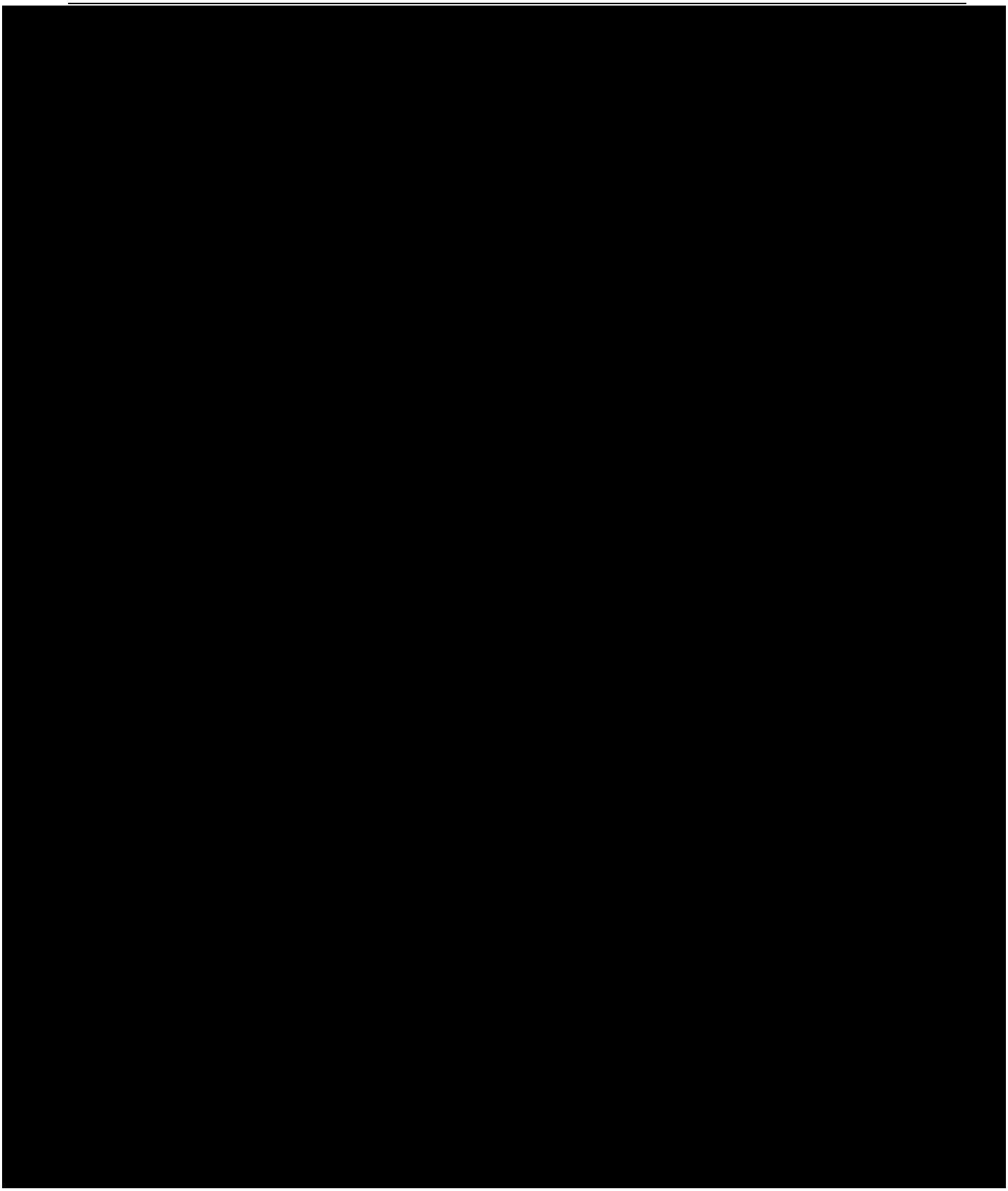












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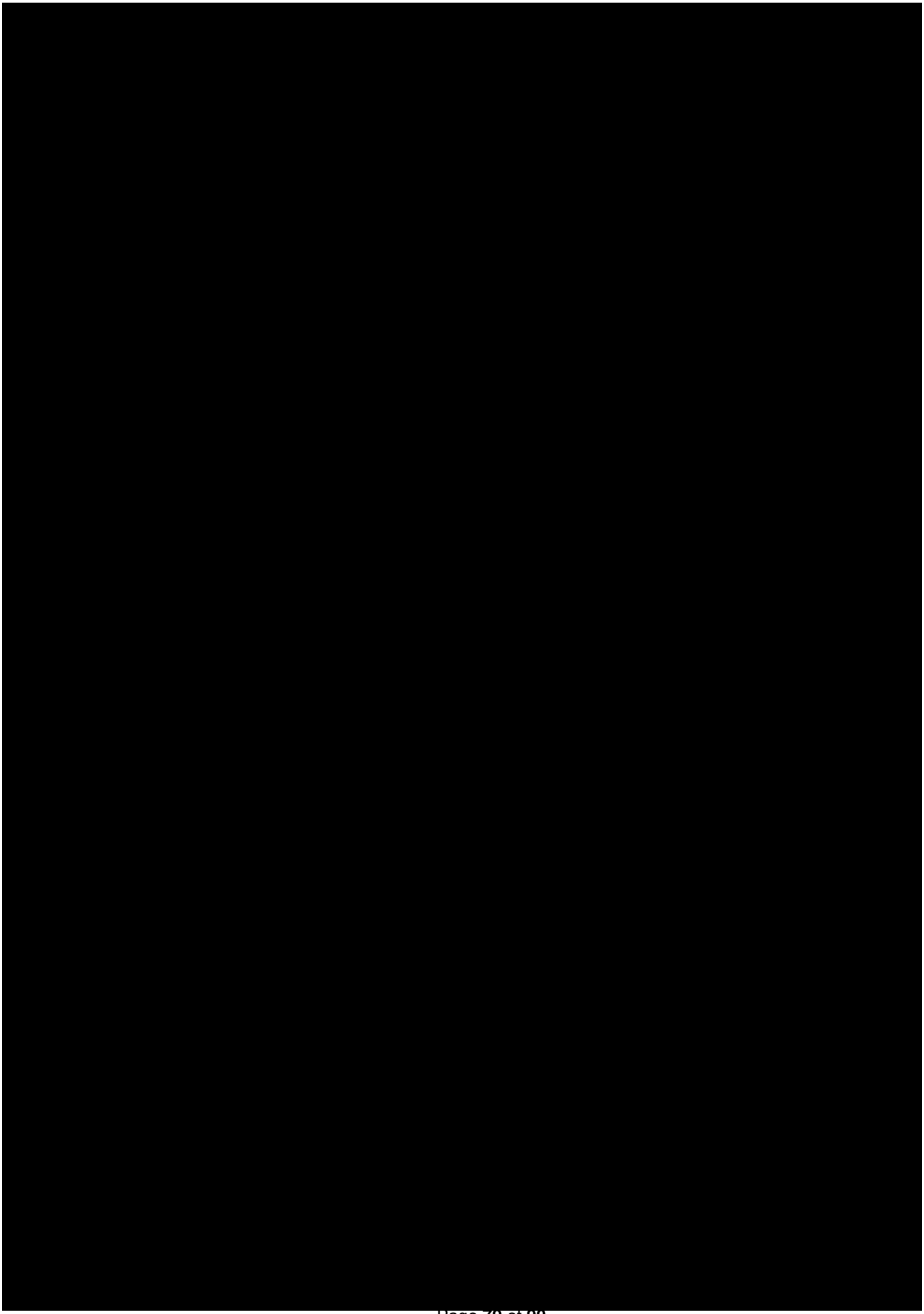

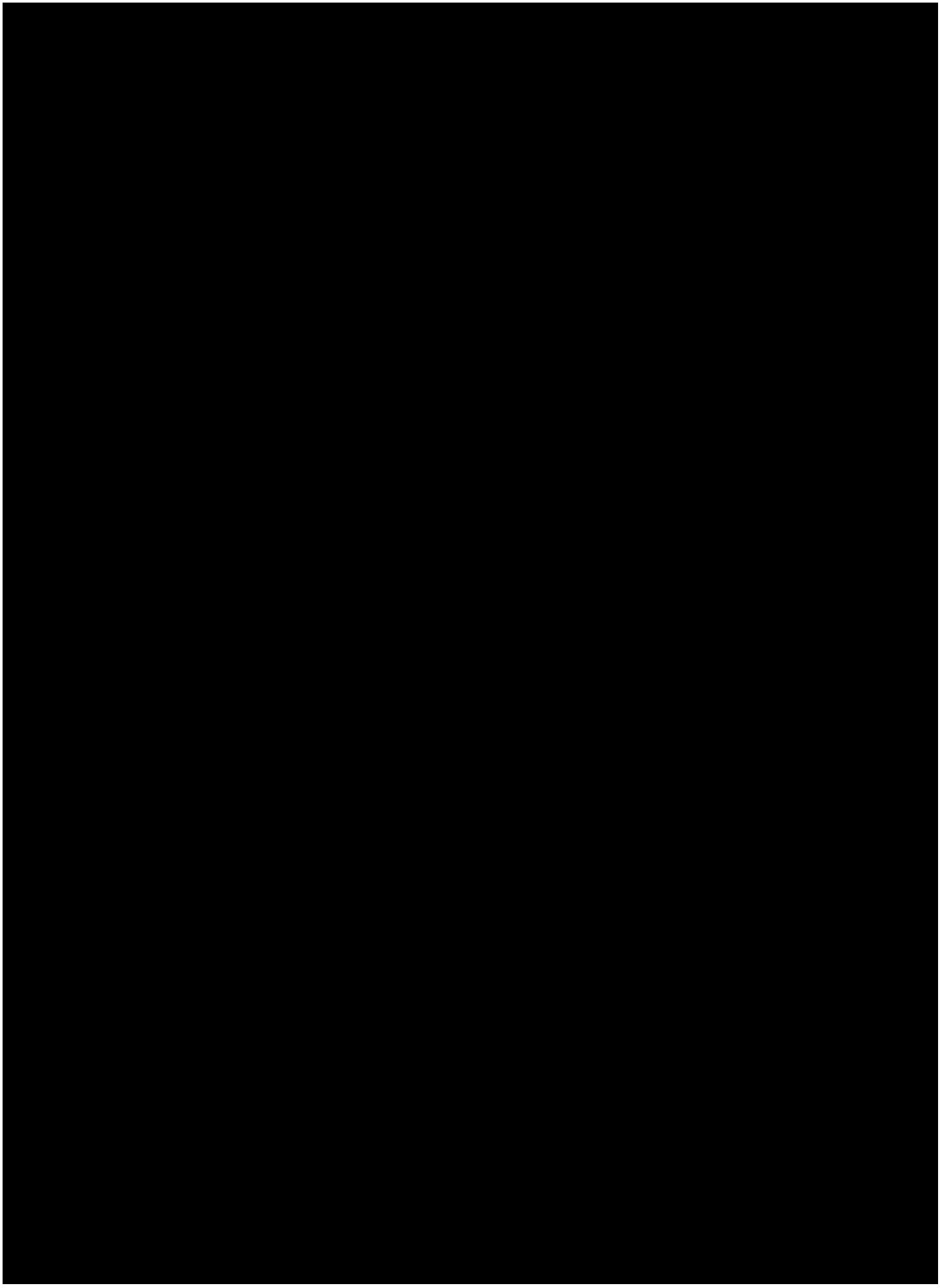

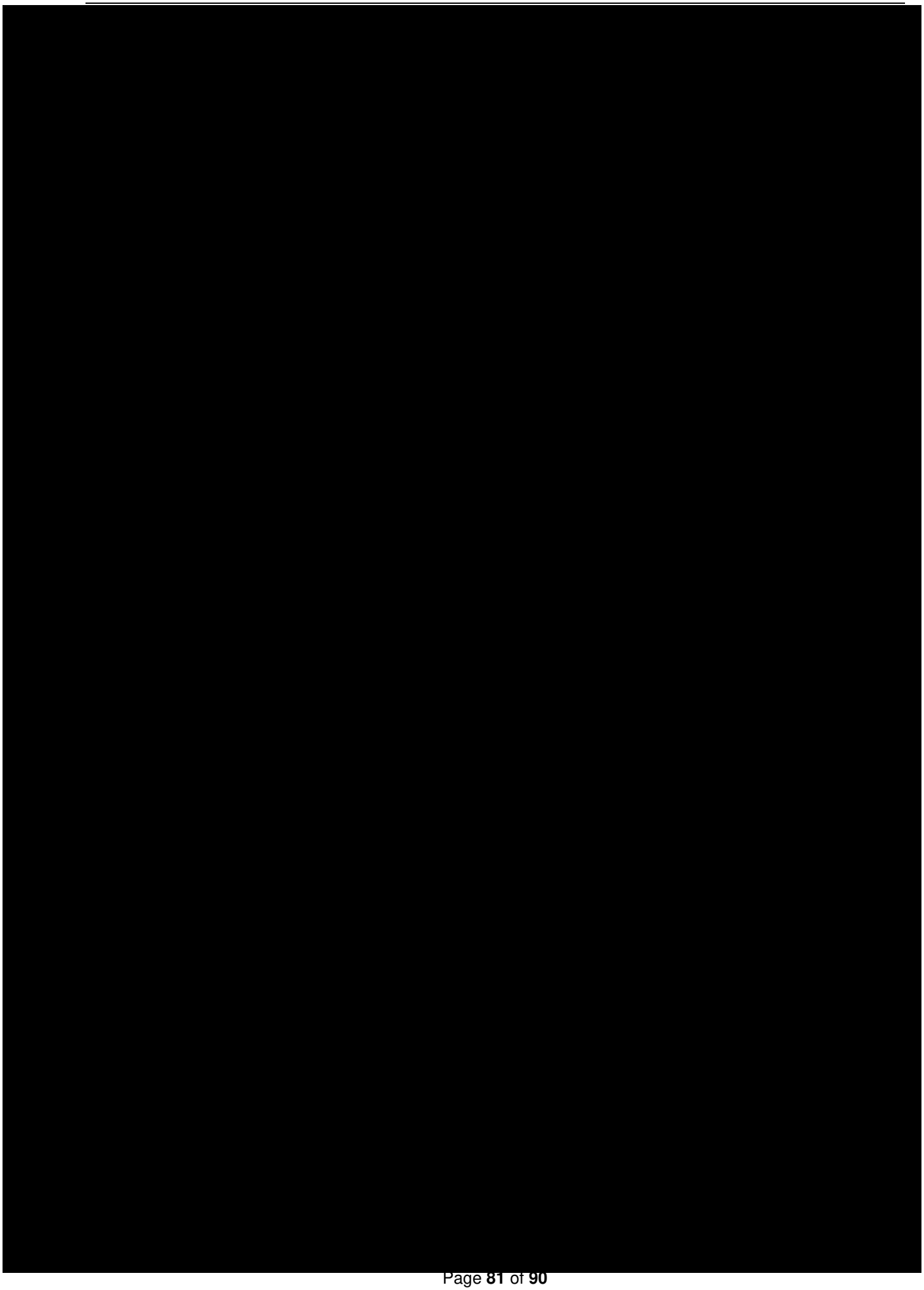

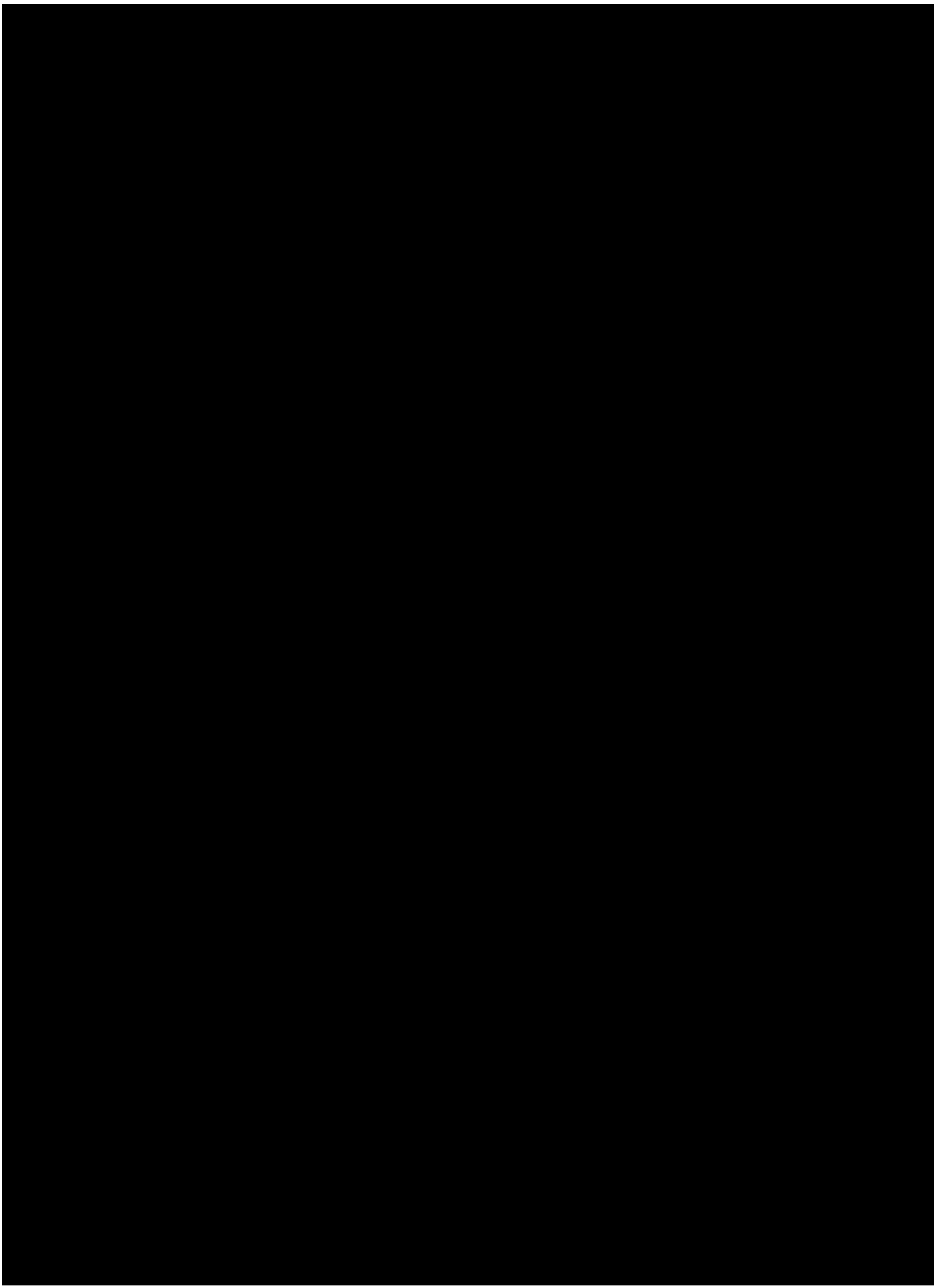

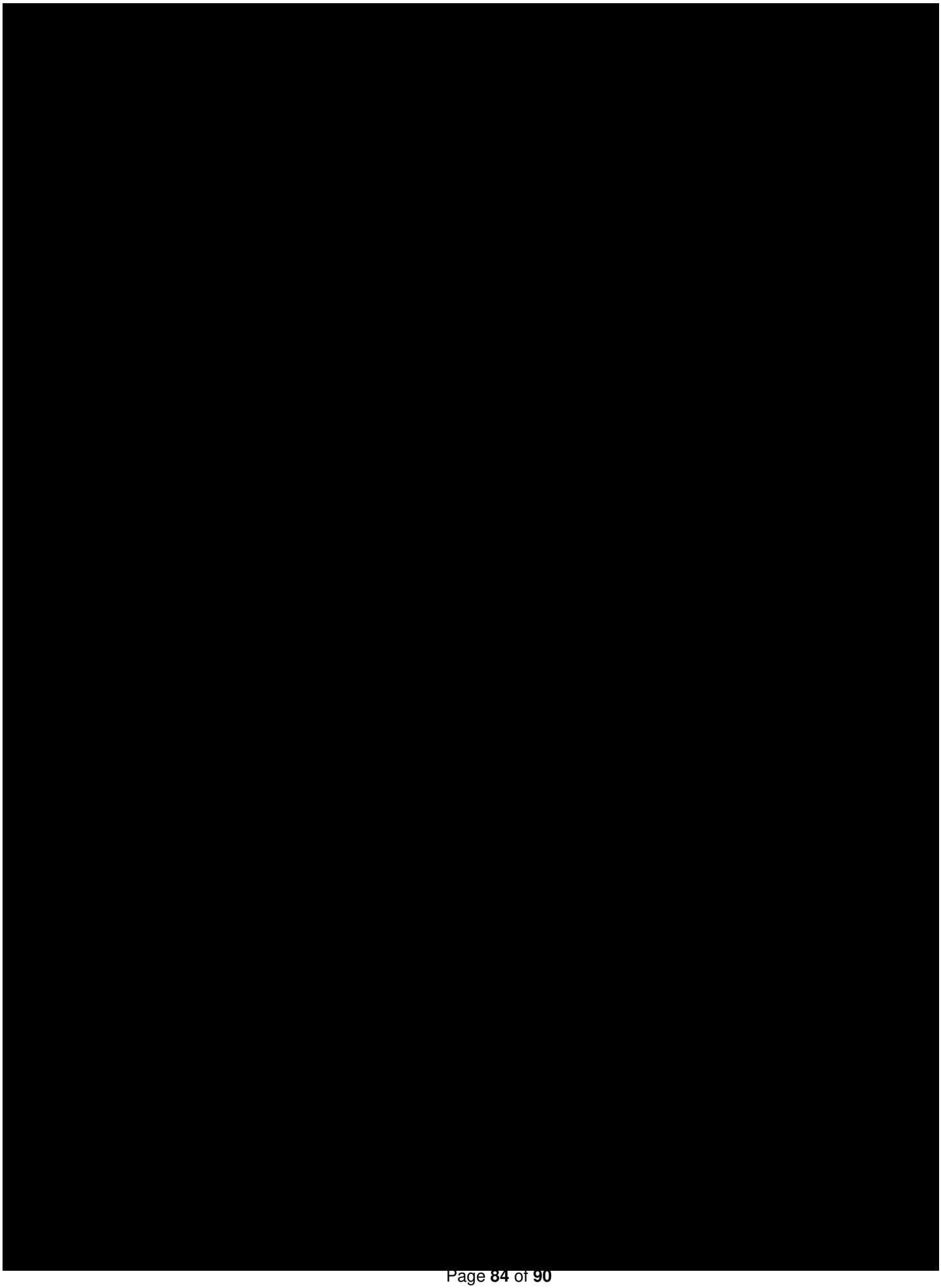

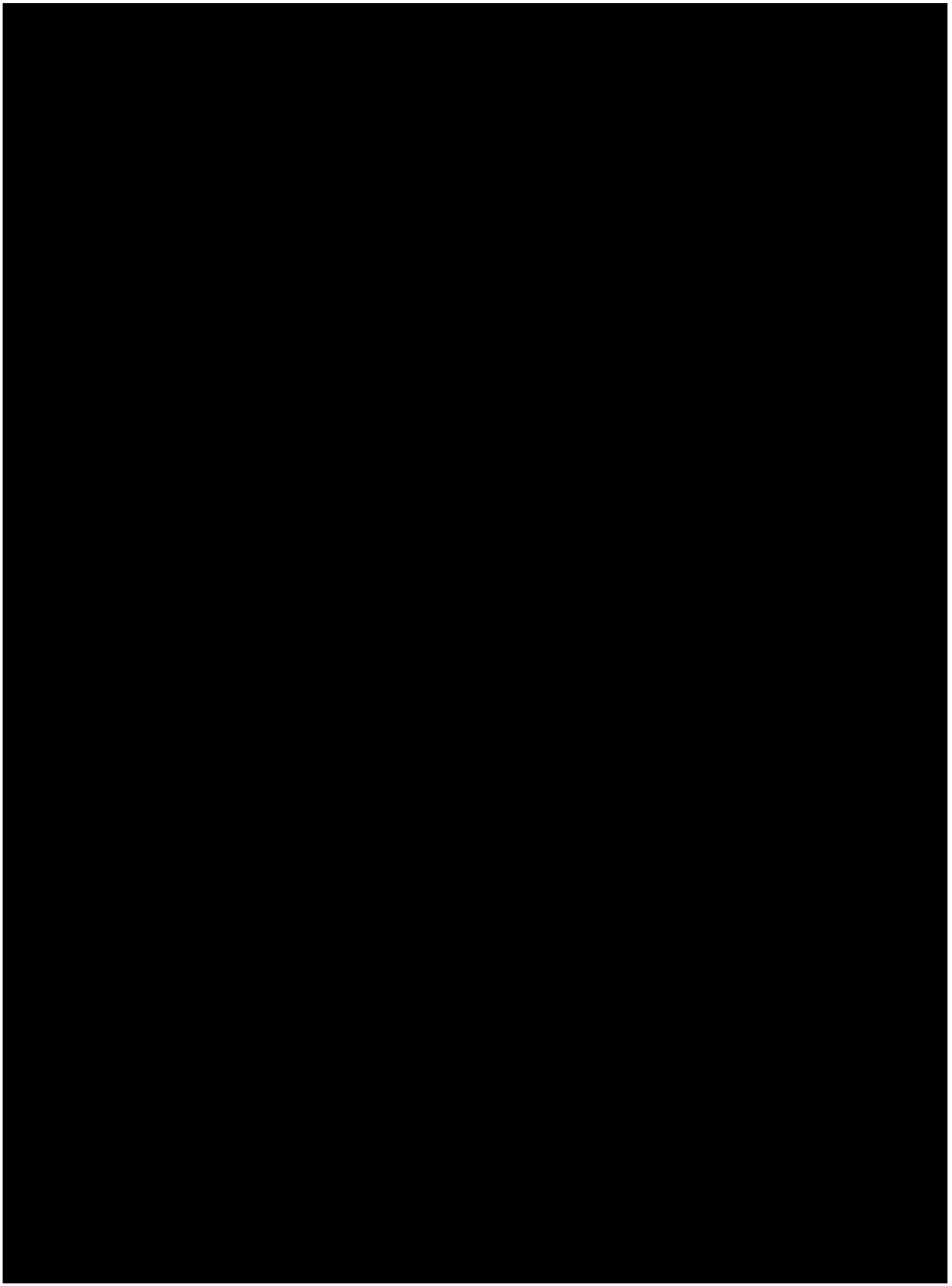

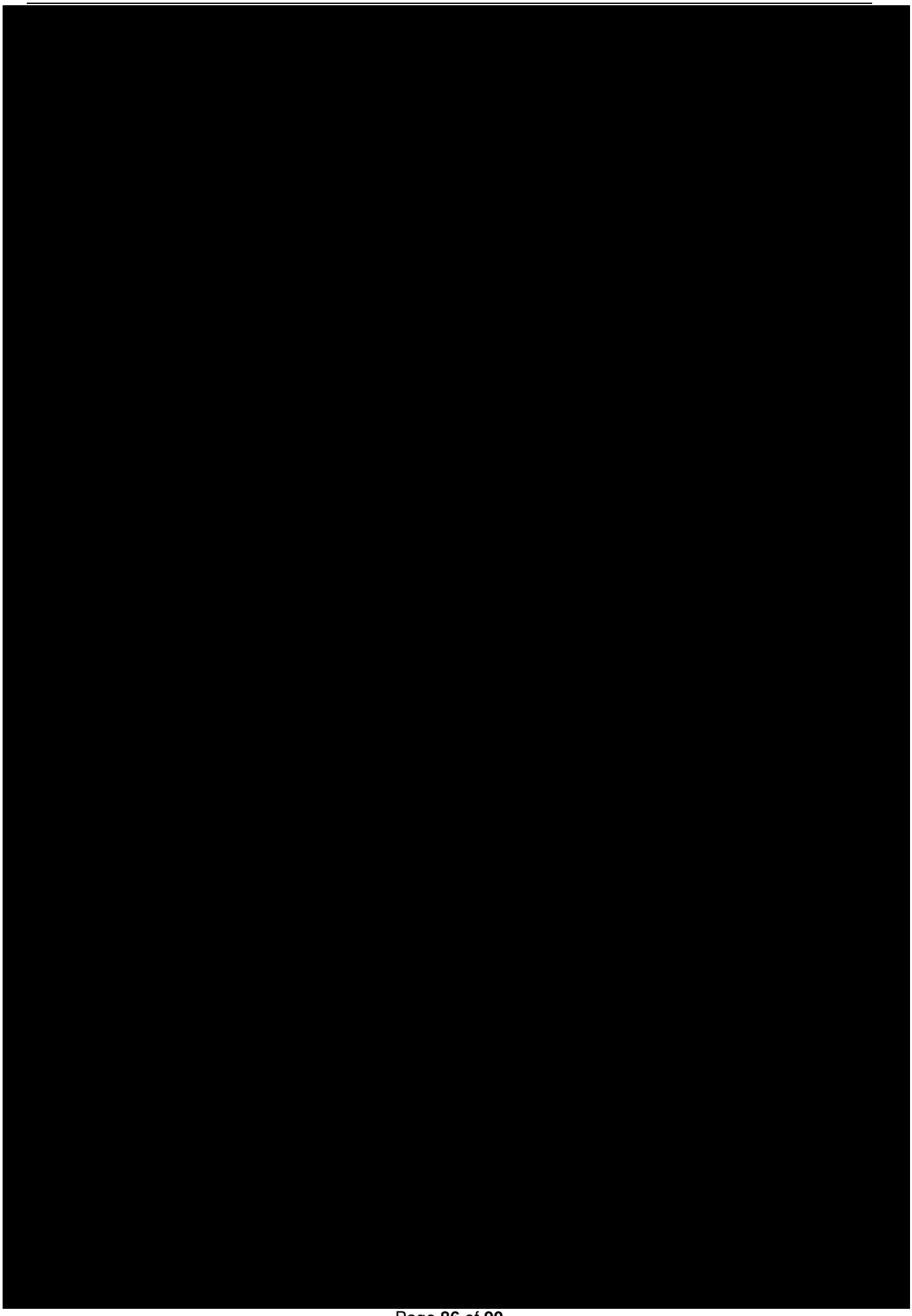

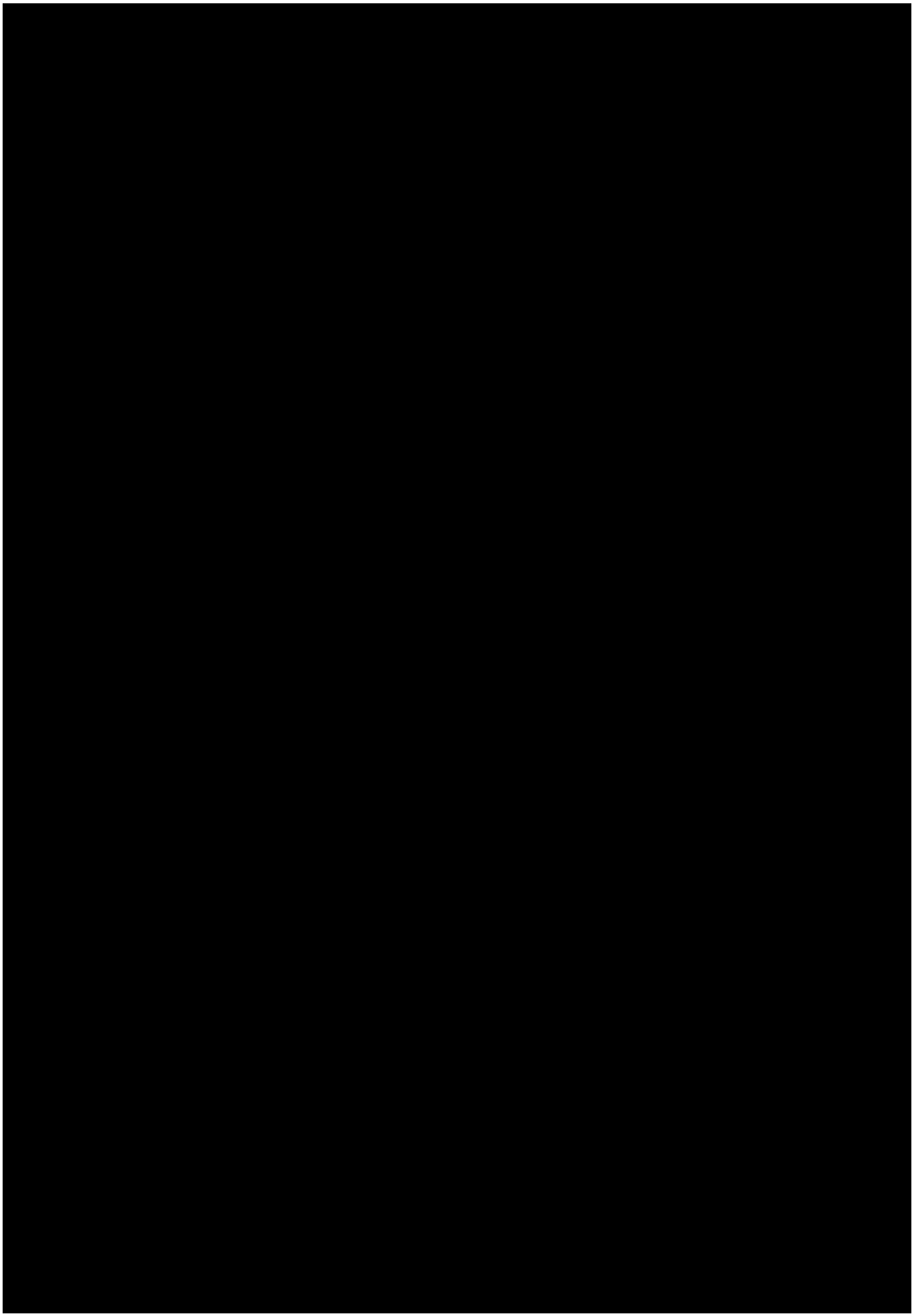

IPMC	**Ghana Forestry Commission (GFC)** **Sign-off Form for Completion of** **Network / Security Refresh Project**	Forestry Commission

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.

[redacted]

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ANNEX D
Schedule of Prices

SCHEDULE OF PRICES (Phase B)	
Value of Goods:	[redacted]
- Computers & IT Equipment (GE031F)	
- Power Supplies & Batteries (GE031K)	
Value of Transportation (including freight, in-country distribution, insurance, customs clearance, etc) (GE031A):	
- Import Duties	
- Local VAT	
- Onward Transportation in country	
Total Landed Cost (DDP)	
DPSA Fee Rate - 6% of the delivered/landed cost of Goods (PS89000)	
Phase B QA Design Review Cost (PS89001)	
TOTAL PROGRAMME COST	
Alternatively broken down as:	
TOTAL CONTRACT COST (Goods, Equipment & Services)	**£2,009,429.17**

The above table represents the maximum programme cost. A full cost breakdown provided at Annex C Procurement Plan.

[redacted]

[redacted]

[redacted]

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	Description	[redacted]				
1	Cost of Materials					
2	Cost of Freight					
3	Cost of Insurance					
4	**CIF Cost**					
6	Cost of Inland Transport					
7	**Sub Total Cost of Material Delivered**					
8	Duties, taxes, levies					
9	VAT					
10	**Total Cost without fees**					
11	DPSA Fee (Procurement) = 6% of total cost					
12	**Total Cost including DPSA fee**					
13	Post-delivery and PM and implementation oversight					
14	**Total Cost cost to DFID**	**£ 2,009,429.18**		[redacted]	[redacted]	[redacted]

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ANNEX E
Key Performance Indicators and Service Level Agreements

#	KPI description	Measurement	**Evidence** (in addition to regular minutes of meetings)
KPI1	Delivery in Full	Quantity of items delivered against quantity of items requested	Monthly scorecard to PCD
KPI2	On Time Delivery	Final delivery date against requested delivery date	Monthly scorecard to PCD
KPI3	Supplier profiling	Total financial value or orders delivered by UK-SMEs, UK-LEs, local-SMEs, local-LEs, Regional SMEs and Regional LEs	Monthly scorecard to PCD
KPI4	Timber procurement policy	Cost, quantity and source of origin of any timber product purchased	Monthly scorecard to PCD
KPI5	Third Party Suppliers performance	Active management of 3rd party suppliers	Quarterly scorecard to PCD
SLA1	Savings achieved	Amount invoiced against budget	Monthly scorecard to PCD
SLA2	Customer satisfaction Index	Customer Survey	Feedback from end recipient and DFID Natural Resources & Resilience Team
COM1	Timeliness and quality of reporting	• All reporting contains required information, is of high standard and is submitted within agreed timeframe; • Management meetings take place in line with agreed schedule, have a clear agenda, cover key issues, record minutes and actions taken.	Feedback from DFID.
COM2	Timeliness of Communication	• Timeliness, appropriateness and quality of all DFID communications including responsiveness to enquiries/request and escalations	Feedback from DFID.

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ANNEX F
Savings management

SLA1 - Savings Service Level Agreement Measurement

Rating	Definition
Green	Savings are 90% on target
Green	Savings are in between 81% and 90%
Amber Green	Savings are in between 71% and 80%
Amber Red	Savings are in between 61% and 70%
Amber Red	Savings are in between 51% and 60%
Red	Savings are below 50%

At the outset of each financial year, the Supplier will agree with PCD a target efficiency savings figure that must be achieved.

Savings will be based on an agreed total value of the Delivered goods.

The Supplier will use the attached form to record the savings against each delivery. At the end of each programme, a summary form will be provided.

All values will be indicated in GBP.

DFID Savings Template:

DFID PO Number	
Supplier PO Number	
Component Code	
Project name:	
Country	
Goods description	
Goods' supplier name	

Definition of Saving Type	Type of saving	Quantity	Starting Price (A)	Agreed Final Price (B)	Amount of Saving (B-A)
Corporate Savings	Direct		£	£	£
Prices negotiated by another organisation but the supplier	Indirect		£	£	£
One-off savings and Discounts negotiated on individual purchases	Tactical		£	£	£
An alternative solution which provides the SP with a tangible saving	Value Engineering		£	£	£
	TOTAL SAVINGS ACHIEVED		£	£	£

For validation and audit purposes, the Supplier is expected to provide a copy of A and B.

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ANNEX G
Communication matrix

Organisation	Role		
DFID Natural Resources & Resilience Team	Programme Manager	[redacted]	
DFID Natural Resources & Resilience Team	Climate & Environment Support Officer		
DFID Natural Resources & Resilience Team	Senior Forestry Adviser		
DFID Natural Resources & Resilience Team	Climate and Environment Support Officer		
DFID Procurement & Commercial Department	Procurement & Commercial Officer		
AECOM	Procurement Supplier CRM		
AECOM	Head of Delivery		
AECOM	Deputy Head of Technical Assistance		

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ANNEX H

Duty of Care Country Assessment

DFID Overall Project/Intervention Summary Risk Assessment Matrix

Project/Intervention title: Procurement of Solar IT Backup Systems for Ghana Forestry Commission – Technical Assistance – Phase C
Location: Ghana
Date of assessment: 08/08/2017
Assessing official: Martin Kanyagui

Theme	**DFID Risk score**									
	Greater Accra Region	**Ashanti**	**Western**	**Volta**	**Brong Ahafo**	**Northern**	**Upper East**	**Upper West**	**Central**	**Eastern**
OVERALL RATING	2	2	2	2	2	2	2	2	2	2
FCO travel advice	2	2	2	2	2	2	2	2	2	2
Host nation travel advice	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available
Transportation	2	3	3	3	3	3	3	3	3	3
Security	2	2	2	2	2	3	3	3	2	2
Civil unrest	2	2	2	2	2	3	3	3	2	2
Violence/crime	3	3	3	3	3	3	3	3	3	3

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Espionage	1	1	1	1	1	1	1	1	1	1
Terrorism	1	1	1	1	1	1	1	1	1	1
War	1	1	1	1	1	1	1	1	1	1
Hurricane	1	1	1	1	1	1	1	1	1	1
Earthquake	1	1	1	1	1	1	1	1	1	1
Flood	2	2	2	2	2	2	2	2	2	2
Medical Services	2	2	2	2	2	2	3	3	2	2
Nature of Project/ Intervention	1	1	1	1	1	1	1	1	1	1

1 Very Low risk	2 Low risk	3 Med risk	4 High risk	5 Very High risk
Low		**Medium**	**High**	

Click the link below for the latest FCO travel advice. **https://www.gov.uk/foreign-travel-advice/ghana**