

Stream Mitigation Area, James Long Park, Haymarket, VA



Prince William County

**PPEA Proposal:
Ecological Enhancements**

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Cover Letter

May 12, 2022

REVISED May 2, 2023

Adam Manne -Procurement Services Director
Prince William County - Department of Finance
1 County Complex Court, Prince William, VA 22192
Email: AManne@pwcgov.org

RE: PPEA Proposal- Ecological Enhancements

Dear Mr. Manne:

HGS, LLC is pleased to submit this unsolicited proposal (the "Proposal") in conformance with the County's *Procurement Regulations Pursuant to the Public-Private Transportation Act of 1995 and the Public-Private Education Facilities and Infrastructure Act (PPEA) of 2002" (2011) ("Procedures")*, adopted by Prince William County with an effective date of July 1, 2022, to fully deliver ecological enhancements to County-owned environmental resources, particularly stream, wetland, and riparian habitat, for the purpose of creating (1) stream and wetland mitigation banks, (2) retail nutrient credit banks, (3) credits for the direct application to the County's (or other applicable permittees') Chesapeake Bay (Bay) Total Maximum Daily Load (TMDL) requirements (aka TMDL credits), or (4) permittee responsible mitigation (PRM) projects.

HGS, LLC is a wholly-owned subsidiary of Resource Environmental Solutions, LLC (together with all its subsidiaries and affiliates, "RES").¹ Our proposal includes all site identification, feasibility analysis and prioritization, design, cost estimates, financing, construction, maintenance and monitoring, and documentation and coordination inherent to any one of the four above-described project scenarios. The entirety of this work and its potential outcomes is referred to herein as the "Project."

As detailed herein, the Project will yield numerous benefits to the County. Not only will RES complete ecological restoration, enhancements, or conservation practices on county-owned environmental resources [REDACTED], but with the added benefits of [REDACTED]

RES is proposing to partner with Mitigation Services, Inc. (MSI) which established a [REDACTED] public-private partnership (P3) with the County in 2008, enabling stream mitigation banking at any one of 10 listed park sites. This P3 became known as the Prince William Environmental Bank (PWEB) [REDACTED]

RES is a national, fully scaled operating company providing ecological restoration and water resource solutions. Our goal is to maximize value for our clients with practical, timely, and cost-effective solutions drawing on the depth of our expertise and experience across the country. We sincerely appreciate the opportunity to provide you with this PPEA submission. Thank you for your consideration and we look forward to maximizing the ecological value of County resources.

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¹ For the purposes of a qualitative evaluation of this submittal, HGS and RES should be viewed as a single entity ("RES") in our experience. We are one company with a singular vision and proven track record of implementing the creative solutions presented here to Prince William County.

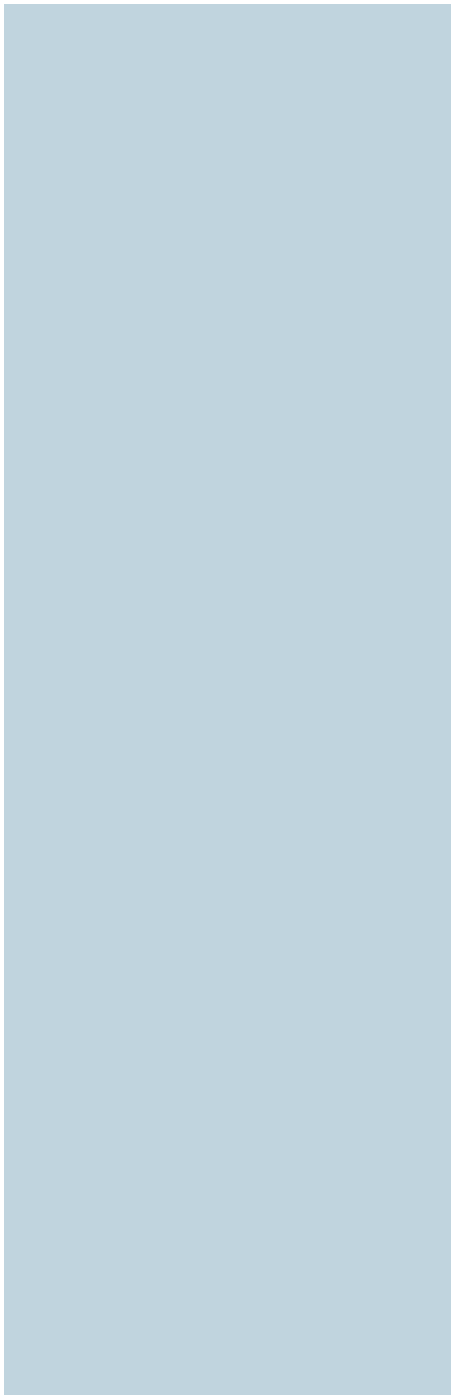


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1. Qualifications and Experience



1. Qualifications and Experience

A. Legal Structure

HGS, LLC is the legal entity offering this submission. HGS, LLC is a wholly-owned subsidiary of Resource Environmental Solutions, LLC (together with all its subsidiaries and affiliates, "RES"). For the purposes of a qualitative evaluation of this submittal, HGS, LLC, and RES should be viewed as a single entity ("RES") in our experience. HGS, LLC will be referred to as RES throughout this submission.

RES is also partnering with Mitigation Services, Inc. (MSI), which established a similar public-private partnership (P3, or the Partnership) with the County in 2008, enabling stream mitigation banking at any one of 10 listed park sites. Sites resulting from this P3 became known as the Prince William Environmental Bank (PWEB), and MSI has access to valuable feasibility analysis data gained from these park sites useful in the future planning of the Project (see **Appendix F**). Additionally, MSI's institutional knowledge of the regulatory process inherent in approving and implementing numerous stream and wetland mitigation banks in Virginia will ensure new projects proposed under this P3 are expedited maximally.

RES is a national, fully scaled operating company providing ecological restoration and water resource solutions. In a handful of sites across the country, we're restoring land areas the size of Manhattan and streams that stretch for 10, 20, or even 40 miles. RES' bonding capacity is \$100M per project, backed by A+ rated surety underwriters, and we have the knowledge, resources, and experience to fully deliver the Project under our singular ownership. As such, no other partnering firm is proposed.

Organizational Structure

Being mindful to capture as many cost efficiencies as possible, RES proposes to complete the project with Virginia-based staff and subcontractors. Table 1: Project Team below lists all pertinent staff leads, and the main Project Manager and Point of Contact, Tara Kelly. Resumes for each key staff member are provided in **Appendix B: Key Personnel Resumes**.

Main Point of Contact for the Project:

Tara Kelly

Director, Regional Technical and Regulatory
Mobile: 571.264.3788 | Email: tkelly@res.us

B. Firm Overview

RES is a national operating company focused on restoring a resilient earth for a modern world, project by project. As the nation's largest ecological restoration company, RES supports the public and private sector with solutions for environmental mitigation, stormwater and water quality, and climate and flooding resilience. RES has a unique operating model for delivering ecological uplift, based on science-led design, full delivery, long-term stewardship, and guaranteed performance. RES designs, builds, and sustains sites that preserve the environmental balance, lifting impaired ecosystems into restored health and ultimately, self-sufficiency.

In the existing P3 known as PWEB (see **Appendix A**), RES was able to complete 2.4 miles of stream restoration (Locust Shade and James Long Park).

RES looks forward to increasing the overall value to the county in this current P3 Project.

RES works closely and creatively with developers, operators, landowners, and regulatory agencies to balance the needs of the client, community, and the resource. Our operating model is built around this approach. We employ teams covering the full project lifecycle, combining in-house analytics and technical expertise with implementational resources and capabilities.

We have helped clients successfully permit more than 3,900 projects, creating rich, high-functioning ecosystems as part of each permit. In 2016, RES acquired HGS, LLC d/b/a Angler Environmental, which was based in Virginia, to further grow RES' capabilities in delivering specialized ecological consulting, design, and construction services for our client's complex ecological projects. We are now one company with a singular vision and a proven track record of implementing the creative solutions sought by our clients. Our clients include local and state governments, large mining operators, energy production companies, energy transmission companies, Fortune 500 companies, departments of transportation, and other public-sector organizations. RES now employs approximately 1,000 dedicated staff in 30 operational hubs across the country and has three local offices throughout the state of Virginia.



RES delivers customized solutions tailored to our clients' needs. RES' internal resources include environmental, health, safety, and security (EHS&S) staff, land acquisition specialists, wildlife biologists, Rosgen IV certified stream designers, professional wetland scientists, engineers, hydrologists, QA/QC oversight teams, field ecologists, regulatory project managers, analysts, certified foresters, arborists, landscape architects, construction managers, superintendents, and field crew members as well as supporting project controls, government affairs, public relations, financial, legal and analytical staff.

RES' experience includes:

- Restoration, enhancement, and preservation of 62,637 acres of wetlands
- Restoration of over 607 miles of streams
- Rehabilitation, preservation, and/or management of over 20,200 acres of special-status species habitat
- Currently, conduct monitoring and maintenance (including invasive species management) for over 50,000 acres of mitigation habitat
- Successful close-out of over 100 mitigation sites
- Permitting and development of over 200 permittee-responsible mitigation projects
- Design, permitting, management, and development of 406 wetland, stream, species, and/or conservation banks
- Delivery of 20,000 acres of custom, turnkey mitigation solutions
- Design and construction of over 350 stormwater management facilities
- Reductions of over 292 tons of water quality nutrients
- Planting of over 22,900,000 trees across all operating regions
- Development and operation of nurseries in six states including the largest coastal nursery in Louisiana
- Facilitation of compensatory mitigation and nutrient offsets for over 3,980 federal and state permits

We draw on our dedicated, in-house resources and deep experience across all phases of ecological restoration projects in defining our project approach, which seeks to balance performance and cost in the manner that is most beneficial to our clients.

A sampling of RES' advisory consulting services includes:

- Wetland determinations and wetland delineations
- 404 and 401 wetland permitting
- Ecosystem restoration design and implementation
- Wetland mitigation banking design and permitting
- Solar facility vegetation and soil management plans (VSMP)
- Natural resource inventory and T&E assessments
- Ecological restoration and management plans (ERMP)
- Ecological Research, Assessment, Inventory, Analysis, and Monitoring
- Environmental and Water Resources Engineering
- Ecological Landscape Architecture
- Geospatial Services: GIS and Remote Sensing
- Soil Health Research, Assessment, Inventory, Analysis, and Monitoring
- Wildlife Studies and Management
- Streambank and Shoreline Stabilization
- Stormwater Management Design
- Sustainable Development Services

The following table summarizes our experience with regard to five similar projects in the state of Virginia. Full project descriptions can be found within **Appendix A: Project Experience**.



Table 1. Project Experience

Project Name / Location	Client	Scope of Work	Contract Period
The Prince William Environmental Bank – P3 Contract for Stream Restoration, Prince William County, VA	Prince William County, VA	<ul style="list-style-type: none"> Stream Restoration and Enhancement Opportunities Within 10 Potential Bank Sites Over 2,000 Acres and 147,000 LF of Parkland 	<ul style="list-style-type: none"> Start of Contract: 2007 Initial Construction of Locust Shade Completed in May 2012 Ecological Monitoring and Construction Maintenance Ongoing Until 2023 No delays in Actual Completion as compared to Scheduled Completion
Washington Golf and Country Club, Arlington County, VA	Arlington County, VA	<ul style="list-style-type: none"> 2,210 Linear Feet of Stream Restoration 541 Pounds of Phosphorous Reduction Additional 1,000 Linear Feet of Stream Channel Restoration for WGCC Bio-Retention Basin Installation 	<ul style="list-style-type: none"> March 2018 to September 2030
Whispering Hills Nutrient Bank / Loudoun County, VA	Loudoun County, VA	<ul style="list-style-type: none"> Stream Restoration and Cattle Exclusion on an Active Cattle Farm. ~5000 LF 	<ul style="list-style-type: none"> Construction June 2021 - November 2021 Monitoring through 2031
Little Westham Creek / Gambles Mill Eco-Corridor Restoration / Richmond, VA	University of Richmond	<ul style="list-style-type: none"> Turnkey Project Delivering Over 1,590 Pounds of Total Phosphorous (TP) Removal Per Year Delivering 274 Tons of Total Suspended Solids (TSS) Delivering 3,452 Pounds of Total Nitrogen (TN) per year 	<ul style="list-style-type: none"> 2019-2029 Construction Completed: December 2019
Wancopin Creek Stream Restoration / Loudoun County, VA	Virginia Department of Transportation	<ul style="list-style-type: none"> Turnkey Stream Restoration Project Covers Nearly 9 Miles of Streams, Including 3 Miles of Wancopin Creek Produced 4,300 Lbs of Phosphorus (and Nitrogen and Sediment) Reduction Credit directly toward VDOT's TMDL reduction requirements 16,195 Linear Feet Of Stream Restoration 	<ul style="list-style-type: none"> 2018-Present



C. Other Engagements of Firms

Representative Recent Public-Sector Works in Progress are provided below.

Table 2. RES Public-Sector Works in Progress

Project Name	Construction Firm	Design Firm	Guarantees	Warranties
Package P SWM Facilities	HGS, LLC	Rinker Design Associates	HGS, LLC – Equipment, Materials, workmanship, tools, and supplies	HGS, LLC – 2 years Materials and Workmanship
Powells Creek Stream Restoration Phase II	HGS, LLC	WSP	HGS, LLC – 1 year maintenance bond	HGS, LLC – 1 year workmanship &
Cherrydale Lake Rehab	HGS, LLC	Watershed Consulting, PLLC	HGS, LLC – Work is not defective	HGS, LLC – Work is not defective
Piney Run @ Lake Werowance	HGS, LLC	Stantec	HGS, LLC – Payment and Performance Bond	HGS, LLC – 1 year – Materials and Workmanship
Hunting Creek at Fairchild	HGS, LLC	Wetland Studies and Solutions, Inc. (WSSI)	HGS, LLC – Payment and Performance Bond	HGS, LLC – 1 year – Materials and Workmanship
Bull Neck Run Stream Restoration	HGS, LLC	Stantec	HGS, LLC – Payment and Performance Bond	HGS, LLC – 1 year – Materials and Workmanship
Nutley Pond Dredging	HGS, LLC	Gannett Fleming	HGS, LLC – Payment and Performance Bond	HGS, LLC – 2 years vegetation
Rolling Creek Way Outfall Restoration	HGS, LLC	Wetland Studies and Solutions, Inc. (WSSI)	HGS, LLC – Payment and Performance Bond	HGS, LLC – 1 year – Materials and Workmanship
Rocky Run Trib @ Dulles Access Road	HGS, LLC	AMT	HGS, LLC – Payment and Performance Bond	HGS, LLC – 1 year – Materials and Workmanship
Schneider Branch	HGS, LLC	Wetland Studies and Solutions, Inc. (WSSI)	HGS, LLC – Payment and Performance Bond	HGS, LLC – 1 year – Materials and Workmanship
Ashburton Ponds	HGS, LLC	AMT	HGS, LLC – Payment and Performance Bond	HGS, LLC – 1 year – Materials and Workmanship



D. Key Personnel

The following table lists key team members and their professional training and experience. Full resumes can be found in **Appendix B: Key Personnel Resumes**.

Table 3. Key Personnel Overview

Name / Project Role	Years of Exp.	Address	Phone	Email Address
Tara Kelly / Project Manager & POC	20	7010 Little River Turnpike, Suite 330 Annandale, VA 22003	571.264.3788	tkelly@res.us
Bailey Wilfong / Lead Designer	12	5367 Telephone Road Warrenton, VA 20187	571.489.0276	bwilfong@res.us
Ben Eubanks / Overall QA / QC	16	1408 Roseneath Road, Suite B Richmond, VA 23230	804.955.0330	beubanks@res.us
Ed Kabay / Permitting Lead	9	7010 Little River Turnpike, Suite 330 Annandale, VA 22003	571.489.0278	ekabay@res.us
PJ Pitera, PWD / Ecologist Lead	22	7010 Little River Turnpike, Suite 330 Annandale, VA 22003	412.249.2440	ppitera@res.us
Joe Caterino, PE / Engineer of Record	25	1408 Roseneath Road, Suite B Richmond, VA 23230	804.729.9113	jcaterino@res.us
Reid Cook / Technical Design Advisor	18	5367 Telephone Road Warrenton, VA 20187	540.905.4504	rcook@res.us
Laura Sokol, PLA, ISA / Arborist / Landscape Architect	8	1408 Roseneath Road, Suite B Richmond, VA 23230	804.729.8986	lsokol@res.us
Wes Tweedy / Construction Oversight	18	5367 Telephone Road Warrenton, VA 20187	540.905.4513	wtweedy@res.us
Mason Lee Bullock / Safety Officer	6	5367 Telephone Road Warrenton, VA 20187	443.833.3175	mleebullock@res.us
Paul Quinlin (CAP Land Surveying, PPLC) / Surveying & Permitting	29	4821A Eisenhower Ave, Alexandria, VA 22304	571.319.9064	pquinlan@cap-ls.com

E. Audited Financial Statement

The most recent audited financial statement for RES is from 2021 and can be found in **Appendix C: RES Financial Statements**.

F. Conflicts of Interest / Disqualifications

At the time of the writing of this PPEA submission, there are no conflicts of interest or other limitations that may impact the County's consideration of the Partnership, including any persons working with RES who would be obligated to disqualify themselves from participation in any transaction arising from, or in connection to, the Project pursuant to The Virginia State and Local Government Conflict of Interest Act.

G. Qualified Tradesmen/women

In-house Expertise

As the nation's leading turnkey provider of customized ecological restoration solutions, RES has an unparalleled combination of professionals combined under one roof. RES' internal resources include Environmental, Health, Safety, And Security (EHS&S) staff, land acquisition specialists, wildlife biologists, Rosgen IV certified stream designers, professional wetland scientists, engineers, hydrologists, QA / QC oversight teams, field ecologists, regulatory project managers, analysts, certified foresters, arborists, landscape architects, construction managers, superintendents, and field crew members as well as supporting project controls, government affairs, public relations, financial, legal and analytical staff.

This seamless integration of specialized talents, working toward the same goal, offers RES insights and capabilities that significantly benefit our clients' end goals. Our professional and construction staff include the following:



Table 4. In-house Expertise

On the Ground		Behind the Scenes	
<ul style="list-style-type: none"> • Certified arborists • Construction operators • Engineers • Field crew members • Field ecologists • Landscape architects • Hydrologists 	<ul style="list-style-type: none"> • QA / QC oversight teams • Rosgen IV certified stream designers • Superintendents • Wetland scientists • Wildlife biologists • Specialized labor crews 	<ul style="list-style-type: none"> • Environmental, health, Safety, and security (EHS&S) • Financial • GIS specialists • Government affairs • Project controls 	<ul style="list-style-type: none"> • NPDES compliance inspectors • Public relations • Land acquisition • Legal • Regulatory project managers • Nursery managers

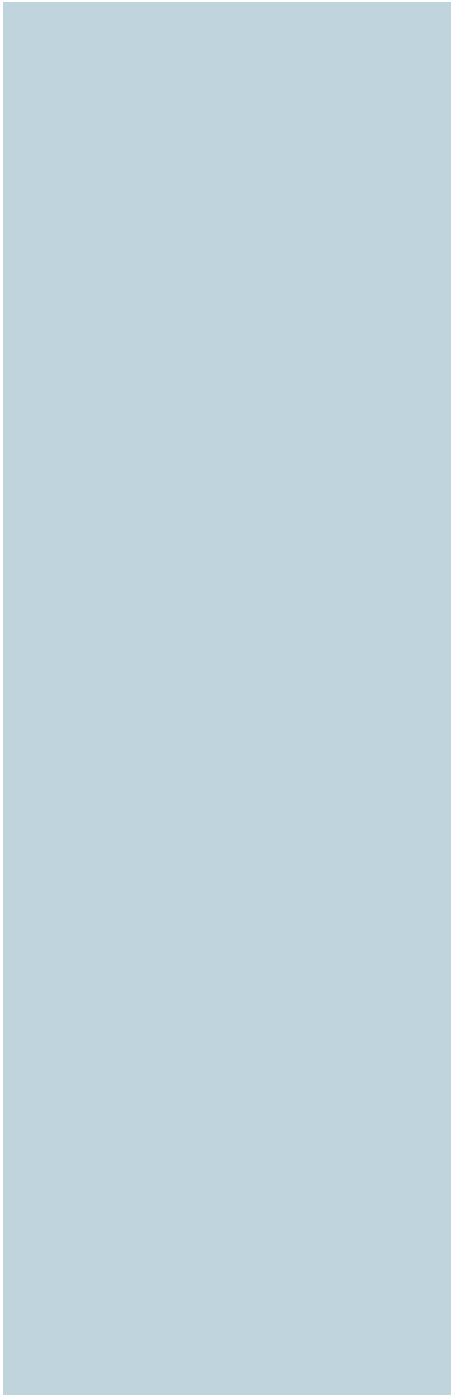
Public Sector Experience

In our over two decades of business experience, RES has worked for a diversified clientele, including many categories within the private, public, and federal sectors. Within the public sector, RES has completed professional and/or construction services directly for numerous municipalities (towns, cities, and county governments), state governments, and state entities such as VDOT, Maryland State Highway Administration and Maryland Transportation Authority, and public service authorities such as Loudoun Water and the Washington Suburban Sanitation Commission. The following is a listing of some of the various Virginia municipalities for whom RES is currently working, or has worked for within just the past two years:

- Arlington County
- Augusta County
- Charlottesville, City of
- Chesapeake, City of
- Chesterfield County
- Colonial Heights, City of
- Fairfax, City of
- Fairfax County
- Fauquier County
- Hampton, City of
- Harrisonburg, City of
- James City County
- Loudoun County
- Manassas, City of
- Manassas Park, City of
- Newport News, City of
- Occoquan, Town of
- Prince William County
- Richmond, City of
- Stafford County
- York County
- Warrenton, Town of

H. Sworn Certifications

RES is not currently debarred or suspended by any Federal, State, or Local governmental entity.



2. Project Characteristics



2. Project Characteristics

A. Project Description and Conceptual Design

RES, in combination with its partner MSI, is proposing to provide the County with ecological improvements to stream, wetland, and/or riparian habitat performed in such a way as to constitute (1) environmental (stream or wetland) mitigation banks, (2) nutrient credit banks, (3) credits for direct application to the County's (or other applicable permittees') Chesapeake Bay (Bay) Total Maximum Daily Load (TMDL)-related phosphorus, nitrogen, and sediment reduction requirements, as dictated by the County's Municipal Separate Storm Sewer System (MS4) permit, or (4) permittee responsible mitigation (PRM) projects. (A project for direct application to TMDL reduction requirements could also be performed for other (non-County) applicable permittees such as VDOT or even other permittees within the Potomac watershed. Such a project could be shared between one or more applicable permittees.)

Ecological improvement projects to County-owned resources could include any combination of the following: stream and corresponding riparian area restoration and stabilization, wetland creation and enhancement, and/or shoreline restoration, or stormwater management facility upgrades or retrofits (referred to herein as stormwater management (SWM) improvements/improvement projects). To a lesser extent, projects could also contain elements of land conversion, invasive species control, augmentation of native species plantings, and the preservation of stream, wetland, and riparian areas.

The benefits to the County by implementing these types of projects are numerous, and not only include immediate benefit to the land and its ecosystems, flora and fauna, and even improved stormwater control and flood attenuation, but benefits to the County's finances, strategic growth, and to the citizens of the County with enhanced recreational opportunities, as summarized below:

Ecological Benefits

The ecological benefits resulting from this Proposal typically include minimizing sediment loss from bank erosion, reconnecting a stream to its floodplain, and providing improved in-stream and riparian habitat. Restoration activities will rehabilitate habitat for fish, benthic macroinvertebrates, and other aquatic fauna on a significant scale. Restored and protected areas will provide a host of ecosystem services, including water quality restoration, floodplain restoration, groundwater recharge, floodplain nutrient processing, and carbon storage.

The stream restoration and riparian buffer woody species plantings will work to improve the aquatic and terrestrial habitat corridor for local bat species (including the Northern long-eared bat and Indiana bat), brook floater, and a state-listed endangered mussel species, and various native fish species. Wetland creation in the buffer area is also likely to attract amphibians including salamanders and frogs; reptiles such as yellow, spotted, and snapping turtles; and many invaluable Virginia pollinator species including the federally protected rusty-patch bumblebee. Improvements will continue to manifest downstream as the overall fish assemblage benefits.

Over time, as hydrology reverts to natural conditions, historical natural communities will reestablish in the riparian buffer restoration and enhancement areas. The natural succession of the vegetative communities will be supplemented by the installation and seeding of native trees, shrubs, and herbaceous plants, indigenous to each watershed. This reestablishment of native, resilient ecosystems (and 5 to 10 years of invasives control included by RES, per project) will result in habitat creation and preservation for native plants and animals, including rare, threatened, and endangered species. The combined positive impact on water quality, biodiversity, soil conservation, and habitat restoration will provide relief to any injured aquatic resources.

Lastly, RES stream restoration and SWM improvement projects (including but not limited to retrofits) will work to improve stormwater flows in the drainage way and will likely reduce the impacts associated with flood events. For instance, a RES-designed stream restoration seeks to reconnect the stream channel with its historic floodplain, and simply accessing that area again even in smaller storm events brings a substantial amount of flood storage and retention to the area, previously inaccessible. Completed SWM improvements will also likely work to store and/or retain storm flows and flood volume, lessening flood impacts downstream.

Fiscal and Monetary Benefits to the County

Our proposal seeks to provide the County with numerous monetary and strategic fiscal benefits:

- [REDACTED]



Table 5. Project Types and Respective Benefits

Benefit to the County	Project Type 1	Project Type 2	Project Type 3		Project Type 4	
	Stream or Wetland Mitigation Banks	Nutrient Credit Banks	TMDL-crediting Projects		PRM Projects	
			for the County	for other entities	for the County	for other entities
1. Direct ecological habitat enhancements	✓	✓	✓	✓	✓	✓
2. Stormwater improvements, quantity and/or quality		✓	✓	✓		
3. Site feasibility and prioritization at no cost to County	✓	✓	✓	✓	✓	✓
4. Entire project delivered at no cost to County	✓	✓		✓		✓
5. Reduction of administrative oversight and burden	✓	✓	✓	✓	✓	✓
6. Direct revenue to the County as a portion of credit sales	✓	✓				
7. Direct revenue to County from easement purchase	✓	✓		✓		✓
8. Discounted credits when purchased for County projects	✓	✓				
9. Reserved credits for County projects	✓	✓				
10. Project financing and all-inclusive, fixed-fee pricing			✓		✓	
11. Potential for community benefits such as passive recreation, trails, interpretive signage, and educational opportunities	✓	✓	✓	✓	✓	✓

B. Work to be Performed by the County

As previously indicated, RES would expect to work closely with the County to evaluate the restoration potential on County-owned property, but, to the greatest extent, the level of the County staff involvement would be at their discretion. RES can complete this type of feasibility analysis with minimal input from the landowner, prior to making final decisions about a given site. However, given the types of uses/constraints inherent in publicly owned property, and based on previous discussions with the County, we anticipate that the County will be integrally involved in the feasibility analysis of each possible restoration site, particularly from an oversight perspective. We are confident that most of the work associated with this process will be handled by RES.

Aside from these coordination efforts, RES does not anticipate that any work will be required to be performed by County staff or any other public entity, other than standard plan review and approval as necessary to permit the anticipated construction and implementation associated with the stream and/or wetland restoration/enhancement activities.

C. Required Federal, State, and County Permits and Approvals

RES is proposing four distinct project types under this Partnership: (1) retail stream and/or wetland mitigation banks, (2) retail nutrient credit banks, and (3) restoration projects for the direct reduction of the County's (or other applicable permittees') TMDL-related reduction requirements, or (4) PRM projects. Each project type is governed by different permitting and approval processes, as described below.



Retail Stream and/or Wetland Mitigation Banks

The mitigation banking process is ultimately regulated by the U.S. Environmental Protection Agency (EPA) as part of that agency's responsibilities under the Clean Water Act. Review and approval of a mitigation bank is the responsibility of the Interagency Review Team (IRT), which, in Virginia, is typically comprised of staff from the EPA, the U.S. Army Corps of Engineers (Corps), the Virginia Department of Environmental Quality (DEQ), the U.S. Fish and Wildlife Service (FWS), the Virginia Department of Wildlife Resources (DWR) and the bank sponsor. However, while all parties typically provide input during the bank approval process, ultimately only the bank sponsor, the Corps, and DEQ need to be signatory parties on the Mitigation Banking Instrument (MBI), the document that establishes the requirements, uses, rights, responsibilities, etc. associated with the mitigation bank.

Once the MBI is approved for the overall bank, a separate Bank Development Plan will need to be reviewed and approved by the Corps and DEQ for each different mitigation bank site that is included within the bank. The Bank Development Plan contains the specific information regarding the site including existing conditions, a proposed design, anticipated credit yield, etc. for a given mitigation bank site.

Retail Nutrient Credit Banks

The nutrient banking process is less regulated than mitigation banks, as these banks are approved solely by the DEQ. The application process begins with the submittal of a Nutrient Reduction Implementation Plan (NRIP) which, like an MBI, describes the project and expected credit estimates, and establishes the requirements, uses, rights, responsibilities, etc. associated with the nutrient bank.

Restoration and SWM Improvement Projects for Direct Application to TMDL Reduction Requirements

Restoration and SWM improvement projects to be applied directly to the County's TMDL-related nutrient and sediment reduction requirements (or other, non-County applicable permittees) are the simplest of the four categories proposed under this Partnership. Like nutrient banks, they are approved solely by the DEQ, but no formal application is required. Rather, the project description, credit estimates, and other project information are established in the County's TMDL Action Plan (or the respective permittee's Action Plan if another permittee is purchasing the credits). Once approved by the County, the project may be fully implemented. Upon final as-built survey acceptance, which is approved by the County, the nutrient and sediment reductions, also known as "credits", are directly applied to the County's reduction requirements as described in the County's MS4 permit-guided Annual Report. Unlike the prior two project types, credits from this category cannot be sold, but they can be traded with other MS4 permittees once the County has achieved 100% of its required reductions.

Regardless of the above categories, each restoration site involved may incur temporary and/or permanent, unavoidable impacts to existing streams and/or wetlands and therefore require a separate permit from the Corps and/or DEQ to authorize these impacts.

Outside of the federal and state review processes, all the anticipated restoration or SWM improvement projects will require standard site construction (grading, erosion and sediment control, environmental, etc.) approvals and permits from the County / VSMP Authority associated with land disturbance activities.

Permittee Responsible Projects

For particularly large mitigation needs and/or situations in which no other mitigation credit solutions (i.e. private bank credits or the Virginia Aquatic Resource Trust Fund) are available at the time of permitting, RES will employ the PRM project approach. This entails identifying sites on which mitigation can occur and matching as closely as possible the unavoidable impact need with the amount of mitigation yielded from the site. With the site identified, a conceptual mitigation plan is developed and submitted to the DEQ and USACE along with the site's draft permit application. A final mitigation plan is then completed, to be submitted with the final permit application. The PRM plan is approved concurrently with the project's permit, and work on the PRM site must begin prior to or concurrent with the date impacts occur on the impacting project site.

D. Schedule for Obtaining Permits and Approvals

An example schedule is listed below for each of the four project categories proposed under this Partnership. For purposes of this section, RES is using a start date of June 1, 2022, and assuming a medium-sized stream restoration project of 2,500 LF.



Table 5a. Project Schedule, Retail Stream or Wetland Mitigation Bank

Task	Anticipated Duration	Start Date	End Date
Completion of Assessment, Feasibility, Baseline Data Collection, Concept Mitigation Plan	6 - 9 months	June 2022	December 2022
Bank Prospectus and Public Notice	6 months	December 2022	June 2023
Mitigation Banking Instrument	12 months	June 2023	June 2024
Final Design / Permitting	1 month	June 2024	July 2024
Construction and Planting	6-9 months	July 2024	January 2025
(Wetland Mitigation) As-built Survey / Approval	1 month	January 2025	February 2025
(Wetland Mitigation) Monitoring and Maintenance	10 years (reporting years 1-3, 5, 7, and 10)	2025	2035
(Stream Mitigation) As-built Survey / Approval	2 months after first bankfull event following construction	Schedule dependent on bankfull event occurrence	
(Stream Mitigation) Monitoring and Maintenance	10 years (reporting years 1-3, 5, 7, and 10)	2025	2035

Table 5b. Project Schedule, Retail Nutrient Credit Bank

Task	Anticipated Duration	Start Date	End Date
Completion of Assessment, Baseline Monitoring, Conceptual Design for NRIP	6 - 9 months	June 2022	December 2022
Final Design and NRIP Approval	3 months	December 2022	March 2023
Permitting	3 months	March 2023	June 2023
Construction	6 months	June 2023	December 2023
Planting (during planting season)	As reaches are completed	September 2023	December 2023
As-built Survey and Nutrient and Sediment Reduction Calculations	1 month	December 2023	January 2024
Final Credit Calculations	Upon completion of Year 3 monitoring and determination of final restoration efficiency	December 2026	
First five-year warranty period / Monitoring and Maintenance	5 years	2023	2028
Second five-year warranty period / Monitoring (if required) and Maintenance	5 years	2028	2033

Table 5c. Project Schedule, Restoration Projects for Direct Application to TMDL Reduction Requirements

Task	Anticipated Duration	Start Date	End Date
Completion of Assessment, Baseline Monitoring, Conceptual Design, and Permit Applications	6 months	June 2022	December 2022
Final Design and Permitting	9 months	December 2022	September 2023
Construction	3 months	September 2023	December 2023
Planting (during planting season)	As reaches are completed	October 2023	December 2023
As-built Survey and Nutrient and Sediment Reduction Calculations	1 month	December 2023	January 2024
Final Credit Calculations	Upon completion of Year 3 monitoring and determination of final restoration efficiency	January 2027	



Task	Anticipated Duration	Start Date	End Date
First five-year warranty period / Monitoring and Maintenance	5 years	2024	2029
Second five-year warranty period / Monitoring (if required) and Maintenance	5 years	2029	2034

Table 5d. Permittee Responsible Projects

Task	Anticipated Duration	Start Date	End Date
Completion of Assessment, Feasibility, Baseline Data Collection, Concept Mitigation Plan, Draft Permit	3 - 4 months	June 2022	October 2022
Final Mitigation Plan / Permitting	6 months	October 2022	April 2023
Construction and Planting	3 months	April 2023	July 2023
As-built Survey / Approval	1 month	July 2023	August 2023
Monitoring and Maintenance	7 years (reporting each year 1-3, 5, and 7)	2023	2030

Notes:

These design-build schedules are based on past performance of similar work by RES, and the timeframe to complete the work has been shown to be much shorter when compared to traditional design-bid-build procurement. Therefore, the proposed schedule reflects the fastest reasonable timeframe to complete from the industry. The County can rest assured that each project schedule will be optimized since, [REDACTED]

[REDACTED] The County may be assured of timely completion of any restoration project under this Partnership.

Stream restoration projects will be completed in a sequential and essentially uninterrupted fashion, from the upstream project limit to the downstream project limit. Interruptions to work are only anticipated for the duration of storm events, and erosion from storms will be minimized as the progress of each workday is stabilized prior to the completion of that day. This best practice by RES significantly limits the risk to each project during construction and protects the project schedule. No phasing or partial openings of any project are proposed.

E. Anticipated Adverse Impacts

RES does not anticipate any adverse social, economic, environmental, or transportation-related impacts from the implementation of any of the four categories of projects proposed under this Partnership.

F. Anticipated Positive Impacts

A summary of the anticipated positive impacts of this Partnership is proved above in **Section 2.A**. There are also numerous benefits in conducting ecological restoration work by setting up comprehensive mitigation or nutrient banks as opposed to a piecemeal, site-specific approach. First, pursuing a mitigation bank can result in a more efficient and economical design, approval, and construction process than many individual project-specific mitigation efforts. Instead of identifying County-owned lands to be restored individually and proceeding one by one, the mitigation bank approach will allow for a comprehensive analysis of all lands covered by the bank. Mitigation banks are also looked upon more favorably by the relevant regulatory agencies due to the stringent initial approval process, the length of the monitoring period and the requirement to have a fund set aside in case there is any catastrophic failure of the bank.

Aside from the benefits associated with the actual setup of the agreement and management of the mitigation bank, there certainly are tangible benefits tied to the physical manifestation of the project. Specifically, restoration of wetland and stream resources improves water quality while providing healthy aquatic and terrestrial habitats utilized by a wide spectrum of wildlife. As areas are restored, they become more attractive for recreational activities such as hiking, birding, and even educational tours. An additional benefit related to these increased recreational activities is that RES can provide appropriate signage in areas accessible to the public with educational content regarding the functions of wetlands and streams, the importance of restoration activities, and a summary of the local flora and fauna typically observed in the area.



G. Proposed Schedule of Work

A detailed schedule for each of the four project types proposed under this Partnership is described above in Section D. It should be noted that, as needed, the feasibility analysis, design, and/or construction of individual restoration projects on separate County lands may occur concurrently with other sites.

H. Allocation of Risk and Liability

[REDACTED] 1) stream or wetland mitigation banks, (2) nutrient credit banks, (3) ecological restoration or SWM improvement projects for the direct application to the County's (or other applicable permittees') TMDL reduction requirements, and (4) PRM projects. [REDACTED]

At the end of each respective monitoring period, which typically lasts ten years, RES will need to designate a long-term steward to either (1) take over the management of any banks or PRM projects, or (2) take over the responsibility to recertify TMDL credits every 5 years post-construction for TMDL projects. [REDACTED]

[REDACTED] note that while the bank or PRM site must remain as undisturbed open spaces in perpetuity, once the established monitoring period has ended, there are no specific requirements for active monitoring or maintaining bank areas [REDACTED]. The recertification process for TMDL reduction projects can be achieved by any competent County staff, or a 3rd party consultant or engineer.

I. Ownership and Legal Liability

RES will work with the County to establish an easement (whether for access or perpetual conservation or both) or deed of restriction (DOR) over completed projects where required by the agencies, or as desired by the County. While the ownership of the property(ies) containing these projects is presumed to be retained by the County, an access easement may be desirable, and/or a conservation easement or DOR may be required. For banking projects, the requirements of the MBI and NRIP will necessitate that the restoration areas be maintained within permanent open space, while for TMDL projects, the credits need to be recertified every five years post-construction. Should the project area be found deficient, the TMDL credits will not be certified from that point until corrected, and an easement or DOR may be desired to help prevent problems within the project area.

J. Project Phasing

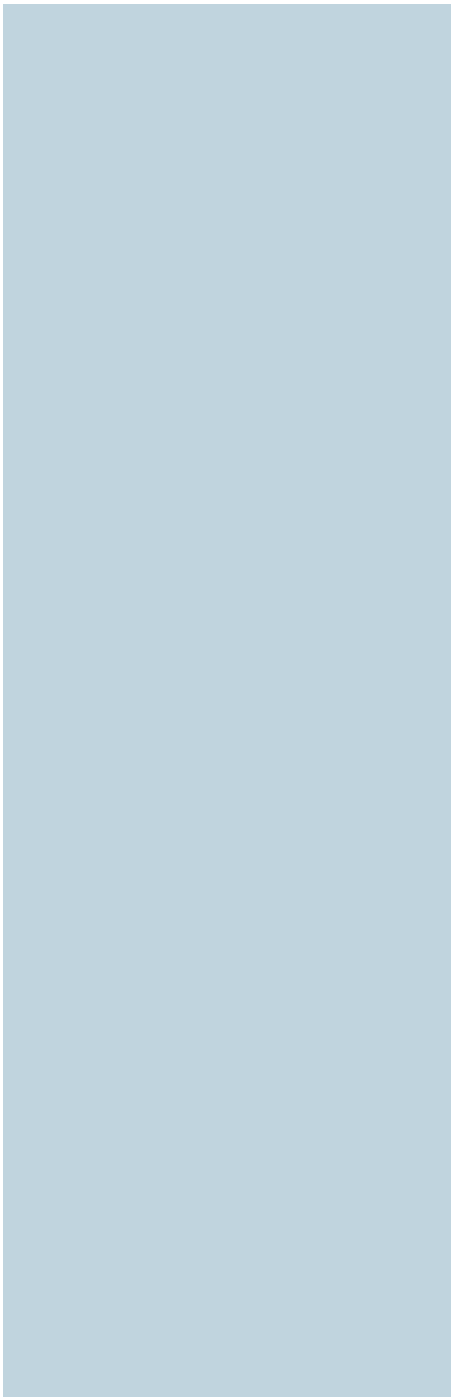
RES will work with the County closely to identify the first viable project under this Partnership. With this first project identified, the first phase of this Partnership will commence. Additional stream, wetland, and/or SWM improvement opportunities on other County properties would be prioritized and implemented based on subsequent coordination with the County and on the amount and type of potential credit yield on each of the properties.

K. Assumption(s)

As previously noted, RES would only require an easement on select County properties involved to implement the restoration projects associated with this Partnership, and ownership of the properties containing these projects would be retained with the current ownership entity. Furthermore, while the requirements of the MBI or NRIP will necessitate that the restoration areas are maintained within permanent open space, the easement allowing RES to complete the required work associated with the restoration projects would be terminated after the required monitoring period.

L. Contingencies

As a full-delivery project, RES' performance is contingent upon site access from the County for the timeframe of implementation, and for 10 years post-construction. No other contingencies are anticipated.



3. Project Financing



3. Project Financing

A. Preliminary Estimate and Estimating Methodology

Until relevant [REDACTED]

B. Development, Financing, and Operation Plan

For [REDACTED]

It is our experience that no liens [REDACTED]

[REDACTED] RES and its partners have access to significant cash resources and maintain a bonding capacity of \$100,000,000 per project and \$500,000,000 aggregate by A+ sureties.

The proposed Partnership will relieve the County of the [REDACTED]

RES is aware that the County often conducts its own development projects which may result in unavoidable impacts to jurisdictional resources, requiring mitigation. Currently, the County is required to purchase stream or wetland mitigation credits through a mitigation bank, or utilize the Virginia Aquatic Resource Trust Fund (VARTF) should private bank credits be unavailable. [REDACTED]

RES has spent considerable time reviewing County-owned parcels for the potential to establish stream or wetland mitigation banks (and PRM projects), nutrient credit banks, or restoration and SWM improvement projects to apply to the County's (or other applicable permittees') TMDL reduction goals. [REDACTED]

[REDACTED] Obviously, not all these areas are in need of



restoration, nor do areas in need of restoration necessarily constitute cost-effective, or even feasible, projects given site constraints and characteristics, or can be restored as candidates under this proposed Partnership, [REDACTED]

See

Appendix D: County Lands and Stream Resources for an overview of County-owned resources.

As noted above, RES will be solely responsible for [REDACTED]

Restoration or SWM Improvement Projects for Direct Application to TMDL Reduction Requirements and PRM Projects for County Impacts

[REDACTED]

Each proposal submitted is actionable at the County's sole discretion, and if approved, RES will commence the project. This implementation model has been utilized by RES for a variety of projects and has shown substantial savings over traditional design-bid-build projects. Notably, this model has been utilized by VDOT, Arlington County, and the City of Richmond, and each project has produced pounds of phosphorus [REDACTED] (see **Appendix A: Project Experience**).

[REDACTED]

C. Assumption for Major Elements of Plan

At this time, RES has performed GIS analyses, visual site assessments, and detailed Bank Erosion Hazard Index / Near Bank Stress (BEHI / NBS) surveys at numerous sites on County-owned property. Given site constraints, erosion severity, restoration potential, and/or SWM improvement potential, these sites have been categorized as stream or wetland mitigation bank sites, nutrient bank sites, and sites to be applied directly to the County's (or other applicable permittees') TMDL reduction requirements, or as PRM sites.

These determinations have incorporated some degree of assumption, for instance, County GIS data for general location and anticipated interaction with major utilities and other encumbrances. Prior to construction, Ms. Utility or a survey firm will be utilized to further locate utilities in the field, including those not necessarily identified in GIS data, such as underground electric lines or fiber-optic lines. Further coordination on utility locations will be conducted with the County as well, but these assumptions regarding underground utilities are as described in this submission.

D. Proposed Risk Factors

[REDACTED]

At the end of each respective monitoring period, which typically lasts ten years, RES will need to designate a long-term steward to either (1) take over the management of any banks or PRM projects, or (2) take over the responsibility to recertify TMDL credits every 5 years post-construction for TMDL projects. [REDACTED]

[REDACTED] Note that while the bank or PRM site must remain as undisturbed open spaces in perpetuity, once the established monitoring period has ended, there are no specific requirements for active monitoring or maintaining bank



areas [REDACTED] The recertification process for TMDL reduction projects can be achieved by any competent County staff, or a 3rd party consultant or engineer.

RES will need to determine a long-term steward for each project and has traditionally done so by engaging a non-profit or other interested organization, such as the Virginia Outdoors Foundation, but the County may elect to assume this role as well if desired.

E. County, State, or Federal Resources

It is our understanding that the County recognizes the importance of undertaking stream and wetland restoration and SWM improvement projects on their land; [REDACTED]

F. General / Moral Obligation Backing

The proposed Partnership does not rely on [REDACTED]

G. Interest Rate Drop Impacts

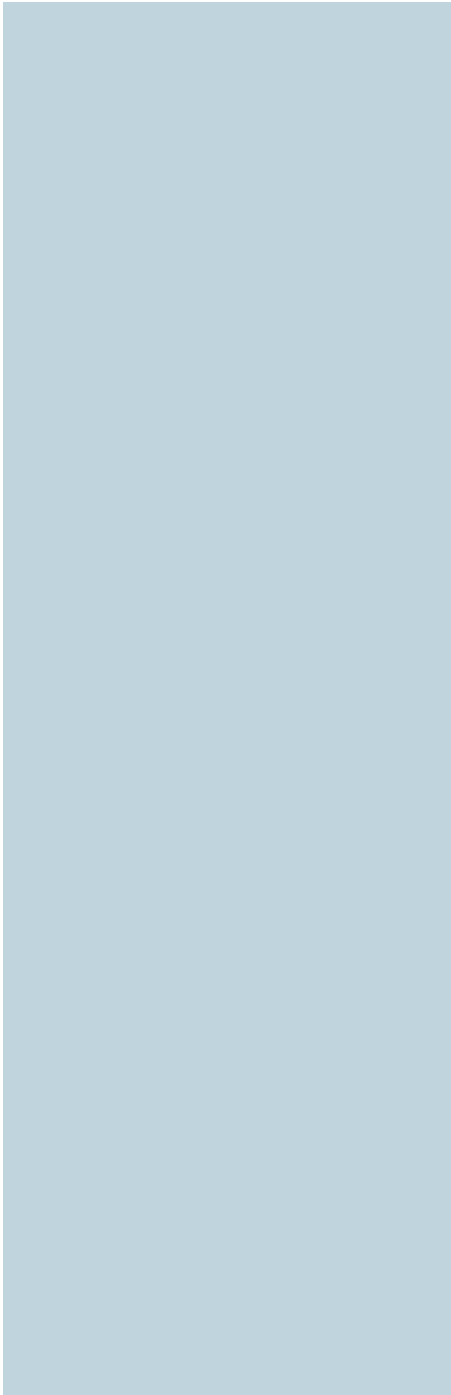
Interest rate drops or other related impacts will be discussed with the County if and when applicable. [REDACTED]

H. Breakout / Breakdown of Fees

As described previously, the Partnership proposes four types of projects: (1) stream or wetland mitigation banks, (2) nutrient credit banks, and (3) restoration or SWM improvement projects for direct application to the County's (or other applicable permittees') TMDL reduction requirements, and (4) PRM projects.

[REDACTED]

[REDACTED]



4. Project Benefit and Compatibility



4. Project Benefit and Compatibility

The benefits associated with this proposed Partnership will be substantial and diverse. Restoration and preservation activities have been shown to create and/or improve economic, recreational, aesthetic, and educational resources enjoyed by all members of the community. Additionally, by undertaking wetland and stream restoration via a mitigation or nutrient bank or as a TMDL reduction project, the project team will employ the most cost-effective methods of implementing the County's restoration goals by minimizing the regulatory approvals required and reducing County restoration and SWM improvement costs.

A. County and Community Benefits

RES proposes to enter into a P3 with the County to complete any one or a combination of the following: (1) a stream or wetland mitigation bank, (2) a nutrient credit bank, (3) a restoration or SWM improvement project for TMDL reduction requirements, or (4) a PRM project, all of which will occur on property controlled by the County. There are multiple benefits to this Partnership as also described elsewhere in this submittal. Specifically, the proposed Partnership will: relieve the County of the day-to-day burden of managing stream and wetland restoration/preservation projects; provide revenue directly to the County or discounted credits for internal projects; reduce the cost of restoration or SWM improvement projects; and place the responsibility of managing the restoration projects in the hands of a team of restoration specialists with decades of experience (see Section 1).

Aside from the benefits associated with the actual setup of the agreement and management of the mitigation bank, there certainly are tangible benefits tied to the physical manifestation of the project. Specifically, restoration of wetland and stream resources increases water quality while providing healthy aquatic and terrestrial habitats utilized by a wide spectrum of wildlife. As areas are restored, they become more attractive for recreational activities such as hiking, birding, and even educational tours. An additional benefit of the project related to these increased recreational activities is that RES proposes to provide appropriate signage in areas accessible to the public. This signage will provide educational content regarding the functions of wetlands and streams, SWM improvements and flood attenuation, the importance of restoration activities, and a summary of the local flora and fauna typically observed in the area. A more detailed list of all County and Community Benefits is provided in **Section 2.A.**

B. Project Support or Opposition

No public opposition to the project is anticipated; moreover, RES expects overwhelming public support due to the Partnership's restorative and preservative nature and potential for SWM improvements and flood attenuation. The local community typically looks fondly upon the restoration of wetlands and streams due to the educational, health-related, and recreational benefits that accompany it, and certainly favors projects to alleviate or minimize flooding concerns including threats to safety and property.

Additionally, agencies responsible for issuing relevant wetland and stream impact permits are likely to show overwhelming support for projects resulting from this Partnership. As described above, mitigation and nutrient banks have an exhaustive approval process aimed at insuring restoration efforts do not fail. Monitoring of restoration work completed at mitigation and nutrient banks is typically five to ten years. Finally, because the resulting banks will be operated by one party, the agencies have a consistent point of contact.

C. Public Involvement Strategy

The Partnership will provide numerous community benefits as detailed throughout this section and in Section 2.A. In an effort to promote these benefits to the public, RES will be providing appropriate signage during the construction phase of restoration and SWM improvement projects to educate the community on the benefits of these projects. Signage will also indicate the joint effort on the part of RES and the County to enhance the County's natural areas and reduce stormwater and flood-related problems. RES believes that signage is an excellent method to better inform the public regarding the benefits of healthy wetland and stream systems, the Bay, and stormwater issues. Additionally, once County lands have been restored and are accessible to the public, RES will provide environmental educational signs as previously mentioned. The proposed signage will first be approved by relevant County personnel.

RES also proposes to promote public involvement with this Partnership by assisting in the development of an environmental education volunteer program. Such programs have been shown to encourage stewardship of natural resources. Specifically for this project, RES plans to work with the County to conduct educational seminars throughout the year, which will focus on the importance of a healthy watershed and resiliency and sustainability initiatives and progress. Aside from informational



sessions and tours of restoration sites, RES also proposes to establish a volunteer program where members of the community can assist in the restoration process, enabling a broad spectrum of the community to be included.

RES has produced a variety of marketing materials in the past that focus on promoting the beneficial aspects of wetland and stream restoration. Considering this, RES proposes to supply the County with marketing materials to help promote ecological restoration, resiliency, and sustainability. Materials may consist of pamphlets with informational text, photographs, and even digital data that can be integrated into County websites and social media.

Additionally, RES will work to establish strategic partnerships with local businesses within the County.

D. Economic Benefits

The County and Community will experience significant economic benefits as a result of the proposed project. Specifically,

E. Social Benefits

Healthy and functioning wetlands and streams offer social benefits in that they provide increased recreational resources. As areas are restored, they become more attractive for recreational activities such as hiking, birding, and even educational tours. An additional benefit of the project related to these increased recreational activities is that RES proposes to provide appropriate educational signage in areas accessible to the public. This signage may provide content such as the ecological functions of wetlands and streams, the importance of restoration activities, and a summary of the local flora and fauna typically observed in the area.

F. Environmental Benefits

Wetlands and streams are widely recognized as resources with important functions and values that affect humans and the environment. In a natural healthy state, these resources perform valuable chemical, physical, and biological processes and support jobs and an economy connected to the ecosystem. It is important that these resources are kept in a healthy condition and preserved.

The Partnership proposed herein seeks to complete numerous wetland and stream restoration and SWM improvement projects on County land. These projects will involve the identification of areas where resources are degraded or where there is potential for SWM improvements and produce a customized solution. Upon completion, the natural resources will be rehabilitated via physical repairs and plantings to higher functionality and habitat value with improved water quality.

G. Transportation Benefits

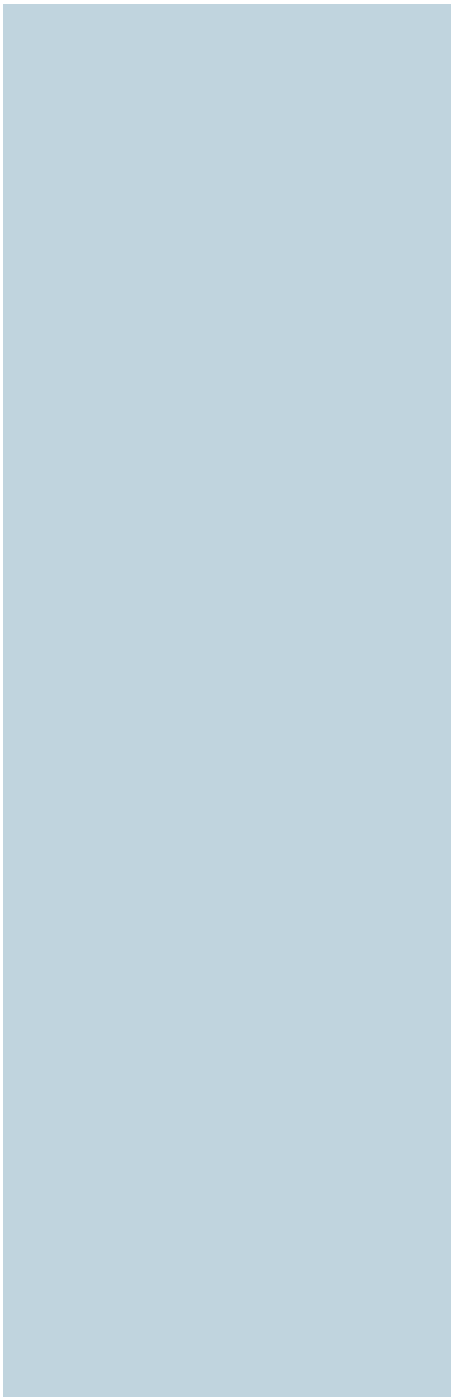
It is not anticipated that the proposed project will have any negative effect on the County's transportation systems and will likely augment recreational trails used by pedestrians and the public.

H. Role of Project in Attracting Competitive Businesses and Industries

As mentioned previously,

I. Project's Compatibility with the County's Local and Comprehensive Plan

The project will fully comply with the comprehensive plan for the County and shall not affect transportation plans, infrastructure development plans, capital improvement plans, capital budget, or other government spending plans for the County or any other locality. Each project proposed by RES under this Partnership will be formally submitted to the County for review and approval prior to any work.



5. Any Additional Information as the County May Request

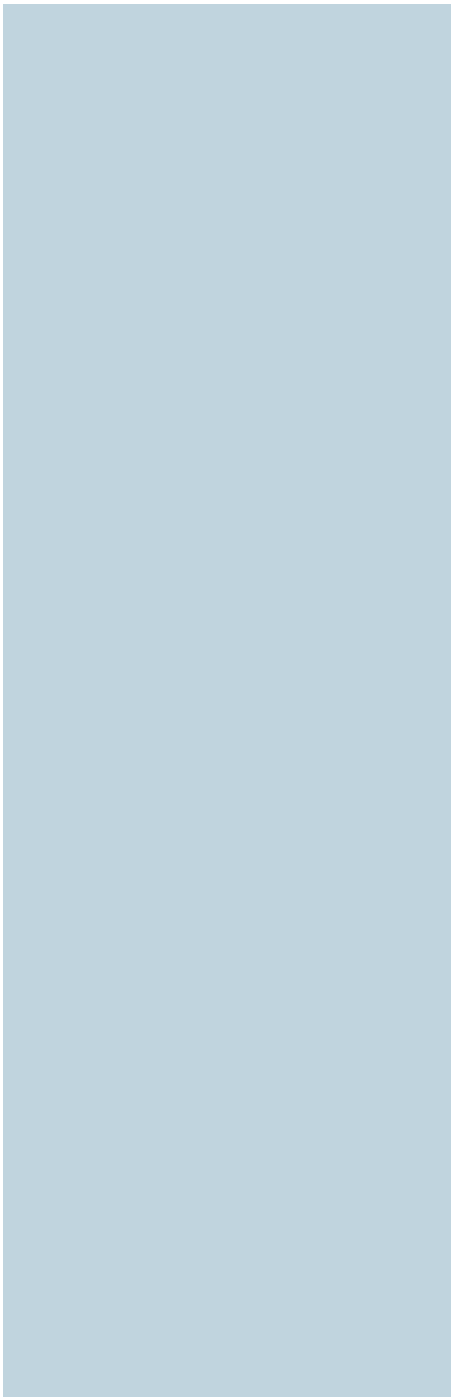


5. Any Additional Information as of the County May Request

RES has provided maps of the County-Owned Parcels [REDACTED]

[REDACTED] additional information as the County may request.

RES is happy to provide any



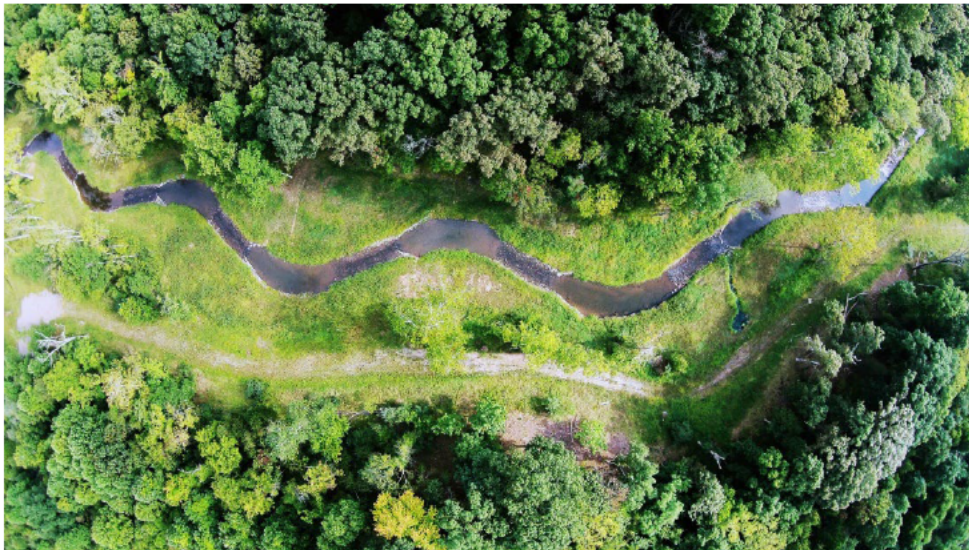
Appendix A / Project Experience



Appendix A / Project Experience

The Prince William Environmental Bank – P3 Contract for Stream Restoration

Prince William County, VA | Prince William County Department of Parks and Recreation



AT A GLANCE

Client Contact

Ben Eib | 703.792.6689
beib@pwcgov.org,
County Project Manager and Contracting
Point of Contact



Contract Period

- Start of contract: 2007
- Initial construction of James Long completed October 2013
- Ecological monitoring and construction maintenance ongoing until 2023
- No delays in actual completion as compared to scheduled completion

Project Highlights

- Only P3 of its kind in Virginia
- Extensive public outreach
- Two design-build stream restorations completed
- 12,534 LF restored to date
- 28,430 LF preserved to date

In 2007, RES partnered with the Prince William County Department of Parks and Recreation (PWC) to identify stream restoration and enhancement opportunities within 10 potential bank sites over 2,000 acres and 147,000 LF of parkland. RES established a **public-private partnership (P3) with PWC to enable stream restoration across the County at no cost to the County** by combining the benefits of stream restoration and preservation within the County Park system with the need for stream mitigation credits in the watershed. The Prince William Environmental Bank (PWEB) is the only P3 agreement of its kind in Virginia. All design, permitting, planning, and construction were implemented by RES.

INITIAL STREAM CONDITION ASSESSMENTS AND DESIGN FEASIBILITY STUDIES

RES performed comprehensive feasibility and needs assessment of streams within 10 PWC parks. Opportunities were identified to address stream degradation and improve water quality through the implementation of various natural stream design (NSD) techniques and stormwater BMPs, including bio-retention basins, infiltration trenches, riparian buffers, invasive plant controls, bank stabilization with natural materials, bankfull bench creation, root wads, and in-stream structures, such as log/rock vanes and step pools. For each of the 10 PWC Parks containing potential stream restoration sites, RES performed:

- WOUS Wetland Delineations and USACE Confirmation
- Perennial Flow Determinations
- Geomorphic and Resource Protection Area (RPA) Assessments
- Threatened and Endangered (T&E) Species Surveys (where required)

STATUS OF P3 IMPLEMENTATION

RES developed a Mitigation Banking Instrument (MBI) for PWEB, an umbrella bank, as well as Bank Development Plans (BDP) for sites included in Phase I of the project. RES received MBI approval from the Interagency Review Team (IRT) and has completed the construction of two of the identified projects. RES is currently developing a third project under this P3 agreement with PWC. Over 28,000 LF have been preserved within PWC parks.

- Locust Shade Park, Triangle, VA: Initial construction phase completed in May 2012, restored 5,160 LF of stream channel with overall preservation of 13,580 LF. Active maintenance and monitoring are ongoing.
- James S. Long Park, Haymarket, VA: Initial construction phase completed in October 2013, restored 7,374 LF of stream channel with overall preservation of 14,850 LF. Active maintenance and monitoring are ongoing.
- Forest Greens: preserved 8,081 LF.



JAMES LONG PARK STREAM RESTORATION

The most recent project completed under this program is a 7,374 LF stream restoration at James Long Park in Haymarket, VA. RES provided all design, permitting, and construction for the project, which was completed in October 2013. Within the park, 14,850 LF of streams and 109 acres of riparian buffer were protected by conservation easements, while 7,374 LF of impaired streams were restored.



Specific tasks provided by RES to PWC for this project:

- Conceptual & Final Stream Restoration Design
- Regulatory Approvals from State & Federal Entities Including VA DEQ & USACE
- Client and Stakeholder Coordination
- Construction
- Success Criteria Monitoring & Reporting (Ongoing)
- Required Maintenance (Ongoing)

Existing Conditions

Prior to restoration, stream channels at James Long Park were heavily degraded due to increased residential/commercial development within the watershed. Based on channel evolution scenarios, streams within the park were either Stage II (Disturbance) or Stage IV (Channel Widening) and were undergoing accelerated bank erosion and channel aggradation.



Assessment & Design

A detailed geomorphic survey was completed for Catharpin Creek and its associated tributaries. This investigation was coupled with a watershed assessment to determine baseline conditions onsite and a restoration strategy. As part of the geomorphic survey, a total of 34 reference cross-sections were surveyed and used to determine project-specific hydraulic geometry relationships, validate bankfull discharge estimates, and determine sediment entrainment calculations. Approximately 11,000 linear feet of longitudinal profiles were surveyed and used to determine design slopes, elevations, and planform changes for restoration.

All geomorphic and reference data was coupled with site-specific data of pedestrian trails and other user group features to complete the stream restoration strategy for the site. The final design included approximately 7,374 linear feet of channel restoration and other design features to enhance the ecological lift to the site. These included the creation of oxbow open water wetland features and floodplain wetland creation because of floodplain connectivity and changes in the groundwater elevation due to restoration. All restoration and floodplain construction was coupled with riparian vegetation re-establishment along with stream bank plantings to ensure long-term stability.

In addition to stream restoration, collaboration with park personnel enabled additional useful features such as trails and stream pedestrian crossings to be created from construction access roads and in-stream rock structures. This combined approach to the site has enabled greater user access and created additional amenities without cost to PWC.

Construction

During construction, RES performed erosion and sediment (E&S) control installation, inspection, and SWPPP development for NPDES/VPDES compliance, dewatering and pump around tasks, excavation, grading, and structure installation. The construction of this project included the installation of Offset Cross Vanes (55), Log Vanes (44), Plunge Pool (1), Cross Vanes (10), and Constructed Riffles (3), and several rootwads.



Monitoring & Maintenance

RES field ecology staff currently monitor James Long for compliance with success criteria required by the regulatory agencies. Annual reports are submitted to the DEQ and USACE. As of 2021, James Long is in the 8th year of its 10-year monitoring period and has met all success criteria. The project generated approximately 10,000 mitigation credits from a combination of restoration and buffer conservation efforts, and all have been released to date.



Cost

Within the PWEB project, the James Long restoration project restored 7,374 LF of the stream. The budget was \$1,450,000 for a design/build project. There were significant cost savings due to both the Design/Build procurement and the length of the project. As a design/build project, RES delivered the project on budget. No cost overruns were incurred by the client.

PUBLIC EDUCATION AND OUTREACH PLANNING

RES recognized the tight-knit communities that utilize and cherish the parks of Prince William County. Both the Locust Shade and James Long Park stream restorations took place in areas highly utilized by the public, especially the stream restoration in James Long Park, which is adjacent to Battlefield High School and contains several ball fields. Thus, RES understood its responsibility to develop quality, on-time restoration projects while remaining responsive to the needs and concerns of project stakeholders along the way.



During stream restoration at both Locust Shade and James Long Parks, Don Seaborn, RES Regional Vice President, met with interest groups to address concerns and offer information on why construction was occurring. This included trail groups, habitat enthusiasts, and concerned residents. Meetings occurred onsite to walk the stream and personally explain project logistics, as well as offsite at the regular meetings of concerned interest groups.

RES also developed multiple public resources to educate the community on stream restoration. RES recognized both an obligation to alleviate public concerns as well as an opportunity to educate the community on ecological restoration. Prior to construction activities at Locust Shade Park and James Long Park, RES posted onsite signage detailing the stream restoration project and directed the public to an online resource for more information. In conjunction, RES created online pages that presented the science of stream restoration. On this site, community members could view pictures of each project before, during, and after construction, as well as submit questions or concerns to RES or County staff directly.



During construction, RES made considerable efforts to minimize disturbance to park visitors as much as possible, and even improve park amenities whenever possible. Trail closures were kept to business hours as much as possible and updates were posted online as well as onsite. RES construction forces utilized existing trails for construction access, which limited the need to cut down trees to make a new path for equipment access. Of note, this practice often improved trails that were overgrown or had been washed away in areas. RES worked with the PWC trail specialists to plan access through areas with a larger percentage of small or dead trees, avoiding removing mature, healthy trees to the greatest extent possible. RES was present at several PWC Park Authority board meetings to explain project milestones. RES Principal Don Seaborn was present at these meetings in order to answer any questions posed by the board.

The picture at Left: Ribbon Cutting Ceremony for Completion of First PWEB Stream Restoration at Locust Shade Park, 2012 (from left to right): Lee Goodwin, Principal at RES; Tom Dombrowski, PWC Dept. of Public Works; Don Seaborn, Principal at RES; Maureen Caddigan, PWC Potomac District Supervisor; Brenda Gardziel, PWC Dept. of Parks Chairman of the Board; Marc Aveni, PWC Dept. of Public Works; Charles Williamson, PWC Dept. of Public Works; Debbie Andrew, PWC Dept. of Parks; Susan Roltsch, Assistant PWC Executive; and Tom Brune, PWC Dept. of Public Works.





Washington Golf and Country Club

Arlington County | Arlington County, Virginia

RES has delivered Total Maximum Daily Load (TMDL) credits to Arlington County, Virginia for their MS4 compliance using a full delivery project implementation process. The delivery of MS4 TMDL credits involved collaboration with a land partner, Washington Golf and Country Club (WGCC), to secure an easement for the stream restoration work and monitoring/maintenance grant of access for ten years following completion of construction. The property was chosen as a strong candidate for restoration due to the severely impaired conditions of the stream channel located on the property. Additionally, the stream channels located on the WGCC property were at the headwaters of Donaldson Run stream which was restored by Arlington County in previous years.

The stream restoration design and implementation involved raising the stream bed on average by 10 to 15 vertical feet. The stream had down cut in the valley and had lost connection to the floodplain. The stream channels had high rates of erosion along both banks, particularly where the channel had migrated into the valley walls, with some banks as tall as 15 plus feet. Additional significant erosion was occurring around the five culvert crossings located along the channel reach. The stream restoration project involved the restoration of the plan form, dimension, and profile to represent a stable B3 stream type with average riffle slopes of 3 to 6 percent with a combination of step pools and boulder cascades consisting of rock and wood. The stream restoration also provided a minimum 15-foot wetland floodplain bench on each side of the stream channel to provide frequent floodplain access. The restoration project also removed five (5) culvert crossings and replaced them with two-stream/floodplain span bridges.

AT A GLANCE

Client Contact

Jason Papacosma | 703.228.3613
jpapacosma@arlingtonva.us

Project Size

2,210 linear feet

Contract Period

March 2018 to September 2030

Project Highlights

- 2,210 linear feet of stream restoration
- 541 pounds of phosphorous reduction
- Additional 1,000 linear feet of stream channel restoration for WGCC
- Bio-retention basin installation



Pre-construction erosion



Post-construction



Whispering Hills Nutrient Bank

Loudoun County, VA | CBAY-VA, LLC



CBAY-VA, LLC (Sponsor), a wholly-owned subsidiary of RES, proposed to establish the Whispering Hills Nutrient Bank (Bank) to provide retail nutrient credits for application to stormwater management water quality requirements for point source and non-point source stormwater discharges.

AT A GLANCE

Client Contact

Ben Eubanks
General Manager, Mid-Atlantic
Beubanks@res.us

Contract Period

June 2021 – November 2021

Project Highlights

- First stream restoration-based nutrient bank in the state
- First to be approved under new regulations

The Bank is helping to achieve TMDL goals within the Potomac River watershed by completing stream restoration along targeted reaches of unnamed tributaries of Catoctin Creek, reducing sediment and nutrient loads, while improving the ecological function of the streams. The Bank encompasses 12.65 acres that are situated within the 338-acre Whispering Hills Farm property in northern Loudoun County, Virginia, and incorporates 5,840 LF of perennial stream channels with a minimum 35-foot wide forested buffer along both sides of the stream.

Stream restoration took place along portions of five tributaries, totaling approximately 4,070 LF. The remaining 1,770 LF of perennial stream channel within the Bank site are being incorporated to meet baseline practice requirements for a property containing a nutrient bank. The fully implemented restoration project is expected to deliver a minimum of 380 lbs/year of Total Phosphorus (TP) reduction (aka nutrient credits), along with the associated Nitrogen (N) and Total Suspended Solids (TSS) reductions.



Pre-Construction



During Construction



Pre-Construction

Historic land-use practices detrimentally affected the onsite streams through clearing and draining of riparian floodplain systems for grazing or crop production, leading to streambank instability and erosion, a lowering of the regional water table, an increase in downstream sediment and nutrient loads, and more frequent flooding from the separation of the streams and their historic floodplain.

The constructed Bank site has alleviated the previously degraded conditions of the onsite streams and riparian buffers within the watershed. The activities improved on-site and downstream water quality by decreasing bank erosion, in-stream sedimentation, and nutrient loading, and benefitting instream and riparian vegetation and wildlife habitat.



Post-Construction



Little Westham Creek / Gambles Mill Eco-Corridor Restoration

Richmond, VA | University of Richmond



AT A GLANCE

Client Contact

Grace LeRose | 804.646.0033
grace.lerose@richmondgov.com

Contract Period

10 years
Construction Completed: December 2019

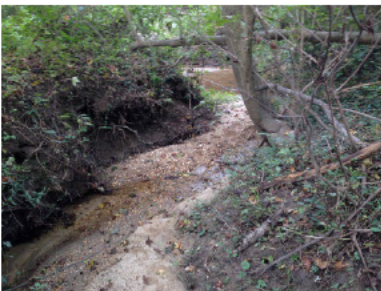
Project Highlights

- 2,300LF stream restoration
- Extensive invasive species program including the use of goats
- Extensive outreach to University students, professors, and staff
- Innovative floodplain / stream design
- Historical mill dam location with two outdoor classrooms for interpretation and education
- New paved walking/biking trail with landscaping and amenities

RES provided a turnkey project to deliver over 1,590 pounds of Total Phosphorous (TP) removal per year to the City of Richmond toward the City's Chesapeake Bay-related TMDL requirements. RES is also delivering 274 tons of Total Suspended Solids (TSS) and 3,452 pounds of Total Nitrogen (TN) per year. RES conducted all site surveys, credit calculations, design, permitting, construction, and post-construction monitoring. The project includes 10 years of post-restoration maintenance, monitoring, and inspections to ensure that the stream continues to provide nutrient and sediment removal.

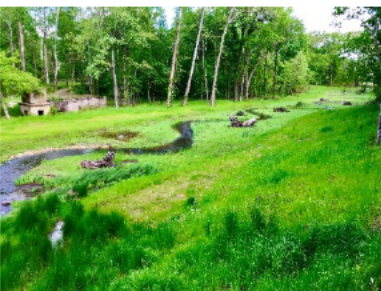


The restoration design and permitting required geomorphic assessments, BEHI evaluations, fish and benthic sampling, tree surveys, and wetland delineations. RES completed all permitting, including 401/404 permits and local land disturbance permits. RES prepared conceptual, preliminary, and final construction plans and completed construction of the stream.



The project has a 3.5 square mile urban watershed with a modern dam and lake immediately upstream that traps any bedload flowing downstream. As a result, RES took an innovative approach to restore this stream, focusing the design on baseflow. RES designed a smaller baseflow channel within an accessible floodplain. Any runoff generated by a storm with 1/4 inch of rain or more now spills out onto the adjacent floodplain, which traps sediment and nutrients and reduces hydraulic stress on the channel. The newly constructed floodplain is developing a diverse plant community to support stream health and wildlife habitat.

Prior to restoration, the channel was deeply incised with short riffles and deep scour pools. After restoration, the stream contains significantly more riffle habitat, typical of a healthy stream. Pre and Post Restoration fish sampling data has shown a shift from primarily pond species to minnow species that thrive in fast-moving streams.



In conjunction with the stream restoration, RES provided extensive invasive species management. As a unique feature of this vegetation maintenance, goats were used for the initial "hooves-on-the-ground" efforts. The herd grazed approximately ten acres of



forest that had been densely vegetated with non-native invasive plant species. The control program will extend for several years after restoration in order to protect the newly planted project.

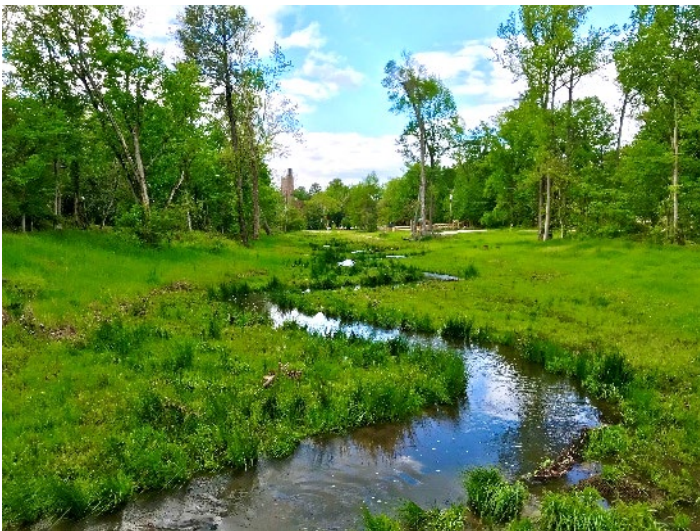
RES partnered with the University of Richmond, the landowner, to restore a ½ mile of stream and walking trail running through an underused section of the campus. RES worked with a subcontractor to create a Master Plan to design the paved trail with extensive landscaping and amenities, including a rain garden, pollinator meadow, additional mulch paths, and outdoor classrooms. One highlight of the project was the opportunity to use the site as a working classroom. RES hosted multiple classes where University of Richmond students learned about stream conditions, stream sampling, and native and invasive species.



Prior to the project, this site was known as the Gambles Mill corridor, but the actual location of the historical mill dam was not quite known. Another benefit of the project was uncovering and identifying the remnants of the historic mill dam. Portions of the dam were preserved, and RES built an outdoor classroom in the area to help interpret the history of mill dam construction, impacts on the stream (and dam-impacted streams in general), and the benefits of restoration. Overall, the University is developing a curriculum to utilize each of the outdoor classrooms and incorporate the stream as a “living laboratory;”.



The new trail system is also popular with the public community and is readily used by cyclists, joggers, walkers, etc. This project highlights the importance of maximizing the benefits of TMDL compliance-related projects by combining elements of habitat restoration with community connection and finding opportunities to share the history and potential of a once-forgotten stream.





Wancopin Creek Stream Restoration

Loudoun County, VA | Virginia Department of Transportation



AT A GLANCE

Client Contact

Joseph Parfitt, TMDL Project Manager | 804.339.4365

Joseph.Parfitt@VDOT.Virginia.gov

Project Size

- Phase I Construction: ~6,000 LF
- Phase II Construction: ~8,600 LF

Contract Period

2018-Present

Project Highlights

- Covers nearly 9 miles of streams, including 3 miles of Wancopin Creek
- Broker 4,300 lbs of Phosphorus reduction credit
- 16,195 linear feet of stream restoration
- Provides direct TMDL Solution to VDOT

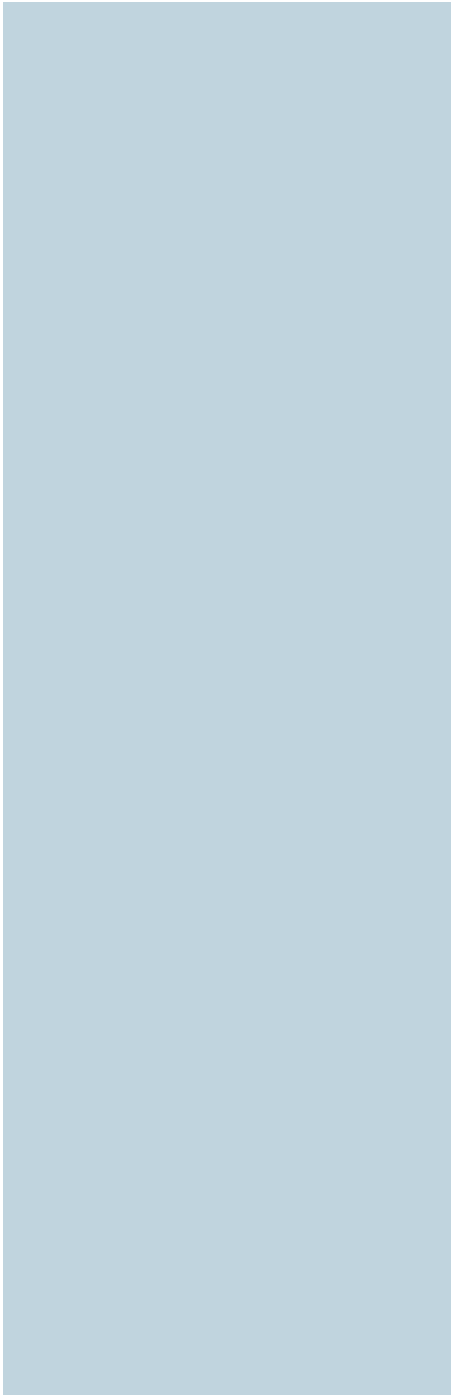
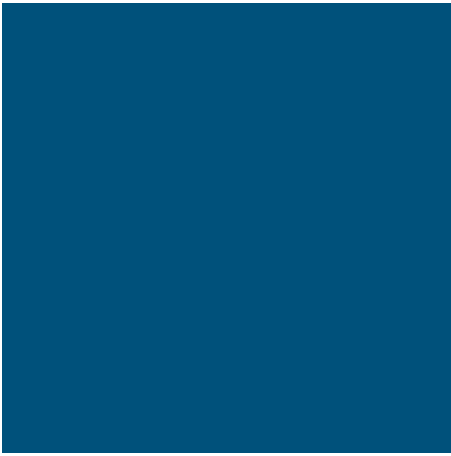
RES is providing an innovative turnkey stream restoration project on VDOT's behalf. The Project will be enrolled as part of VDOT's Bay TMDL Action Plan, with the associated nutrient reductions credited toward compliance with the Bay TMDL Special Conditions applicable to VDOT as a regulated MS4 under Virginia's MS4 General Permit Program. This project is being completed under RES' VDOT Statewide MS4 / TMDL Implementation & Related Activities On-Call Contract.

This project involves the restoration of approximately three miles of degraded channel along Wancopin Creek, as well as several unnamed perennial and intermittent tributaries to Wancopin Creek and Goose Creek. The project is located on a 900+ acre private property near Middleburg, VA. As the Project is situated on private land, RES has acquired all rights necessary to implement the Project and seek credit certification on behalf of VDOT. All of the remaining streams on the property are slated to be restored or preserved, as necessary, as part of a RES-owned stream mitigation bank that will generate credits to offset impacts authorized under Clean Water Act Section 401/404 permits.

All land acquisition, design, permitting, construction, monitoring, and maintenance work has or will be performed by RES. Design and permitting for phases I and II of the project are complete, as is the construction of phase I (~6,000 LF). Construction of phase II (~8,600 LF) is ongoing.

RES projects that the restoration work will deliver approximately 4,300 lbs per year of Total Phosphorus (TP) reduction using Protocol 1, which assesses the reduction of nutrient-laden sediment from stream bank and channel erosion, as outlined in the Expert Panel Report and TMDL Action Plan Guidance. Monitoring of the constructed reaches in phase I has demonstrated greater than 95% efficiency in terms of load reduction, significantly higher than the 50% default rate outlined in the Expert Panel guidance.





Appendix B / Key Personnel Resumes



Appendix B / Key Personnel Resumes



AT A GLANCE



Tara Kelly

Project Manager and Point-of-Contact

With 20 years of experience, Ms. Kelly manages and provides technical input and project management oversight for projects within RES' Regulatory Division, including wetland and stream mitigation, water quality, and ecological offset projects. Ms. Kelly has overseen the management of more than 100 wetland and stream mitigation bank sites and project-specific mitigation sites in the Mid-Atlantic region. For these 100+ mitigation projects, her responsibilities include oversight of site feasibility and design, landowner contract coordination, regulatory agency review and approval, compliance monitoring and reporting, and credit sale management. This involves a high level of coordination with the Interagency Review Team (IRT), which includes regulatory agencies such as the U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), Environmental Protection Agency (EPA), and the Department of Environmental Quality and Maryland Department of the Environment (DEQ and MDE). Ms. Kelly has managed the generation of over 45,000 mitigation credits.

Contact

tkelly@res.us | 571.489.0216

Years' Experience

20 years

Education

- Masters, Environmental Management
- BA, Environmental Studies

SELECT WORK EXPERIENCE

Prince William Environmental Bank – Locust Shade, Forest Greens, Andrew Leitch, and James Long Park Sites, Prince William County, VA

Regulatory manager for the development of stream mitigation bank known as The Prince William Environmental Bank (PWEB). PWEB is a public-private partnership between RES and Prince William County, VA to restore and preserve over 22 miles of stream channel in county public parks. For 10 selected park sites, oversaw mitigation feasibility analyses, T&E assessments, stream perennial flow determinations, wetland delineations, USACE confirmations, and conceptual stream design. Prepared mitigation banking documents and coordinated IRT approval of the overall mitigation banking instrument (MBI) and bank development plans (BDP) for three sites. To date, managed full development of three stream mitigation bank sites including Locust Shade Park (5,160LF restored) and James Long Park (7,215LF restored). Oversees annual monitoring reports to maintain compliance with regulatory agencies.

Wancopin Creek Stream Restoration, Middleburg, VA

Provides project management oversight for this innovative turnkey stream restoration project. The project will be enrolled as part of Virginia Department of Transportation's (VDOT) Bay TMDL Action Plan, with the associated nutrient reductions credited toward compliance with the Bay TMDL Special Conditions applicable to VDOT as a regulated MS4 under Virginia's MS4 General Permit Program. This project is being completed under RES' VDOT Statewide MS4/TMDL Implementation & Related Activities On-Call Contract. This project involves the restoration of approximately 15,000LF of significantly degraded reaches of stream channel located along Wancopin Creek, as well as several unnamed perennial and intermittent tributaries to Wancopin Creek and Goose Creek. Overall, almost seven miles of stream will be enhanced or restored. All land acquisition, design, permitting, construction, monitoring, and maintenance work has or will be performed by RES.

Statewide MS4/TMDL Implementation and Related Activities On-Call Contract, Statewide, VA

Provides project management oversight for a five-year, open-end contract with VDOT to provide technical services for the development and implementation of projects to meet applicable total maximum daily load (TMDL) action plans in support of VDOT's Municipal Separate Storm Sewer (MS4) Program. Anticipated projects include stream restoration, land cover conversion, shoreline stabilization, and other structural and non-structural stormwater management (SWM). Best Management Practices under this contract include ecological assessment, regulatory permitting, design, construction and construction oversight, and maintenance and monitoring services.

Master Service Agreement with Columbia Gas for Statewide Utility Projects, Various Locations, VA

Serves as senior project manager for a variety of projects throughout Virginia including liner pipeline replacements, facility expansions, installation of pipeline inspection gauge (PIG) apparatuses, and pipe protection projects. Specific tasks for these projects include, but are not limited to, on-site verification of site conditions and constraints, and development of project-specific erosion and sediment control plans in compliance with approved standards and specifications for linear projects. In



addition, studies including SWM plans, water quality impact assessments (WQIAs), and stream restoration plans were developed for unique projects.

Master Service Agreement for Environmental Consulting Services for Statewide Utility Projects, Various Locations, VA, NC, and WV

Overseeing Master Service Agreement (MSA) with Dominion Virginia Power since 2008. Key services provided include the full suite of environmental permitting services, such as feasibility studies, environmental constraints analysis, wetland delineations, USACE submittals and confirmations, T&E species reviews, CWA Section 401/404 permitting, erosion and sediment (E&S) control plans, Virginia Pollutant Discharge Elimination System (VPDES) construction activity permitting, VDOT construction entrance and aerial crossing permitting, stormwater pollution prevention plans (SWPPPs), and VPDES inspection services. To date, RES has conducted a combination of these services on over 400 individual Dominion projects, totaling over 500 miles of linear utilities across the state of Virginia.

Hull Springs Farm Mitigation Bank, Westmoreland County, VA

Project manager for management of stream and wetland mitigation bank owned by the Longwood University Foundation at its Hull Springs Farm site. The project entails 1,383LF of stream restoration, 2,845LF of stream enhancement, 3,238 of stream preservation, 26 acres of wetland restoration, 47 acres of wetland enhancement, and 105 acres of wetland and buffer preservation. Ms. Kelly is responsible for IRT submittals, coordination, and approvals; credit sale management; and coordination with the university, the foundation, and other relevant stakeholder groups, including the Virginia Institute of Marine Science (VIMS) and the Center for Excellence in Environmental Education (CE3).

Wetland and Stream Mitigation Compliance Manager, Multiple Sites, VA & WV

Responsible for supervision and direction of comprehensive success criteria monitoring program for all active mitigation sites managed by RES, presently consisting of approximately 75 individual sites totaling over 15 miles of stream channel and 300 AC of wetland mitigation. Management duties include coordination with project team members for monitoring results, agency reporting, and ensuring mitigation success. Of note, 52 of RES' permit-specific mitigation projects as well as one bank have met all success criteria monitoring requirements and have been closed out by the regulatory agencies. RES was responsible for all monitoring and maintenance of these mitigation sites.

Full Delivery Stream Restoration Services, Statewide, MD

Provides project management oversight to a total of 34,148LF of full delivery stream restoration projects. RES will be providing services on seven separate sites under this contract. For each site, RES is responsible for site selection, land acquisition, survey, design, permitting, construction, monitoring, and adaptive management in order to support the SHA's Chesapeake Bay restoration goals.

TMDL Credit Services, Prince George's County, MD

Provides project management oversight to provide TMDL credits to the Clean Water Partnership to help Prince George's County meet its MS4 permit goals. RES is providing full-delivery services including design, permitting, and construction. Two projects are currently being completed under this contract: the Crain Highway project which includes the design, permitting, and restoration of 2,556LF of the main stem Horse Tavern Branch (Reach 1) and along 1,064LF of an unnamed tributary to Charles Branch (Reach 2).

Water Quality Improvement Credits – Green Infrastructure Best Management Practices, Montgomery County, MD

Provides QA/QC and senior oversight for turnkey projects defined as green infrastructure BMPs, that will treat impervious surface acres, which are currently untreated or inadequately treated, and secure the greatest water quality credits per the Maryland Department of the Environment (MDE). Work under this contract includes but is not limited to, planning, design, permitting, and construction.

Full Delivery of Water Quality Improvements, Anne Arundel County, MD

Provides regulatory oversight to carry out the implementation of new water quality improvement practices; including design, permitting, construction, and maintenance on private properties throughout Anne Arundel County. These water quality improvement projects are eligible for water quality credits consistent with current MDE standards.



AT A GLANCE



Bailey Wilfong, LEED AP BD+C, PE

Lead Designer

As an Engineer IV with RES, Ms. Wilfong's primary responsibilities include preparing environmental impact, restoration, and grading plans. Additional responsibilities include stormwater hydraulic calculations and modeling, utility routing, erosion and sediment control plan development, and stormwater management design plan development.

Prior to joining RES, Ms. Wilfong provided on-site supervision during the construction of several large facilities, many of which included the implementation of various LID technologies, including permeable pavers and green roofs. During the time assigned to these projects, Ms. Wilfong has estimated competitively bid projects and budgeted negotiated contracts for projects up to \$17 million. Her roles have included take-offs, subcontractor bid evaluation and selection, and bid compilation.

SELECT WORK EXPERIENCE

Wancopin Creek Mitigation Bank, Middleburg, VA

Serves as project engineer for a CWA 401/404 stream mitigation bank that has been integrated with the larger Wancopin Creek Stream Restoration project with VDOT. The mitigation bank consists of 4,200LF stream restoration along with 285 acres of riparian buffer planting, enhancement, preservation, and cattle exclusion fencing.

Wancopin Creek Stream Restoration, Middleburg, VA

Serves as project engineer to provide an innovative turnkey stream restoration project. The project will be enrolled as part of VDOT's Bay TMDL Action Plan, with the associated nutrient reductions credited toward compliance with the Bay TMDL Special Conditions application to VDOT as a regulated MS4 under Virginia's MS4 General Permit Program. This project is being completed under RES' VDOT Statewide MS4/TMDL Implementation & Related Activities On-Call Contract. This project involves the restoration of approximately 15,000LF of significantly degraded reaches of stream channel located along Wancopin Creek, as well as several unnamed perennial and intermittent tributaries to Wancopin Creek. Overall, almost seven miles of stream will be enhanced or restored. All land acquisition, design, permitting (including a detailed FEMA floodplain study), construction, monitoring, and maintenance work has or will be performed by RES.

Design-Build Stream Restoration for Fort Belvoir National Museum of the United States Army (NMUSA), Fort Belvoir, VA

Providing grading and construction plans for the daylighting of a currently piped 205LF stream segment to fulfill the design-build stream restoration requirements associated with the construction of the NMUSA building.

Design-Build Phase II Rockfish River Corrective Action Plan, Nelson County, VA

Served as project engineer to provide field evaluation of existing stream restoration. Ms. Wilfong developed a corrective action plan that included grading, as well as erosion and sediment control (E&S) plans.

Possom Point Power Station Water Quality Impact Assessment and Stormwater Management Plan, Prince William County, VA

This project involved a shoreline stabilization treatment, and RES led the effort to assist the client with obtaining the necessary federal, state, and local permits for the project and its associated natural resource impacts. As a project engineer, Ms. Wilfong developed the Water Quality Impact Assessment (WQIA) for the impacts on the RPA along the Potomac, including a site-specific replanting plan, as well as a site-specific stormwater management plan.

Brandywine Automotive Water Quality Impact Assessment, Fairfax County, VA

Served as project engineer to develop a WQIA that included quantifying the impact and the restoration planting plan for an unauthorized impact made to the RPA along a stream in Fairfax County.

Hampstead Mitigation Site Phase 2 Environmental Services, Stafford County, VA

Provided full-spectrum engineering services for the restoration of 5,197LF of the stream that is broken into four reaches of varying sizes and flows. The stream was a riffle-pool system utilizing log and rock vane structures. Engineering services included grading; cut-fill balance; erosion and sediment control plans; and planting plans. The planting plans in addition to

Contact

bwilfong@res.us | 571.489.0276

Years' Experience

12 years

Education

- Professional Engineer VA, 0402057190
- Professional Engineer MD, 52852
- LEED AP BD+C
- Certified Sustainable Building Advisor, CSBA

Training and Professional Certifications

- Certified Permit-Required Confined Space Training
- Rosgen Level I
- Rosgen Level II
- Rosgen Level III



stabilization and stream bank planting included upland, wetland, and stream buffer enhancement planting covering a cumulative acreage of 15.9 AC. All work was done using features of AutoCAD Civil 3D.

Surry Power Station Dredge Management, Surry County, VA

Developed a preliminary conceptual stormwater management plan for the proposed Dredge Material Management Area facility in southeast Virginia, near the James River. The preliminary conceptual plan included the utilization of the Virginia Runoff Reduction Method spreadsheet.

Stream Restoration Design at Fort Belvoir for American Water Stream Crossings #2, 3, 4 & 6, Fort Belvoir, VA

Providing engineering services for the design of approximately 2,033LF of degraded coastal plain headwater streams at four separate locations within Ft. Belvoir. The project's primary goal is utility protection, but designs incorporated TMDL load reductions as well. Engineering services provided include grading plans and erosion and sediment control plans. Plan preparation was broken into three phases: Concept, Professional Engineering Plans, and Final Construction Drawings.

Design-Build Stream Restoration for Fort Belvoir Buildings 3245/3246, Fort Belvoir, VA

Providing grading and construction plans for an outfall retrofit and a segment of stream restoration to fulfill the design-build stream restoration requirements associated with the construction of Fort Belvoir Building 3245/3246 along Mason Run.

Master Service Agreement for Statewide Utility Projects, Various Locations, VA, NC, and WV

As a project engineer assists in designing erosion and sediment control master plans for inter-state utility lines. Other responsibilities include reviewing drainage systems and investigating access routes to minimize impacts. Prepared multiple construction access plans to ensure adequate sight distance in conformance with VDOT requirements and Maintenance of Traffic plans for work within VDOT right of ways.

Master Service Agreement for Statewide Utility Projects, Various Locations, VA

As a project engineer, provides engineering services for a variety of utility projects throughout Virginia including liner pipeline replacements, facility expansions, installation of pipeline inspection gauge (PIG) apparatuses, and pipe protection projects. Specific tasks provided include on-site verification of site conditions and constraints and development of project-specific erosion and sediment control plans. Develop erosion and sediment control plans based on specific construction standards for underground reconstruction and maintenance projects. Assist in stormwater management plans (SWM), water quality impact assessments (WQIA's), and stream restoration plans.

C. Milton Wright High School Stream Restoration, Bel Aire, MD

Serves as project engineer on a stream restoration project for the Harford County Department of Public Works. Providing design and permitting as part of a design-build contract with the County for the restoration of 3,644LF of incised and degraded channel.

Water Quality Improvement Credits – Green Infrastructure Best Management Practices, Montgomery County, MD

Served as the primary engineer on an approximately 12,000LF stream restoration design for Montgomery County, MD consisting of 1st, 2nd, and 3rd order streams along the headwaters of Broad Run, a direct tributary of the Potomac River. This project represents significant sediment and nutrient reductions with a possible total decrease of 1,400 tons of sediment, 1,490 pounds of Phosphorus, and 3,200 pounds of nitrogen annually from the Montgomery County MS4 jurisdictional area.



AT A GLANCE



Ben Eubanks

Overall QA/QC

As a general manager for RES' Mid-Atlantic team, Mr. Eubanks has extensive experience in the management and development of the annual operating plan by aggregating project forecasts, Capex, SG&A, and workforce inputs from functional leaders, and actively engaging stakeholders to achieve the plan. Ben and his team are responsible for the acquisition, entitlement, development, and long-term success of RES' portfolio of ecological offset solutions, which include mitigation and water quality. Moreover, he oversees the portfolio of properties to achieve the required risk/return objectives. Mr. Eubanks and his team navigate the regulatory process to ensure site adherence to the required performance standards and facilitate the long-term monitoring and management process for each of the mitigation and nutrient bank projects.

Mr. Eubanks was previously the Senior Manager of Financial Planning and Analysis within RES' Mid-Atlantic Region, responsible for overseeing the forecasting, budgeting, project financials, and opportunity evaluations (among other duties), for multiple complex stream and wetland mitigation banks, conservation banks, retail nutrient bank (Virginia-specific), and customized TMDL solution projects, including the following reference projects.

SELECT WORK EXPERIENCE

Wancopin Creek Stream Restoration. Loudoun County, VA

As part of a TMDL Implementation & Related Activities On-Call contract, Mr. Eubanks was responsible for program oversight on this approximately 15,000LF stream restoration project to reduce TSS, TP, and TN loads for VDOT's MS4 compliance. Services provided include BEHI/NBS field data collection and pollutant load calculations, hydrology and hydraulic studies, geomorphic stream assessments, stream restoration design, fish passage assessment, riparian corridor enhancements, and permitting.

Pike Branch Restoration, Fairfax County, VA

As part of a TMDL Implementation & Related Activities On-Call contract, Mr. Eubanks provided program oversight for this project involving the restoration of 4,000LF of urban stream channel to reduce TSS, TP, and TN load for VDOT's MS4 compliance. Services provided include BEHI/NBS field data collection and pollutant load calculations, hydrology and hydraulic studies, geomorphic stream assessments, stream restoration design, fish passage assessment, wetland restoration, and permitting. This project includes a detailed FEMA floodplain study as well as outreach to Fairfax County and local stakeholders.

Little Westham Creek Restoration/Gambles Mill Corridor Restoration, University of Richmond, Richmond, VA

Restoration of 2,300LF of urban stream channel for the City of Richmond's MS4 compliance. The project included surveys, master planning, credit calculations, design, permitting, invasive species control, construction, and post-construction monitoring. Mr. Eubanks was responsible for program oversight on this project.

Dewey's Creek (Phases 1 and 2) Stream Restoration. Prince William County, VA

This was an urban 6,220LF stream restoration project, which included brush toe bundles, coir matting installation, rock vane installation, and earthwork. Mr. Eubanks was responsible for program oversight on this project.

Contact

beubanks@res.us | 804.955.0330

Years' Experience

16 years

Education

- MBA, Finance
- BA, Management

Training and Professional

Certifications

- Project Management Professional (PMP)



AT A GLANCE



Ed Kabay *Permitting Lead*

Mr. Kabay applies nine years of ecology and regulatory specialization to his role as a regulatory specialist for RES. With expertise spanning stream and wetland ecology, herpetology, and environmental compliance, he leads the industrial stormwater to permit compliance sampling efforts and technical support for the wetlands program for the Directorate of Public Works (DPW) at Fort Belvoir. He has extensive experience conducting field surveys for impact assessment, developing management plans, and preparing habitat management reports. Prior to joining RES, Mr. Kabay was a researcher at the University of Maryland where he worked to assess and solve several natural resource issues.

SELECT WORK EXPERIENCE

Wetlands Permitting, Fort Belvoir, VA

Serves as a support contractor for the Fort Belvoir DPW Wetland Program, providing technical services for CWA Section 404 permit application preparation, mitigation design review, wetland delineations, field natural resource surveys, impact mitigation plan development, and compliance documentation. Coordinates management plans and report development for habitat improvement projects. Conducts natural resource, wetland, and stream surveys, and monitors construction projects for Waters of the U.S. impact permit compliance. Provides technical support for agency coordination and wetland delineation confirmation. Conducts field site visits for impact assessment and evaluation of potential habitat improvement.

Industrial Stormwater Permit Water Quality Sampling, Fort Belvoir, VA

Serves as project manager for Fort Belvoir's Virginia Pollutant Discharge Elimination System (VPDES) permitting compliance sampling at each of the 31 permitted outfalls located throughout the installation. Oversees biannual water quality sampling and quarterly visual inspections, and supports outfall investigations of pollutant benchmark exceedances through technical support and coordination with permitting agencies.

Stormwater Quality Sampling and Analysis for EPA Form 2F, Fort Belvoir, VA

Serves as project manager for technical services required under the Fort Belvoir VPDES permit to complete Environmental Protection Agency Form 2F at select outfalls throughout the installation. Coordinates sample collection, laboratory analysis, and result interpretation in accordance with all applicable laws and regulations.

Evaluation of Stormwater Runoff at Solid Waste Management Units (SWMU), Fort Belvoir, VA

Serves as project manager for technical services required to evaluate active SWMU deemed active under the Resource Conservation and Recovery Act's regulations and within the drainage areas of permitted stormwater outfalls.

Clean Water Act Natural Pollutant Background Level Investigation, Fort Belvoir, VA

Served as environmental specialist and provided technical services for a field investigation of natural background levels of potential pollutants present in drainage areas for stormwater outfalls throughout the investigation.

Permitting Projects

- Dawson Property | The Parada Group, Prince William County, VA
- Arden at McLean | Toll Mid-Atlantic LP Company, Inc., Fairfax County, VA
- Haymarket Bypass | Haymarket Landing, L.C., Prince William County, VA

Contact

ekabay@res.us | 571.489.0278

Years' Experience

9 years

Education

- MS, Environmental Science
- BS, Biology

Training and Professional Certifications

- VA Erosion and Sediment Control
- VA Stormwater Management
- Anti-terrorism Level I
- First Aid/CPR/AED



AT A GLANCE

Contact

ppitera@res.us | 412.249.2440

Years' Experience

22 years

Education

- BA, Environmental Sciences

Training and Professional Certifications

- Certified Professional Wetland Delineator, State of Virginia #3402 000070
- U.S. Fish & Wildlife Service-approved Small Whorled Pogonia (*Isotria medeoloides*) Survey Contact
- Rosgen Level I



Paul "PJ" Pitera

Ecologist Lead

As a senior project manager for RES, Mr. Pitera manages and provides technical input and oversight for projects within the firm's Field Ecology and Regulatory Divisions, including aquatic resource assessments, Chesapeake Bay Act compliance, threatened and endangered (T&E) species investigations, Clean Water Act (CWA) Section 401 and 404 permitting, and stream and wetland mitigation projects. He has extensive training and expertise in wetland delineation and permitting, wetland mitigation feasibility and design, and stream assessments and restoration. Mr. Pitera has experience developing and implementing assessment and monitoring programs involving the US Army Corps of Engineers (USACE) 1987 Manual procedures and the EPA's Rapid Bioassessment Protocols. He has over two decades of experience performing Rosgen stream classification, forest stand delineation, water quality sampling, macroinvertebrate and fisheries surveys, plant identification, soil sampling, and hydrologic assessments.

Mr. Pitera has successfully managed all aspects of a number of stream and wetland mitigation projects, including site feasibility and design, landowner contract coordination, regulatory agency review and approval, construction oversight, and compliance monitoring. His efforts represent more than 150 acres of wetland mitigation and 50,000 LF of stream mitigation.

In 2015, Mr. Pitera was appointed as the Braddock District representative on Fairfax County's Environmental Quality Advisory Council. In this role, Mr. Pitera provides professional insight on environmental issues impacting his community. In addition to this appointment, Mr. Pitera developed a class for the Engineers and Surveyors Institute (ESI) outlining Clean Water Act permitting and the mitigation process in Virginia, which he presented in 2015 and 2016.

SELECT WORK EXPERIENCE

Whispering Hills Nutrient Bank, Loudoun County, VA

Project manager to provide environmental and permitting services for a 13-acre, nearly 6,000LF, stream restoration project turned nutrient credit bank. Oversaw wetland delineation and jurisdictional confirmation from USACE, T&E database check, resource protection area (RPA) determination, and perennial flow determination. Oversaw NRIP completion and all local, state, and federal permitting required for the project. Mr. Pitera oversaw a cultural resource assessment that was performed by a subcontractor. Additional tasks provided by RES included VSMP (Virginia Stormwater Management Program) and VWP (Virginia Water Protection) permit compliance monitoring.

Ashwood Property Environmental Services, Prince William County, VA

Project manager to provide environmental and permitting services for 80-acre future data center site. The property holds three large buildings totaling 650,000SF. Oversaw wetland delineation and jurisdictional confirmation from USACE, T&E database check, RPA determination, and perennial flow determination. Oversaw all local, state, and federal permitting required for the project. Mr. Pitera oversaw a cultural resource assessment that was performed by a subcontractor. Additional tasks provided by RES included VSMP and VWP permit compliance monitoring.

Neabsco Mills Road Environmental Services, Prince William County, VA

Project manager to provide environmental consulting and permitting services for this three-acre commercial development site. Obtained general permit from DEQ, though a USACE permit was not necessary. Oversaw wetland delineation and jurisdictional confirmation from USACE, T&E investigation for Small Whorled Pogonia, and perennial flow determination. Additional tasks provided by RES included VPDES permit application, SWPPP development, and VPDES monitoring and reporting.

Manassas Corporate Center/Airport Gateway Project, Prince William County, VA

Project manager for environmental permitting for a commercial development and data center site encompassing 183 acres. Performed federal, state, and local permitting; wetland delineation and USACE confirmation; T&E investigation for Brook Floater mussel within Broad Run; historic resources investigation; water quality impact assessment (WQIA); preservation area



site assessment (PASA); and stream impact assessment. Coordinated with RES' Stormwater division for National Pollutant Discharge Elimination System (NPDES) and Virginia Stormwater Management Program (VSMP) permitting, including a SWPPP and inspections. The project obtained the necessary environmental permits.

Wancopin Creek Stream Restoration, Loudon County, VA

Project manager for restoration of approximately seven miles of degraded channel along Wancopin Creek, as well as several unnamed perennial and intermittent tributaries to Wancopin Creek and Goose Creek, as part of the VDOT Bay TMDL Action Plan. Mr. Pitera oversees all land acquisition, design, permitting, construction, monitoring, and maintenance work, all of which is performed by RES. The project has been issued a 404 permit, and RES has completed the design and an assessment of stream conditions supporting a site-specific crediting calculation for the project pursuant to the Expert Panel Report and TMDL Action Plan Guidance. The project is expected to yield between 2,205 and 3,748 lbs. of total phosphorous (TP) reduction.

Loudoun Center, Loudoun County, VA

Project manager for environmental consulting and permitting services associated with the commercial development of a 326 AC parcel. Oversaw fieldwork, interviews, and records review required to complete a Phase I environmental site assessment (ESA). The Phase I ESA identified any recognized environmental conditions in connection with the property, to the extent feasible pursuant to good commercial and customary practice, as set forth in the American Society for Testing and Materials (ASTM) publication *E 1527 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*. Additional tasks performed or supervised by Mr. Pitera included federal, state, and local permitting; wetland delineation and USACE confirmation; and T&E investigation. Currently overseeing construction monitoring for the portion of the site covered under the CWA permit, which was obtained by Mr. Pitera.

Fulks Run Wetland Mitigation, Rockingham County, VA

Served as project manager for the restoration of 10.14 acres of wetlands and the establishment of approximately 7.35 acres of forested upland buffer to derive wetland mitigation credits for the Virginia Aquatic Resources Trust Fund. Performed site feasibility analysis, including wetland delineation and USACE confirmation, and landowner contract negotiation. Directed the wetland restoration design by RES wetland specialists. Obtained all county and environmental agency permitting and approvals for the mitigation project and provided QA/QC for the site's construction by RES' Ecological Construction division. Currently coordinating long-term stewardship of the site and overseeing 10 years of project success monitoring and maintenance.

Warrenton Aquatic and Recreation Facility (WARF) Environmental Consulting, Warrenton, VA

Served as project manager responsible for all environmental permitting for the proposed community center and park project in Fauquier County, VA. Performed federal, state, and local permitting; wetland delineation and USACE confirmation; T&E investigation; WQIA; preservation area site assessment; and stream impact assessment. Oversaw historic resources investigation and coordinated with RES' Stormwater division for NPDES and VSMP permitting.

Woods at Warrenton Mitigation Bank, Fauquier County, VA

Administered the feasibility study and design of this 60-acre wetland mitigation bank and consolidated stream mitigation area serving the Potomac River watershed in Northern Virginia. Performed detailed vegetation and soil texture surveys and permeability analyses. Designed and implemented a comprehensive stream assessment protocol involving evaluation of the physical, chemical, macroinvertebrate, and fisheries components of 4,358LF of on-site perennial streams. Data were then used as the basis for the design of wetland mitigation cells, as well as the in-stream and riparian corridor restoration activities.



AT A GLANCE



Joe Caterino, PE

Engineer of Record

As a senior project manager with RES, Mr. Caterino manages water resource engineering projects for residential, commercial, industrial, and recreational developments. His involvement begins at site selection, where he works with a team of environmental specialists to define the environmental constraints of the property. Mr. Caterino prepares water quality plans to reduce non-point source pollutants by implementing conventional or low-impact integrated management strategies. He has experience drafting floodplain studies to obtain local and federal permits for work within a regulated floodplain or floodway.

Mr. Caterino has been an integral part of the design and construction management team for several wetland creation and stream restoration projects that provide mitigation to development projects with environmental impacts. Other management responsibilities include managing watershed management and planning studies, dam rehabilitation, erosion and sediment control design, floodplain studies including FEMA no-rise, CLOMR, and LOMR certifications, project bidding, on-site construction administration, and post-construction monitoring.

SELECT PROJECT EXPERIENCE

Wancopin Creek Stream Restoration, Middleburg, VA

Serves as project engineer to provide an innovative turnkey stream restoration project. The project will be enrolled as part of VDOT's Bay TMDL Action Plan, with the associated nutrient reductions credited toward compliance with the Bay TMDL Special Conditions applicable to VDOT as a regulated MS4 under Virginia's MS4 General Permit Program. This project is being completed under RES' VDOT Statewide MS4 / TMDL Implementation & Related Activities On-Call Contract. This project involves the restoration of approximately 15,000LF and the restoration of significantly degraded reaches of stream channel located along Wancopin Creek, as well as several unnamed perennial and intermittent tributaries to Wancopin Creek and Goose Creek. Overall, almost seven miles of stream will be enhanced or restored. All land acquisition, design, permitting, construction, monitoring, and maintenance work has or will be performed by RES.

Statewide MS4/TMDL Implementation & Related Activities On-Call Contract, Statewide, VA

Serves as project engineer for a five-year, open-end contract with VDOT to provide technical services for the development and implementation of projects to meet applicable total maximum daily load (TMDL) action plans in support of VDOT's Municipal Separate Storm Sewer (MS4) Program. Anticipated projects include stream restoration, land cover conversion, shoreline stabilization, and other structural and non-structural stormwater management (SWM). Best Management Practices under this contract include ecological assessment, regulatory permitting, design, construction, and construction oversight, and maintenance and monitoring services.

Individual projects completed to date include:

- Pike Branch Restoration, Fairfax County: Restoration of approximately 4,000LF of stream channel to reduce TSS, TP, and TN loads. Services provided include BEHI/NBS field data collection and pollutant load calculations, hydrology and hydraulic studies, geomorphic stream assessments, stream restoration design, fish passage assessment, wetland restoration, and permitting. This project includes a detailed FEMA floodplain study as well as outreach to Fairfax County and local stakeholders.
- Skiffes Creek, James City County: Served as project manager for the design, permitting, and implementation of a TMDL reduction project that incorporated a bio-swale surface runoff collection system in combination with the restoration of two degraded intermittent tributaries. The restoration of the tributaries resulted in significant functional uplift, including hydraulic, geomorphic, physicochemical, and biological properties. The realignment of the stream channel and adjustments to the stream channel dimensions reduced erosion and decreased the delivery of sediment and nutrient loads. The increase in floodplain connection improved hydrology to floodplain vegetation and reduced in-channel hydraulic stresses currently causing bank erosion. The bio-swale captures

Contact

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Years' Experience

25 years

Education

- BS, Civil Engineering

Professional Engineer

- VA, 035242; MD, 28756; PA, 080339

Training and Professional Certifications

- Rosgen Level I-III
- Advanced Stream Restoration Design Principals – North Carolina Stream Restoration Institute
- NSCD Stream Restoration Construction Management Workshop – Canaan Valley Institute
- Rivermorph Stream Restoration Software Training – Pilot View Resource and Conservation Development, Inc.



sheet flow runoff from the adjacent impervious surfaces to provide additional nutrient reduction and peak flow retention.

Full Delivery TMDL, Arlington County, VA

Serves as project manager for full delivery stream restoration and BMP retrofit projects for TMDL credits. RES has delivered TMDL credits to Arlington County, Virginia for their MS4 compliance using a full delivery project implementation process. The delivery of MS4 TMDL credits involved collaboration with a land partner, Washington Golf and Country Club (WGCC), to secure an easement for the stream restoration work and monitoring/maintenance grant of access for 10 years following completion of construction. The property was chosen as a strong candidate for restoration due to the severely impaired conditions of the stream channel located on the property. Additionally, the stream channels located on the WGCC property were at the headwaters of Donaldson Run stream which was restored by Arlington County in previous years.

The stream restoration design and implementation involved raising the stream bed on average by 10 to 15 vertical feet. The stream had down cut in the valley and had lost connection to the floodplain. The stream channels had high rates of erosion along both banks, particularly where the channel had migrated into the valley walls, with some banks as tall as 15 plus feet. Additional significant erosion was occurring around the five culvert crossings located along the channel reach. The stream restoration project involved the restoration of the plan form, dimension, and profile to represent a stable B3 stream type with average riffle slopes of 3 to 6 percent with a combination of step pools and boulder cascades consisting of rock and wood. The stream restoration also provided a minimum 15-foot wetland floodplain bench on each side of the stream channel to provide frequent floodplain access. The restoration project also removed five culvert crossings and replaced them with two-stream/floodplain span bridges.

Watershed Management Planning, James City County, VA

Served as project manager for the watershed planning contract for James City County. Work under this contract included baseline watershed assessment to quantify the land uses and impervious areas; inventory and assessment for stream corridors based on stream and floodplain stability and habitat conditions; assessment of existing stormwater management practices; and development of pollutant loading models. Utilizing the baseline assessment data, a decision support system was developed to provide guidance for implementation projects. Watershed management plans were prepared to document the recommended implementation projects and to establish watershed goals and strategic actions. The watershed management plans are a valuable tool for the County staff to assist with planning future development, identifying hot spots, implementing better site design protocols, providing watershed education, and identifying potential implementation projects for TMDL reductions.

Maymont Park, Richmond, VA

Completed a master stormwater management plan for the Maymont Foundation to review current water quality and quantity conditions and assess future sustainable treatment options. The modeling efforts involved the Runoff Reduction Method (RRM) and Watershed Treatment Model (WTM). The RRM modeling results confirmed the need for treatment practices to meet the Virginia Stormwater Ordinance for redevelopment activities. The WTM confirmed the results of water quality grab samples that showed excessive phosphorous, nitrogen, and fecal coliform levels in the receiving on-site streams. The additional design included a water quality treatment train involving a permeable paved parking lot bio-retention basin that drains to a regenerative step-pool storm conveyance system. The water quality improvements also involved the creation of on-site wetlands which will serve as an educational training center for Maymont Park. The work was supported by a National Fish and Wildlife (NFWF) grant that was coordinated by the Maymont Foundation.

Baptist Run Stream Restoration Project, York County, VA

Recently completed the design of 1,450LF of Priority 1 stream restoration in a coastal plain physiographic region for the Lee Hall reservoir watershed. The existing stream was severely degraded due to historic alteration of the channel and increased imperviousness in the watershed. The stream channel was restored to a natural Rosgen 'E' type stream channel utilizing local reference stream reach data. One of the many goals the stream restoration project accomplished was the preservation of as much of the forested floodplain as possible while achieving the desired stream pattern. The majority of the trees that were cleared for the project were used for the bio-engineering stabilization practices. The stream restoration project provided compensatory mitigation for the Lee Hall Reservoir Dam and improved the overall water quality to the Newport News Reservoir by reducing sedimentation and subsequent phosphorous and nitrogen loads.



Reid Cook

Technical Design Advisor

As stream restoration design manager for RES, Mr. Cook manages and provides technical expertise and personnel supervision for projects related to stream restoration design, implementation, and monitoring. His specific responsibilities include overall project management; preparation of natural channel design (NCD) stream restoration and mitigation plans; stream geomorphic condition surveys; stream attribute and condition assessments; construction administration and supervision of stream restoration projects; stream monitoring to evaluate project success criteria; and working with regulatory agencies, such as the U.S. Army Corp of Engineers (USACE) and Virginia Department of Environmental Quality (DEQ).

Mr. Cook has designed and/or managed over 65 stream restoration projects totaling approximately 336,000LF. These projects have provided over 150,000 mitigation offset credits and approximately 9,000 nutrient reduction credits. He has performed over 1 million LF of stream channel assessments including habitat and biological evaluation, restoration potential and feasibility, and credit. He has conducted all levels of geomorphic assessments and completed comprehensive surveys on numerous projects that encompass different stream types across several states and physiographic regions. Lastly, he has managed over 45,000LF of stream restoration construction projects that have ranged from bank stability/ bioengineering to full-scale channel relocation.

Mr. Cook has extensive professional training in Rosgen, stream restoration construction, advanced stream restoration design, and RiverMorph courses. He also has expertise in the development, implementation, and reporting of multi-faceted stream research studies, aquatic macroinvertebrate identification, EPA rapid bioassessment protocols, and the identification and resolution of water quality issues.

SELECT PROJECT EXPERIENCE

Prince William Environmental Bank, Prince William County, VA

Conducted initial site identification, preliminary mitigation feasibility analyses, habitat assessments, stream perenniality flow determinations, wetland delineations, and a stream restoration ecological suitability evaluation for 10 county park sites consisting of approximately 1,800 acres and 100,600LF of stream channel affected by urban land use. Evaluated potential locations for stream restoration and enhancement, preservation opportunities, alternative design approaches, and limits of protective buffers for stream corridors. Have prepared concept and final designs for two completed PWEB projects including Locust Shade Park and James Long Park, which involved 5,160LF and 7,215LF of stream restoration, respectively. Oversaw construction for both projects.

James Long Stream Restoration, Prince William County, VA

Stream designer for restoration design for 7,215LF of the stream channel. Conducted detailed survey and collected upstream reference reach geomorphic and sediment data, which were used in NCD of all on-site restoration reaches. Coupled NCD dimensionless ratios and reference reach data with near bank stress, critical shear stress, stream incision, and bank erosion hazard potential data as part of the final design. Oversaw construction. Currently oversees monitoring and maintenance.

Locust Shade Stream Restoration, Prince William County, VA

Stream designer for restoration design for 5,160LF of the stream channel. Conducted detailed survey and collected upstream reference reach geomorphic and sediment data, which were used in NCD of all on-site restoration reaches. Coupled NCD dimensionless ratios and reference reach data with near bank stress, critical shear stress, stream incision, and bank erosion hazard potential data as part of the final design. Oversaw construction. Currently oversees monitoring and maintenance.

Master Service Agreement (MSA), Statewide, VA

Contract manager for MSA with Columbia Gas of Virginia to provide environmental consulting and restoration services for a variety of gas utility projects throughout Virginia. Notable projects completed to date include the protection of two shallow main utility lines located in stream channels: 2455 Sherwill Line and 2777 Sherwill Line. For these projects, both located in

AT A GLANCE

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Years' Experience

18 years

Education

- MS, Aquatic Ecology
- BS, Environmental Science – Aquatic Resources

Training and Professional

Certifications

- Rosgen Level I-IV
- Advanced Stream Restoration Design Principles – North Carolina Stream Restoration Institute
- NSCD Stream Restoration Construction Management Workshop – Canaan Valley Institute
- Rivermorph Stream Restoration Software Training – Pilot View Resource and Conservation Development, Inc.



Lynchburg, VA, the general scope of work included the design of adequate pipe protection with articulated concrete blocks and associated stream restoration to ensure long-term stability of the channel crossing. In addition to managing both projects, Mr. Cook developed stream restoration design plans and provided construction oversight for quality assurance. A total of nine projects have been completed under this project; seven in Lynchburg, VA, and two located in Harrisonburg, VA.

Hull Springs Farm Mitigation Bank, Westmoreland County, VA

Provided stream assessment and final design services to this stream and wetland mitigation bank located on the 200-acre property associated with Longwood University. Original concept plans approved by the IRT dictate that the bank will provide 1,238LF of stream restoration, 3,202LF of stream enhancement, 3,357 of stream preservation, 26.5 acres of wetland restoration, and 47 acres of wetland enhancement, and 95.88 acres of wetland preservation. Generated final stream plans and oversees construction, which is being provided by RES in phases. As this bank is intended for educational as well as ecological purposes, Mr. Cook will lead student outreach efforts to incorporate the restoration and associated data into the relevant curriculum.

The Potomac Regional Environmental Bank (Caeli Farm), Aldie, VA

For Phase I, completed the final design plans at Caeli Farm for approximately 3,400LF of Priority II, III, and IV stream restoration and 23 acres of riparian buffer reestablishment on Hungry Run, as well as 1,224LF of Priority I restoration on an un-named tributary of Little River. Conducted detailed surveys and collected upstream reference reach geomorphic and sediment data, which are used as the major component for the natural channel design (NCD) employed in all on-site restoration reaches. Coupled NCD dimensionless ratios and reference reach data with near bank stress, critical shear stress, stream incision, and bank erosion hazard potential data as part of the final design. Phase II of this project required the assessment, design, and construction oversight of an additional 6,800LF of the channel. The design included Offset Cross Vanes (8), Rock Vanes (6), Constructed Riffle with Wood (2), Log Vanes (36), Constructed Riffle (3), and several rootwads.

Stream Mitigation Design and Construction Oversight for Multiple Clients, Multiple Sites, VA and WV

As senior stream specialist, provided initial mitigation feasibility studies, existing conditions assessments, stream perennially flow determinations, and restoration design, permitting, and construction oversight for the following example stream projects:

- Locust Shade Park Stream Restoration, Prince William County, VA (5,160LF)
- James Long Park Stream Restoration, Prince William County, VA (7,215LF)
- Wedderburn Stream Restoration, Vienna, VA (300LF)
- Reids Prospect Phase I and II Stream Mitigation, Loudoun County, VA (1,500LF)
- Linton Crest Stream Mitigation, Loudoun County, VA (>2,000LF)
- Luck Stone Sycolin Creek Stream Mitigation, Loudoun County, VA (>1,700LF)
- Hidden Creek Stream Mitigation, Loudoun County, VA (>3,000LF)
- Villages at Rippon Lodge Mitigation at Suffield Meadows, Fauquier County, VA (5,000LF of perennial and intermittent stream channels and riparian buffer; 8 acres of wetlands)
- Route 28/Nokes Boulevard Interchange Mitigation, Fauquier County, VA (2,230LF)
- Route 28/Frying Pan Road Interchange Mitigation, Fauquier County, VA (2,195LF)

TMDL Credit Services, Prince George's County, MD

Serves as contract manager to provide TMDL credits to the Clean Water Partnership to help Prince George's County meet its MS4 permit goals. RES provided full-delivery services including design, permitting, and construction. These projects restored over 27,000LF of degraded streams, generated over 568 equivalent impervious acres (EIA) credits, and resulted in approximately 2,900 pounds of phosphorus, 2,800 tons of sediment, and 9,500 pounds of nitrogen reductions. Four projects have been completed under this contract:

- Crain Highway: 4,695LF of stream restoration that generated 93.90 EIA credits
- Hillmeade Site: 2,862LF of stream restoration that generated 79.86 EIA credits
- Black Swamp Creek: 14,811LF of stream restoration that generated 296.21 EIA credits
- Tributary to Mattawoman: 4,926LF of stream restoration that generated 98.53 EIA credits



Laura Sokol
Landscape Architect

As a designer for RES, Ms. Sokol assists the design and engineering teams on wetland and stream restoration design projects. Her role requires site visits, coordination with project managers, and preparing construction plan submittals and impact plans to state and federal agencies as required. Ms. Sokol assists with client coordination; technical development of projects involving grading, runoff reduction calculations, and water budgets for wetland projects; development and mapping graphics in AutoCAD; and finalization of construction plans for submittals.

AT A GLANCE

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Years' Experience
8 years

Education
• BS, Landscape Architecture

Training and Professional Certifications
• Professional Landscape Architect, Virginia
• Certified Arborist

SELECT WORK EXPERIENCE

Washington Golf & Country Club Stream Restoration, Arlington, VA

Conducted tree inventory throughout the site, identified tree species, collected DBH, and determined the health conditions of the trees. Utilized this information in the WQIA (Water Quality Impact Assessment) submittal requirement for Arlington County and determining tree removal/replacement calculations. Developed the planting plan and proposed herbaceous, grass, and woody material for the project.

Statewide MS4/TMDL Implementation & Related Activities On-Call, Statewide, VA

Serves as a designer for a five-year, open-end contract with the Virginia Department of Transportation (VDOT) to provide technical services for the development and implementation of projects to meet applicable total maximum daily load (TMDL) action plans in support of VDOT's Municipal Separate Storm Sewer (MS4) Program. For multiple projects under this contract, Ms. Sokol created the construction plan set in AutoCAD, determined areas for planting zones and pulled together planting schedules, determined temporary and permanent impacts to wetlands and streams, and developed plan and section rendering for public presentations.

Gambles Mill Eco-Corridor Restoration Project, Richmond, VA

Assisted in various phases of this stream restoration project. Initially, Ms. Sokol helped conduct an existing tree survey along the stream corridor to evaluate tree conditions pre-construction. Additionally, she assisted stream designers in construction document development and helped coordinate tasks with vendors and sub-consultants. During construction, she met with university staff, sub-consultants, and contractors to coordinate the trail portion of the site.

Keaton Property Wetland Restoration, Mitigation Sites for Multiple PRMs, Fauquier County, VA

Assisted senior scientists and soils scientist with the on-site investigation of existing wetlands on an agricultural property for wetland restoration potential. Developed concept plans and the entire construction document set for the project including technical development such as stakeout plan, grading, proposed profiles, and water budget input and output determinations.

George Washington Village Stream Restoration and Stormwater BMP, Fort Belvoir, VA

Assisted engineers in developing the construction plan set for multiple submittals. Developed E&S control plans that adhere to the *Virginia Erosion and Sediment Control Handbook*. Developed the planting plan and species selection for the various habitats for the proposed restoration. Worked on various other plan-set components including sheet set development.

Hayfields Farm Wetland Restoration, Mitigation Site for the Atlantic Coast Pipeline, Highland County, VA

Assisted senior scientists and soils scientist with the on-site investigation of existing wetlands on an agricultural property for wetland restoration potential. Developed concept plans and the entire construction document set for the project including technical development such as stakeout plan, grading, proposed profiles, and water budget input and output determinations.

Greening DC Streets Illustrative Manual, District of Columbia

While at AMT Engineering, Ms. Sokol worked on a team that developed a manual for the District Department of Transportation (DDOT) that conveyed opportunities for innovative stormwater management practices throughout various neighborhoods of Washington D.C. The initial development of the project involved an overall field assessment of the district that looked at areas for opportunities within existing and future stormwater facilities. The final deliverable provided the



DDOT with different approaches they could use for implementing more sustainable practices through an informative illustrative manual.

Forest Stand Delineation, Various Locations, MD

Conducts forest stand delineations for numerous stream restoration and/or development projects in Montgomery and Prince George's Counties. Provides inventory for specimen trees and trees to be impacted by construction. Collects other pertinent forest data used for county submittals.

Western Maryland Rails to Trails, Allegheny County, MD

While at AMT Engineering, Ms. Sokol assisted on the Western Maryland Rail-Trail project in Allegheny County, MD. The National Park Service, owner of the 4.5-mile defunct segment, contracted AMT Engineering for trail design, permitting, and project management services. She helped with the construction plan development and permitting aspects of the project which entailed right-of-way access permits, ADA compatibility, and overall construction plan development.

Jurisdictional Waters of the US Determinations, Various Locations, VA & MD

Delineates wetlands and conducts perennial streams determinations according to federal and state protocols for various projects throughout Maryland and Virginia including:

- Knox Avenue and Back River Neck Road – Baltimore County, MD
- Wheaton-Claridge Park, Montgomery County, MD
- SAARC Brandywine, Prince George County, MD
- Oxford Conservation Park, Talbot County, MD
- Odenton Amtrak, Odenton, MD



AT A GLANCE



Wesley Tweedy, EIT

Construction Oversight

Mr. Tweedy serves as the Virginia Operations Manager with RES. In this role, he oversees all ecological construction projects in Virginia. Projects include stream restoration, wetland construction, shoreline stabilization, and bioretention facility construction for public and private sector clients. His specific responsibilities include but are not limited to project managers and construction administrators oversight; field crew oversight; budget and schedule management; equipment and resource allocation; and mobilization prioritization and coordination.

Prior to serving in the role of Virginia Operations Manager, Mr. Tweedy served as a project manager. In this role, his responsibilities included, but were not limited to contract and subcontract preparation and review; coordination with subcontractors, vendors, and clients; review of job costs to ensure quantities and resources are claimed correctly; invoice management; and change order estimation and preparation.

Prior to serving as a project manager, Mr. Tweedy acted as an environmental specialist for RES. In this role, he was responsible for erosion and sediment control inspections and other stormwater compliance tasks associated with the Virginia Stormwater Management Program (VSMP). Of note, he assisted in the management of an erosion and sediment control maintenance crew on a 65-mile-long transmission line owned by Dominion Power.

SELECT WORK EXPERIENCE

Statewide MS4/TMDL Implementation and Related Activities On-Call Contract, Statewide, VA

Mr. Tweedy serves on the RES construction team as operations manager for a five-year, open-end contract to provide technical services for the development and implementation of projects to support VDOT's MS4 Program. He managed the following individual projects in addition to his programmatic construction operations oversight responsibilities:

- **Pikes Branch Restoration:** Restoration of approximately 4,500LF of the urban stream channel. Services provided include oversight and management of construction phases of the project. The design included addressing the condition and repair of 21 stormwater outfalls. RES provided weekly coordination between design staff and construction crews.
- **Wancopin Creek Stream Restoration:** Turnkey stream restoration project of approximately 15,000LF of restoration on significantly degraded reaches, and overall almost seven miles of stream will be enhanced or restored. All land acquisition, design, permitting, construction, monitoring, and maintenance work has or will be performed by RES.
- **Lake Ridge Restoration:** Restoration of approximately 700LF of the stream channel. Implementation was completed in 2019. Currently under monitoring.

Wetland and Stream Monitoring and Maintenance Open-End Contract, Statewide, VA

Construction operations manager for corrective action plan implementation and remedial construction for VDOT's existing stream and wetland project-specific mitigation sites. The contract was a \$3M, open-end contract. Mr. Tweedy's role included budget oversight, construction staff allocation, equipment and crew resource management, and technical problem-solving expertise. Example individual projects completed with Mr. Tweedy in an operational capacity include the following:

- Rockfish River Phases I&II Corrective Action Design and Implementation, Nelson County, VA
- I-85 Stream Restoration, South Hill, VA

Stream Restoration Construction for American Water Sites 1, 5, 7 & 8, Fort Belvoir, VA

Project manager to provide stream restoration and related construction services for four American Water sites on Fort Belvoir (Sites #1, 5, 7, and 8). Work will involve the restoration and protection of existing utilities around three streams and one sloped area. Once remaining permits were obtained by American Water for these projects, RES began stream restoration

Contact

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Years' Experience

18 years

Education

- BS, Civil Engineering

Training and Professional Certifications

- Registered Land Disturber Certification (RLD), VA Department of Conservation and Recreation, Certification # RLD06839
- VDOT Intermediate Work Zone Traffic Control Training and Flagger Certification
- VDOT Erosion & Sediment Control Contractor Certification
- CPR/ First Aid Certification
- Confined Space Certification
- General Mineral Miner Certification #9022604
- OSHA 30 Hour Construction Safety & Health Certification #600055593
- Engineer in Training (EIT) Certification



construction. Project management tasks included schedule and budget compliance, client coordination, equipment mobilization, crew and installation oversight, and safety compliance.

Arlington National Cemetery Stream Restoration, Arlington, VA

Mr. Tweedy served as the construction phase project manager for urban stream restoration construction services at Arlington National Cemetery. This highly visible project in conjunction with the Millennium Expansion Project developed approximately 27 acres to increase burial space. Oversaw restoration of 1,920LF of degraded stream channel on cemetery property, as well as 165LF of impaired channel and outfall remediation at an offsite location behind the National Park Service building. Due to the project's sensitive placement in Arlington National Cemetery, the project required innovative strategies for equipment access, professional and respectful crew members, strict safety protocol, and efficient project progress for on-time completion. Mr. Tweedy oversaw coordination with several large entities including the US Army Corps of Engineers (project owner), Forrester Construction (prime contractor for Millennium Project), various engineering firms, and The National Park Service (Landowner for Chaffee Place site).

Hull Springs Farm Mitigation Bank, Westmoreland County, VA

Served as construction phase project manager for the development of stream mitigation bank and nutrient credit generation owned by the Longwood University Foundation at its Hull Springs Farm site. The project entailed 238LF of stream restoration, 3,202LF of stream enhancement, 3,357LF of stream preservation, 26.5 acres of wetland restoration, 47 acres of wetland enhancement, and 95.88 acres of wetland preservation. Managed staff operations, oversaw the implementation of major tasks, ensured budget and schedule constraints were met, and coordinated closely with the client and designer.

Pohick Creek at Queen Victoria Stream Restoration, Fairfax County, VA

Provided operational oversight on 3,330LF of stream restoration of the Pohick Creek in the Braddock District of Fairfax County. RES provided operational services that included, but were not limited to, stream restoration for Pohick Creek and unnamed tributaries; removal and replacement of two pedestrian bridges; 36-inch diameter RCP storm sewer; demolition; excavation; fill; and landscape planting. Stream restoration structures included: modified cross vanes, combination rock sills/pedestrian crossings, riffles, boulder riffles, step pools, armored step pools, imbricated rock walls, reinforced bed material, wetland/floodplain habitat logs, in-stream wood debris, in-stream habitat log sill, and toe logs. The overall goal was to reduce erosion, protect private property, perform assets protection of a sanitary line, and improve water quality.



Mason Lee-Bullock

Environmental Health, Safety, and Security Specialist

As an EH&S specialist, Mr. Lee-Bullock is responsible for the design, implementation, and management of accident prevention, loss mitigation, and internal and external safety requirements for RES and its clients. Mr. Lee-Bullock is responsible for ensuring safe work practices in ecological construction, erosion and sediment control inspection, and ecological consulting settings to reduce or eliminate occupational injuries, illnesses, deaths, and financial losses. The position is both strategic and tactical in nature, supporting activities in multiple locations and customer facilities.

In this role, he works closely with RES' corporate EH&S officer and senior management, and representatives from various company departments. He conducts research and performs investigations for the purpose of identifying, abating, or eliminating sources of pollutants or hazards that affect the environment or health of the population. He utilizes knowledge of various scientific disciplines to collect, synthesize, study, report, and act based on data derived from measurements or observations of air, soil, water, noise, etc.

Mr. Lee-Bullock serves as the regional first aid, AED, and CPR instructor. On a day-to-day basis, he conducts internal safety inspections and site assessments of regional job sites; tracks safety deficiencies; and generates reports.

AT A GLANCE

Contact

mleebullock@res.us | 443.822.3175

Years' Experience

6 years

Education

- BS, Environmental Science, and Policy

Professional Certifications

- Certified Safety Professional
- Certified Hazardous Materials Manager
- OSHA 511
- HAZWOPER 40 Hour Certified
- OSHA 30 Hour Construction
- First Aid/CPR/AED Trainer



Paul D. Quinlan,
Partner, CAP Land Surveying, PLLC
Surveying & Permitting Lead

Mr. Quinlan has 29 years of experience, including 23 years working in Northern Virginia. His surveying experience includes the preparation of boundary, ALTA, plats, and topographic surveys for numerous properties in Northern Virginia and Maryland, ranging from single residential lots to undeveloped acreage parcels, retail centers, office parks, and military bases, public schools, and large scale planned urban development parcels.

His survey stakeout experience includes the coordination of small and large-scale residential and commercial projects, corporate office buildings, retail centers, multifamily residential subdivisions, public/private schools, and highways.

Mr. Quinlan began surveying in 1990, and since has held many positions both in the field and the office including Draftsman, Party Chief, Survey Technician, Plant Manager, and Survey Manager, he recently left Urban, LTD in Annandale, VA, where he managed the daily operations of the survey department, as well as heading up the GIS department where he provided over three hundred GIS studies for engineering and land planning use.

Also, in recent years he has personally conducted and processed 3D laser scanning surveys for over fifty projects in Virginia, Maryland, and the District of Columbia.

SELECT WORK EXPERIENCE

Construction Stakeout and As-Builts for various Stream Restoration Projects - Virginia:

Project	County in Virginia
Windy Run	Arlington County
Pohick Creek	Fairfax County
Bull Neck Run	Fairfax County
Wancopin Creek	Loudoun County
Dewey Creek	Prince William County
Pike Branch	Fairfax County
Woodmont Swale	Arlington County
Lake Ridge	Prince William County

Parks and Recreation:

Mount Vernon Historic Site - Mount Vernon, Virginia - 2005

66,700 S.F. Complex, Orientation Center, Education Center, and Museum. Coordinated and managed all surveying and mapping for a boundary and detailed topography survey of this historic site, including a comprehensive utility study and survey. Coordination with historical society members and staff for a broad understanding of the site.

Philip A. Bolen Memorial Park – Loudoun County

Topographic and boundary surveys for major athletic and recreational improvements to this 405-acre park. Construction stakeout for softball, baseball, and soccer/field hockey fields, and associated roadways and facilities.

Upton Hill Regional Park

Topographic and boundary survey of existing conditions for athletic and recreational improvements.

NVRPA W&OD Trail

Prepared topographic and boundary surveys of existing conditions for 1.5 miles of trail running through the City of Falls Church and Arlington County.

Multifamily and Mixed-Use Residential



AT A GLANCE

Contact

pquinlan@cap-ls.com | 571.319.9064

Years' Experience

29 years

Education

- Construction Technician, Dublin Institute of Technology, Ireland

Training and Professional

Certifications

- AutoCAD, GPS, Computing, Drafting and Surveying Seminars, GIS training, including ESRI ArcMap, Remote Sensing, Advanced Cartography
- Leica Cyclone and Laser Scanner Training
- Autodesk Civil 3D



Avalon at Arlington Square, Arlington, Virginia – 2001

Twenty-six Acre Townhome Apartment Community. Prepared an ALTA, and Topographic Survey of a complicated and older apartment complex backing up to I-395. Coordinated all computations and cut sheets for construction stakeout of land development and multiple buildings, parking structure, amenities, etc.

Buckingham Village, Arlington, Virginia – 2006–2015

Forty-two Acre Multi-Family Community. Coordinated and managed all surveying for this apartment complex, surrounded by multiple public streets. Managed construction stakeout of townhomes, parks, and apartment buildings. Prepared detailed topography surveys for ADA compliance using laser scanning. Prepared ALTA surveys for multi-story residential portions. 2005 to Present.

Landmark Mall, City of Alexandria, Virginia – 2012

Sixty-three Acre Shopping Mall. Coordinated and managed all surveying, mapping, scanning, and GIS data capture for all improvements and utilities. The field ran extensive laser scans of a 13-acre, 3-level parking structure for a detailed survey. Coordination with the owner and legal counsel for Air Rights Plat and Reciprocal Easement Agreement documents. Coordination with utility firm for subsurface locating and video capture.

Halstead at Metro Square, Dunn Loring, Virginia – 2016

Eight Acre Mixed Use Residential Community. Coordinated and managed all surveying, mapping, scanning, construction stakeout, as-builts, and ALTA surveys for this modern mixed-use residential site. Prepared subdivision, easement, and quitclaim plats. Prepared multiple ALTA surveys as the site progressed through to recent completion.

Residential

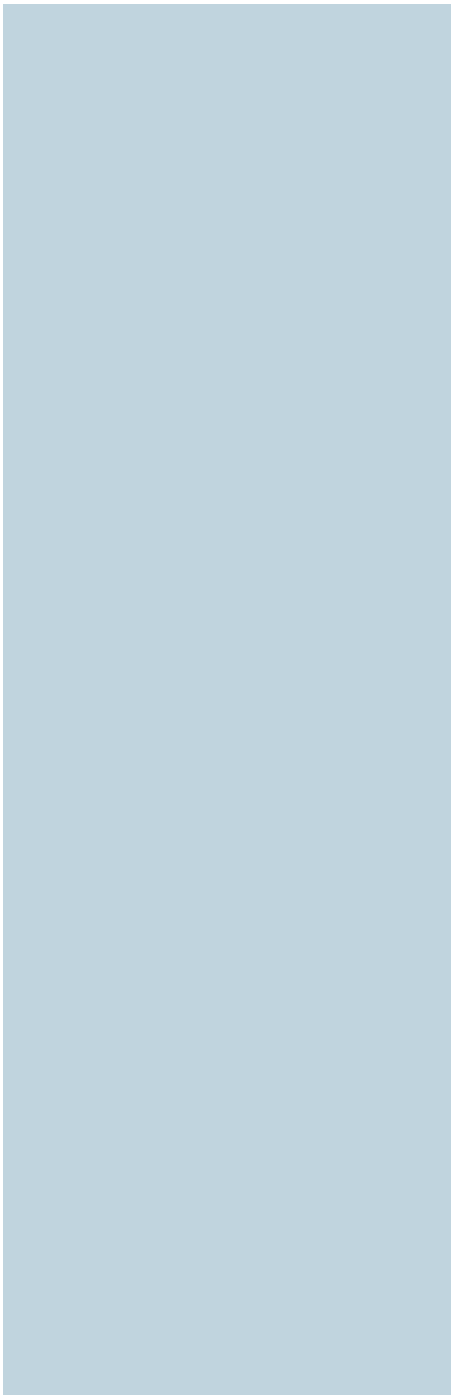
Aside from the many large-scale planned-urban-development sites, additional projects include hundreds of individual residential surveys, which involved grading plan drafting, house stakeouts, wall checks, house location surveys, property corner stakeouts, and building height certifications.

Commercial

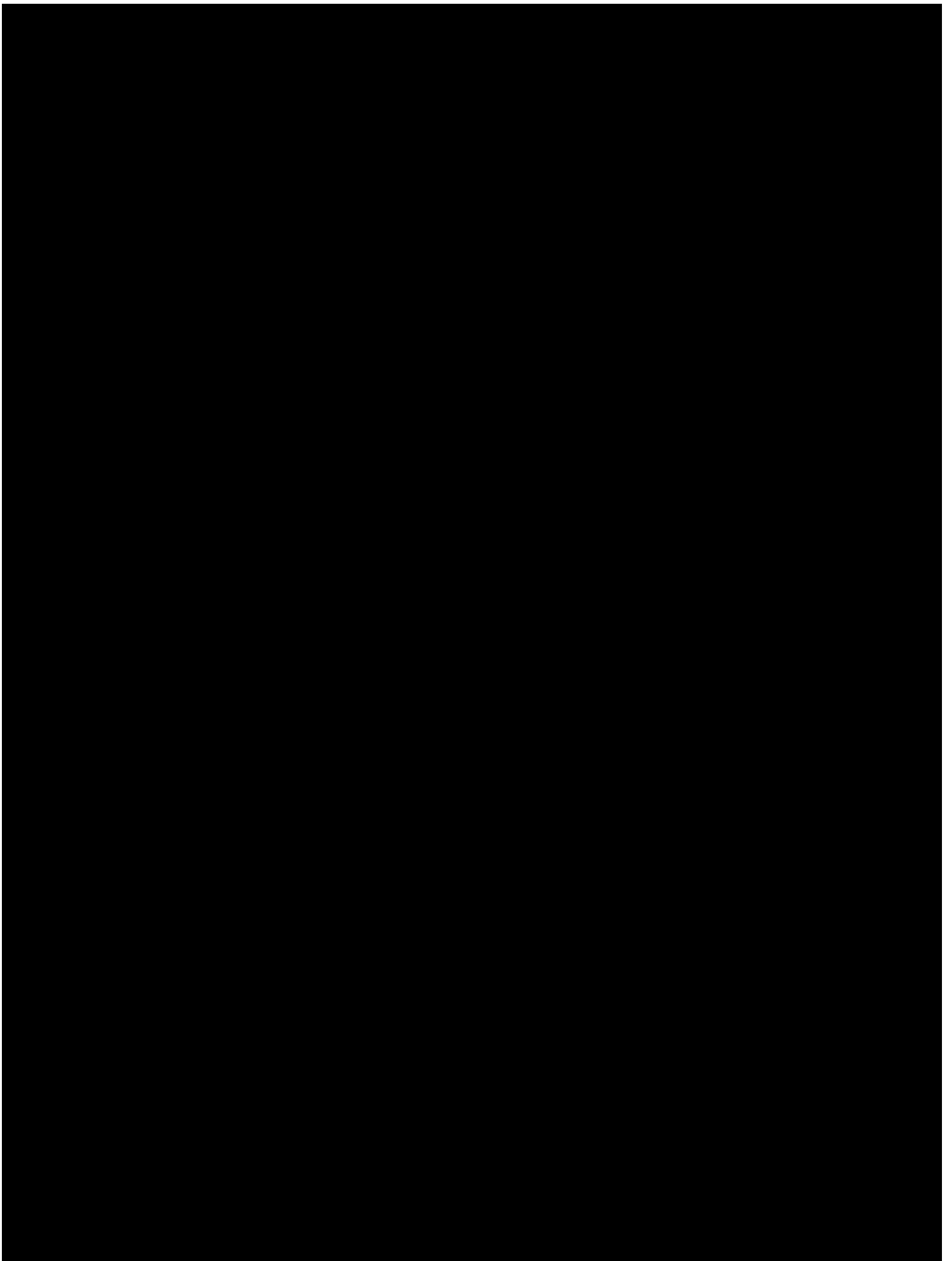
In addition to the many development plans, hundreds of ALTA surveys across Virginia and Maryland range from small offices, gas stations, etc., to shopping malls, office parks, and military bases.

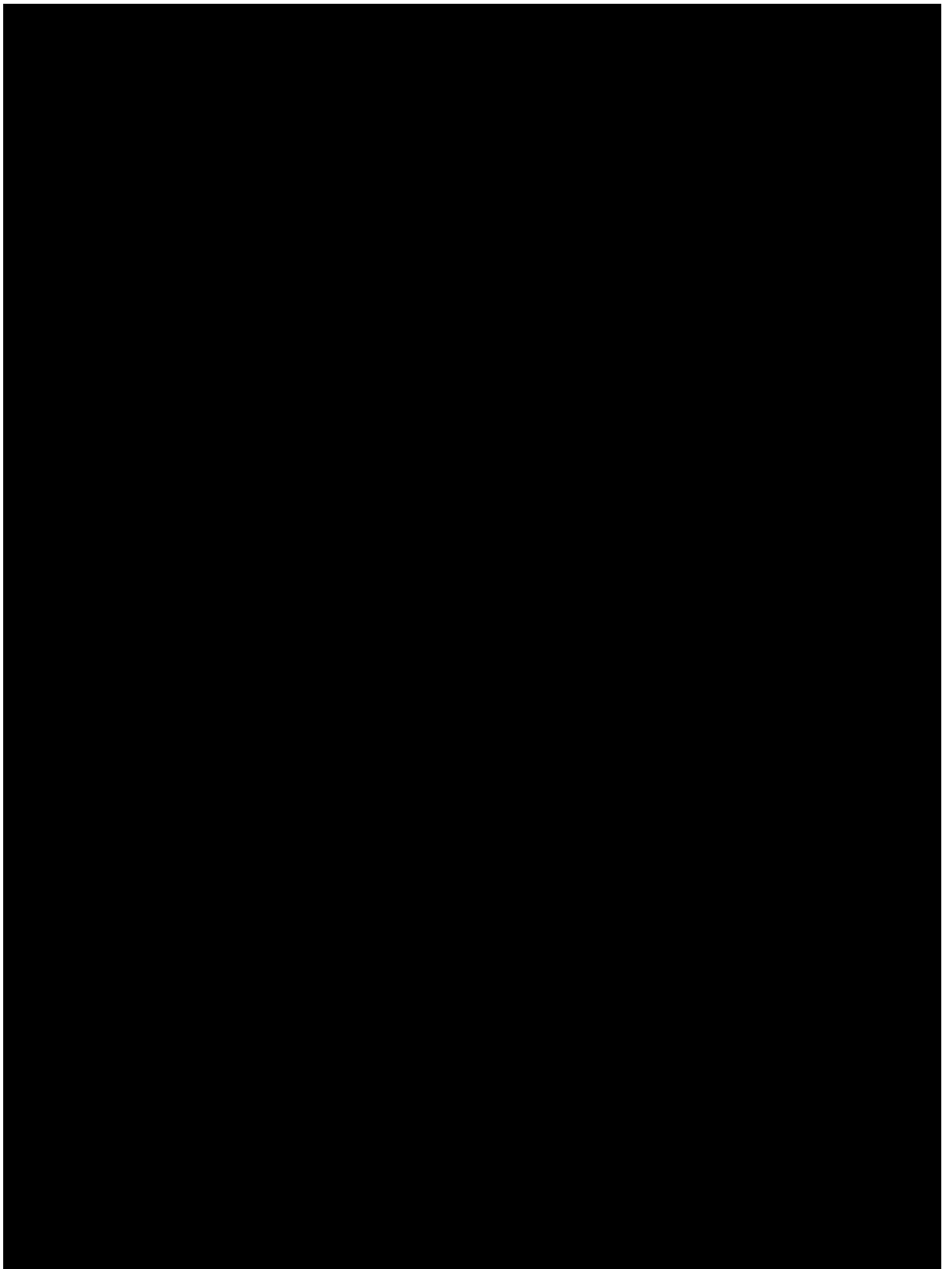
Equipment and Software Knowledge

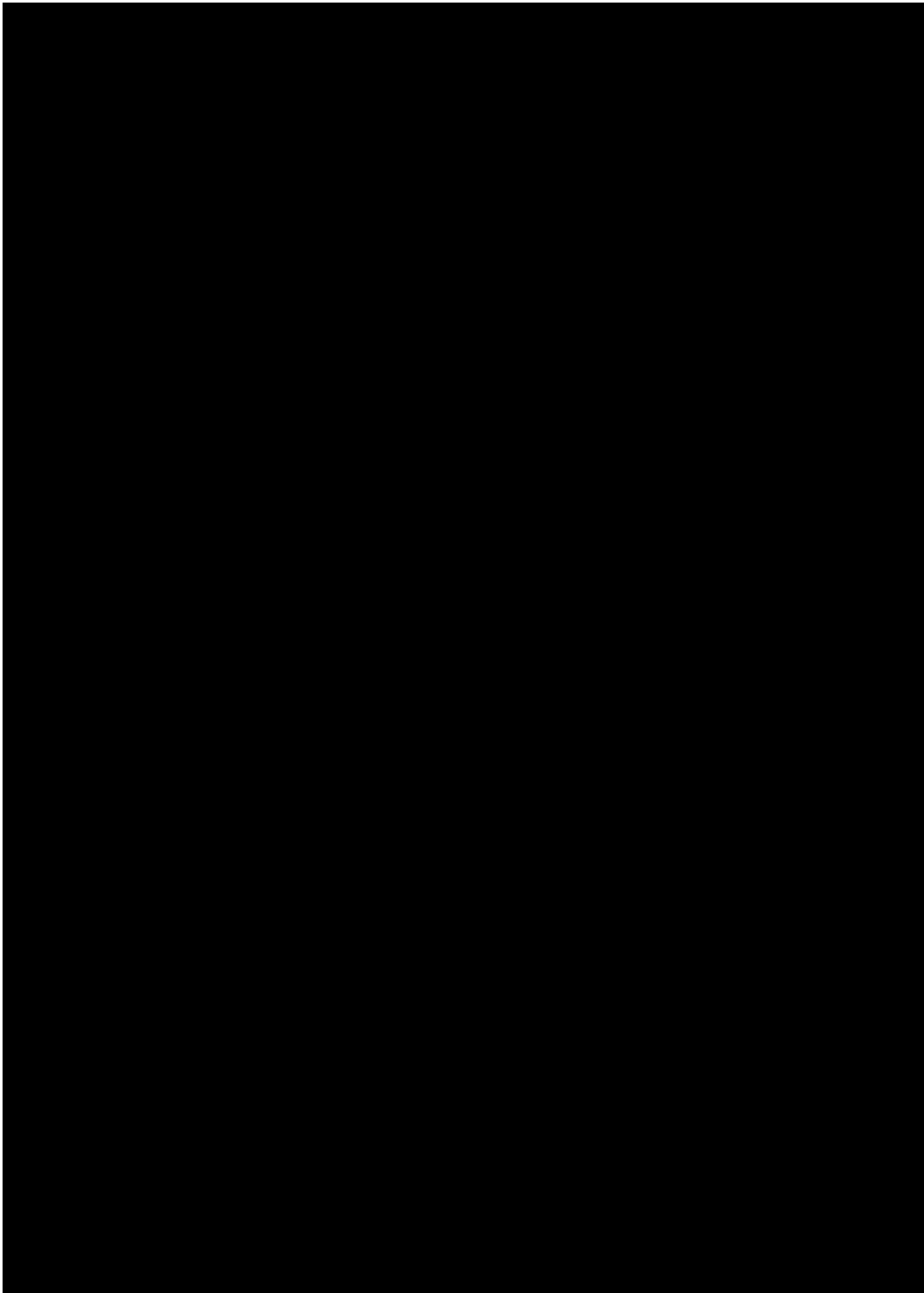
- Topcon, Spectra GPS Systems
- Leica Total Station Robotics Systems Leica Scanning Systems
- Digital Leveling
- Autodesk – Civil 3D, Land Development Desktop, ReCAP ESRI ArcMap GIS, Google Earth Pro
- Carlson Survey Leica Cyclone
- Adobe InDesign, Acrobat, Photoshop, Microsoft Office, Quickbooks, Sketchup.

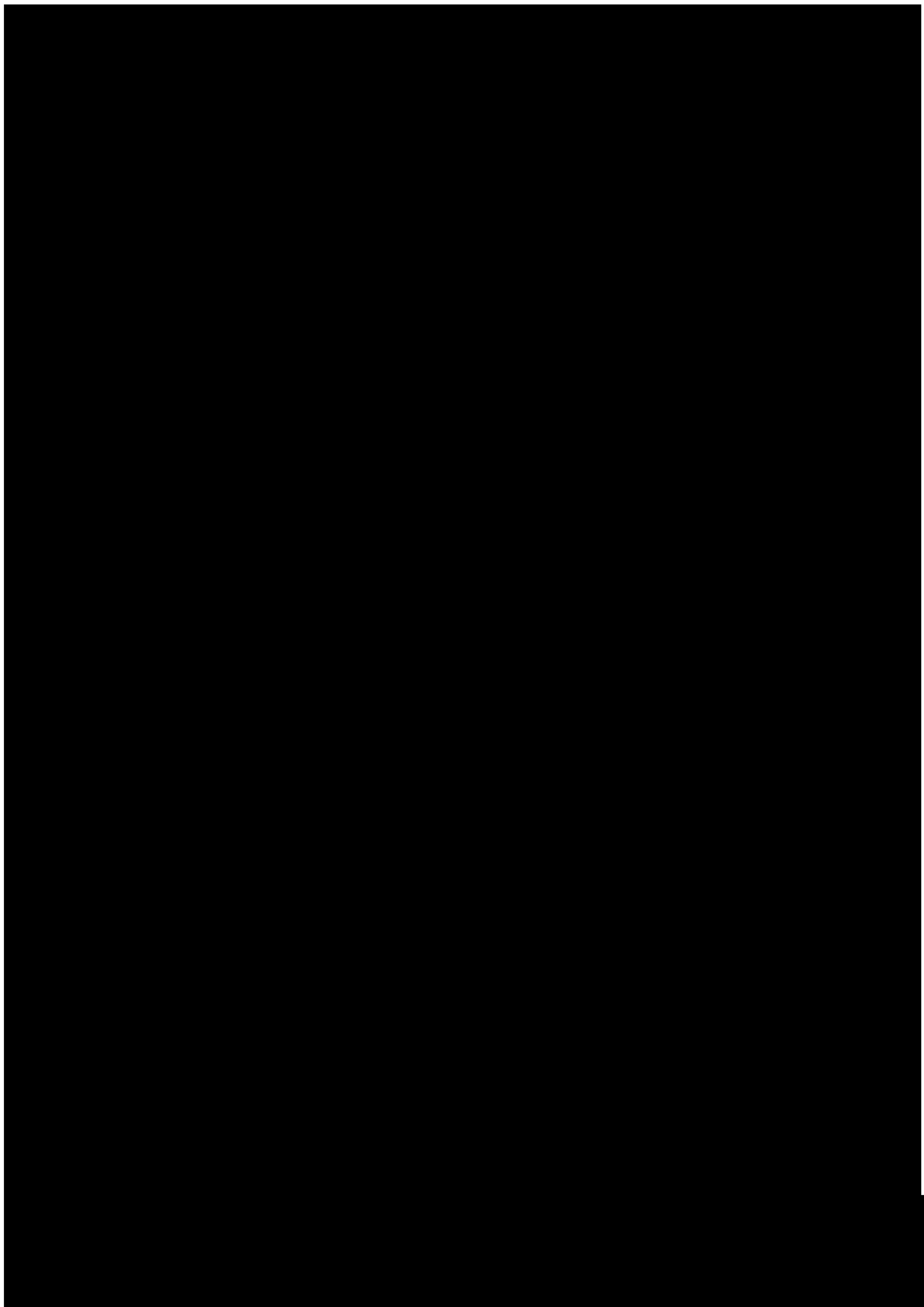


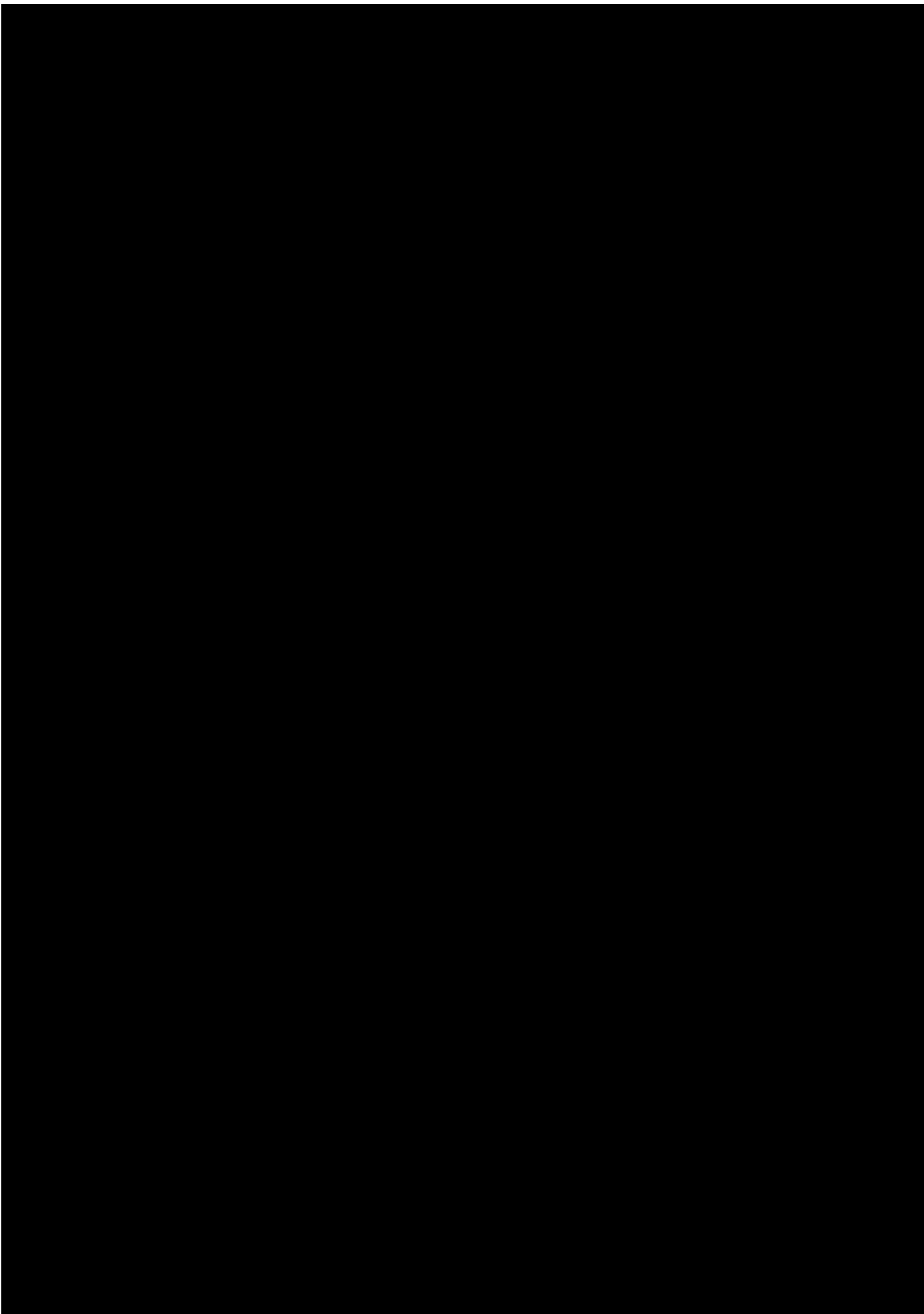
Appendix C / RES Financial Statements

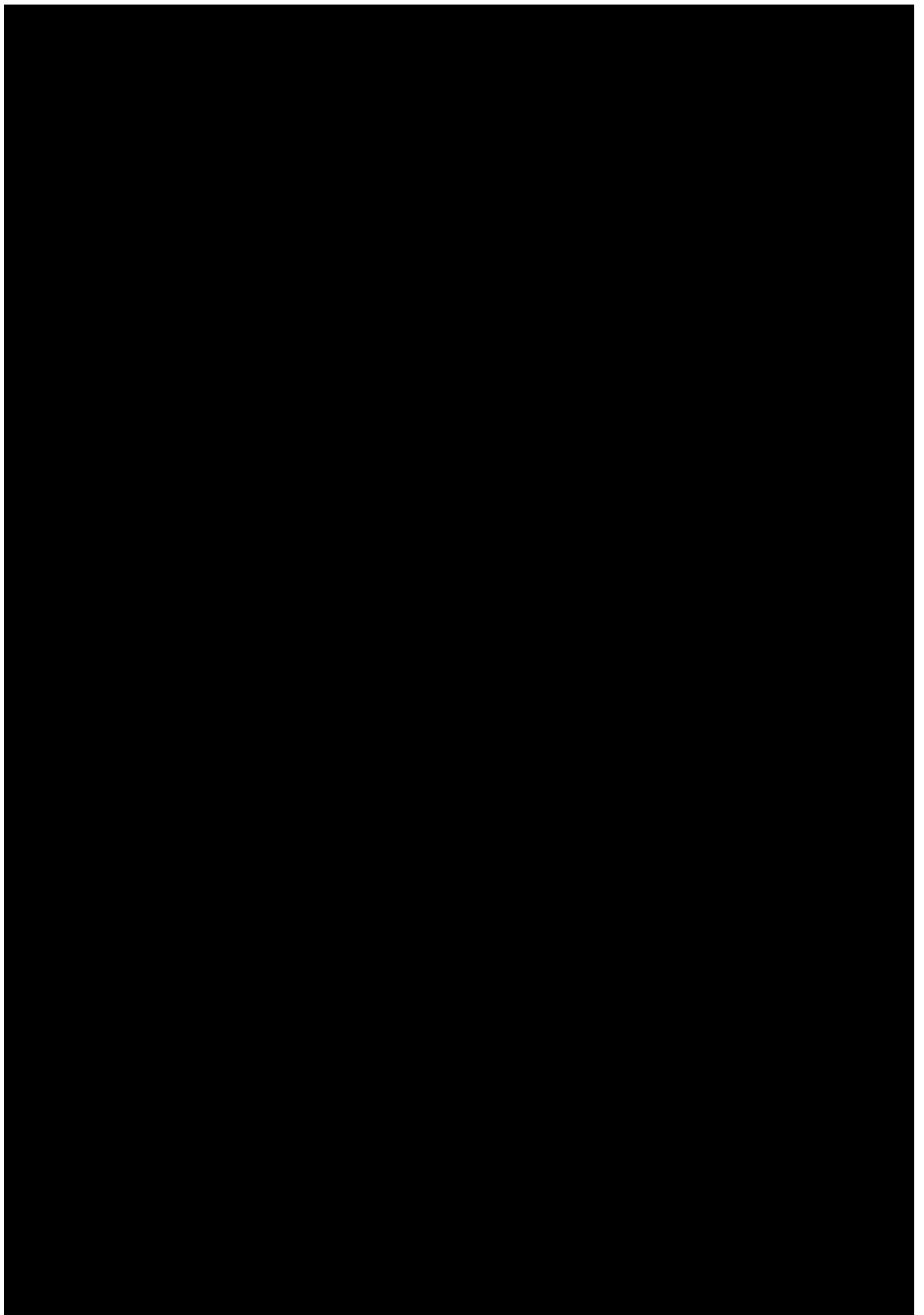


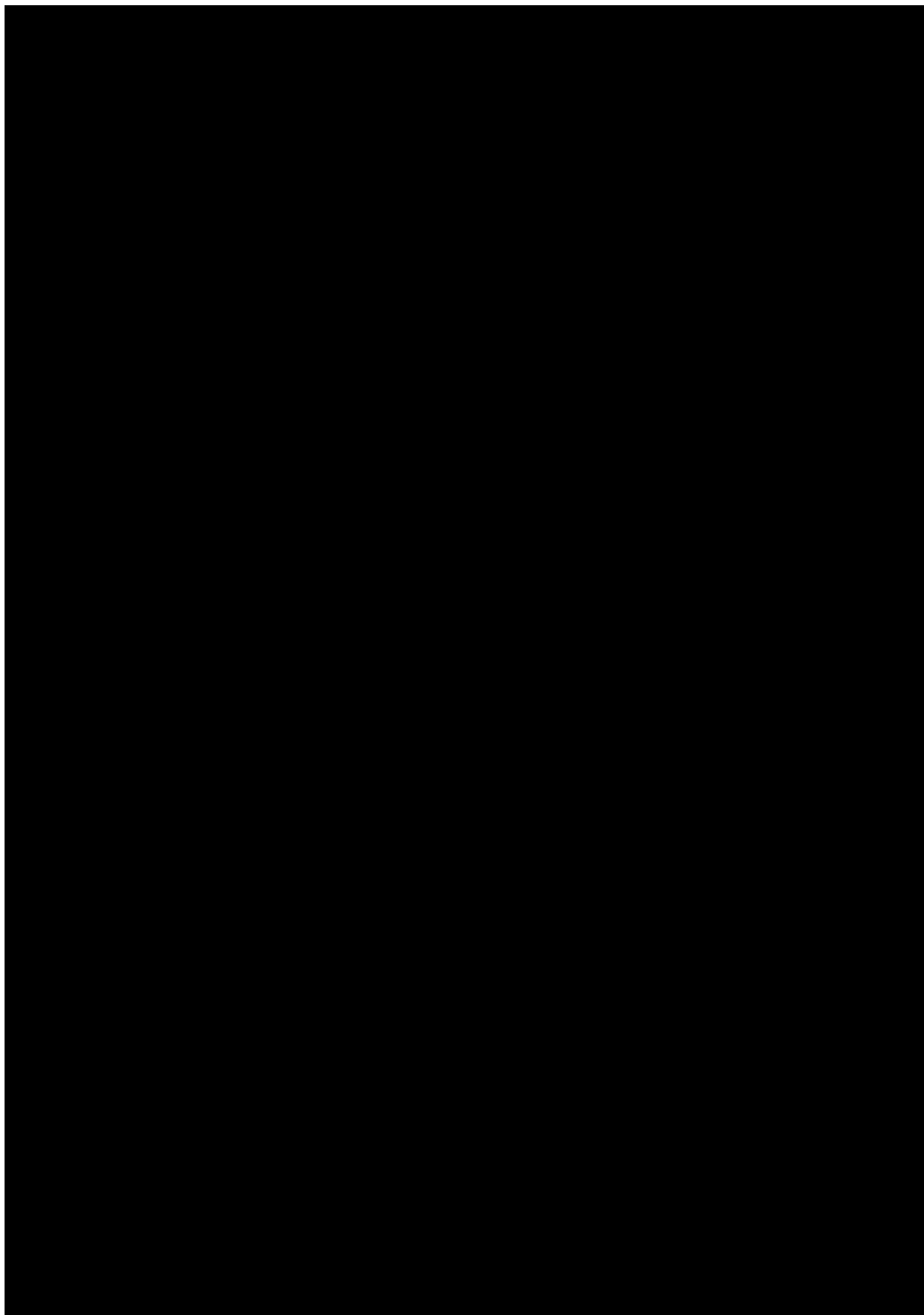


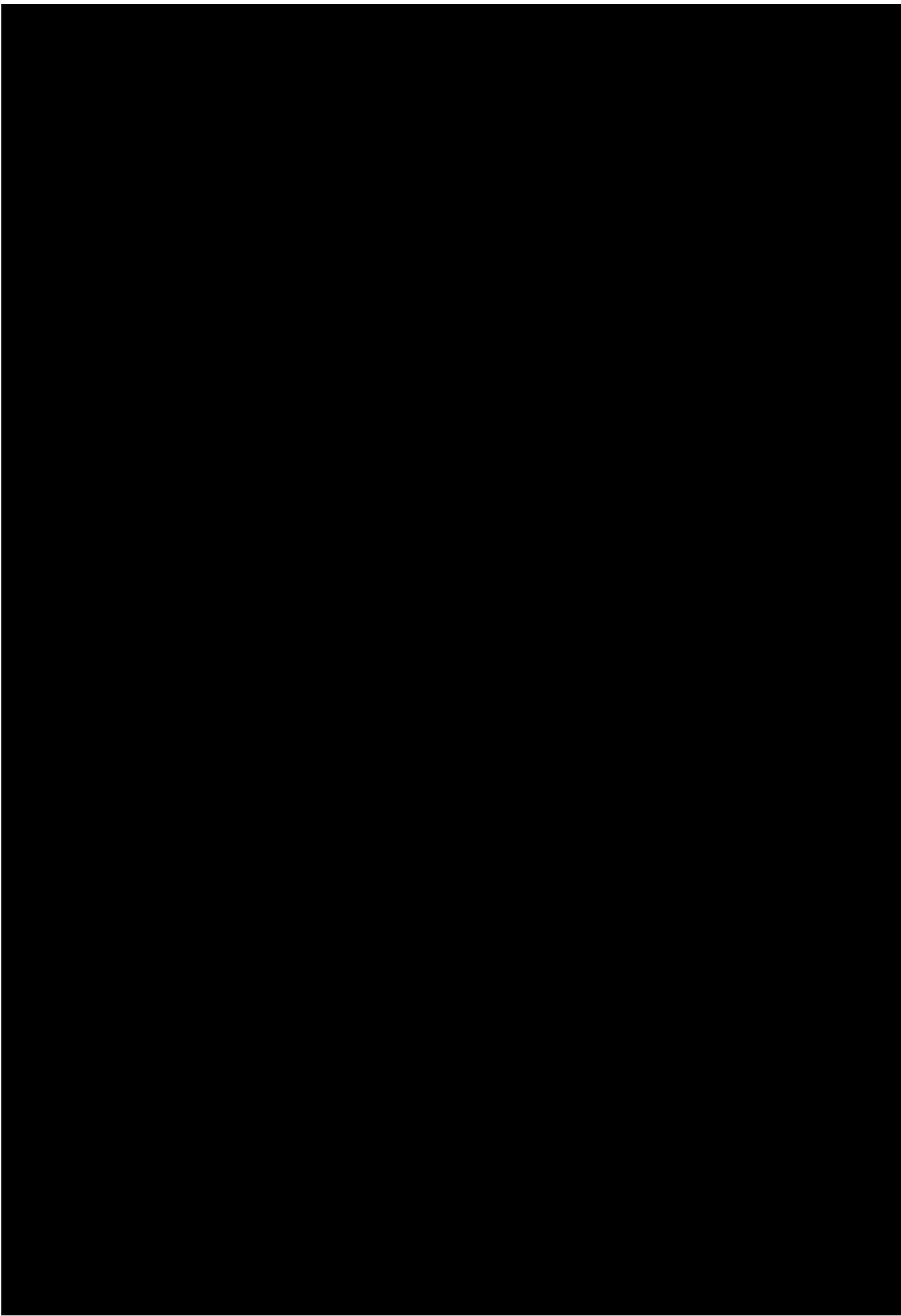


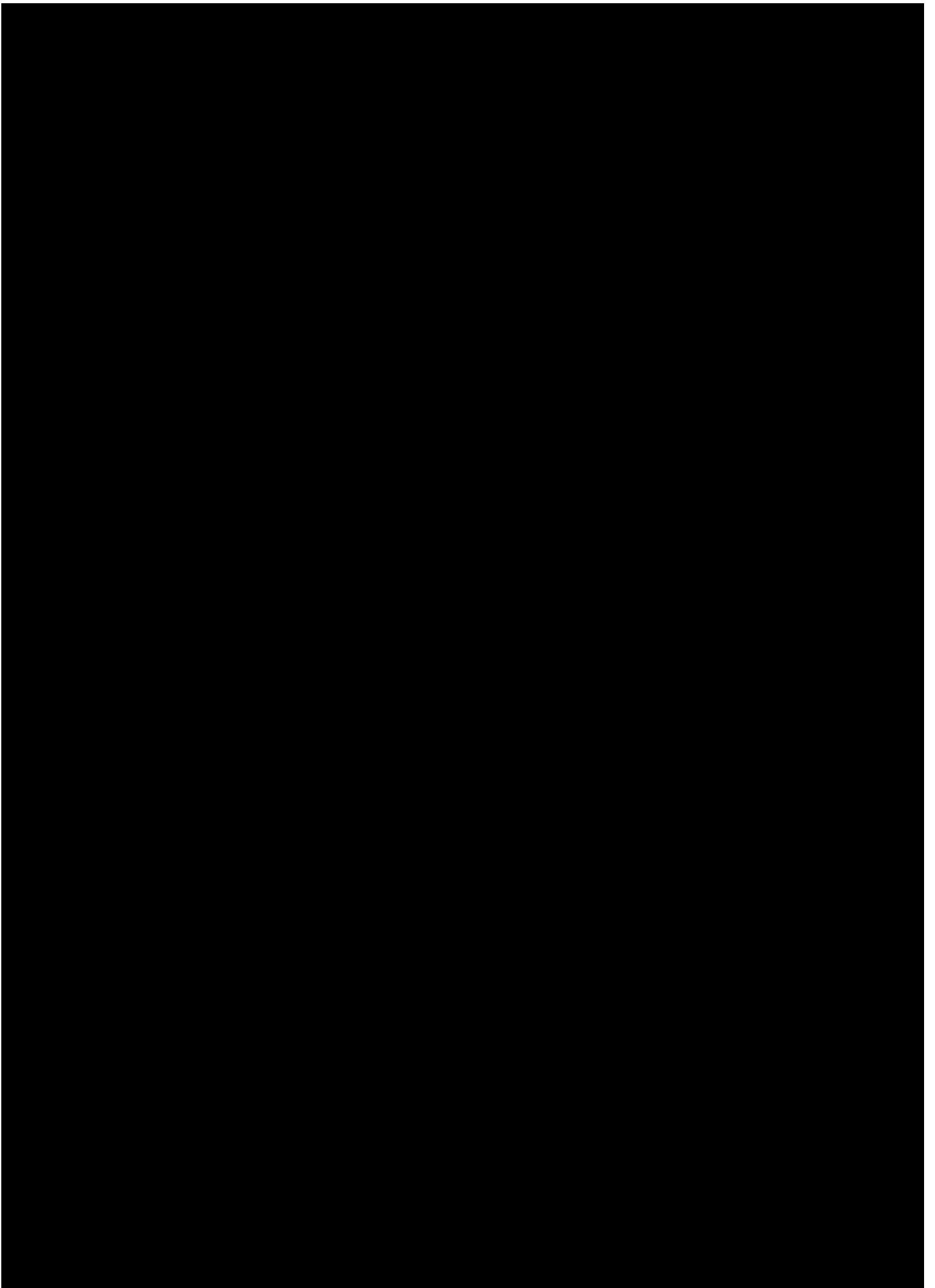


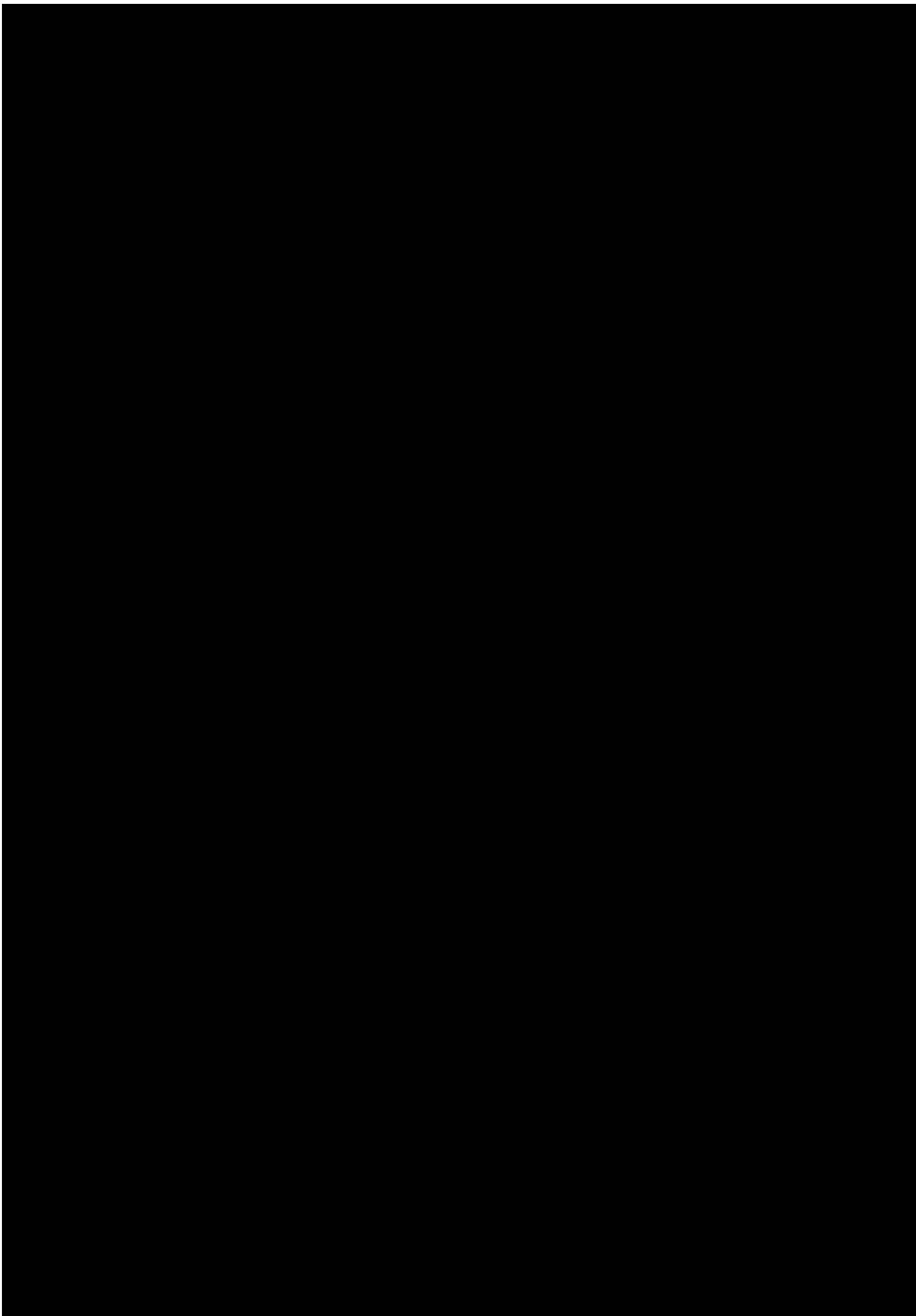


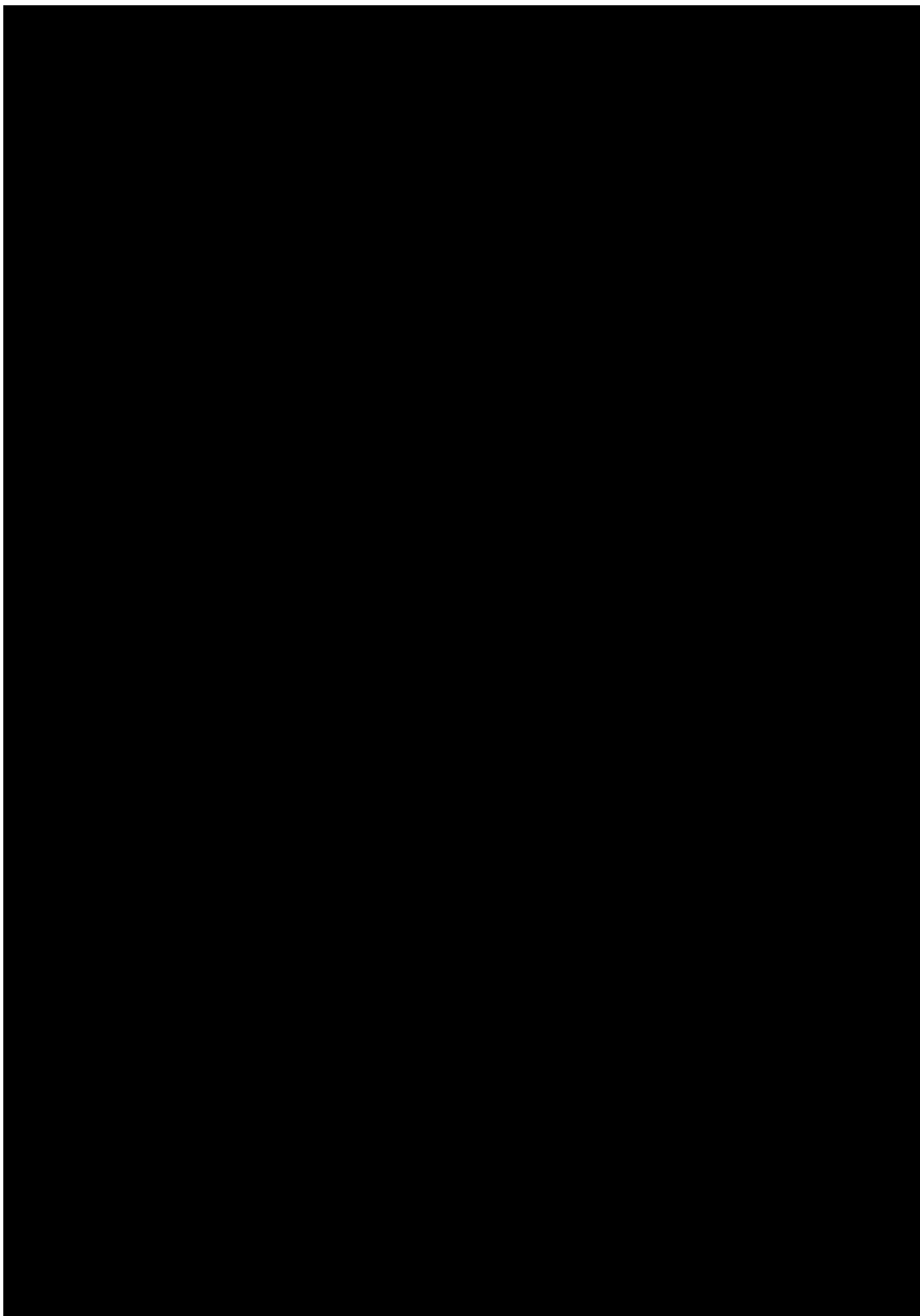


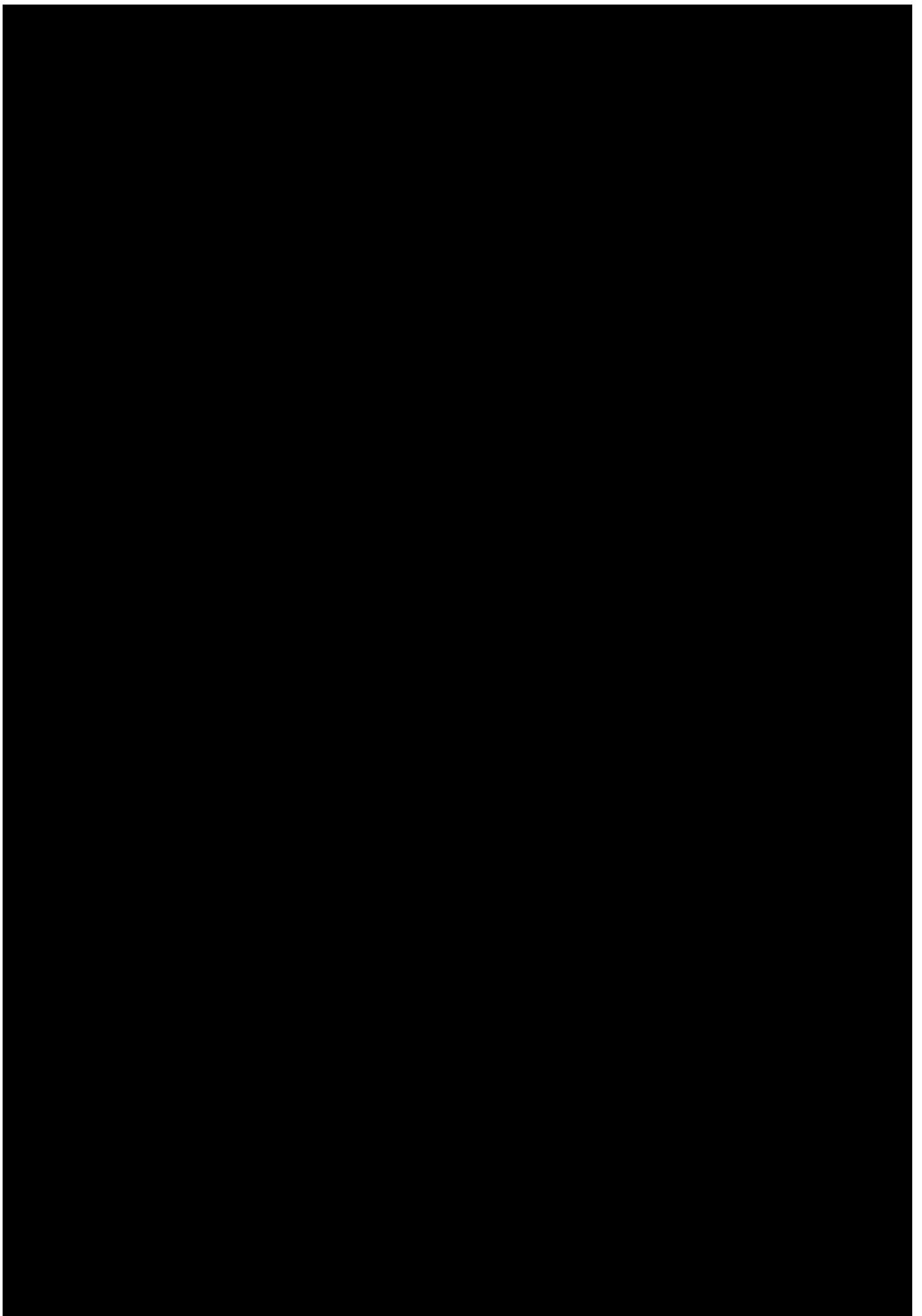


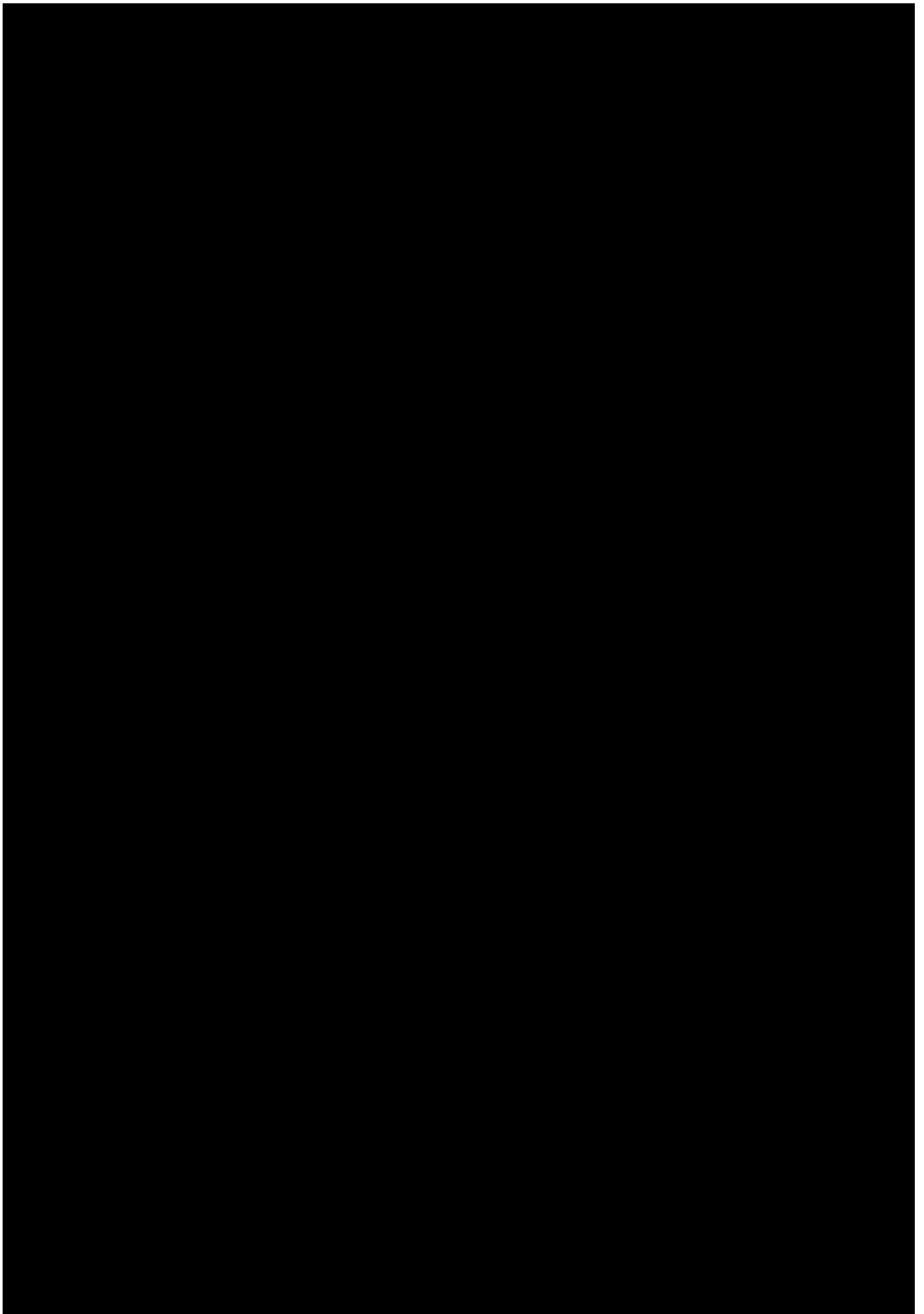


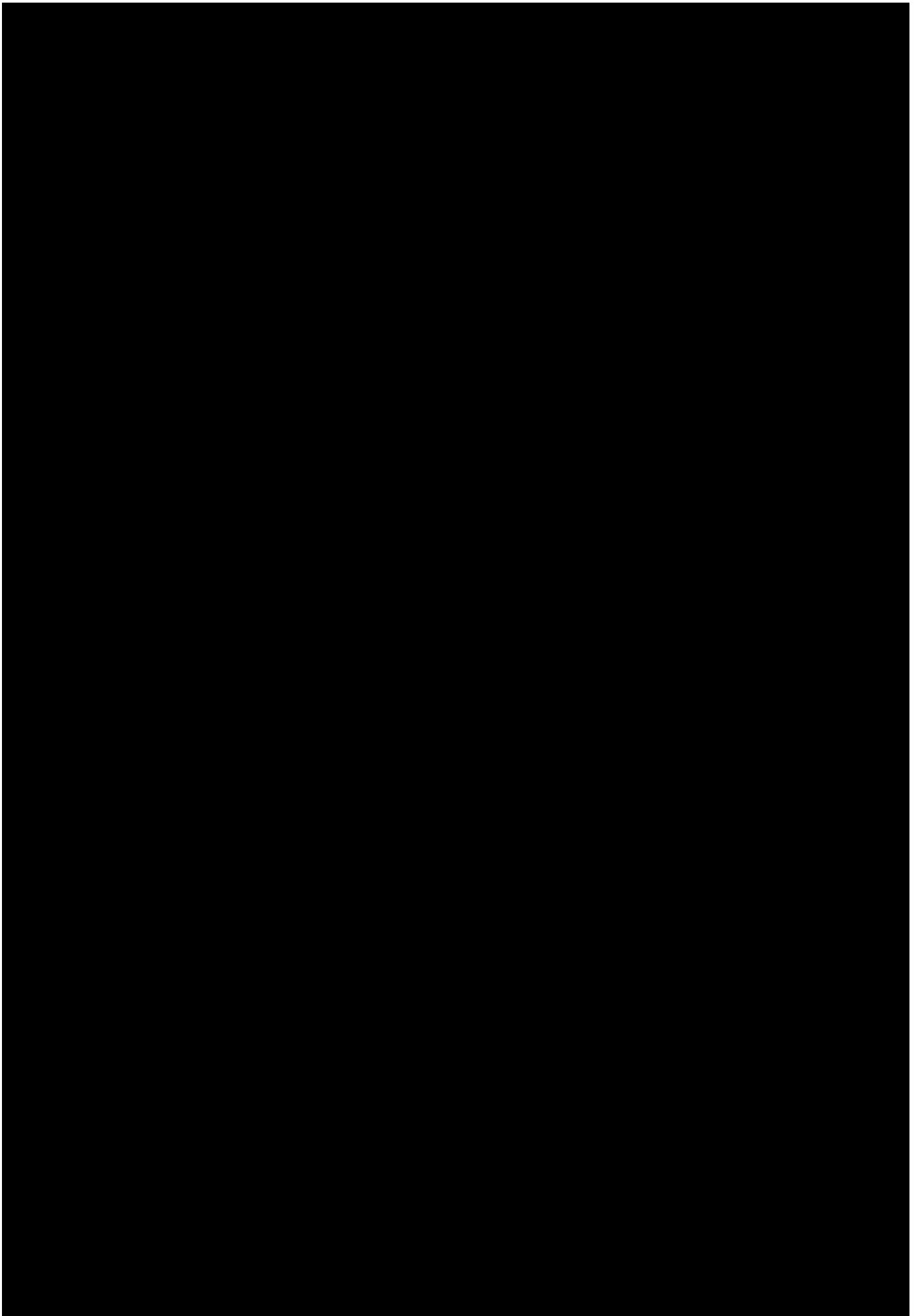


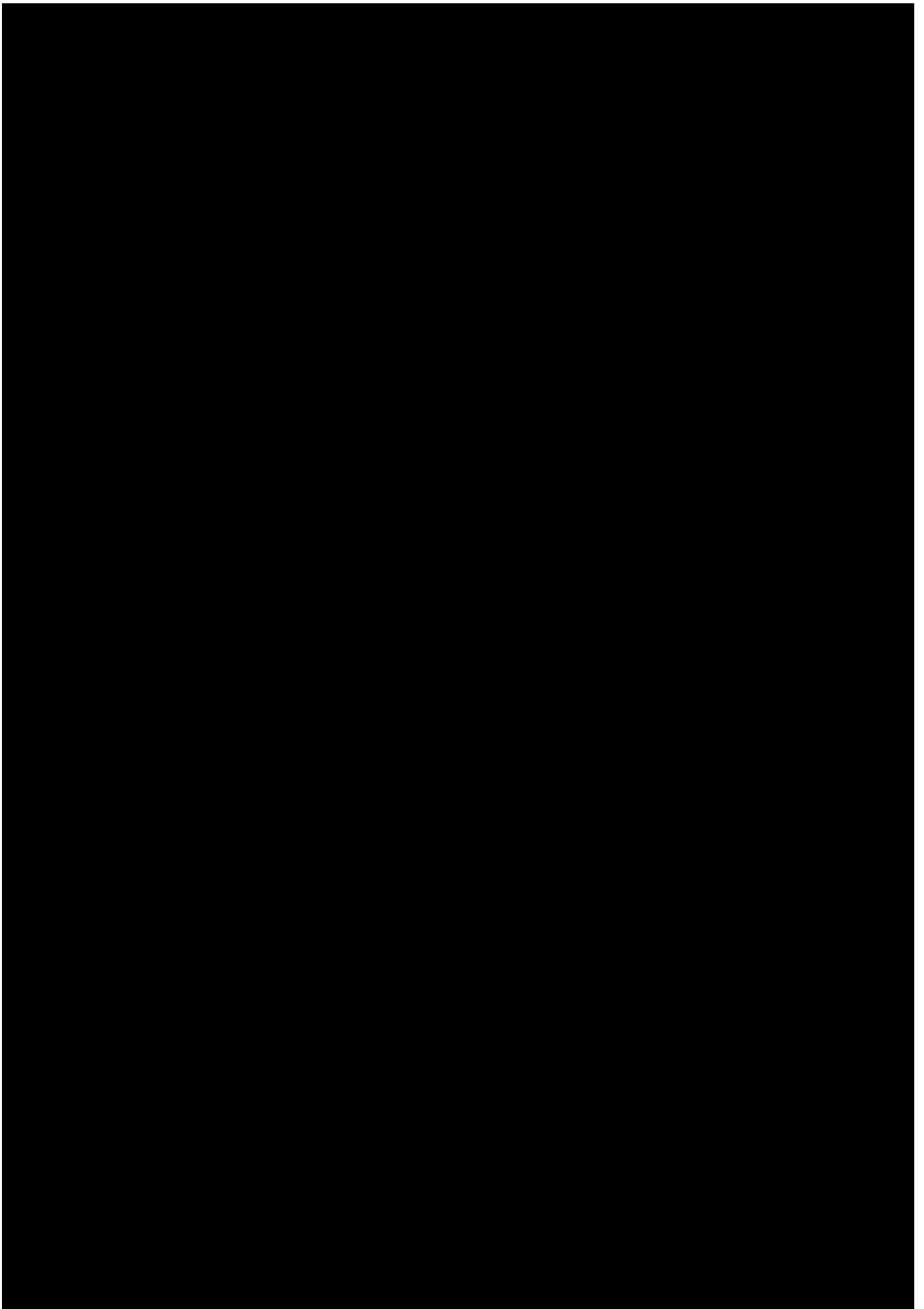


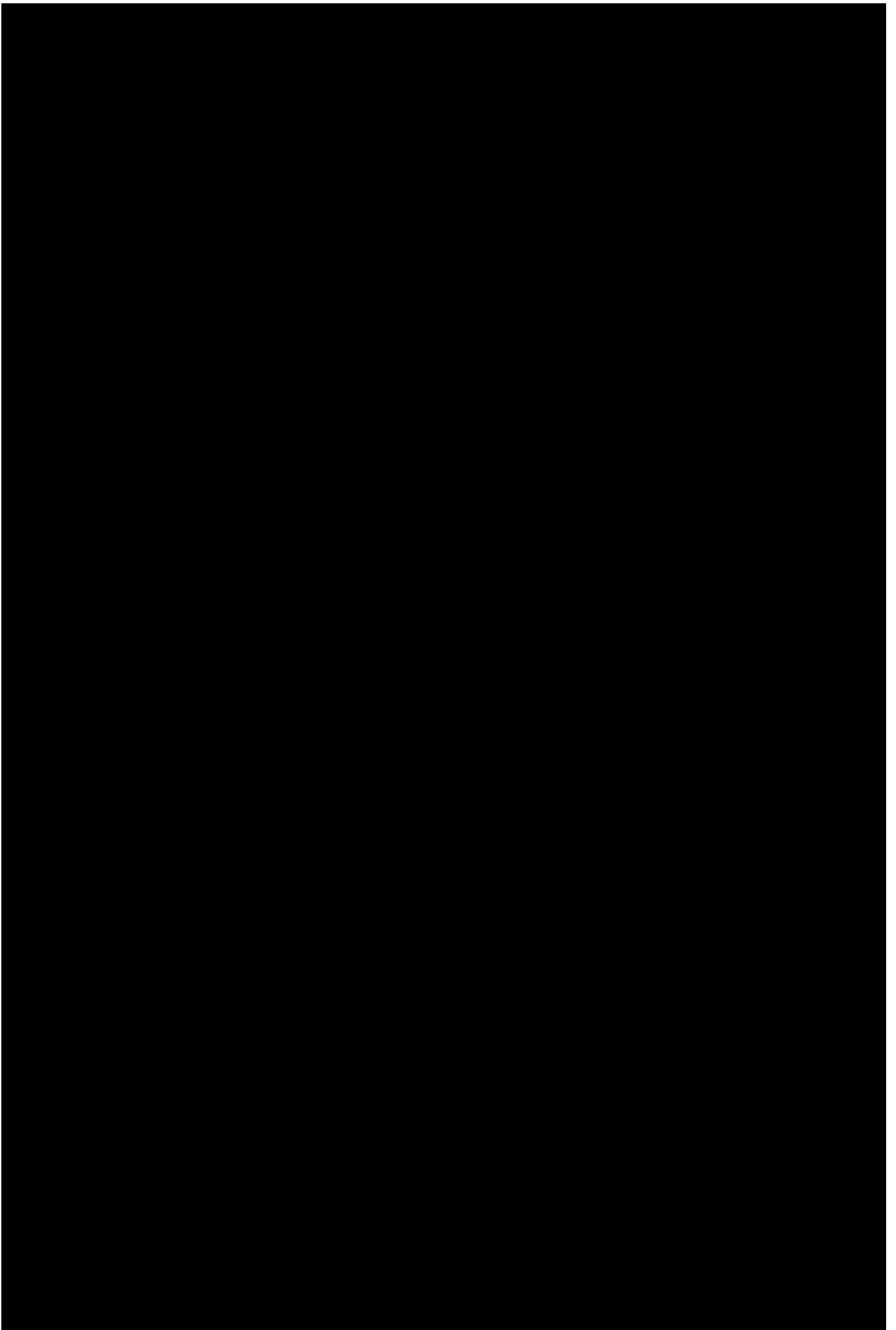


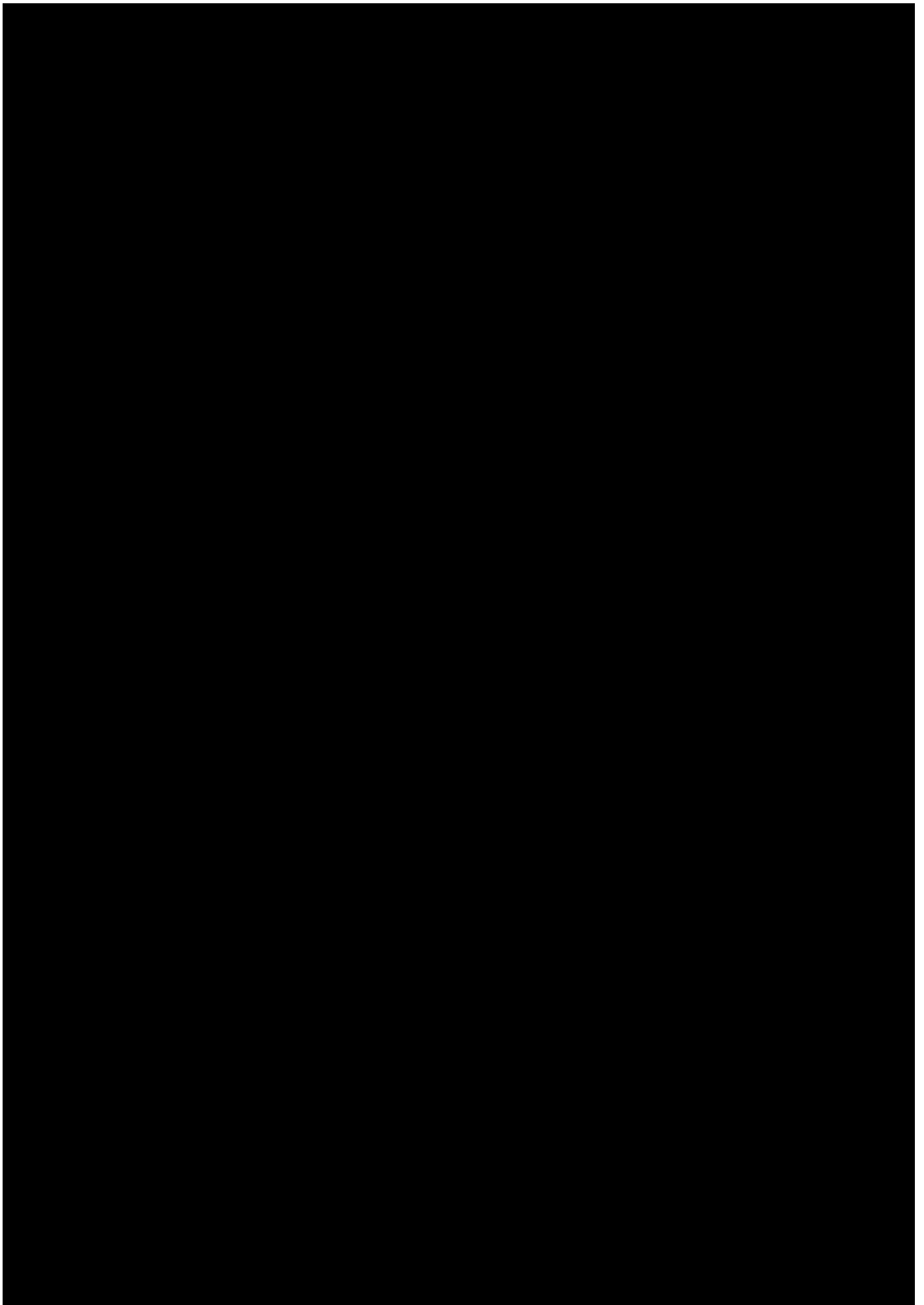


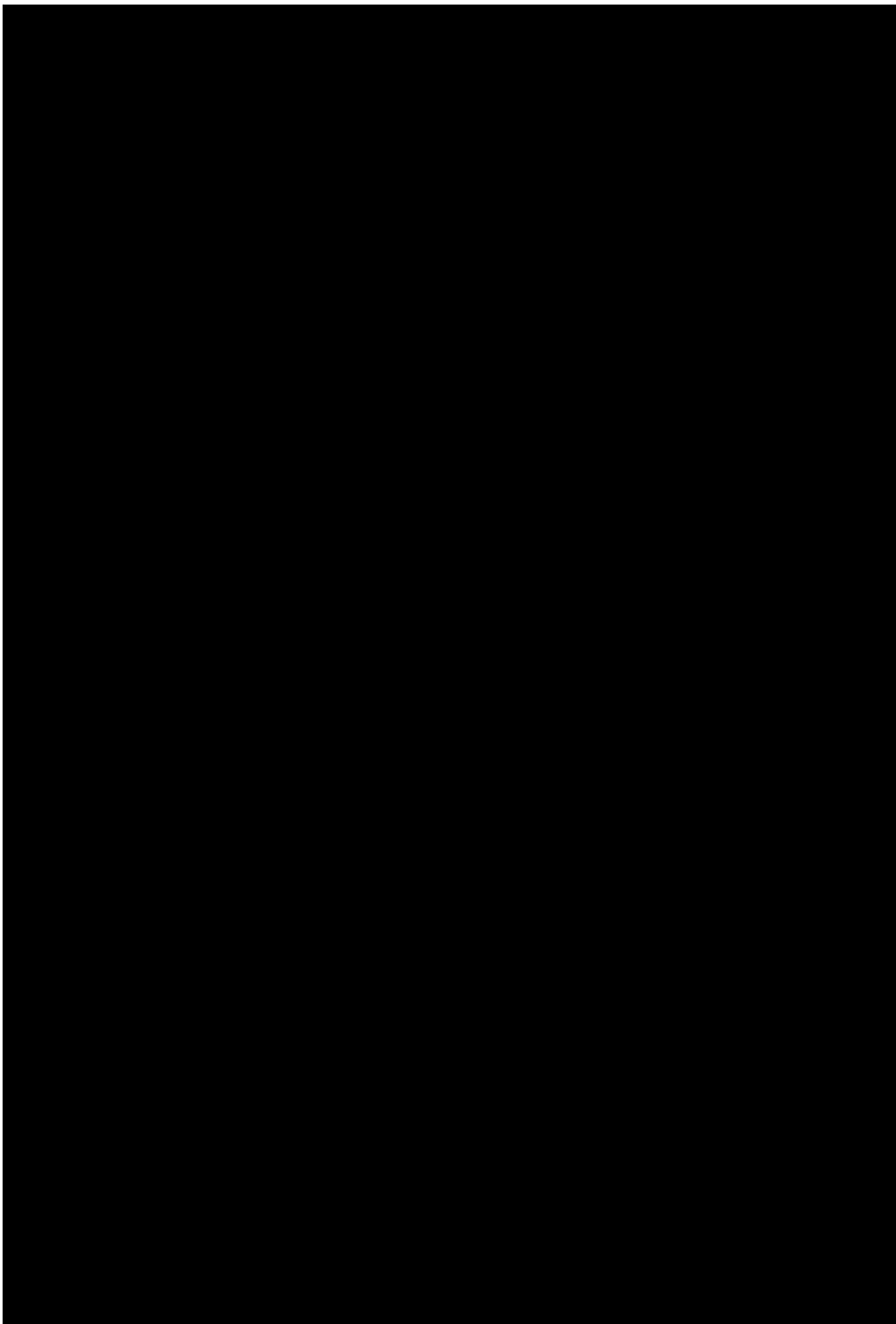


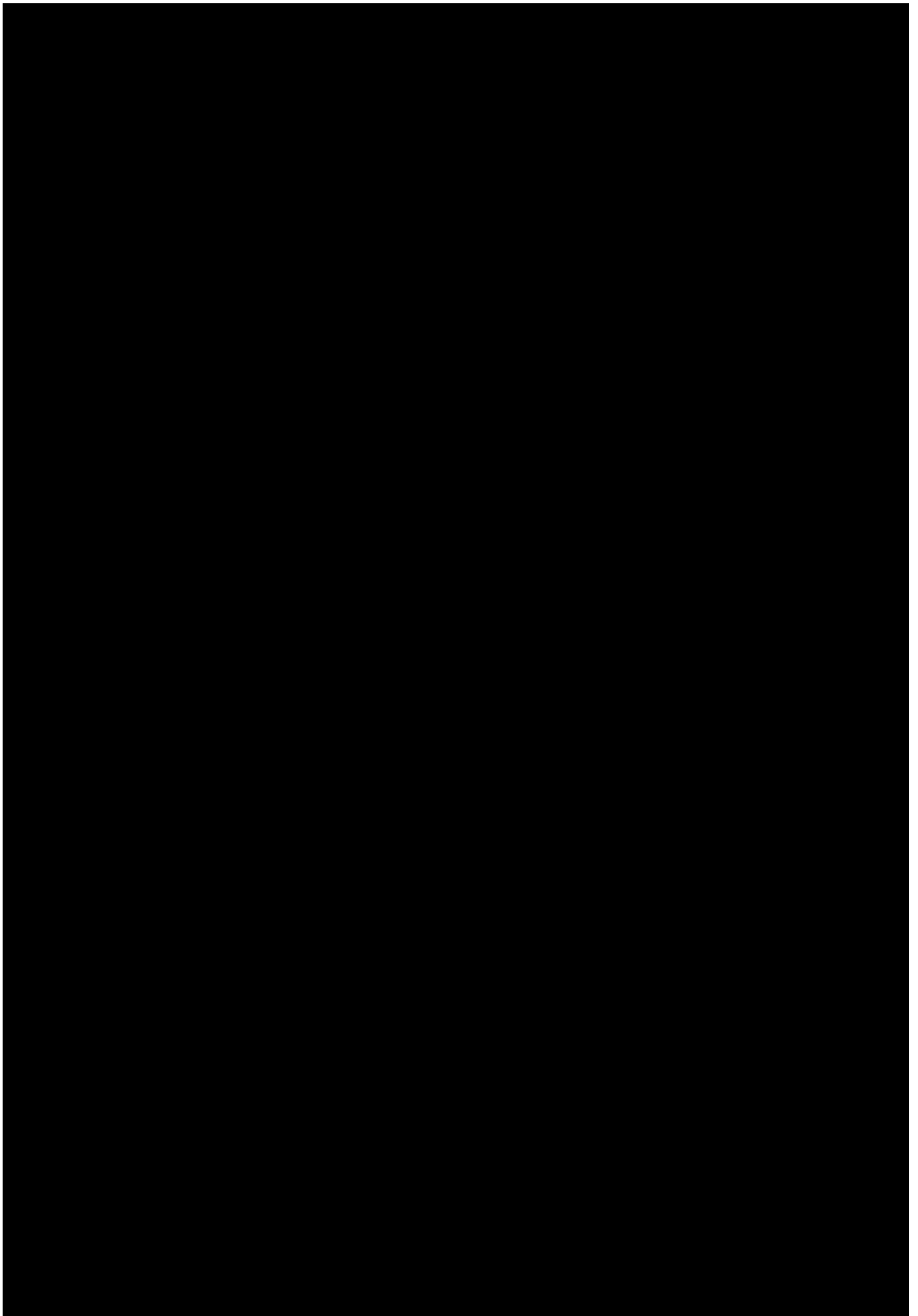


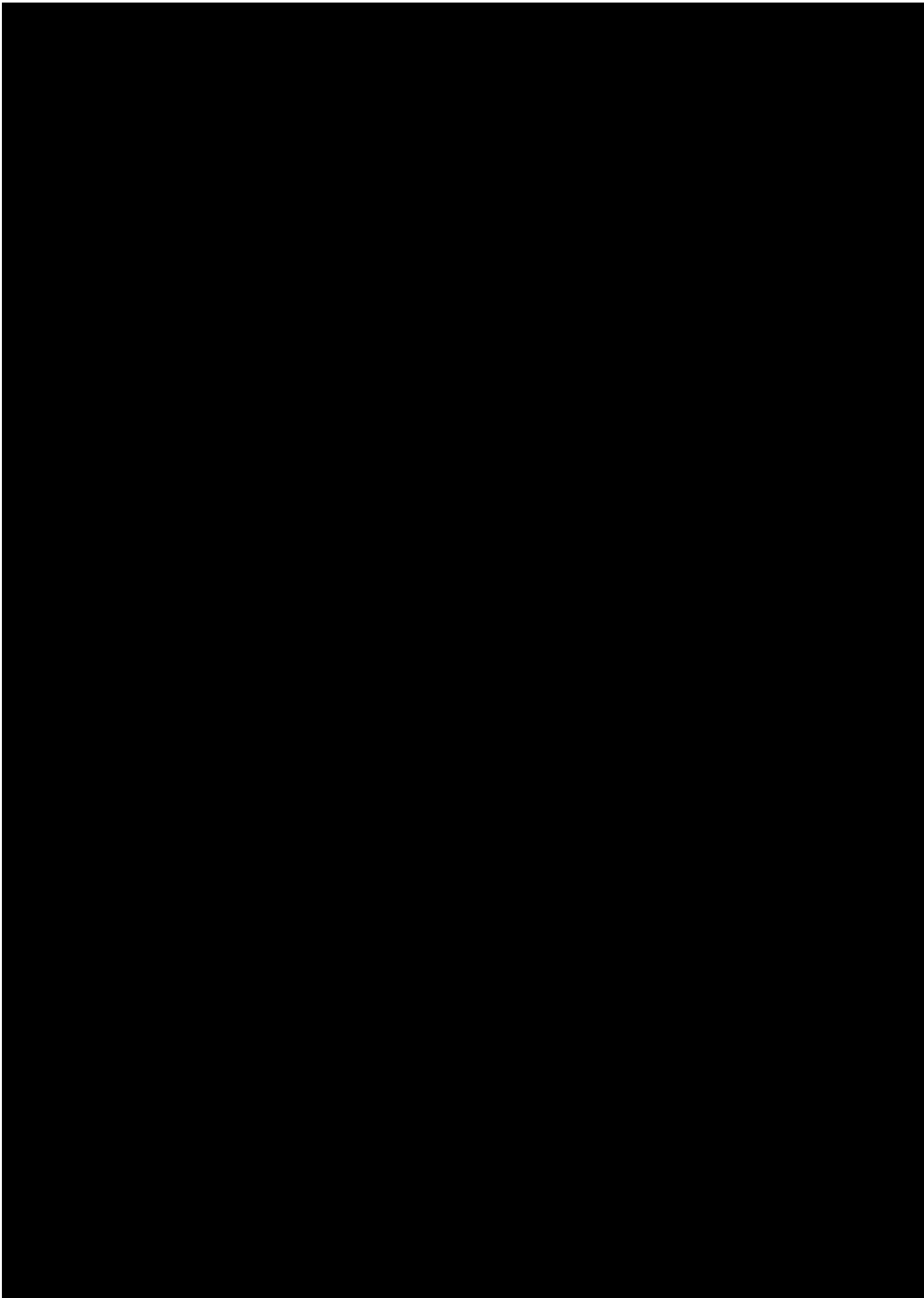


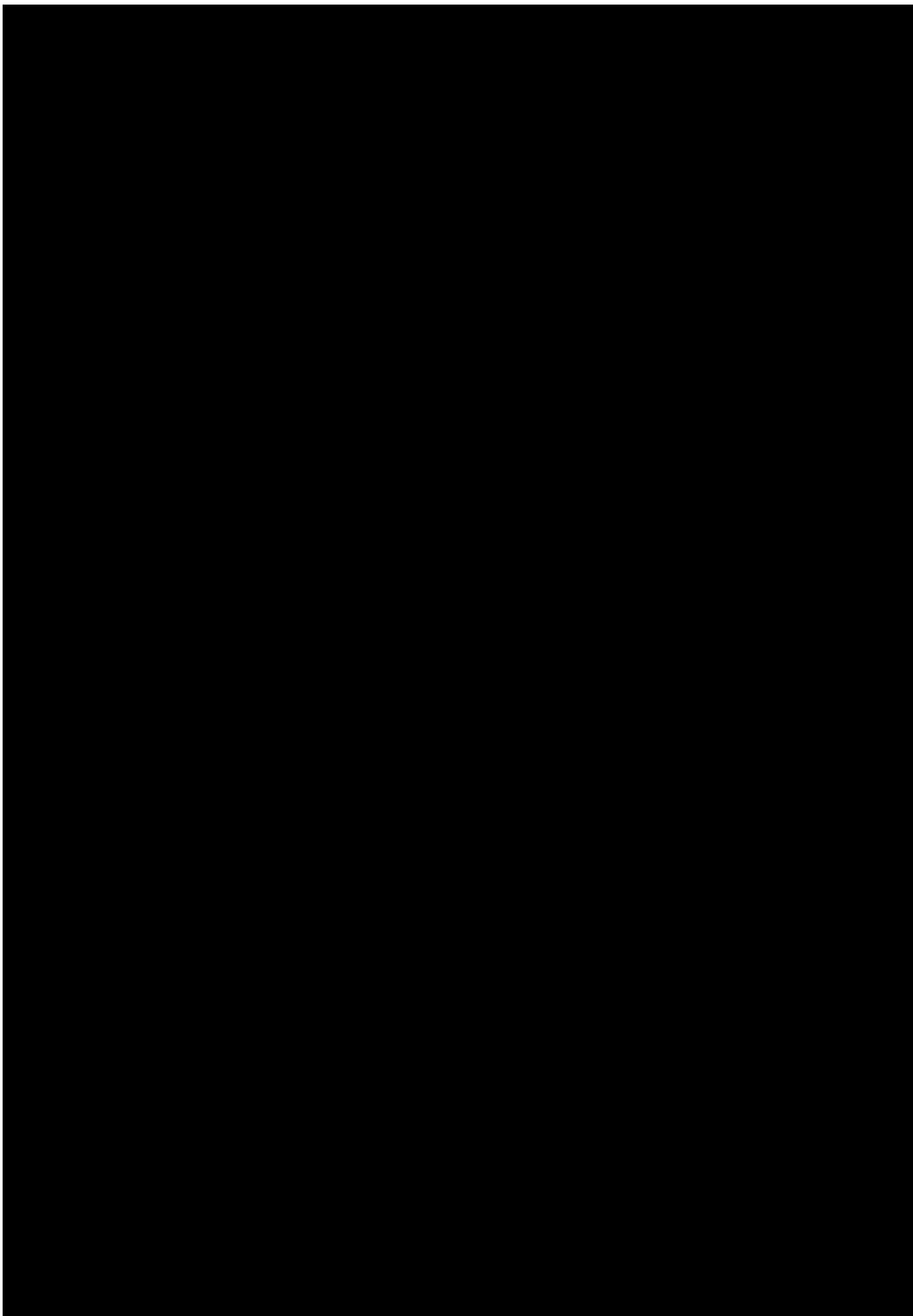


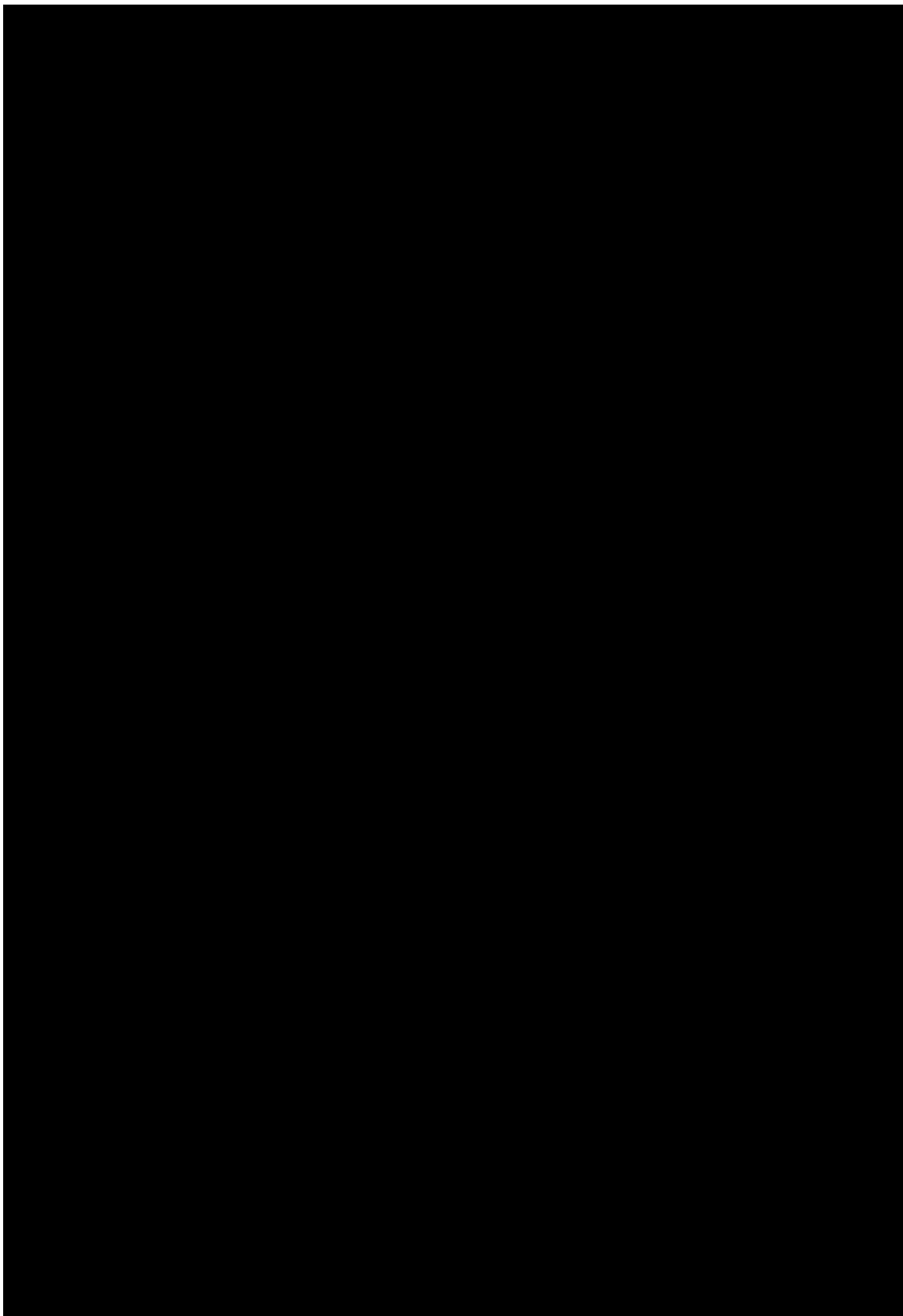


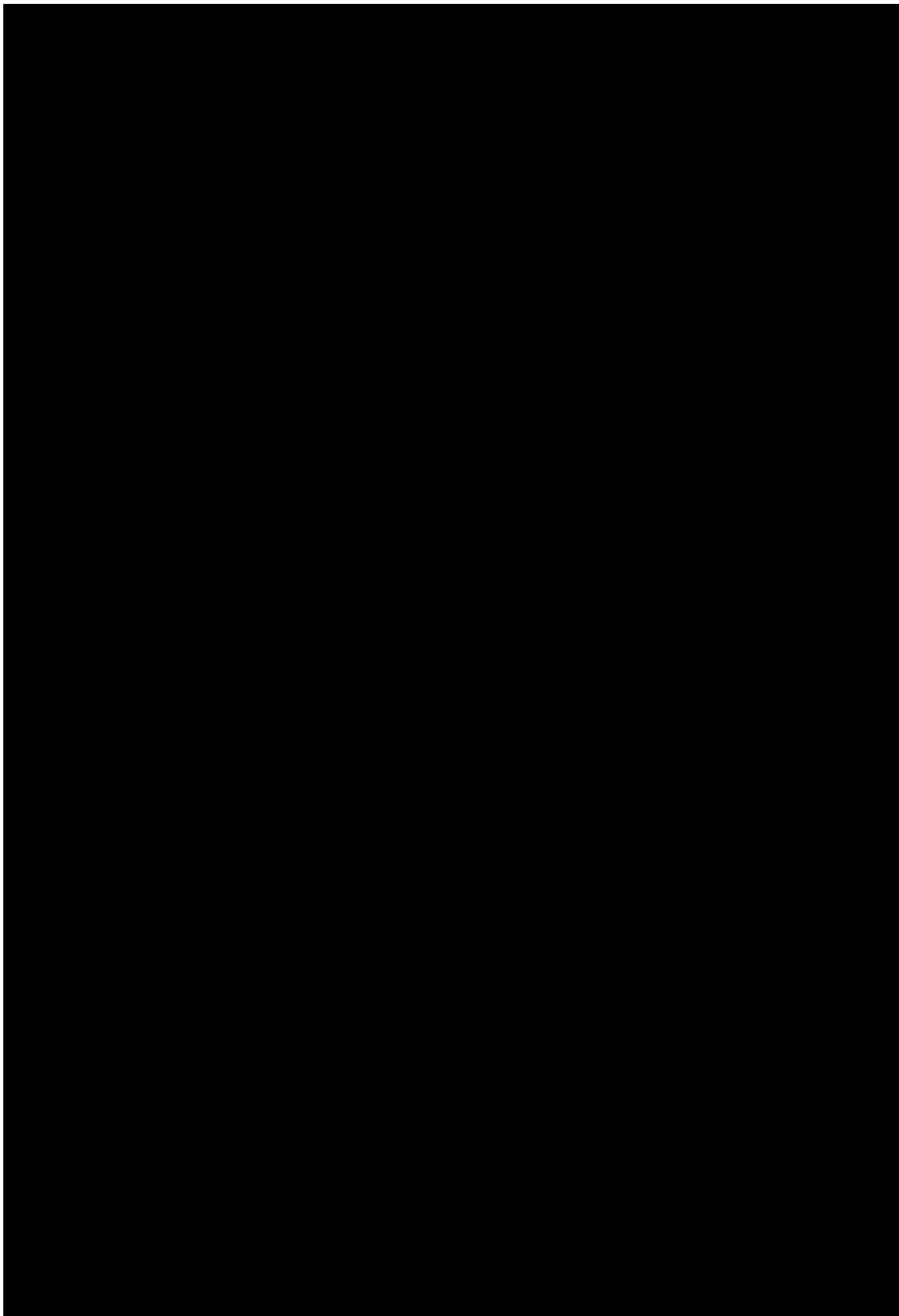


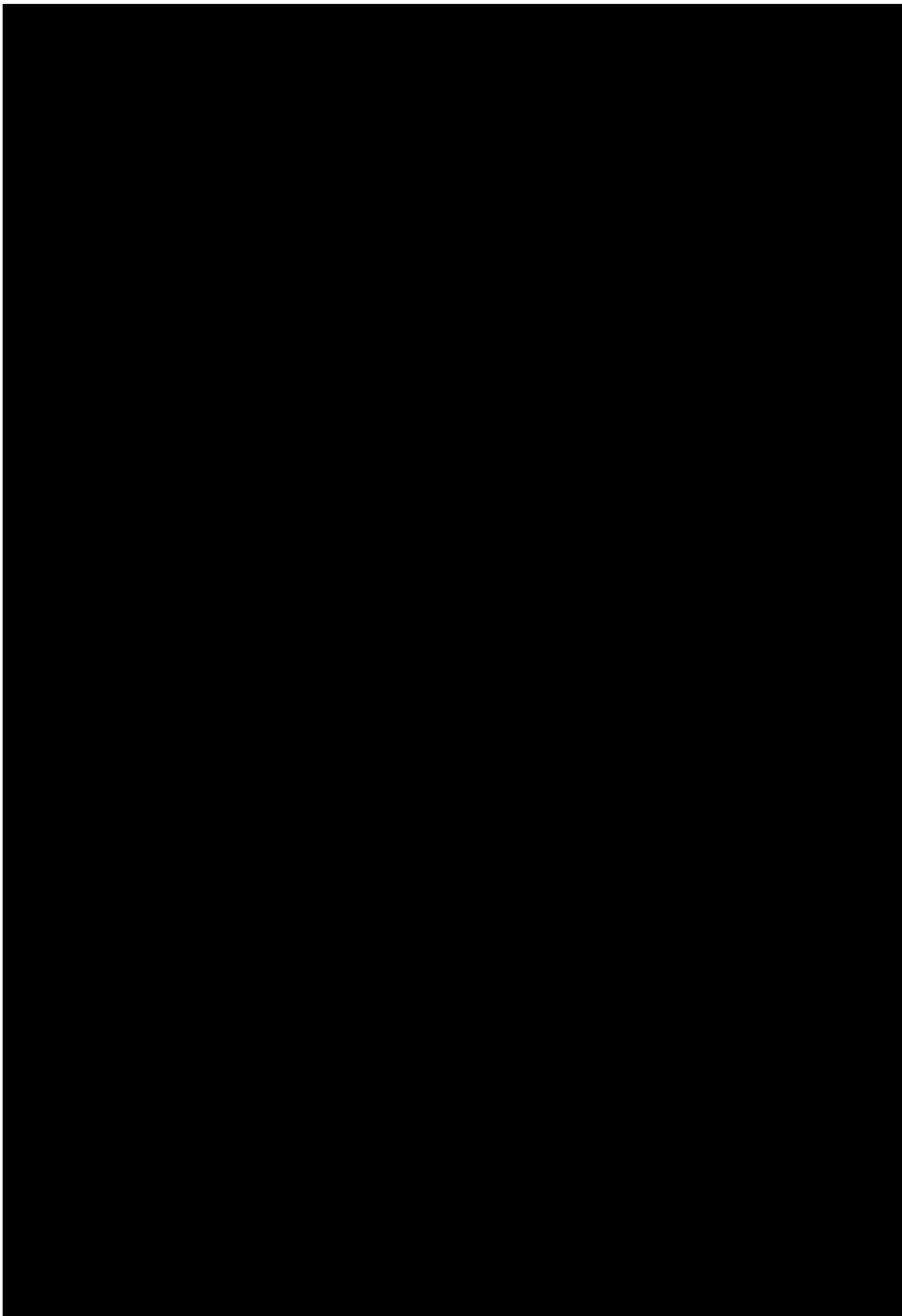


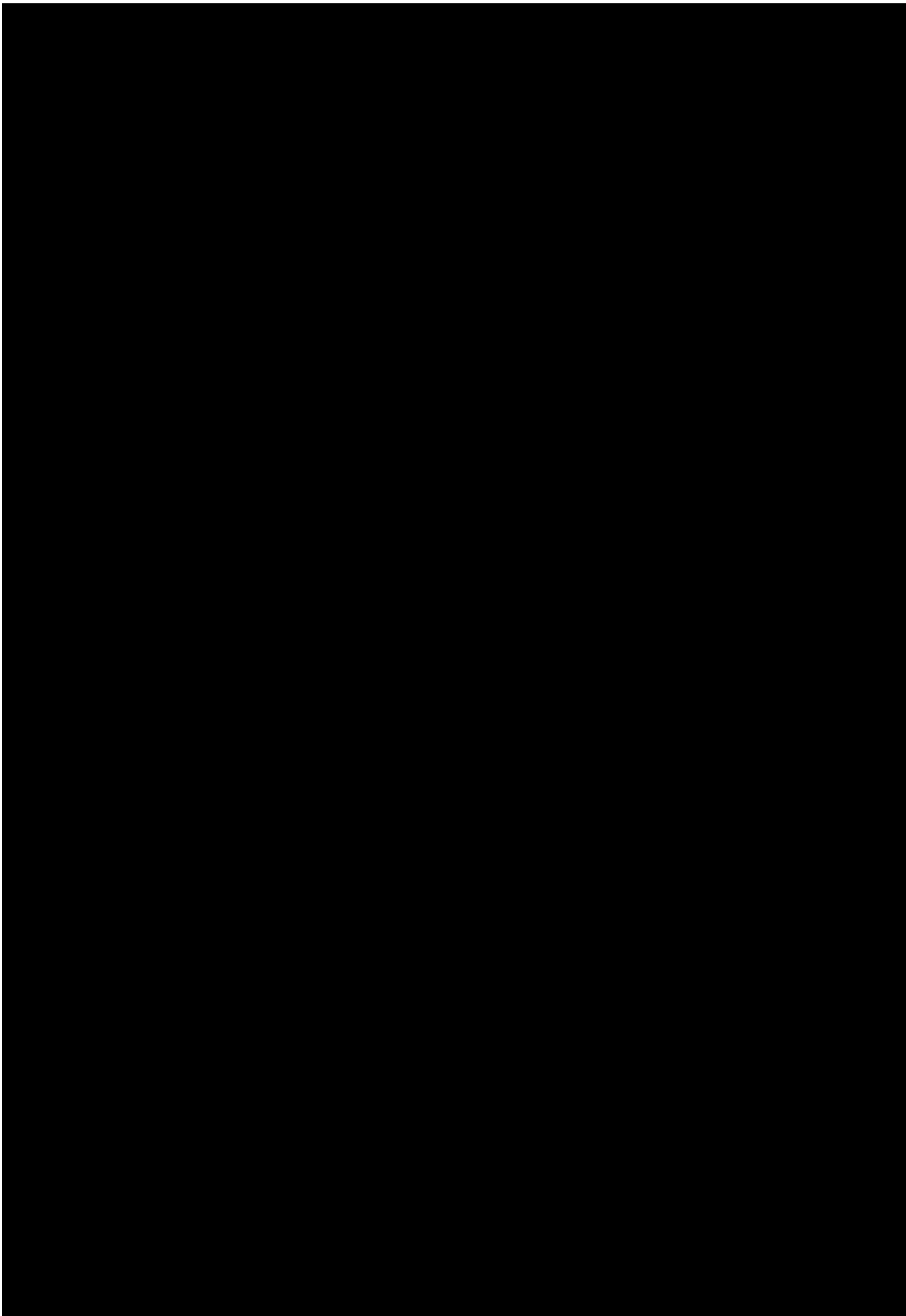


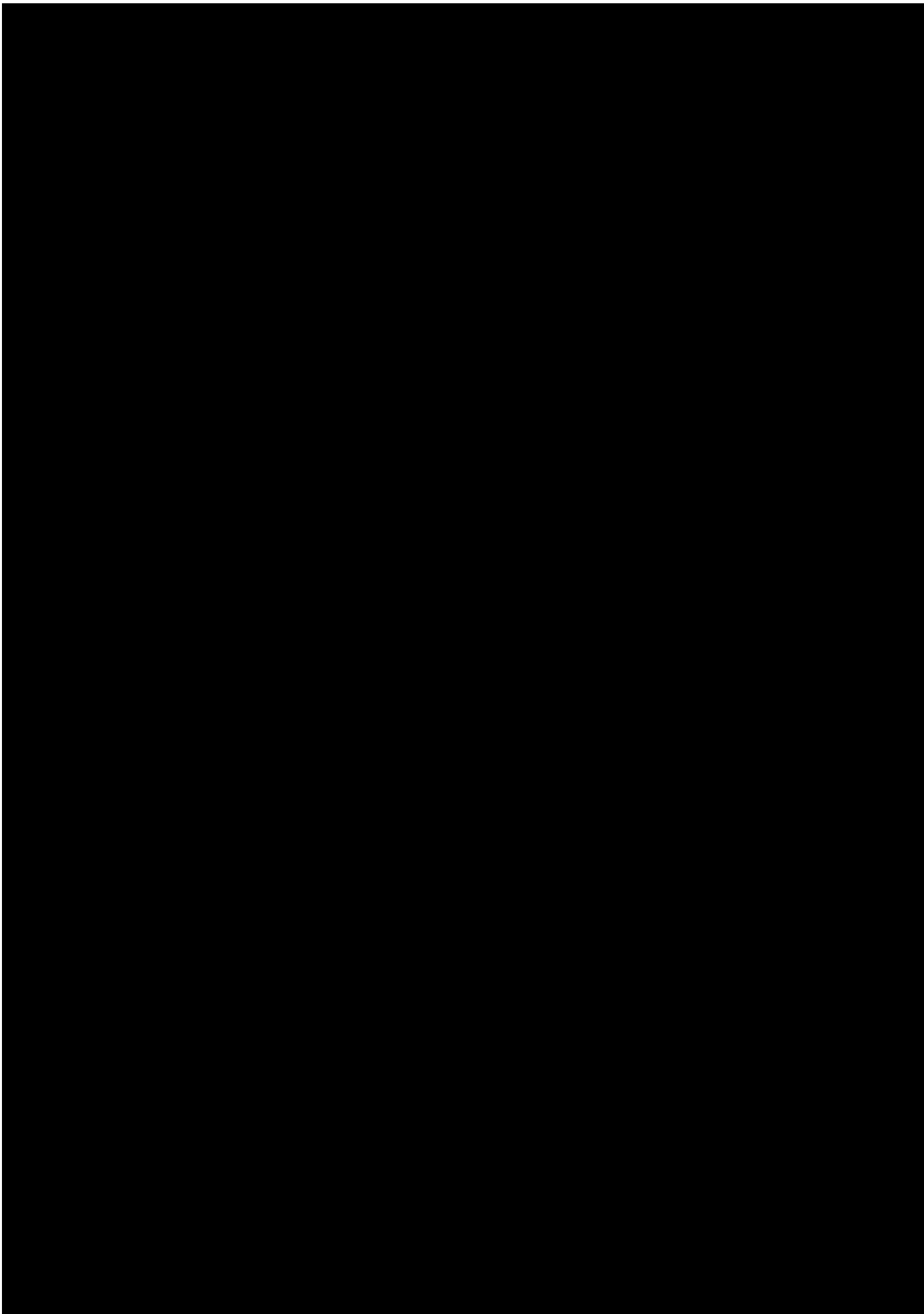


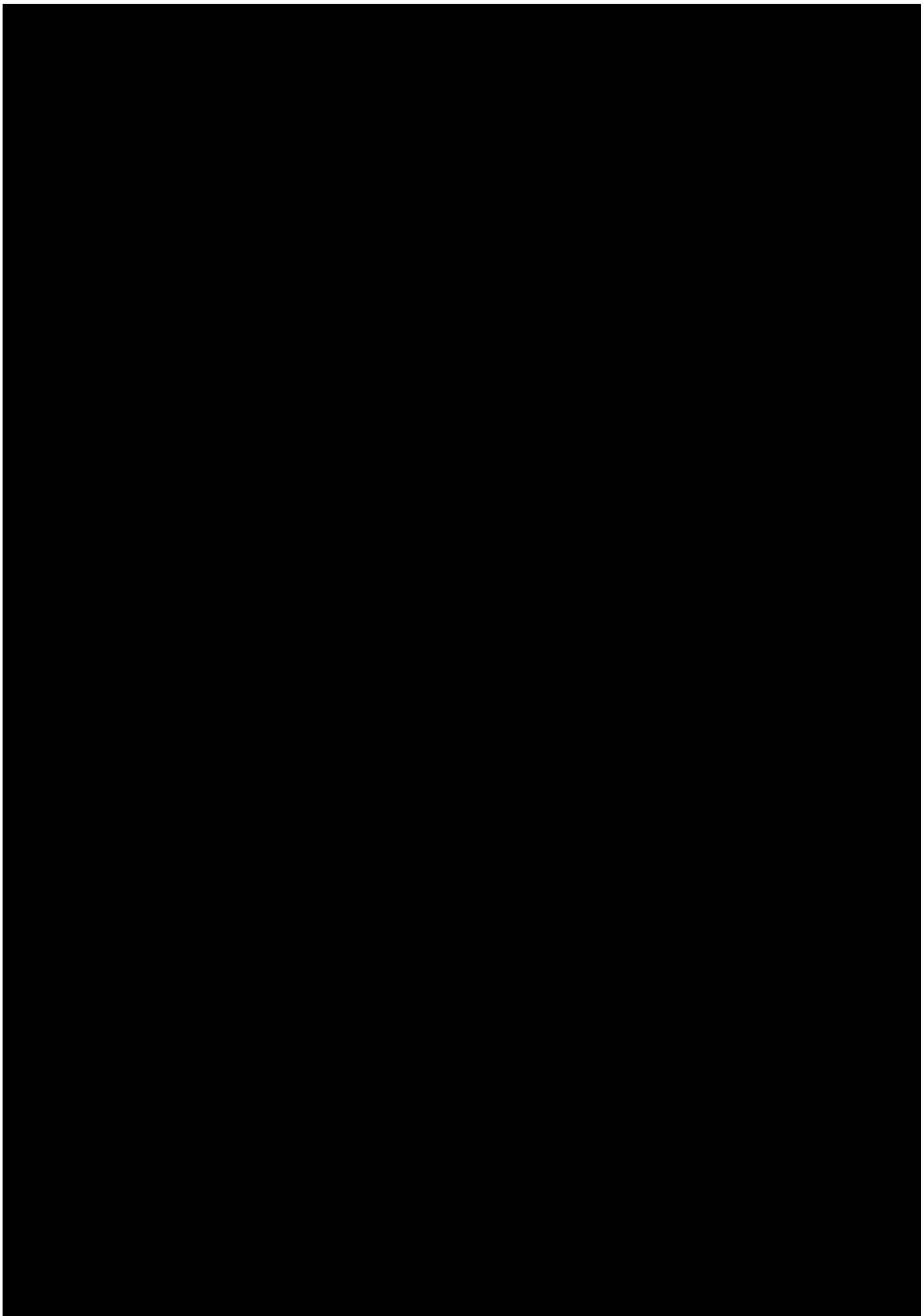


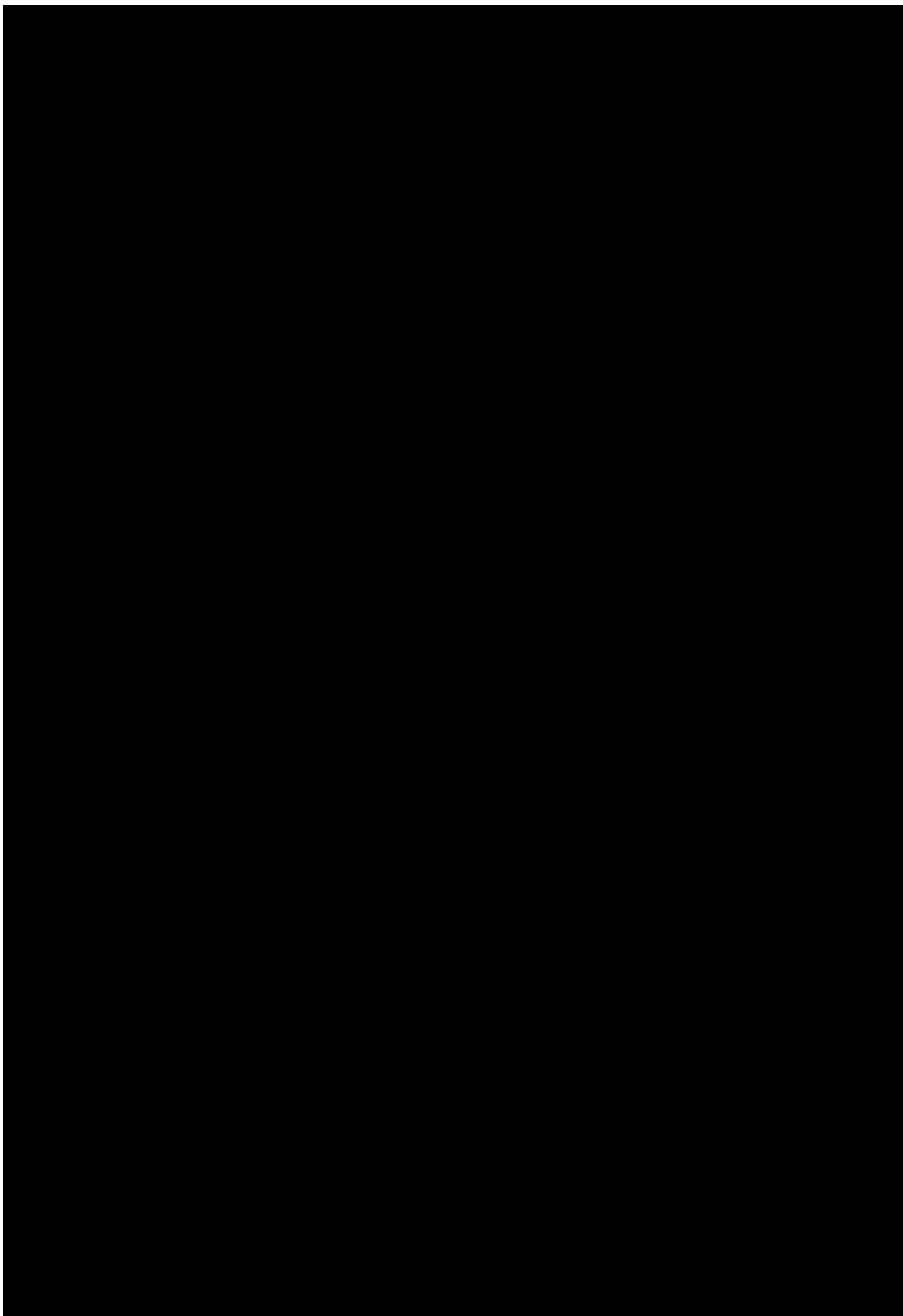


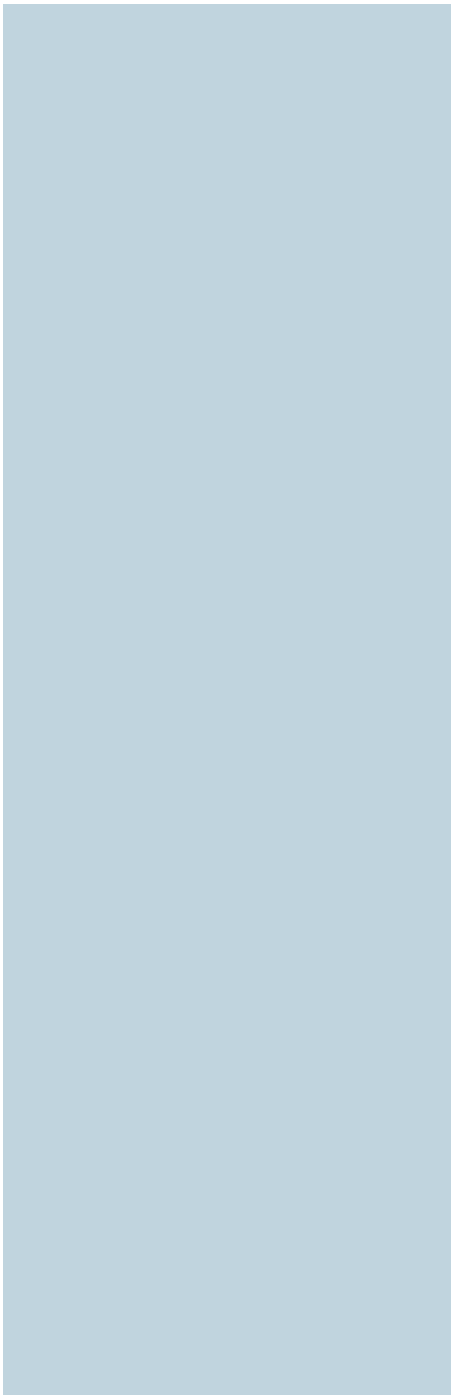












Appendix D / County-Owned Parcels

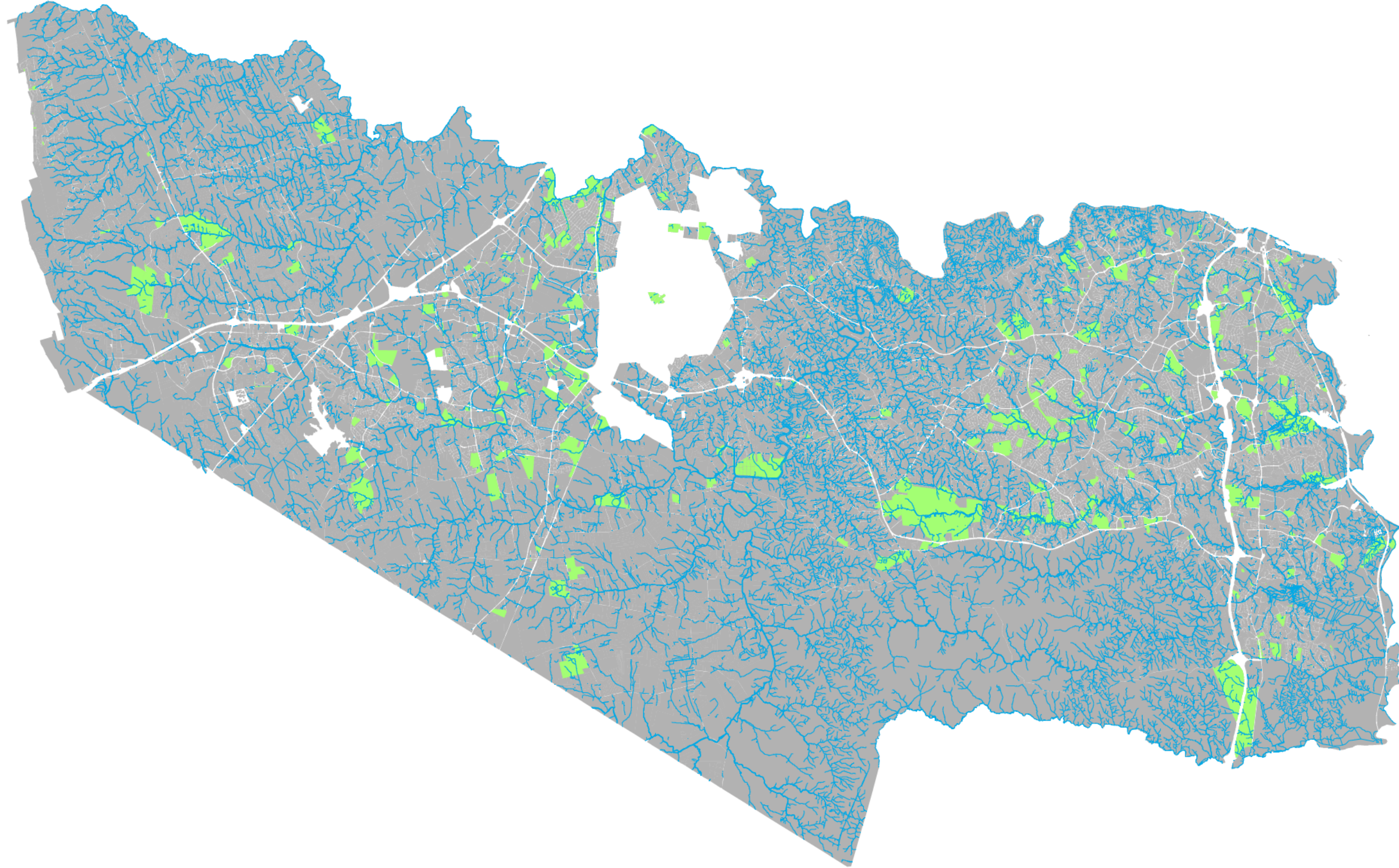


1 INCH = 2.5 MILES



LEGEND

- COUNTY STREAMS LAYER
- COUNTY OWNED PROPERTIES
- PRINCE WILLIAM COUNTY PARCELS



CORPORATE | 6575 WEST LOOP SOUTH,
SUITE 300, BELLAIRE, TX 77401
P: 713.520.5400
WWW.RES.US

**PRINCE WILLIAM COUNTY,
VIRGINIA**

STAMP/SEAL:

REVISIONS:

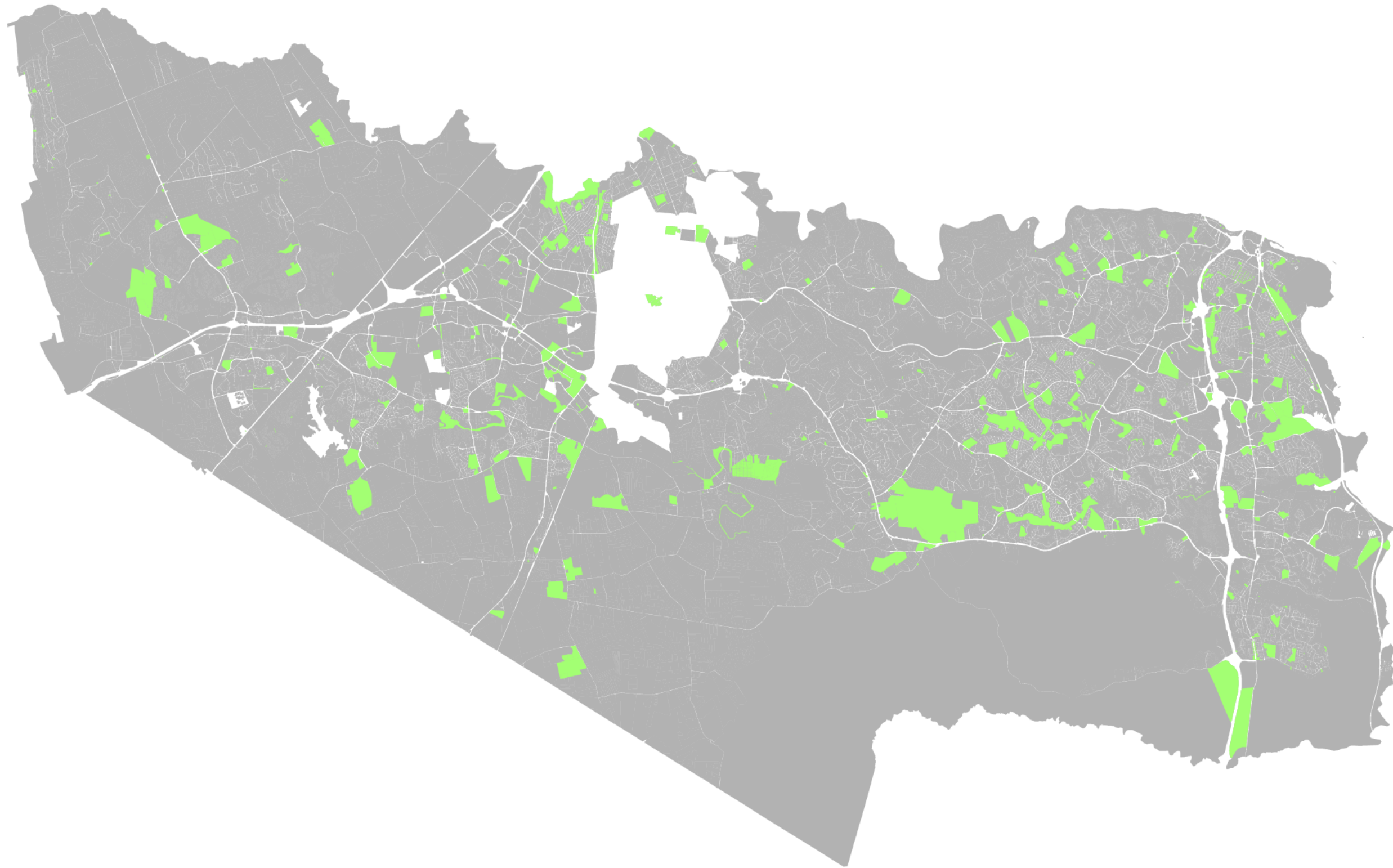


1 INCH = 2.5 MILES



LEGEND

- COUNTY OWNED PROPERTIES
- PRINCE WILLIAM COUNTY PARCELS

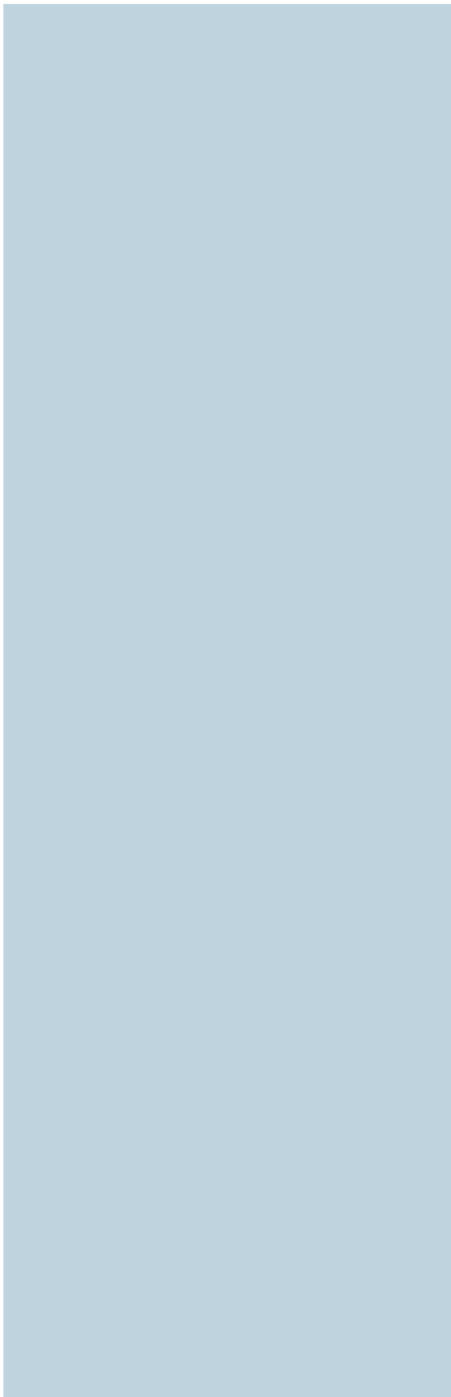


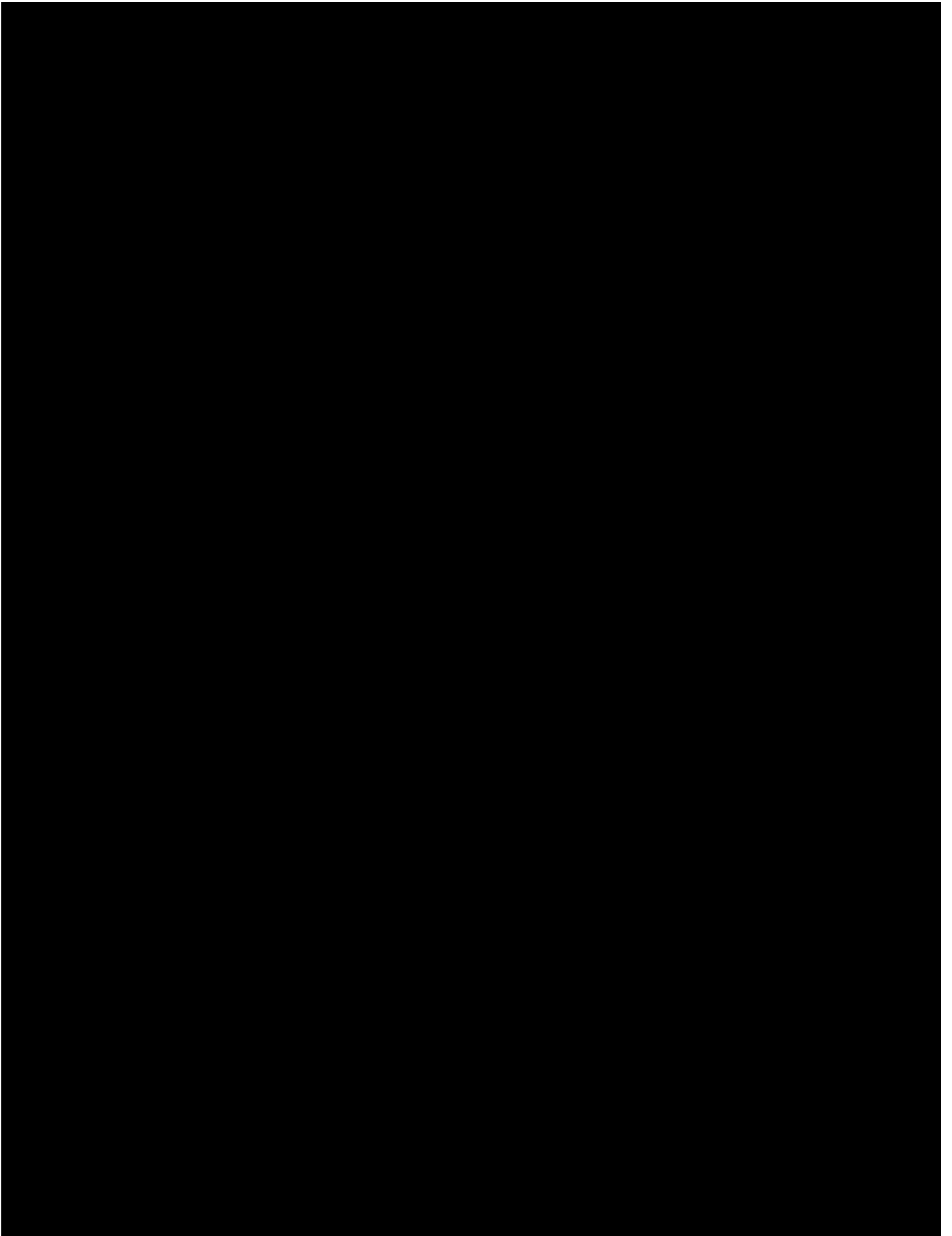
CORPORATE | 6575 WEST LOOP SOUTH,
SUITE 300, BELLAIRE, TX 77401
P: 713.520.5400
WWW.RES.US

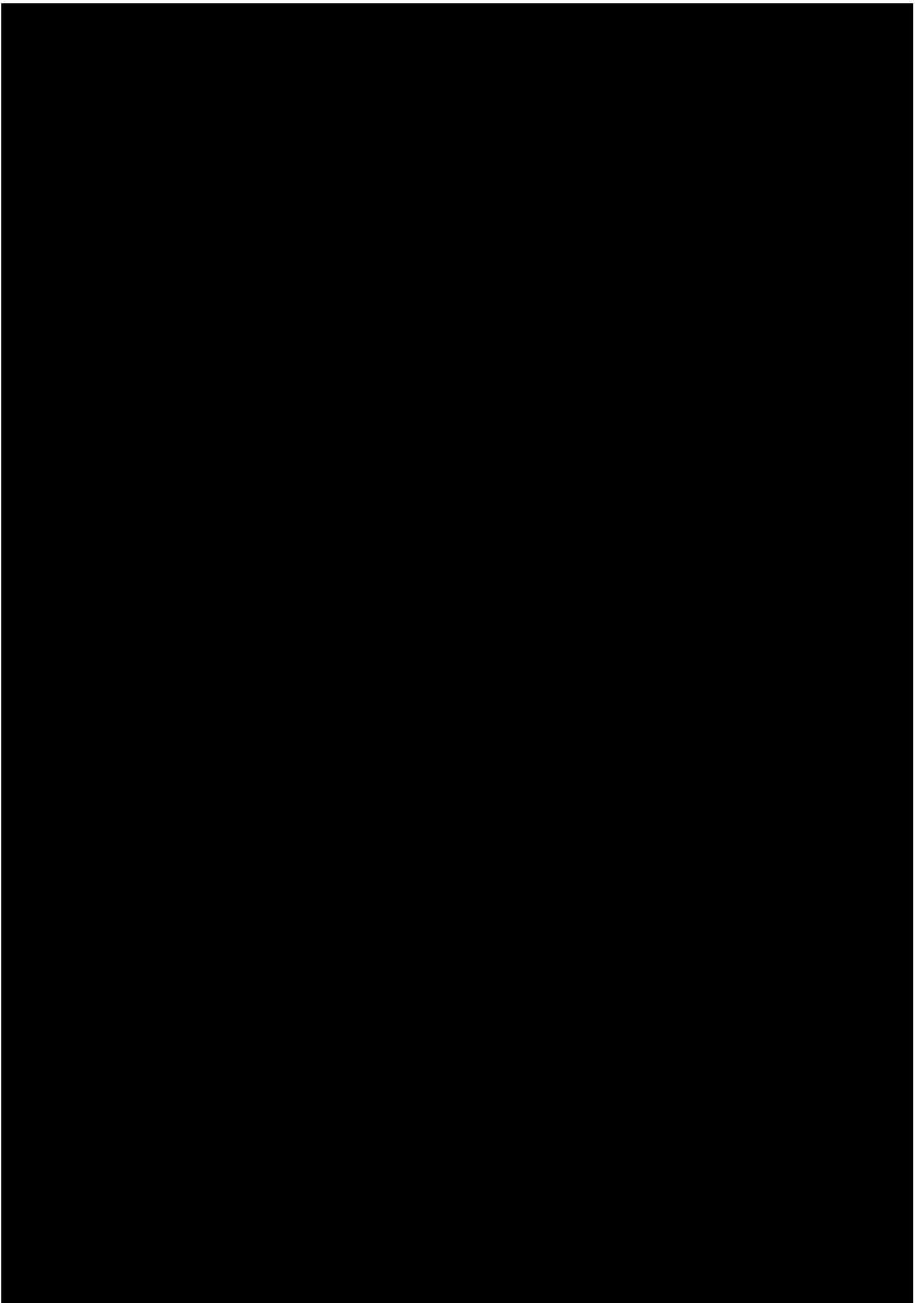
**PRINCE WILLIAM COUNTY,
VIRGINIA**

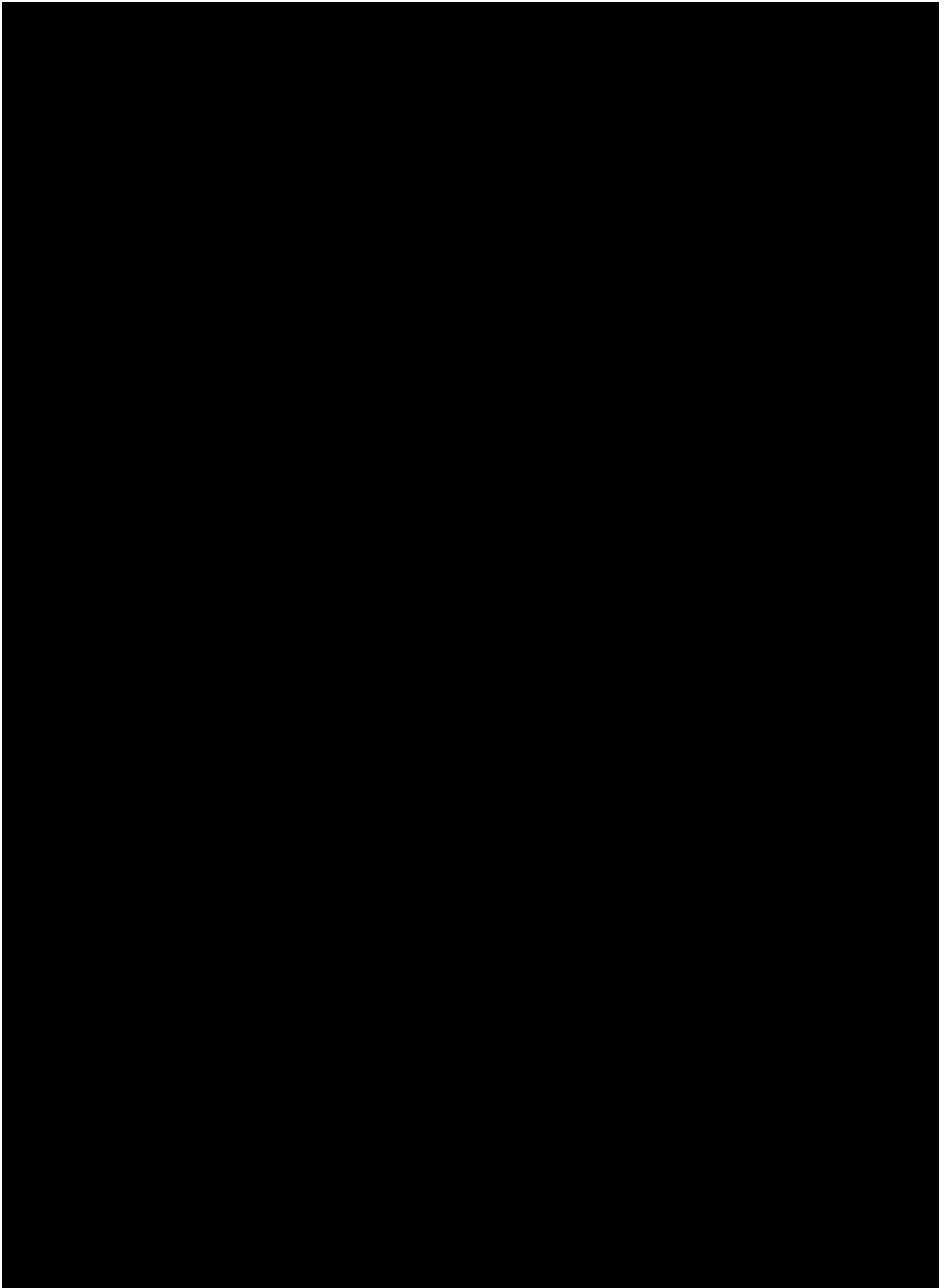
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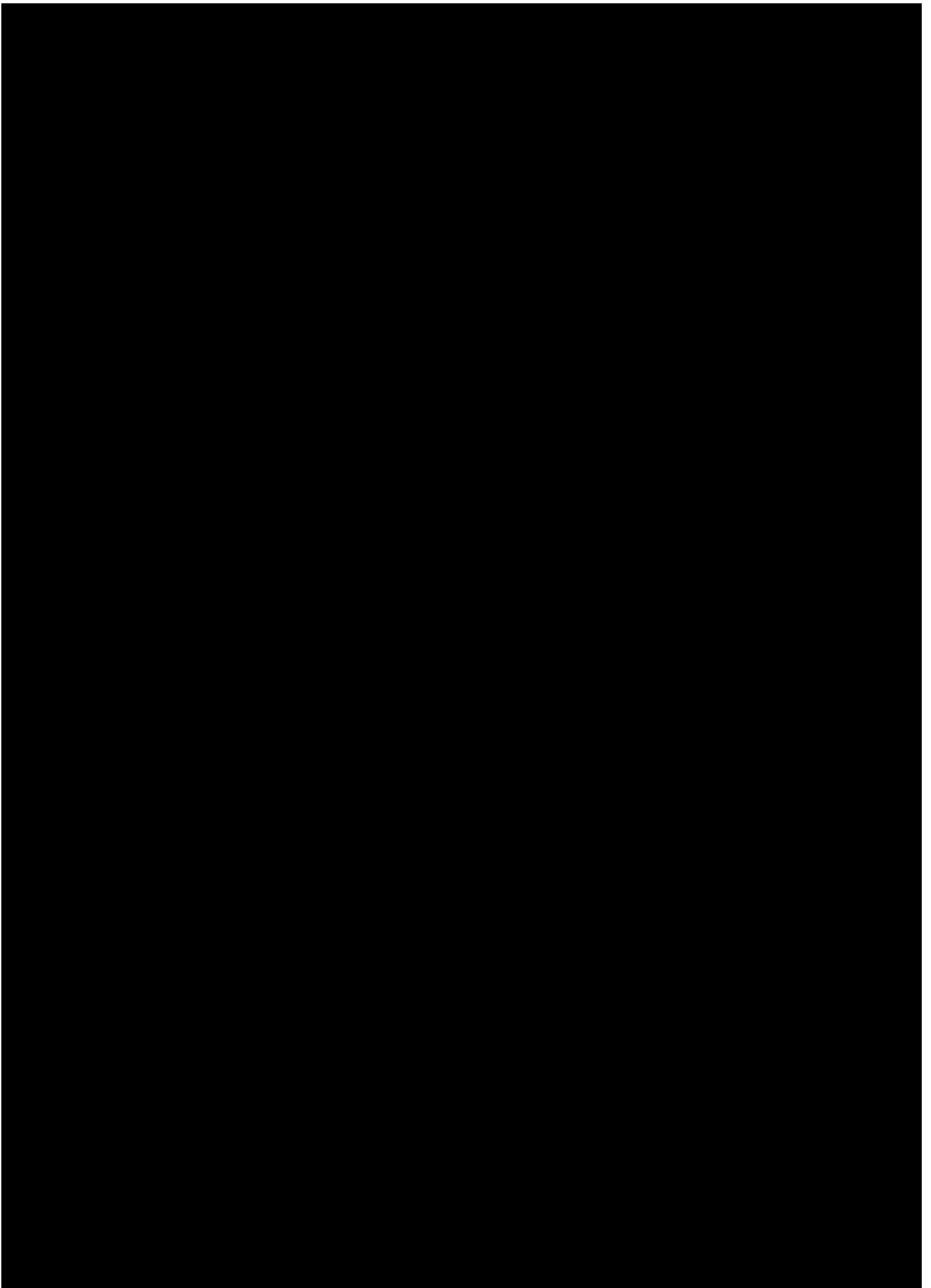
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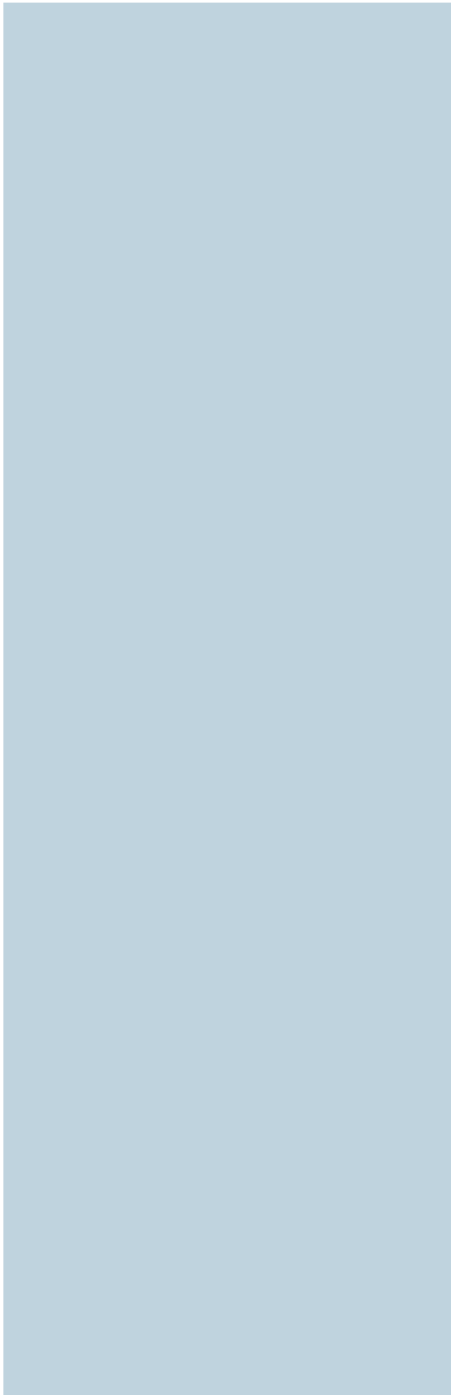














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