

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION**
Washington, D.C. 20549

FORM 8-K

CURRENT REPORT
Pursuant to Section 13 or 15(d)
of the Securities Exchange Act of 1934

Date of Report (Date of earliest event reported): December 19, 2023

bluebird bio, Inc.

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction
of incorporation)

001-35966
(Commission
File Number)

13-3680878
(IRS Employer
Identification Number)

**455 Grand Union Boulevard,
Somerville, MA
02145**
(Address of principal executive offices) (Zip Code)

Registrant's telephone number, including area code: (339) 499-9300

Not Applicable
(Former name or former address, if changed since last report)

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions (*see* General Instruction A.2. below):

- Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)
- Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)
- Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))
- Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, \$0.01 par value per share	BLUE	The Nasdaq Stock Market LLC

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (§230.405 of this chapter) or Rule 12b-2 of the Securities Exchange Act of 1934 (§240.12b-2 of this chapter). Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Item 1.01. Entry into a Material Definitive Agreement.

On December 19, 2023, bluebird bio, Inc. (the “Company”) entered into an underwriting agreement (the “Underwriting Agreement”) with Goldman Sachs & Co. LLC and J.P. Morgan Securities LLC, as representatives of the several underwriters listed on Schedule I attached thereto (the “Underwriters”), in connection with the public offering, issuance and sale by the Company of 83,333,333 shares of the Company’s common stock, \$0.01 par value per share (the “Common Stock”), at a public offering price of \$1.50 per share, less underwriting discounts and commissions, pursuant to an effective shelf registration statement on Form S-3 (Registration No. 333-271772) and a related final prospectus supplement that will be filed with the Securities and Exchange Commission (the “Offering”). Under the terms of the Underwriting Agreement, the Company also granted the Underwriters an option exercisable for 30 days to purchase up to an additional 12,499,999 shares of Common Stock at the public offering price, less underwriting discounts and commissions. The closing of the Offering is expected to occur on or about December 22, 2023, subject to the satisfaction of customary closing conditions.

The Company expects to receive net proceeds from the Offering of approximately \$118.3 million, after deducting underwriting discounts and commissions and estimated offering expenses payable by the Company. The Company intends to use the net proceeds of the Offering to support commercialization and manufacturing for its three approved gene therapies, ZYNTEGLO, SKYSONA and LYFGENIA, and to fund working capital and other general corporate purposes. Based on the Company’s current business plan, the Company anticipates that its cash, cash equivalents, and marketable securities excluding restricted cash, together with the net proceeds of this offering, and anticipated cash flows from operations (taking into account the effect of its accounts receivable-backed factoring agreement), will be sufficient to fund its operations into the first quarter of 2025. The Company’s expectations regarding its anticipated cash runway into the first quarter of 2025 may be affected by many factors, including its ability to execute its current business plan, the ongoing commercialization of the Company’s three approved products, the number of patient starts for the Company’s three approved products, and its realization of anticipated revenue. These expectations are based on estimates and the judgment of management. The Company’s cash runway may not extend as far as it has forecasted and anticipated cash needs could be greater than the Company expects.

The Underwriting Agreement contains customary representations, warranties and covenants by the Company, customary conditions to closing, indemnification obligations of the Company and the Underwriters, including for liabilities under the Securities Act of 1933, as amended, other obligations of the parties and termination provisions. The representations, warranties and covenants contained in the Underwriting Agreement were made solely for the benefit of the parties thereto and may be subject to limitations agreed upon by the contracting parties. Accordingly, the Underwriting Agreement is incorporated herein by reference only to provide investors with information regarding the terms of the Underwriting Agreement and not to provide investors with any other factual information regarding the Company or its business, and should be read in conjunction with the disclosures in the Company’s periodic reports and other filings with the Securities and Exchange Commission.

The foregoing description of the Underwriting Agreement is not complete and is qualified in its entirety by reference to the full text of the Underwriting Agreement, a copy of which is filed as Exhibit 1.1 to this Current Report on Form 8-K (the “Current Report”) and is incorporated by reference herein.

Latham & Watkins LLP, counsel to the Company, has issued an opinion to the Company, dated December 20, 2023, regarding the validity of the shares of Common Stock to be issued and sold in the offering. A copy of the opinion is filed as Exhibit 5.1 to this Current Report.

Forward-Looking Statements

This Current Report contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. All statements contained in this Current Report that do not relate to matters of historical fact should be considered forward-looking statements, including without limitation statements regarding the Company’s expectations regarding its cash runway, the consummation of the offering, the terms of the offering, the satisfaction of customary closing conditions with respect to the offering, the anticipated amount of net proceeds from the offering and the intended use of such net proceeds. Statements using words such as “expect”, “anticipate”, “believe”, “may”, “will” and similar terms are also forward-looking statements. These statements are neither promises nor guarantees, but involve known and unknown risks, uncertainties and other important factors that may cause its actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements, including, but not limited to, the important factors discussed under the caption “Risk Factors” in the Company’s Quarterly Report on Form 10-Q for the quarterly period ended September 30, 2023 and its other filings with the Securities and Exchange Commission. Except as required by law, the Company undertakes no obligations to make any revisions to the forward-looking statements contained in this Current Report or to update them to reflect events or circumstances occurring after the date of this Current Report, whether as a result of new information, future developments or otherwise.

Item 9.01. Financial Statements and Exhibits.

(d) Exhibits

<u>Exhibit No.</u>	<u>Description</u>
1.1	<u>Underwriting Agreement, dated as of December 19, 2023, by and among bluebird bio, Inc., Goldman Sachs & Co. LLC and J.P. Morgan Securities LLC.</u>
5.1	<u>Opinion of Latham & Watkins LLP.</u>
23.1	<u>Consent of Latham & Watkins LLP (included in Exhibit 5.1).</u>
104	Cover Page Interactive Data File (embedded within the inline XBRL document).

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned hereunto duly authorized.

bluebird bio, Inc.

Date: December 20, 2023

By: /s/ Joseph Vittiglio

Name: Joseph Vittiglio

Title: *Chief Legal and Business Officer and Secretary*

bluebird bio, Inc.**95,833,332 Shares of Common Stock**

Underwriting Agreement

December 19, 2023

Goldman Sachs & Co. LLC,
J.P. Morgan Securities LLC
As representatives (the "Representatives") of the several Underwriters
named in Schedule I hereto,

c/o Goldman Sachs & Co. LLC
200 West Street
New York, New York 10282-2198

c/o J.P. Morgan Securities LLC
383 Madison Avenue
New York, New York 10179

Ladies and Gentlemen:

bluebird bio, Inc., a Delaware corporation (the "Company"), proposes, subject to the terms and conditions stated in this agreement (this "Agreement"), to issue and sell to the Underwriters named in Schedule I hereto (the "Underwriters") an aggregate of 83,333,333 shares (the "Firm Securities") of common stock, par value \$0.01 per share ("Stock") and, at the election of the Underwriters, up to 12,499,999 additional shares of Stock (the "Optional Securities") of the Company (the Firm Securities and the Optional Securities that the Underwriters elect to purchase pursuant to Section 2 hereof being collectively called the "Securities").

1. The Company represents and warrants to, and agrees with, each of the Underwriters that:

(a) A registration statement on Form S-3 (File No. 333-271772) (the "Initial Registration Statement") in respect of the Securities has been filed with the Securities and Exchange Commission (the "Commission"); the Initial Registration Statement and any post-effective amendment thereto, each in the form heretofore delivered to you, have been declared effective by the Commission in such form; other than a registration statement, if any, increasing the size of the offering (a "Rule 462(b) Registration Statement"), filed pursuant to Rule 462(b) under the Securities Act of 1933, as amended (the "Act"), which became effective upon filing, no other document with respect to the Initial Registration Statement or document incorporated by reference therein has been filed, or transmitted for filing, with the Commission (other than prospectuses filed pursuant to Rule 424(b) of the rules and regulations of the Commission under the Act,

each in the form heretofore delivered to the Representatives); and no stop order suspending the effectiveness of the Initial Registration Statement, any post-effective amendment thereto or any part thereof or the Rule 462(b) Registration Statement, if any, has been issued and no proceeding for that purpose or pursuant to Section 8A of the Act has been initiated or threatened by the Commission (the base prospectus filed as part of the Initial Registration Statement, in the form in which it has most recently been filed with the Commission on or prior to the date of this Agreement relating to the Securities, is hereinafter called the "Basic Prospectus"; any preliminary prospectus (including any preliminary prospectus supplement) relating to the Securities filed with the Commission pursuant to Rule 424(b) under the Act is hereinafter called a "Preliminary Prospectus"; the various parts of the Initial Registration Statement and the Rule 462(b) Registration Statement, if any, including all exhibits thereto and including any prospectus supplement relating to the Securities that is filed with the Commission and deemed by virtue of Rule 430B under the Act to be part of the Initial Registration Statement, each as amended at the time such part of the Initial Registration Statement became effective or such part of the Rule 462(b) Registration Statement, if any, became or hereafter becomes effective, are hereinafter collectively called the "Registration Statement"; the Basic Prospectus, as amended and supplemented immediately prior to the Applicable Time (as defined in Section 1(c) hereof) is hereinafter called the "Pricing Prospectus"; and the form of the final prospectus relating to the Securities filed with the Commission pursuant to Rule 424(b) under the Act in accordance with Section 5(a) hereof is hereinafter called the "Prospectus"; any reference herein to the Basic Prospectus, the Pricing Prospectus, any Preliminary Prospectus or the Prospectus shall be deemed to refer to and include the documents incorporated by reference therein pursuant to Item 12 of Form S-3, as of the date of such prospectus; any reference to any amendment or supplement to the Basic Prospectus, any Preliminary Prospectus or the Prospectus shall be deemed to refer to and include any post-effective amendment to the Registration Statement, any prospectus supplement relating to the Securities filed with the Commission pursuant to Rule 424(b) under the Act and any documents filed under the Securities Exchange Act of 1934, as amended (the "Exchange Act"), and incorporated therein, in each case after the date of the Basic Prospectus, such Preliminary Prospectus, or the Prospectus, as the case may be; any reference to any amendment to the Registration Statement shall be deemed to refer to and include any annual report of the Company filed pursuant to Section 13(a) or 15(d) of the Exchange Act after the effective date of the Registration Statement that is incorporated by reference in the Registration Statement; any oral or written communication with potential investors undertaken in reliance on Rule 163B under the Act is hereinafter called a "Testing-the-Waters Communication"; and any Testing-the-Waters Communication that is a written communication within the meaning of Rule 405 under the Act is hereinafter called a "Written Testing-the-Waters Communication"; and any "issuer free writing prospectus" as defined in Rule 433 under the Act relating to the Securities is hereinafter called an "Issuer Free Writing Prospectus");

(b) (A) No order preventing or suspending the use of any Preliminary Prospectus or any Issuer Free Writing Prospectus has been issued by the Commission, and (B) each Preliminary Prospectus, at the time of filing thereof, conformed in all material respects to the requirements of the Act and the rules and regulations of the Commission thereunder, and did not contain an untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein, in the light of the circumstances under which they were made, not misleading; provided, however, that this representation and warranty shall not apply to any statements or omissions made in reliance upon and in conformity with the Underwriter Information (as defined below);

(c) For the purposes of this Agreement, the “Applicable Time” is 8:30 p.m. (Eastern time) on the date of this Agreement. The Pricing Prospectus, as supplemented by the information listed on Schedule II(c) hereto, taken together (collectively, the “Pricing Disclosure Package”), as of the Applicable Time did not, and as of each Time of Delivery (as defined in Section 4(a) of this Agreement) will not, include any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; and each Issuer Free Writing Prospectus and each Written Testing-the-Waters Communication does not conflict with the information contained in the Registration Statement, the Pricing Prospectus or the Prospectus and each Issuer Free Writing Prospectus and each Written Testing-the-Waters Communication, as supplemented by and taken together with the Pricing Disclosure Package as of the Applicable Time, did not, and as of each Time of Delivery will not, include any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; provided, however, that this representation and warranty shall not apply to statements or omissions made in an Issuer Free Writing Prospectus in reliance upon and in conformity with the Underwriter Information;

(d) The documents incorporated by reference in the Pricing Prospectus and the Prospectus, when they became effective or were filed with the Commission, as the case may be, conformed in all material respects to the requirements of the Act or the Exchange Act, as applicable, and the rules and regulations of the Commission thereunder, and none of such documents contained an untrue statement of a material fact or omitted to state a material fact required to be stated therein or necessary to make the statements therein not misleading; and any further documents so filed and incorporated by reference in the Pricing Prospectus and the Prospectus or any further amendment or supplement thereto, when such documents become effective or are filed with the Commission, as the case may be, will conform in all material respects to the requirements of the Act or the Exchange Act, as applicable, and the rules and regulations of the Commission thereunder and will not contain an untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein not misleading; provided, however, that this representation and warranty shall not apply to any statements or omissions made in reliance upon and in conformity with the Underwriter Information; and no such or any other documents were filed with the Commission since the Commission’s close of business on the business day immediately prior to the date of this Agreement and prior to the execution of this Agreement, except as set forth on Schedule II(b) hereto;

(e) The Registration Statement conforms, and the Prospectus and any further amendments or supplements to the Registration Statement and the Prospectus will conform, in all material respects to the requirements of the Act and the rules and regulations of the Commission thereunder and do not and will not, as of the applicable effective date as to each part of the Registration Statement, as of the applicable filing date as to the Prospectus and any amendment or supplement thereto, and as of each Time of Delivery, contain an untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein not misleading; provided, however, that this representation and warranty shall not apply to any statements or omissions made in reliance upon and in conformity with the Underwriter Information;

(f) [Reserved].

(g) The financial statements (including the related notes thereto) of the Company and its consolidated subsidiaries included or incorporated by reference in the Registration Statement, the Disclosure Package and the Prospectus comply in all material respects with the applicable requirements of the Act and the Exchange Act, as applicable, and present fairly in all material respects the financial position of the Company and its consolidated subsidiaries as of the dates indicated and the results of their operations and the changes in their cash flows for the periods specified, subject in the case of unaudited financial statements to normal year-end audit adjustments; such financial statements have been prepared in conformity with generally accepted accounting principles in the United States applied on a consistent basis throughout the periods covered thereby, except in the case of unaudited, interim financial statements, which are subject to normal year-end adjustments and do not contain certain footnotes as permitted by the applicable rules of the Commission, any supporting schedules included or incorporated by reference in the Registration Statement, and as may be expressly stated in the related notes thereto present fairly in all material respects the information required to be stated therein; and the other financial information included or incorporated by reference in the Registration Statement, the Disclosure Package and the Prospectus has been derived from the accounting records of the Company and its consolidated subsidiaries and presents fairly in all material respects the information shown thereby;

(h) Since the date of the most recent financial statements of the Company included or incorporated by reference in the Registration Statement, the Disclosure Package and the Prospectus, (i) there has not been any change in the capital stock (other than the issuance of shares of Stock upon exercise of stock options and warrants described as outstanding in, and the grant of options and awards under existing equity incentive plans described in, the Registration Statement, the Disclosure Package and the Prospectus), short-term debt or long-term debt of the Company or any of its subsidiaries, or any dividend or distribution of any kind declared, set aside for payment, paid or made by the Company on any class of capital stock, or any material adverse change, or any development that would reasonably be expected to result in material adverse change, in or affecting the business, properties, management, financial position, stockholders' equity, results of operations or prospects of the Company and its subsidiaries taken as a whole; (ii) neither the Company nor any of its subsidiaries has entered into any transaction or agreement (whether or not in the ordinary course of business) that is material to the Company and its subsidiaries taken as a whole or incurred any liability or obligation, direct or contingent, that is material to the Company and its subsidiaries taken as a whole; and (iii) neither the Company nor any of its subsidiaries has sustained any loss or interference with its business that is material to the Company and its subsidiaries taken as a whole and that is either from fire, explosion, flood or other calamity, whether or not covered by insurance, or from any labor disturbance or dispute or any action, order or decree of any court or arbitrator or governmental or regulatory authority, except in each case as otherwise disclosed in the Registration Statement, the Disclosure Package and the Prospectus;

(i) The Company and each of its subsidiaries have been duly organized and are validly existing and in good standing under the laws of their respective jurisdictions of organization, are duly qualified to do business and are in good standing in each jurisdiction in which their respective ownership or lease of property or the conduct of their respective businesses requires such qualification, and have all power and authority necessary to own or hold their respective properties and to conduct the businesses in which they are engaged, except where the failure to be so qualified or in good standing or have such power or authority would not, individually or in the aggregate, have a material adverse effect on the business, properties, management, financial position, stockholders' equity, results of operations or prospects of the Company and its subsidiaries taken as a whole or on the performance by the Company of its obligations under this Agreement (a "Material Adverse Effect"). The Company does not own or control, directly or indirectly, any corporation, association or other entity, other than (i) those subsidiaries not required to be listed on Exhibit 21.1 by Item 601 of Regulation S-K under the Exchange Act and (ii) those subsidiaries formed since the last day of the most recently ended fiscal year. None of the subsidiaries of the Company is a "Significant Subsidiary," as defined by Rule 1-02(w) of Regulation S-X promulgated by the Commission;

(j) The Company has an authorized capitalization as set forth in the Registration Statement, the Disclosure Package and the Prospectus; all the outstanding shares of capital stock of the Company have been duly and validly authorized and issued and are fully paid and non-assessable and are not subject to any pre-emptive or similar rights that have not been duly waived or satisfied; except as described in or expressly contemplated by the Disclosure Package and the Prospectus, there are no outstanding rights (including, without limitation, pre-emptive rights), warrants or options to acquire, or instruments convertible into or exchangeable for, any shares of capital stock or other equity interest in the Company or any of its subsidiaries, or any contract, commitment, agreement, understanding or arrangement of any kind relating to the issuance of any capital stock of the Company or any such subsidiary, any such convertible or exchangeable securities or any such rights, warrants or options; the capital stock of the Company conforms in all material respects to the description thereof contained in the Registration Statement, the Disclosure Package and the Prospectus; and all the outstanding shares of capital stock or other equity interests of each subsidiary owned, directly or indirectly, by the Company have been duly and validly authorized and issued, are fully paid and non-assessable and are owned directly or indirectly by the Company, free and clear of any lien, charge, encumbrance, security interest, restriction on voting or transfer or any other claim of any third party. There are no debt securities or preferred stock of, or guaranteed by, the Company or any of its subsidiaries that are rated by a "nationally recognized statistical rating organization," as such term is defined in Section 3(a)(62) of the Exchange Act;

(k) With respect to the stock options (the "Stock Options") granted pursuant to the stock-based compensation plans of the Company (the "Company Stock Plans"), (i) to the Company's knowledge, each Stock Option intended to qualify as an "incentive stock option" under Section 422 of the United States Internal Revenue Code of 1986, as amended (the "Code") so qualifies, (ii) each grant of a Stock Option was duly authorized no later than the date on which the grant of such Stock Option was by its terms to be effective by all necessary corporate action, including, as applicable, approval by the Board of Directors of the Company (or a duly constituted and authorized committee thereof) and any required stockholder approval by the necessary number of votes or written consents, and the award agreement governing such grant (if any) was duly executed and delivered by each party thereto, (iii) each such grant was made in accordance with the terms of the Company Stock Plans and (iv) each such grant was properly accounted for in accordance with generally accepted accounting principles in

the United States in the financial statements (including the related notes) of the Company. Since January 1, 2013, the Company has not knowingly granted, and there is no and has been no policy or practice of the Company of granting, Stock Options prior to, or otherwise coordinating the grant of Stock Options with, the release or other public announcement of material information regarding the Company or its subsidiaries or their results of operations or prospects;

(l) The Company has full right, power and authority to execute and deliver this Agreement and to perform its obligations hereunder; and all action required to be taken for the due and proper authorization, execution and delivery by it of this Agreement and the consummation by it of the transactions contemplated hereby has been duly and validly taken;

(m) This Agreement has been duly authorized, executed and delivered by the Company;

(n) The Securities to be issued and sold by the Company hereunder, when issued and delivered, will be duly authorized and, when issued and delivered by the Company against payment therefor as provided herein, will be duly and validly issued, fully paid and nonassessable and will conform in all material respects to the descriptions thereof in the Registration Statement, the Disclosure Package and the Prospectus; and the issuance of the Securities is not subject to any preemptive or similar rights that have not been duly waived;

(o) This Agreement conforms in all material respects to the description thereof contained in the Registration Statement, the Disclosure Package and the Prospectus;

(p) Neither the Company nor any of its subsidiaries is (i) in violation of its charter or by-laws or similar organizational documents; (ii) in default, and no event has occurred that, with notice or lapse of time or both, would constitute such a default, in the due performance or observance of any term, covenant or condition contained in any indenture, mortgage, deed of trust, loan agreement or other agreement or instrument to which the Company or any of its subsidiaries is a party or by which the Company or any of its subsidiaries is bound or to which any of the property or assets of the Company or any of its subsidiaries is subject; or (iii) in violation of any law or statute or any judgment, order, rule or regulation of any court or arbitrator or governmental or regulatory authority, except, in the case of clauses (ii) and (iii) above, for any such default or violation that would not, individually or in the aggregate, have a Material Adverse Effect;

(q) The execution, delivery and performance by the Company of this Agreement, the issuance and sale of the Securities and the consummation by the Company of the transactions contemplated by this Agreement will not (i) conflict with or result in a breach or violation of any of the terms or provisions of, or constitute a default under, or result in the creation or imposition of any lien, charge or encumbrance upon any property or assets of the Company or any of its subsidiaries pursuant to, any indenture, mortgage, deed of trust, loan agreement or other agreement or instrument to which the Company or any of its subsidiaries is a party or by which the Company or any of its subsidiaries is bound or to which any of the property or assets of the Company or any of its subsidiaries is subject, (ii) result in any violation of the provisions of the charter or by-laws or similar organizational documents of the Company or any of its subsidiaries or (iii) result in the violation of any law or statute or any judgment, order, rule or regulation of any court or arbitrator or governmental or regulatory authority, except, in the case of clauses (i) and (iii) above, for any such conflict, breach, violation or default that would not, individually or in the aggregate, have a Material Adverse Effect;

(r) No consent, approval, authorization, order, license, registration or qualification of or with any court or arbitrator or governmental or regulatory authority is required for the execution, delivery and performance by the Company of this Agreement, the issuance and sale of the Securities and the consummation of the transactions contemplated by this Agreement, except such consents, approvals, authorizations, orders and registrations or qualifications as may be required for official listing on the Nasdaq Global Select Market (“NASDAQ”) and under applicable state securities laws;

(s) Except as described in the Registration Statement, the Disclosure Package and the Prospectus, there are no legal, governmental or regulatory investigations, actions, suits or proceedings pending to which the Company or any of its subsidiaries is a party or to which any property of the Company or any of its subsidiaries is the subject that, individually or in the aggregate, if determined adversely to the Company or any of its subsidiaries, would reasonably be expected to have a Material Adverse Effect; no such investigations, actions, suits or proceedings are, to the knowledge of the Company, threatened, nor are any such investigations, actions suits or proceedings contemplated in writing or orally by any governmental or regulatory authority or by others; and (i) there are no current or pending legal, governmental or regulatory actions, suits or proceedings that are required under the Act to be described in the Registration Statement, the Disclosure Package or the Prospectus that are not so described in the Registration Statement, the Disclosure Package and the Prospectus and (ii) there are no statutes, regulations or contracts or other documents that are required under the Act to be filed as exhibits to the Registration Statement or described in the Registration Statement, the Disclosure Package or the Prospectus that are not so filed as exhibits to the Registration Statement or described in the Registration Statement, the Disclosure Package and the Prospectus;

(t) Ernst & Young LLP, who has certified certain financial statements of the Company and its subsidiaries, is an independent registered public accounting firm with respect to the Company and its subsidiaries within the applicable rules and regulations adopted by the Commission and the Public Company Accounting Oversight Board (United States) and as required by the Act;

(u) The Company and its subsidiaries have good and marketable title in fee simple (in the case of real property) to, or have valid rights to lease or otherwise use, all items of real and personal property and assets that are material to the business of the Company and its subsidiaries taken as a whole, in each case free and clear of all liens, encumbrances, claims and defects and imperfections of title except those that (i) do not materially interfere with the use made and proposed to be made of such property by the Company and its subsidiaries or (ii) would not reasonably be expected, individually or in the aggregate, to have a Material Adverse Effect;

(v) Except as expressly contemplated by the Registration Statement, the Disclosure Package and the Prospectus, to the Company’s knowledge, the Company and its subsidiaries own or have valid, binding and enforceable licenses or other rights under the patents and patent applications, copyrights, trademarks, trademark registrations, service marks, service mark registrations, trade names, service names and know-how (including trade secrets and other unpatented and/or unpatentable proprietary or confidential information, systems or procedures) that are material to the conduct, or the proposed conduct, of the business of the Company or its subsidiaries taken as a whole in the manner described in the Registration Statement, the Disclosure Package and the Prospectus (collectively, the “Company Intellectual Property”); to the knowledge of the Company, the material patents, trademarks, and copyrights included within the

Company Intellectual Property are valid, enforceable, and subsisting; other than as disclosed in the Registration Statement, the Disclosure Package and the Prospectus, (i) neither the Company nor any of its subsidiaries is obligated to pay a material royalty, grant a license to any material portion of the Company Intellectual Property, or provide other material consideration to any third party in connection with the Company Intellectual Property, (ii) neither the Company nor any of its subsidiaries has received any written notice of any claim of infringement, misappropriation or violation of any asserted intellectual property rights of a third party with respect to any of the Company's or its subsidiaries' products, proposed products, processes or Company Intellectual Property that, in each case, is material to the business of the Company and its subsidiaries taken as a whole, (iii) to the knowledge of the Company, neither the sale nor use of any of the discoveries, inventions, products, proposed products or processes of the Company or its subsidiaries referred to in the Registration Statement, the Disclosure Package or the Prospectus that, in each case, is material to the business of the Company and its subsidiaries taken as a whole infringe, interfere with or violate any valid patent claim of any third party, and (iv) to the knowledge of the Company, no third party has any ownership right in or to any material Company Intellectual Property that is owned by the Company or its subsidiaries, other than any co-owner of any patent constituting Company Intellectual Property who is listed on the records of the U.S. Patent and Trademark Office (the "USPTO") for such patent and any co-owner of any patent application constituting Company Intellectual Property who is named in such patent application, and, to the knowledge of the Company, no third party has any ownership right in or to any material Company Intellectual Property in any field of use that is exclusively licensed to the Company or any of its subsidiaries, other than any licensor to the Company of such Company Intellectual Property;

(w) As of the date of this Agreement, all material patents and patent applications owned by or licensed to the Company or any of its subsidiaries or under which the Company or any of its subsidiaries has rights have, to the knowledge of the Company, been duly and properly filed and maintained; to the knowledge of the Company, the parties prosecuting such applications have complied with their duty of candor and disclosure to the USPTO in connection with such applications; and, as of the date of this Agreement, the Company is not aware of any facts required to be disclosed to the USPTO that were not disclosed to the USPTO and which would preclude the grant of a patent in connection with any such application or could reasonably form the basis of a finding of invalidity with respect to any patents that have issued with respect to such applications;

(x) No relationship, direct or indirect, exists between or among the Company or any of its subsidiaries, on the one hand, and the directors, officers, stockholders, customers or suppliers of the Company or any of its subsidiaries, on the other, that is required by the Act to be described in the Registration Statement and the Prospectus and that is not so described in such documents and in the Disclosure Package;

(y) The Company is not and, after giving effect to the offering and sale of the Securities and the application of the proceeds thereof as described in the Registration Statement, the Disclosure Package and the Prospectus, will not be required to register as an "investment company" or an entity "controlled" by an "investment company" within the meaning of the Investment Company Act of 1940, as amended, and the rules and regulations of the Commission thereunder (collectively, the "Investment Company Act");

(z) The Company and its subsidiaries have (i) filed all material tax returns required to be filed through the date hereof and such tax returns are correct and complete in all material respects, and (ii) paid all material federal, state, local and foreign taxes, except for taxes being contested in good faith and for which reserves in accordance with generally accepted accounting principles in the United States have been taken; except as otherwise disclosed in the Registration Statement, the Disclosure Package and the Prospectus, there is no material tax deficiency that has been, or would reasonably be expected to be, asserted against the Company or any of its subsidiaries or any of their respective properties or assets;

(aa) To the knowledge of the Company, 2seventy bio, Inc. has complied, and each of the Company and its subsidiaries has complied, in all material respects with their respective obligations under the Tax Matters Agreement by and between the Company and 2seventy bio, Inc., dated as of November 3, 2021;

(bb) The Company and its subsidiaries possess all licenses, certificates, registrations, approvals, permits, supplements or amendments, and other authorizations issued by, and have made all declarations and filings with, the appropriate federal, state, local or foreign governmental or regulatory authorities that, in each case, are material to the business of the Company and its subsidiaries, taken as a whole, and are necessary for the ownership or lease of their respective properties or the conduct of their respective businesses as described in the Registration Statement, the Disclosure Package and the Prospectus (the "Permits"), and such Permits are valid and in full force and effect. Except as described in the Registration Statement, the Disclosure Package and the Prospectus, neither the Company nor any of its subsidiaries: is in material violation of, or in default under, any of the Permits; has received written notice of any revocation, modification or termination of any material Permit; or has any reason to believe that any material Permit will not be renewed in the ordinary course. To the knowledge of the Company, no event has occurred which allows, or after notice or lapse of time would allow, revocation or termination thereof or results in any other material impairment of the rights of the holder of any such Permit;

(cc) The statements set forth in the Registration Statement, the Disclosure Package and the Prospectus under the captions "Description of the Securities" and "Material U.S. Federal Income Tax Consequences to Non-U.S. Holders" insofar as such statements purport to constitute summaries of the terms of the statutes, rules or regulations, legal or governmental proceedings, agreements or documents referred to therein, are accurate summaries of the terms of such statutes, rules or regulations, legal or governmental proceedings, agreements or documents, in all material respects. All agreements expressly referenced in the Registration Statement, the Disclosure Package and the Prospectus between the Company or any of its subsidiaries, on the one hand, and any other party, on the other hand, are legal, valid and binding obligations of the Company or the relevant subsidiary and such other party, enforceable against the Company or the relevant subsidiary and such other party in accordance with their respective terms, subject to bankruptcy, insolvency, reorganization, moratorium or similar laws affecting creditors' rights generally and to general equitable principles and except as rights to indemnity and contribution thereunder may be limited by applicable law or policies underlying such law. Except as described in the Registration Statement, the Disclosure Package and the Prospectus, none of the Company or any of its subsidiaries has sent or received any notice indicating the termination of or intention to terminate any of the contracts or agreements referred to, described in or incorporated by reference in the Registration Statement, the Disclosure Package and the Prospectus or filed as an exhibit Registration Statement;

(dd) No labor disturbance by or dispute with employees of the Company or any of its subsidiaries exists or, to the knowledge of the Company, is contemplated or threatened, and the Company is not aware of any existing or imminent labor disturbance by, or dispute with, the employees of any of its or its subsidiaries' principal suppliers, contractors or customers, except as, in each case, would not have a Material Adverse Effect;

(ee) (i) The Company and its subsidiaries (a) are in compliance with any and all applicable federal, state, local and foreign laws, rules, regulations, requirements, decisions, judgments, decrees, orders and the common law relating to pollution or the protection of the environment, natural resources or human health or safety, including those relating to the generation, storage, treatment, use, handling, transportation, Release or threat of Release of Hazardous Materials (collectively, "Environmental Laws"), (b) have received and are in compliance with all permits, licenses, certificates or other authorizations or approvals required of them under applicable Environmental Laws to conduct their respective businesses, if any, (c) have not received notice of any actual or potential liability under or relating to, or actual or potential violation of, any Environmental Laws, including for the investigation or remediation of any Release or threat of Release of Hazardous Materials, and have no knowledge of any event or condition that would reasonably be expected to result in any such notice, (d) are not conducting or paying for, in whole or in part, any investigation, remediation or other corrective action pursuant to any Environmental Law at any location, and (e) are not a party to any order, decree or agreement that imposes any obligation or liability under any Environmental Law; (ii) there are no costs or liabilities associated with Environmental Laws of or relating to the Company or its subsidiaries, except in the case of each of (i) and (ii) above, for any such matter, as would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect; and (iii) except as described in the Registration Statement, the Disclosure Package and the Prospectus, (a) there are no proceedings that are pending, or to the knowledge of the Company, contemplated, against the Company or any of its subsidiaries under any Environmental Laws in which a governmental entity is also a party, other than such proceedings regarding which it is reasonably believed no monetary sanctions of \$100,000 or more will be imposed, (b) the Company and its subsidiaries are not aware of any facts or issues regarding compliance with Environmental Laws, or liabilities or other obligations under Environmental Laws, including the Release or threat of Release of Hazardous Materials, that, individually or in the aggregate, would reasonably be expected to have a Material Adverse Effect, and (c) none of the Company and its subsidiaries anticipates material capital expenditures relating to any Environmental Laws;

(ff) There has been no storage, generation, transportation, use, handling, treatment, Release or threat of Release of Hazardous Materials by, relating to or caused by the Company or any of its subsidiaries (or, to the knowledge of the Company and its subsidiaries, any other entity (including any predecessor) for whose acts or omissions the Company or any of its subsidiaries is or would reasonably be expected to be liable) at, on, under or from any property or facility now or previously owned, operated or leased by the Company or any of its subsidiaries, or at, on, under or from any other property or facility, in violation of any Environmental Laws or in a manner or amount or to a location that would reasonably be expected to result in any liability under any Environmental Law, except for any violation or liability which would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect. "Hazardous Materials" means any material, chemical, substance, waste, pollutant, contaminant, compound, mixture, or constituent thereof, in any form or amount, including petroleum

(including crude oil or any fraction thereof) and petroleum products, natural gas liquids, asbestos and asbestos containing materials, naturally occurring radioactive materials, brine, and drilling mud, regulated or which can give rise to liability under any Environmental Law. "Release" means any spilling, leaking, seepage, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, disposing, depositing, dispersing, or migrating in, into or through the environment, or in, into from or through any building or structure;

(gg) (i) Each employee benefit plan, within the meaning of Section 3(3) of the Employee Retirement Income Security Act of 1974, as amended ("ERISA"), for which the Company or any member of its "Controlled Group" (defined as any organization which is a member of a controlled group of corporations within the meaning of Section 414 of the Code) would have any liability (each, a "Plan") has been maintained in compliance with its terms and the requirements of any applicable statutes, orders, rules and regulations, including but not limited to ERISA and the Code, except for noncompliance that could not reasonably be expected to result in material liability to the Company or its subsidiaries; (ii) no prohibited transaction, within the meaning of Section 406 of ERISA or Section 4975 of the Code, has occurred with respect to any Plan, excluding transactions effected pursuant to a statutory or administrative exemption, that would reasonably be expected to result in a material liability to the Company or its subsidiaries; (iii) for each Plan that is subject to the funding rules of Section 412 of the Code or Section 302 of ERISA, the minimum funding standard of Section 412 of the Code or Section 302 of ERISA, as applicable, has been satisfied (without taking into account any waiver thereof or extension of any amortization period) and is reasonably expected to be satisfied in the future (without taking into account any waiver thereof or extension of any amortization period); (iv) to the extent applicable to a Plan, the fair market value of the assets of each Plan exceeds the present value of all benefits accrued under such Plan (determined based on those assumptions used to fund such Plan); (v) no "reportable event" (within the meaning of Section 4043(c) of ERISA) has occurred or is reasonably expected to occur that either has resulted, or would reasonably be expected to result, in material liability to the Company or its subsidiaries; (vi) neither the Company nor any member of the Controlled Group has incurred, nor reasonably expects to incur, any liability under Title IV of ERISA (other than contributions to the Plan or premiums to the PBGC, in the ordinary course and without default) in respect of a Plan (including a "multiemployer plan", within the meaning of Section 4001(a)(3) of ERISA); and (vii) there is no pending audit or investigation by the Internal Revenue Service, the U.S. Department of Labor, the Pension Benefit Guaranty Corporation or any other governmental agency or any foreign regulatory agency with respect to any Plan that would reasonably be expected to result in material liability to the Company or its subsidiaries. None of the following events has occurred or is reasonably likely to occur: (x) a material increase in the aggregate amount of contributions required to be made to all Plans by the Company or its subsidiaries in the current fiscal year of the Company and its subsidiaries compared to the amount of such contributions made in the Company and its subsidiaries' most recently completed fiscal year; or (y) a material increase in the Company and its subsidiaries' "accumulated post-retirement benefit obligations" (within the meaning of Statement of Financial Accounting Standards 106) compared to the amount of such obligations in the Company and its subsidiaries' most recently completed fiscal year;

(hh) The Company and its subsidiaries maintain an effective system of “disclosure controls and procedures” (as defined in Rule 13a-15(e) of the Exchange Act) that complies with the requirements of the Exchange Act and that has been designed to ensure that information required to be disclosed by the Company in reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the Commission’s rules and forms, including controls and procedures designed to ensure that such information is accumulated and communicated to the Company’s management as appropriate to allow timely decisions regarding required disclosure. The Company has carried out evaluations of the effectiveness of its disclosure controls and procedures as required by Rule 13a-15 of the Exchange Act;

(ii) The Company and its subsidiaries maintain systems of “internal control over financial reporting” (as defined in Rule 13a-15(f) of the Exchange Act) that are designed to comply with the requirements of the Exchange Act and have been designed by, or under the supervision of, the Company’s principal executive and principal financial officers, or persons performing similar functions, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles in the United States, including, but not limited to, internal accounting controls sufficient to provide reasonable assurance that (i) transactions are executed in accordance with management’s general or specific authorizations; (ii) transactions are recorded as necessary to permit preparation of financial statements in conformity with generally accepted accounting principles and to maintain asset accountability; (iii) access to assets is permitted only in accordance with management’s general or specific authorization; (iv) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action is taken with respect to any differences; and (v) interactive data in eXtensible Business Reporting Language included or incorporated by reference in the Registration Statement fairly presents the information called for in all material respects and is prepared in accordance with the Commission’s rules and guidelines applicable thereto. Except as disclosed in the Registration Statement, the Disclosure Package and the Prospectus, there are no material weaknesses in the Company’s internal controls. The Company’s auditors and the Audit Committee of the Board of Directors of the Company have been advised of: (i) all significant deficiencies and material weaknesses, if any, in the design or operation of internal controls over financial reporting which have adversely affected or are reasonably likely to adversely affect the Company’s ability to record, process, summarize and report financial information; and (ii) to the knowledge of the Company, any fraud, whether or not material, that involves management or other employees who have a significant role in the Company’s internal controls over financial reporting;

(jj) The interactive data in eXtensible Business Reporting Language included or incorporated by reference in the Registration Statement fairly presents the information called for in all material respects and has been prepared in accordance with the Commission’s rules and guidelines applicable thereto;

(kk) The Company and its subsidiaries have insurance covering their respective properties, operations, personnel and businesses, including business interruption insurance, which insurance is in amounts and insures against such losses and risks as are generally maintained by companies engaged in the same or similar business and which the Company reasonably believes are adequate to protect the Company and its subsidiaries and their respective businesses; and neither the Company nor any of its subsidiaries has (i) received notice from any insurer or agent of such insurer that capital improvements or other expenditures are required or necessary to be made in order to continue such insurance or (ii) any reason to believe that it will not be able to renew its existing insurance coverage as and when such coverage expires or to obtain similar coverage at reasonable cost from similar insurers as may be necessary to continue its business;

(ll) Neither the Company nor any of its subsidiaries nor, to the knowledge of the Company, any director, officer, agent, employee or other person associated with or authorized to act on behalf of the Company or any of its subsidiaries has (i) used any corporate funds for any unlawful contribution, gift, entertainment or other unlawful expense relating to political activity; (ii) made any direct or indirect unlawful payment to any foreign or domestic government official or employee from corporate funds; (iii) violated or is in violation of any provision of the Foreign Corrupt Practices Act of 1977, the Bribery Act 2010 of the United Kingdom or any other applicable anti-bribery or anti-corruption laws; or (iv) made any bribe, rebate, payoff, influence payment, kickback or other unlawful payment;

(mm) The operations of the Company and its subsidiaries are and have been conducted at all times in compliance with applicable financial recordkeeping and reporting requirements of the Currency and Foreign Transactions Reporting Act of 1970, as amended, the money laundering statutes of all jurisdictions, the rules and regulations thereunder and any related or similar rules, regulations or guidelines, issued, administered or enforced by any governmental agency (collectively, the “Money Laundering Laws”) and no action, suit or proceeding by or before any court or governmental agency, authority or body or any arbitrator involving the Company or any of its subsidiaries with respect to the Money Laundering Laws is pending or, to the knowledge of the Company, threatened;

(nn) None of the Company, any of its subsidiaries or, to the knowledge of the Company, any director, officer, agent, employee or affiliate of the Company or any of its subsidiaries is currently the subject or the target of any U.S. sanctions (“Sanctions”) administered or enforced by the Office of Foreign Assets Control of the U.S. Department of the Treasury (“OFAC”) or other relevant Sanctions authority; and the Company will not, directly or indirectly, use the proceeds of the offering of the Securities hereunder, or lend, contribute or otherwise make available such proceeds to any subsidiary, joint venture partner or other person or entity, (i) for the purpose of financing the activities of or business with any person, or in any country or territory, that, at the time of such funding, is subject to any Sanctions or (ii) in any other manner that will result in a violation by any person (including any person participating in the transaction, whether as underwriter, advisor, investor or otherwise) of Sanctions;

(oo) No subsidiary of the Company is currently prohibited, directly or indirectly, under any agreement or other instrument to which it is a party or is subject, from paying any dividends to the Company, from making any other distribution on such subsidiary’s capital stock, from repaying to the Company any loans or advances to such subsidiary from the Company or from transferring any of such subsidiary’s properties or assets to the Company or any other subsidiary of the Company;

(pp) Neither the Company nor any of its subsidiaries is a party to any contract, agreement or understanding with any person (other than this Agreement) that would give rise to a valid claim against the Company or any of its subsidiaries or any of the Underwriters for a brokerage commission, finder’s fee or like payment in connection with the offering and sale of the Securities;

(qq) Except as described in the Registration Statement, the Disclosure Package and the Prospectus, no person has the right to require the Company or any of its subsidiaries to register any securities for sale under the Act by reason of the filing of the Registration Statement with the Commission or the issuance and sale of the Securities, other than rights that have been validly waived;

(rr) The Company has not taken, directly or indirectly, any action designed to or that would reasonably be expected to cause or result in any stabilization or manipulation of the price of the Securities;

(ss) The Company qualifies as an “experienced issuer” (within the meaning of FINRA Conduct Rule 5110(j)(6)) for purposes of the exemption from filing under FINRA Conduct Rule 5110(h)(1)(C);

(tt) The application of the proceeds received by the Company from the issuance, sale and delivery of the Securities as described in the Registration Statement, the Disclosure Package and the Prospectus will not violate Regulation T, U or X of the Board of Governors of the Federal Reserve System or any other regulation of such Board of Governors;

(uu) No forward-looking statement (within the meaning of Section 27A of the Act and Section 21E of the Exchange Act) contained in the Registration Statement, the Disclosure Package or the Prospectus has been made or reaffirmed without a reasonable basis or has been disclosed other than in good faith;

(vv) Nothing has come to the attention of the Company that has caused the Company to believe that the statistical and market-related data included or incorporated by reference in the Registration Statement, the Disclosure Package and the Prospectus is not based on or derived from sources that are reliable and accurate in all material respects;

(ww) The tests and nonclinical and clinical studies that are described in the Registration Statement, the Disclosure Package and the Prospectus were and, if still pending, are being, conducted in all material respects in accordance with the protocols submitted to the U.S. Food and Drug Administration (the “FDA”), the European Medicines Agency (the “EMA”) or any foreign governmental body exercising comparable authority, procedures and controls pursuant to, where applicable, accepted professional and scientific standards, and all applicable laws and regulations to which such tests and studies are subject; the descriptions of the tests and nonclinical and clinical studies conducted by or, to the Company’s knowledge, on behalf of the Company, and the results thereof, contained in the Registration Statement, the Disclosure Package and the Prospectus are accurate in all material respects; the Company is not aware of any other tests or nonclinical or clinical studies, the results of which reasonably call into question the results described in the Registration Statement, the Disclosure Package and the Prospectus; and, except as disclosed in the Registration Statement, the Disclosure Package and the Prospectus, the Company has not received any written notices or correspondence from the FDA, any foreign, state or local governmental body exercising comparable authority or any Institutional Review Board requiring the termination, suspension or clinical hold of any tests or nonclinical or clinical studies conducted by or on behalf of the Company.

(xx) Except as described in the Registration Statement, the Disclosure Package and the Prospectus, since January 1, 2020: (i) neither the Company nor any of its subsidiaries has received any FDA Form 483, notice of adverse finding, warning letter, untitled letter or other correspondence or notice from the FDA or any other governmental entity alleging or asserting any material noncompliance with any Applicable Laws (as

defined in clause (ii) below), and there have been no material recalls, field notifications, field corrections, market withdrawals or replacements, “dear doctor” letters, or safety alerts relating to an alleged material lack of safety, efficacy or regulatory compliance of any of the Company’s products; (ii) the Company and each of its subsidiaries is and has been in material compliance with statutes, laws, ordinances, rules and regulations applicable to the Company and its subsidiaries and their respective activities, including for the ownership, testing, research, development, manufacture, quality, safety, packaging, use, distribution, marketing, labeling, advertising, promotion, sale, offer for sale, storage, record-keeping, import, export or disposal of any product developed, manufactured or distributed by the Company, including the Federal Food, Drug, and Cosmetic Act (21 U.S.C. § 301, et seq.), the Public Health Service Act (42 U.S.C. § 201 et seq.), and comparable laws of other governmental entities and the regulations promulgated pursuant to such laws (collectively, “Applicable Laws”); (iii) neither the Company nor any of its subsidiaries has received notice of any ongoing claim, action, suit, proceeding, hearing, enforcement, investigation, arbitration or other action from any governmental entity or third party alleging that any product, operation or activity is in material violation of any Applicable Laws or Permits or has any knowledge that any such governmental entity or third party has threatened any such claim, litigation, arbitration, action, suit, investigation or proceeding; (iv) the Company and each of its subsidiaries has timely filed, obtained, maintained or submitted all material reports, documents, forms, notices, applications, records, claims, submissions and supplements or amendments as required by any Applicable Laws or Permits and, to the Company’s knowledge, all such reports, documents, forms, notices, applications, records, claims, submissions and supplements or amendments were complete, correct and not misleading in all material respects on the date filed (or were corrected or supplemented by a subsequent submission). To the Company’s knowledge, since January 1, 2020, neither the Company, any subsidiary nor any of its directors, officers, employees or agents, has made, or caused the making of, any material false statements on, or material omissions from, any other records or documentation prepared or maintained to comply with the requirements of the FDA or any other governmental entity. To the Company’s knowledge, since January 1, 2020, neither the Company, any of its subsidiaries nor any of its directors, officers, employees, agents, employees or affiliates have committed any act, made any statement or failed to make any statement that would reasonably be expected to provide a basis for the FDA or any other governmental or regulatory authority to invoke its policy with respect to “Fraud, Untrue Statements of Material Facts, Bribery, and Illegal Gratuities,” or similar policies, set forth in any Health Care Law (as defined below).

(yy) Except to the extent disclosed in each of the Registration Statement, the Disclosure Package or the Prospectus, (i) each of the Company and its subsidiaries is and has been, since January 1, 2019, in material compliance with all applicable healthcare laws and regulations, including, without limitation, the federal Anti-Kickback Statute (42 U.S.C. § 1320a-7b(b)), the Civil Monetary Penalties Law (42 U.S.C. § 1320a-7a), the civil False Claims Act (31 U.S.C. §§ 3729 et seq.), the administrative False Claims Law (42 U.S.C. § 1320a-7b(a)), the federal Physician Payment Sunshine Act (42 U.S.C. § 1320a-7h), all criminal laws relating to health care fraud and abuse, the exclusion laws (42 U.S.C. § 1320a-7), the Medicare statute (Title XVIII of the Social Security Act), the Medicaid statute (Title XIX of the Social Security Act), all applicable federal, state, local laws governing scope and permissible interactions between pharmaceutical manufacturers and health care providers, laws governing government pricing or price reporting programs and regulations promulgated thereunder,

manufacturer and wholesale licensure requirements, quality, safety and accreditation requirements, state analogues of any such laws to the extent not referenced expressly in the foregoing, any and all other health care laws and regulations and administrative guidances applicable to the Company or its subsidiaries or their respective businesses, each as currently conducted, and the regulations promulgated pursuant to any such laws and programs (collectively, the “Health Care Laws”); (ii) neither the Company nor any of its subsidiaries, nor any director, officer, employee, nor, to the Company’s knowledge, any agent of the Company or any of its subsidiaries: (a) is or has been, since January 1, 2019, suspended, excluded, debarred, or otherwise ineligible to participate in any government health care program, debarred by FDA pursuant to 21 U.S.C. § 335a and the Company has conducted screening of each such person to confirm no such exclusion, suspension, or debarment at least once; (b) has been, since January 1, 2020, convicted of any criminal offense relating to the delivery of an item or service under Medicare, Medicaid or any other government health care program, or (c) to the knowledge of the Company, is the target or subject of any current or potential investigation relating to any Medicare, Medicaid or any other government health care program related offense; (iii) since January 1, 2019, neither the Company nor any of its subsidiaries has received any written notification, correspondence or any other written communication of any pending or threatened claim, suit, proceeding, hearing, enforcement, audit, investigation, arbitration or other action from any governmental entity or any third party, including employees, former employees or competitors alleging that any operation or activity of the Company or any of its subsidiaries is, or potentially is, in violation of any Health Care Law; (iv) neither the Company nor any of its subsidiaries is a party to any corporate integrity agreements, monitoring agreements, deferred prosecution agreements, consent decrees, settlement orders, or similar agreements with or imposed by any governmental entity and, to the Company’s knowledge, no such agreement, decree or order is pending; and (v) the Company and each of its subsidiaries maintains an operational healthcare compliance program that: (a) is designed to detect effectively non-compliance with Health Care Laws in all material respects; (b) governs all employees and contractors, including sales representatives; (c) is materially consistent with the current U.S. Federal Sentencing Guidelines standards for effective compliance programs and U.S. Department of Health and Human Services Office of Inspector General Voluntary Compliance Guidance for Pharmaceutical Manufacturers; (d) complies with the Pharmaceutical Research and Manufacturers of America Code of Interactions with Healthcare Professionals in all material respects; and (e) addresses compliance with Health Care Laws in all material respects.

(zz) There is and has been no failure on the part of the Company or, to the knowledge of the Company, any of the Company’s directors or officers, in their capacities as such, to comply with any applicable provision of the Sarbanes-Oxley Act of 2002 and the rules and regulations promulgated in connection therewith, including Section 402 related to loans and Sections 302 and 906 related to certificates.

(aaa) To the Company’s knowledge, each of the Company and its subsidiaries currently is, and has operated, in material compliance with all applicable data privacy and security laws and regulations (collectively, the “Privacy Laws”), including without limitation the Health Insurance Portability and Accountability Act of 1996 (“HIPAA”) (42 U.S.C. Section 1320d et seq.), as amended by the Health Information Technology for Economic and Clinical Health Act (42 U.S.C. Section 17921 et seq.) and its implementing regulations for which any non-compliance would be reasonably likely to create a material liability. To ensure compliance with the Privacy Laws, the Company and its subsidiaries have in place policies and procedures relating to data privacy and

security and the collection, storage, use, disclosure, handling, and analysis of any Personal Data (the “Policies”) and take appropriate steps reasonably designed to ensure compliance in all material respects with such Policies. “Personal Data” means any personal or personally identifiable data regulated under the Privacy Laws. Where required by applicable Privacy Laws, the Company has provided accurate notice of its Policies then in effect to its customers, employees, third-party vendors and representatives in all material respects. Each of the Company’s notices regarding the Company’s Policies (i) provides accurate and sufficient notice of the Company’s then-current privacy practices relating to its subject matter; and (ii) does not contain any material omissions of the Company’s then-current privacy practices relating to its subject matter. The Company further certifies that neither it nor any of its subsidiaries: (a) has received notice of any actual or alleged violation of any of the Privacy Laws; or (b) is a party to any order, decree, or settlement agreement that imposes any obligation or liability by any governmental or regulatory authority under any Privacy Law;

(bbb) Each of the Company’s and its subsidiaries’ information technology assets and equipment, computers, systems, networks, hardware, software, websites, applications, and databases (collectively, “IT Systems”) are adequate for, and operate and perform in all material respects as required in connection with the operation of the business of the Company and the subsidiaries as currently conducted, and to the knowledge of the Company are free and clear of all material bugs, errors, defects, Trojan horses, time bombs, malware and other corruptants. The Company and the subsidiaries have implemented and maintained commercially reasonable necessary controls, policies, procedures, and safeguards to maintain and protect their material confidential information and the integrity, continuous operation, redundancy and security of all IT Systems and data (including all Personal Data, sensitive, confidential or regulated data (“Confidential Data”)) used in connection with their businesses, and, to the Company’s knowledge, there have been no breaches, violations, outages or unauthorized uses of or accesses to same, except for those that have been remedied without material cost or liability or the duty to notify any other person nor any incidents under internal review or investigations relating to the same.

(ccc) The Stock is registered pursuant to Section 12(b) or 12(g) of the Exchange Act and are listed on NASDAQ, and the Company has taken no action designed to, or likely to have the effect of, terminating the registration of the Stock under the Exchange Act or delisting the Stock from NASDAQ, nor has the Company received any notification that the Commission or NASDAQ is contemplating terminating such registration or listing. To the Company’s knowledge, it is in compliance with all applicable listing requirements of NASDAQ.

(ddd) No stamp or other issuance or transfer taxes or duties and no capital gains, income, withholding or other taxes are payable by the Underwriters in the United States or any political subdivision or taxing authority thereof or therein in connection with the execution, delivery or performance of this Agreement by the Company or the sale and delivery by the Company of the Securities.

(eee) At the time of filing the Registration Statement and any post-effective amendment thereto, at the earliest time thereafter that the Company or any offering participant made a bona fide offer (within the meaning of Rule 164(h)(2) under the Act) of the Securities, and at the date hereof, the Company was not and is not an “ineligible issuer,” as defined under Rule 405 under the Act.

2. Subject to the terms and conditions herein set forth, (a) the Company agrees to issue and sell to each of the Underwriters, and each of the Underwriters agrees, severally and not jointly, to purchase from the Company, at a purchase price per share of \$1.425, the number of Firm Securities set forth opposite the name of such Underwriter in Schedule I hereto and (b) in the event and to the extent that the Underwriters shall exercise the election to purchase Optional Securities as provided below, the Company agrees to issue and sell to each of the Underwriters, and each of the Underwriters agrees, severally and not jointly, to purchase from the Company, at the purchase price per share set forth in clause (a) of this Section 2 (provided that the purchase price per Optional Security shall be reduced by an amount per share equal to any dividends or distributions declared by the Company and payable on the Firm Securities but not payable on the Optional Securities), that portion of the number of Optional Securities as to which such election shall have been exercised (to be adjusted by the Representatives so as to eliminate fractional shares) determined by multiplying such number of Optional Securities by a fraction, the numerator of which is the maximum number of Optional Securities which such Underwriter is entitled to purchase as set forth opposite the name of such Underwriter in Schedule I hereto and the denominator of which is the maximum number of Optional Securities that all of the Underwriters are entitled to purchase hereunder.

The Company hereby grants to the Underwriters the right to purchase at their election up to 12,499,999 Optional Securities, at the purchase price per share set forth in the paragraph above, provided that the purchase price per Optional Security shall be reduced by an amount per share equal to any dividends or distributions declared by the Company and payable on the Firm Securities but not payable on the Optional Securities. Any such election to purchase Optional Securities may be exercised only by written notice from the Representatives to the Company, given within a period of 30 calendar days after the date of this Agreement, setting forth the aggregate number of Optional Securities to be purchased and the date on which such Optional Securities are to be delivered, as determined by the Representatives but in no event earlier than the First Time of Delivery (as defined in Section 4(a) hereof) or, unless the Representatives and the Company otherwise agree in writing, earlier than two or later than ten business days after the date of such notice.

3. Upon the authorization by the Representatives of the release of the Securities, the several Underwriters propose to offer the Securities for sale upon the terms and conditions set forth in the Pricing Disclosure Package and the Prospectus.

4. (a) The Securities to be purchased by each Underwriter hereunder, in definitive or book-entry form, and in such authorized denominations and registered in such names as the Representatives may request upon at least forty-eight hours' prior notice to the Company shall be delivered by or on behalf of the Company to the Representatives, through the facilities of the Depository Trust Company ("DTC"), for the account of such Underwriter, against payment by or on behalf of such Underwriter of the purchase price therefor by wire transfer of Federal (same-day) funds to the account specified by the Company to the Representatives at least forty-eight hours in advance. The Company will cause the certificates, if any, representing the Securities to be made available for checking and packaging at least twenty-four hours prior to the Time of Delivery (as defined below) with respect thereto at the office of DTC or its designated custodian (the "Designated Office"). The time and date of such delivery and payment shall be, with respect to the Firm Securities, 9:30 a.m., New York City time, on December 22, 2023 or such other time and date as the Representatives and the Company may agree upon in writing, and, with respect to the Optional Securities, 9:30 a.m., New York time, on the date specified by the Representatives in the written notice given by the Representatives of the Underwriters' election to purchase such Optional Securities, or such other time and date as the Representatives and the Company may agree upon in writing. Such time and date for delivery of the Firm Securities is herein called the "First Time of Delivery," such time and date for delivery of the Optional Securities, if not the First Time of Delivery, is herein called the "Second Time of Delivery," and each such time and date for delivery is herein called a "Time of Delivery."

(b) The documents to be delivered at each Time of Delivery by or on behalf of the parties hereto pursuant to Section 8 hereof, including the cross receipt for the Securities and any additional documents requested by the Underwriters pursuant to Section 8(m) hereof, will be delivered at the offices of Ropes & Gray LLP, 800 Boylston Street, Boston, Massachusetts 02199 (the "Closing Location"), and the Securities will be delivered through the facilities of the DTC, all at such Time of Delivery. A meeting will be held at the Closing Location at 4:00 p.m., New York City time, on the New York Business Day next preceding such Time of Delivery, at which meeting the final drafts of the documents to be delivered pursuant to the preceding sentence will be available for review by the parties hereto. For the purposes of this Section 4, "New York Business Day" shall mean each Monday, Tuesday, Wednesday, Thursday and Friday which is not a day on which banking institutions in New York City are generally authorized or obligated by law or executive order to close.

5. The Company agrees with each of the Underwriters:

(a) To prepare the Prospectus in a form approved by the Representatives and to file such Prospectus pursuant to Rule 424(b) under the Act not later than the Commission's close of business on the second business day following the execution and delivery of this Agreement or such earlier time as may be required under the Act; to make no further amendment or any supplement to the Registration Statement, the Basic Prospectus or the Prospectus prior to the last Time of Delivery which shall be disapproved by the Representatives promptly after reasonable notice thereof; to advise the Representatives, promptly after it receives notice thereof, of the time when any amendment to the Registration Statement has been filed or becomes effective or any amendment or supplement to the Prospectus has been filed and to furnish the Representatives with copies thereof; to file promptly all materials required to be filed by the Company with the Commission pursuant to Rule 433(d) under the Act; to file promptly all reports and any definitive proxy or information statements required to be filed by the Company with the Commission pursuant to Section 13(a), 13(c), 14 or 15(d) of the Exchange Act subsequent to the date of the Prospectus and for so long as the delivery of a prospectus (or in lieu thereof, the notice referred to in Rule 173(a) under the Act) is required in connection with the offering or sale of the Securities; to advise the Representatives, promptly after it receives notice thereof, of the issuance by the Commission of any stop order or of any order preventing or suspending the use of any Preliminary Prospectus or other prospectus in respect of the Securities, of any notice of objection of the Commission to the use of the Registration Statement or any post-effective amendment thereto pursuant to Rule 401(g)(2) under the Act, of the suspension of the qualification of the Securities for offering or sale in any jurisdiction, of the initiation or threatening of any proceeding for any such purpose, or of any request by the Commission for the amending or supplementing of the Registration Statement or the Prospectus or for additional information; and, in the event of the issuance of any stop order or of any order preventing or suspending the use of any Preliminary Prospectus or other prospectus or suspending any such qualification, to promptly use its best efforts to obtain the withdrawal of such order; and in the event of any such issuance of a notice of objection, promptly to take such steps including, without limitation, amending the Registration Statement or filing a new registration statement, at its own expense, as may be necessary to permit offers and sales of the Securities by the Underwriters (references herein to the Registration Statement shall include any such amendment or new registration statement);

(b) If required by Rule 430B(h) under the Act, to prepare a form of prospectus in a form approved by you and to file such form of prospectus pursuant to Rule 424(b) under the Act not later than may be required by Rule 424(b) under the Act; and to make no further amendment or supplement to such form of prospectus which shall be disapproved by you promptly after reasonable notice thereof;

(c) Promptly from time to time to take such action as the Representatives may reasonably request to qualify the Securities for offering and sale under the securities laws of such jurisdictions as the Representatives may request and to comply with such laws so as to permit the continuance of sales and dealings therein in such jurisdictions for as long as may be necessary to complete the distribution of the Securities, provided that in connection therewith the Company shall not be required to qualify as a foreign corporation (where not otherwise required) or to file a general consent to service of process in any jurisdiction (where not otherwise required);

(d) If by the third anniversary (the "Renewal Deadline") of the initial effective date of the Registration Statement, any of the Securities remain unsold by the Underwriters, the Company will, if it has not already done so, file a new shelf registration statement relating to the Securities, in a form reasonably satisfactory to the Representatives and will use its best efforts to cause such registration statement to be declared effective within 180 days after the Renewal Deadline. The Company will take all other action necessary or appropriate to permit the public offering and sale of the Securities to continue as contemplated in the expired registration statement relating to the Securities. References herein to the Registration Statement shall include such new automatic shelf registration statement or such new shelf registration statement, as the case may be;

(e) Prior to 10:00 a.m., New York City time, on the New York Business Day next succeeding the date of this Agreement (or such other time as may be agreed to by the Representatives and the Company) and from time to time, to furnish the Underwriters with written and electronic copies of the Prospectus in New York City in such quantities as the Representatives may reasonably request, and, if the delivery of a prospectus (or in lieu thereof, the notice referred to in Rule 173(a) under the Act) is required at any time prior to the expiration of nine months after the time of issue of the Prospectus in connection with the offering or sale of the Securities and if at such time any event shall have occurred as a result of which the Prospectus as then amended or supplemented would include an untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made when such Prospectus (or in lieu thereof, the notice referred to in Rule 173(a) under the Act) is delivered, not misleading, or, if for any other reason it shall be necessary during such same period to amend or supplement the Prospectus or to file under the Exchange Act any document incorporated by reference in the Prospectus in order to comply with the Act or the Exchange Act, to notify the Representatives and upon their request to file such document and to prepare and furnish without charge to each Underwriter and to any dealer in securities as many written and electronic copies as the Representatives may from time to time reasonably request of an amended Prospectus or a supplement to the Prospectus which will correct such statement or omission or effect such compliance; and in case any Underwriter is required to deliver a prospectus (or in lieu thereof, the notice referred to in Rule 173(a) under the Act) in connection with sales of any of the Securities at any time nine months or more after the time of issue of the Prospectus, upon the request of the Representatives but at the expense of such Underwriter, to prepare and deliver to such Underwriter as many written and electronic copies as the Representatives may request of an amended or supplemented Prospectus complying with Section 10(a) (3) of the Act;

(f) To make generally available to its securityholders as soon as practicable, but in any event not later than sixteen months after the effective date of the Registration Statement (as defined in Rule 158(c) under the Act), an earnings statement of the Company and its subsidiaries (which need not be audited) complying with Section 11(a) of the Act and the rules and regulations of the Commission thereunder (including, at the option of the Company, Rule 158);

(g) During the period beginning from the date hereof and continuing to and including the date that is sixty (60) days after the date of the Prospectus (the "Lock-Up Period"), not to (i) offer, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, pledge, grant any option, right or warrant to purchase or otherwise transfer or dispose of, directly or indirectly, or file with the Commission a registration statement under the Act relating to, any shares of Stock or any securities that are convertible into or exercisable or exchangeable for Stock, or publicly disclose the intention to make any offer, sale, pledge, disposition or filing or (ii) enter into any swap or other agreement that transfers, in whole or in part, any of the economic consequences of ownership of the Stock or any such other securities, whether any such transaction described in clause (i) or (ii) above is to be settled by delivery of Stock or such other securities, in cash or otherwise, without the prior written consent of the Representatives, other than (A) the Securities to be sold hereunder, (B) any shares of Stock issued upon the exercise of options granted or upon the settlement of restricted stock units granted under Company Stock Plans or warrants described as outstanding in the Registration Statement, the Disclosure Package and the Prospectus, (C) any options and other awards granted under a Company Stock Plan described in the Registration Statement, the Disclosure Package and the Prospectus, (D) the filing by the Company of any registration statement on Form S-8 or a successor form thereto relating to a Company Stock Plan described in the Registration Statement, the Disclosure Package and the Prospectus, and (E) shares of Stock or other securities issued in connection with a transaction with an unaffiliated third party that includes a bona fide commercial relationship (including joint ventures, marketing or distribution arrangements, collaboration agreements or intellectual property license agreements) or any acquisition of assets or not less than a majority or controlling portion of the equity of another entity, provided that (x) the aggregate number of shares issued pursuant to this clause (F) shall not exceed ten percent (10%) of the total number of outstanding shares of Stock immediately following the issuance and sale of the Firm Securities pursuant hereto and (y) the recipient of any such shares of Stock and securities issued pursuant to this clause (F) during the Lock-Up Period shall enter into an agreement substantially in the form of Annex I hereto;

(h) If the Company elects to rely upon Rule 462(b), the Company shall file a Rule 462(b) Registration Statement with the Commission in compliance with Rule 462(b) by 10:00 p.m., Washington, D.C. time, on the date of this Agreement, and the Company shall at the time of filing either pay to the Commission the filing fee for the Rule 462(b) Registration Statement or give irrevocable instructions for the payment of such fee pursuant to Rule 111(b) under the Act;

(i) Upon request of any Underwriter, to furnish, or cause to be furnished, to such Underwriter an electronic version of the Company's trademarks, service marks and corporate logo for use on the website, if any, operated by such Underwriter for the purpose of facilitating the on-line offering of the Securities (the "License"); provided, however, that the License shall be used solely for the purpose described above, is granted without any fee and may not be assigned or transferred;

(j) To use the net proceeds received by it from the sale of the Securities in the manner specified in the Pricing Prospectus under the caption "Use of Proceeds";

(k) To use its best efforts to list, subject to notice of issuance, the Stock and the Optional Securities on NASDAQ; and

(l) [Reserved].

6. (a) The Company represents and agrees that, without the prior consent of the Representatives, it has not made and will not make any offer relating to the Securities that would constitute a "free writing prospectus" as defined in Rule 405 under the Act; each Underwriter represents and agrees that, without the prior consent of the Company and the Representatives, it has not made and will not make any offer relating to the Securities that would constitute a free writing prospectus required to be filed with the Commission; any such free writing prospectus the use of which has been consented to by the Company and the Representatives is listed on Schedule II(a) hereto;

(b) The Company has complied and will comply with the requirements of Rule 433 under the Act applicable to any Issuer Free Writing Prospectus, including timely filing with the Commission or retention where required and legending; and the Company represents that it has satisfied and agrees that it will satisfy the conditions under Rule 433 under the Act to avoid a requirement to file with the Commission any electronic road show;

(c) The Company agrees that if at any time following issuance of an Issuer Free Writing Prospectus or Written Testing-the-Waters Communication any event occurred or occurs as a result of which such Issuer Free Writing Prospectus or Written Testing-the-Waters Communication would conflict with the information in the Registration Statement, the Pricing Prospectus or the Prospectus or would include an untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in the light of the circumstances then prevailing, not misleading, the Company will give prompt notice thereof to the Representatives and, if requested by the Representatives, will prepare and furnish without charge to each Underwriter an Issuer Free Writing Prospectus, Written Testing-the-Waters Communication or other document which will correct such conflict, statement or omission; provided, however, that this representation and warranty shall not apply to any statements or omissions in an Issuer Free Writing Prospectus made in reliance upon and in conformity with the Underwriter Information;

(d) The Company represents and agrees that (i) it has not engaged in, or authorized any other person to engage in, any Testing-the-Waters Communications, other than Testing-the-Waters Communications with the prior consent of the Representatives with entities that the Company reasonably believes are qualified institutional buyers as defined in Rule 144A under the Act or institutions that are accredited investors as defined in Rule 501(a)(1), (a)(2), (a)(3), (a)(7) or (a)(8) under the Act; and (ii) it has not distributed, or authorized any other person to distribute, any Written Testing-the-Waters Communications, other than those distributed with the prior consent of the Representatives that are listed on Schedule II(c) hereto; and the Company reconfirms that the Underwriters have been authorized to act on its behalf in engaging in Testing-the-Waters Communications; and

(e) Each Underwriter represents and agrees that any Testing-the-Waters Communications undertaken by it were with entities that such Underwriter reasonably believes are qualified institutional buyers as defined in Rule 144A under the Act or institutions that are accredited investors as defined in Rule 501(a)(1), (a)(2), (a)(3), (a)(7) or (a)(8) under the Act.

7. The Company covenants and agrees with the several Underwriters that the Company will pay or cause to be paid all costs and expenses incident to the performance of its obligations hereunder, including without limitation, (i) the costs incident to the authorization, issuance, sale, preparation and delivery of the Securities and any taxes payable in that connection; (ii) the costs incident to the preparation, printing and filing under the Act of the Registration Statement, the Basic Prospectus, any Preliminary Prospectus, the Prospectus, any Issuer Free Writing Prospectus, any Testing-The-Waters Communication, and Disclosure Package (including all exhibits, amendments and supplements thereto) and the distribution thereof; (iii) the fees and expenses of the Company's counsel and independent accountants; (iv) the fees and expenses incurred in connection with the registration or qualification of the Securities under the state or foreign securities or blue sky laws of such jurisdictions as the Representatives may designate and the preparation, printing and distribution of a Blue Sky Memorandum (including the related fees and expenses of counsel for the Underwriters in an amount not to exceed \$10,000); (v) the cost of preparing stock certificates; (vi) the costs and charges of any transfer agent and any registrar; and (vii) all expenses and application fees related to the listing of the Securities on NASDAQ.

8. The obligations of the Underwriters hereunder, as to the Securities to be delivered at each Time of Delivery, shall be subject, in their discretion, to the condition that all representations and warranties and other statements of the Company herein are, at and as of the Applicable Time and such Time of Delivery, true and correct, the condition that the Company shall have performed all of its obligations hereunder theretofore to be performed, and the following additional conditions:

(a) The Prospectus shall have been filed with the Commission pursuant to Rule 424(b) under the Act within the applicable time period prescribed for such filing by the rules and regulations under the Act and in accordance with Section 5(a) hereof; all materials required to be filed by the Company pursuant to Rule 433(d) under the Act shall have been filed with the Commission within the applicable time period prescribed for such filing by Rule 433; if the Company has elected to rely upon Rule 462(b) under the Act, the Rule 462(b) Registration Statement shall have become effective by 10:00 p.m., Washington, D.C. time, on the date of this Agreement; no stop order suspending the effectiveness of the Registration Statement or any part thereof shall have been issued and no proceeding for that purpose or pursuant to Section 8A of the Act shall have been initiated or threatened by the Commission; no stop order suspending or preventing the use of the Pricing Prospectus, Prospectus or any Issuer Free Writing Prospectus shall have been initiated or threatened by the Commission; and all requests for additional information on the part of the Commission shall have been complied with to the reasonable satisfaction of the Representatives;

(b) Ropes & Gray LLP, counsel for the Underwriters, shall have furnished to the Representatives such written opinion and negative assurance letter, each dated such Time of Delivery, in form and substance satisfactory to the Representatives, and such counsel shall have received such papers and information as they may reasonably request to enable them to pass upon such matters;

(c) Latham and Watkins LLP, counsel for the Company, shall have furnished to the Representatives their written opinion and negative assurance letter, each dated such Time of Delivery, in form and substance satisfactory to the Representatives;

(d) Latham and Watkins LLP, counsel for the Company, shall have furnished to the Representatives their written opinion regarding certain tax matters, dated such Time of Delivery, in form and substance satisfactory to the Representatives;

(e) Morse, Barnes-Brown & Pendleton, PC, intellectual property counsel for the Company, shall have furnished to the Representatives their written opinion, including negative assurance, with respect to certain intellectual property matters, dated such Time of Delivery, in form and substance satisfactory to the Representatives;

(f) On the date of the Prospectus at a time prior to the execution of this Agreement, at 9:30 a.m., New York City time, on the effective date of any post-effective amendment to the Registration Statement filed subsequent to the date of this Agreement and also at each Time of Delivery, Ernst & Young LLP shall have furnished to the Representatives a letter or letters, dated the respective dates of delivery thereof, in form and substance satisfactory to the Representatives;

(g) (i) Neither the Company nor any of its subsidiaries shall have sustained since the date of the latest audited financial statements included or incorporated by reference in the Pricing Prospectus any loss or interference with its business from fire, explosion, flood or other calamity, whether or not covered by insurance, or from any labor dispute or court or governmental action, order or decree, otherwise than as set forth or contemplated in the Pricing Prospectus, and (ii) since the respective dates as of which information is given in the Pricing Prospectus there shall not have been any change in the capital stock (other than the issuance of shares of Stock upon exercise of stock options and warrants described as outstanding in, and the grant of options and awards under existing equity incentive plans described in, the Registration Statement, the Disclosure Package and the Prospectus) or long term debt of the Company or any of its subsidiaries or any change or effect, or any development involving a prospective change or effect, in or affecting (x) the business, properties, general affairs, management, financial position, stockholders' equity or results of operations of the Company and its subsidiaries, taken as a whole, except as set forth or contemplated in the Pricing Prospectus, or (y) the ability of the Company to perform its obligations under this Agreement, including the issuance and sale of the Securities, or to consummate the transactions contemplated in the Pricing Prospectus and the Prospectus, the effect of which, in any such case described in clause (i) or (ii), is in the judgment of the Representatives so material and adverse as to make it impracticable or inadvisable to proceed with the public offering or the delivery of the Securities being delivered at such Time of Delivery on the terms and in the manner contemplated in the Pricing Prospectus and the Prospectus;

(h) On or after the Applicable Time there shall not have occurred any of the following: (i) a suspension or material limitation in trading in securities generally on the New York Stock Exchange or on NASDAQ; (ii) a suspension or material limitation in trading in the Company's securities on NASDAQ; (iii) a general moratorium on commercial banking activities declared by either Federal or New York State authorities or a material disruption in commercial banking or securities settlement or clearance services in the United States; (iv) the outbreak or escalation of hostilities involving the United States or the declaration by the United States of a national emergency or war or (v) the occurrence of any other calamity or crisis or any change in financial, political or

economic conditions in the United States or elsewhere; if the effect of any such event specified in clause (iv) or (v) in the judgment of the Representatives makes it impracticable or inadvisable to proceed with the public offering or the delivery of the Securities being delivered at such Time of Delivery on the terms and in the manner contemplated in the Pricing Prospectus and the Prospectus;

(i) The Firm Securities and the Optional Securities to be sold at such Time of Delivery shall have been duly listed, subject to notice of issuance, on NASDAQ;

(j) The Company shall have obtained and delivered to the Underwriters executed copies of an agreement from each of the Company's officers and directors, substantially to the effect set forth in Annex I hereto;

(k) The Company shall have complied with the provisions of Section 5(d) hereof with respect to the furnishing of prospectuses on the New York Business Day next succeeding the date of this Agreement;

(l) The Company shall have furnished or caused to be furnished to the Representatives at such Time of Delivery certificates of officers of the Company satisfactory to the Representatives as to the accuracy of the representations and warranties of the Company herein at and as of such Time of Delivery, as to the performance by the Company of all of its obligations hereunder to be performed at or prior to such Time of Delivery, as to the matters set forth in subsections (a) and (e) of this Section and as to such other matters as the Representatives may reasonably request;

(m) On the date of the Prospectus at a time prior to the execution of this Agreement, at 9:30 a.m., New York City time, on the effective date of any post-effective amendment to the Registration Statement filed subsequent to the date of this Agreement and also at each Time of Delivery, the Company shall have furnished to the Representatives a certificate, dated the respective dates of delivery thereof, of its principal financial officer with respect to certain financial data contained in the Pricing Disclosure Package and the Prospectus, providing "management comfort" with respect to such information, in form and substance satisfactory to the Representatives; and

(n) The Company shall have furnished or caused to be furnished to the Representatives, at such Time of Delivery, such additional information, certificates, opinions or documents as the Representatives may reasonably request.

9. (a) The Company will indemnify and hold harmless each Underwriter against any losses, claims, damages or liabilities, joint or several, to which such Underwriter may become subject, under the Act or otherwise, insofar as such losses, claims, damages or liabilities (or actions in respect thereof) arise out of or are based upon an untrue statement or alleged untrue statement of a material fact contained in the Registration Statement, the Basic Prospectus, any Preliminary Prospectus, the Pricing Prospectus or the Prospectus, or any amendment or supplement thereto, any Issuer Free Writing Prospectus, any "roadshow" as defined in Rule 433(h) under the Act (a "roadshow"), any "issuer information" filed or required to be filed pursuant to Rule 433(d) under the Act or any Testing-the-Waters Communication, or arise out of or are based upon the omission or alleged omission to state therein a material fact required to be stated therein or necessary to make the statements therein not misleading, and will reimburse each Underwriter for any legal or other expenses reasonably incurred by such Underwriter in connection with investigating or defending any such action or claim as such expenses are incurred; provided, however, that the Company shall not be liable in any such case to the extent that any such loss, claim, damage or liability arises out of or is based upon an untrue statement or alleged untrue statement or omission or alleged omission made in the Registration Statement, the Basic Prospectus, any Preliminary Prospectus, the Pricing Prospectus or the Prospectus, or any amendment or supplement thereto, or any Issuer Free Writing Prospectus or any Testing-the-Waters Communication, in reliance upon and in conformity with the Underwriter Information.

(b) Each Underwriter, severally and not jointly, will indemnify and hold harmless the Company against any losses, claims, damages or liabilities to which the Company may become subject, under the Act or otherwise, insofar as such losses, claims, damages or liabilities (or actions in respect thereof) arise out of or are based upon an untrue statement or alleged untrue statement of a material fact contained in the Registration Statement, the Basic Prospectus, any Preliminary Prospectus, the Pricing Prospectus or the Prospectus, or any amendment or supplement thereto, or any Issuer Free Writing Prospectus, or any roadshow or any Testing-the-Waters Communication, or arise out of or are based upon the omission or alleged omission to state therein a material fact required to be stated therein or necessary to make the statements therein not misleading, in each case to the extent, but only to the extent, that such untrue statement or alleged untrue statement or omission or alleged omission was made in the Registration Statement, the Basic Prospectus, any Preliminary Prospectus, the Pricing Prospectus or the Prospectus, or any amendment or supplement thereto, or any Issuer Free Writing Prospectus, or any roadshow or any Testing-the-Waters Communication, in reliance upon and in conformity with the Underwriter Information; and will reimburse the Company for any legal or other expenses reasonably incurred by the Company in connection with investigating or defending any such action or claim as such expenses are incurred. As used in this Agreement with respect to an Underwriter and an applicable document, "Underwriter Information" shall mean the written information furnished to the Company by such Underwriter through the Representatives expressly for use therein; it being understood and agreed upon that the only such information furnished by any Underwriter consists of the following information in the Prospectus furnished on behalf of each Underwriter: the concession and reallowance figures appearing in the fifth paragraph under the caption "Underwriting," and the information contained in the tenth, eleventh and twelfth paragraphs under the caption "Underwriting".

(c) Promptly after receipt by an indemnified party under subsection (a) or (b) above of notice of the commencement of any action, such indemnified party shall, if a claim in respect thereof is to be made against the indemnifying party under such subsection, notify the indemnifying party in writing of the commencement thereof; provided that the failure to notify the indemnifying party shall not relieve it from any liability that it may have under the preceding paragraphs of this Section 9 except to the extent that it has been materially prejudiced (through the forfeiture of substantive rights or defenses) by such failure; and provided further that the failure to notify the indemnifying party shall not relieve it from any liability that it may have to an indemnified party otherwise than under the preceding paragraphs of this Section 9. In case any such action shall be brought against any indemnified party and it shall notify the indemnifying party of the commencement thereof, the indemnifying party shall be entitled to participate therein and, to the extent that it shall wish, jointly with any other indemnifying party similarly notified, to assume the defense thereof, with counsel satisfactory to such indemnified party (who shall not, except with the consent of the indemnified party, be counsel to the indemnifying party), and, after notice from the indemnifying party to such indemnified party of its election so to assume the defense thereof, the indemnifying party shall not be liable to such indemnified party under such subsection for any legal expenses of other counsel or any other expenses, in each case subsequently incurred by such indemnified party, in connection with the defense thereof other than reasonable costs of investigation. No indemnifying party shall, without the written consent of the indemnified party, effect the settlement or compromise of, or consent to the entry of any judgment with respect to, any pending or threatened action or claim in respect of which indemnification or contribution may be sought hereunder (whether or not the indemnified party is an actual or potential party to such action or claim) unless such settlement, compromise or judgment (i) includes an unconditional release of the indemnified party from all liability arising out of such action or claim and (ii) does not include a statement as to or an admission of fault, culpability or a failure to act, by or on behalf of any indemnified party;

(d) If the indemnification provided for in this Section 9 is unavailable to or insufficient to hold harmless an indemnified party under subsection (a) or (b) above in respect of any losses, claims, damages or liabilities (or actions in respect thereof) referred to therein, then each indemnifying party shall contribute to the amount paid or payable by such indemnified party as a result of such losses, claims, damages or liabilities (or actions in respect thereof) in such proportion as is appropriate to reflect the relative benefits received by the Company on the one hand and the Underwriters on the other from the offering of the Securities. If, however, the allocation provided by the immediately preceding sentence is not permitted by applicable law, then each indemnifying party shall contribute to such amount paid or payable by such indemnified party in such proportion as is appropriate to reflect not only such relative benefits but also the relative fault of the Company on the one hand and the Underwriters on the other in connection with the statements or omissions which resulted in such losses, claims, damages or liabilities (or actions in respect thereof), as well as any other relevant equitable considerations. The relative benefits received by the Company on the one hand and the Underwriters on the other shall be deemed to be in the same proportion as the total net proceeds from the offering (before deducting expenses) received by the Company bear to the total underwriting discounts and commissions received by the Underwriters, in each case as set forth in the table on the cover page of the Prospectus. The relative fault shall be determined by reference to, among other things, whether the untrue or alleged untrue statement of a material fact or the omission or alleged omission to state a material fact relates to information supplied by the Company on the one hand or the Underwriters on the other and the parties' relative intent, knowledge, access to information and opportunity to correct or prevent such statement or omission. The Company and the Underwriters agree that it would not be just and equitable if contribution pursuant to this subsection (d) were determined by *pro rata* allocation (even if the Underwriters were treated as one entity for such purpose) or by any other method of allocation which does not take account of the equitable considerations referred to above in this subsection (d). The amount paid or payable by an indemnified party as a result of the losses, claims, damages or liabilities (or actions in respect thereof) referred to above in this subsection (d) shall be deemed to include any legal or other expenses reasonably incurred by such indemnified party in connection with investigating or defending any such action or claim. Notwithstanding the provisions of this subsection (d), no Underwriter shall be required to contribute any amount in excess of the amount by which the total price at which the Securities underwritten by it and distributed to the public were offered to the public exceeds the amount of any damages which such Underwriter has otherwise been required to pay by reason of such untrue or alleged untrue statement or omission or alleged omission. No person guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Act) shall be entitled to contribution from any person who was not guilty of such fraudulent misrepresentation. The Underwriters' obligations in this subsection (d) to contribute are several in proportion to their respective underwriting obligations and not joint; and

(e) The obligations of the Company under this Section 9 shall be in addition to any liability which the Company may otherwise have and shall extend, upon the same terms and conditions, to each employee, officer and director of each Underwriter and each person, if any, who controls any Underwriter within the meaning of the Act and each broker-dealer or other affiliate of any Underwriter; and the obligations of the Underwriters under this Section 9 shall be in addition to any liability which the respective Underwriters may otherwise have and shall extend, upon the same terms and conditions, to each officer and director of the Company (including any person who, with his or her consent, is named in the Registration Statement as about to become a director of the Company) and to each person, if any, who controls the Company within the meaning of the Act.

10. (a) If any Underwriter shall default in its obligation to purchase the Securities which it has agreed to purchase hereunder at a Time of Delivery, the Representatives may in their discretion arrange for the Representatives or another party or other parties to purchase such Securities on the terms contained herein. If within thirty-six (36) hours after such default by any Underwriter the Representatives do not arrange for the purchase of such Securities, then the Company shall be entitled to a further period of thirty-six (36) hours within which to procure another party or other parties satisfactory to the Representatives to purchase such Securities on such terms. In the event that, within the respective prescribed periods, the Representatives notify the Company that they have so arranged for the purchase of such Securities, or the Company notifies the Representatives that it has so arranged for the purchase of such Securities, the Representatives or the Company shall have the right to postpone such Time of Delivery for a period of not more than seven (7) days, in order to effect whatever changes may thereby be made necessary in the Registration Statement or the Prospectus, or in any other documents or arrangements, and the Company agrees to file promptly any amendments or supplements to the Registration Statement or the Prospectus which in their opinion may thereby be made necessary. The term "Underwriter" as used in this Agreement shall include any person substituted under this Section with like effect as if such person had originally been a party to this Agreement with respect to such Securities.

(b) If, after giving effect to any arrangements for the purchase of the Securities of a defaulting Underwriter or Underwriters by the Representatives and the Company as provided in subsection (a) above, the aggregate number of such Securities which remains unpurchased does not exceed one-eleventh of the aggregate number of all the Securities to be purchased at such Time of Delivery, then the Company shall have the right to require each non-defaulting Underwriter to purchase the number of shares which such Underwriter agreed to purchase hereunder at such Time of Delivery and, in addition, to require each non-defaulting Underwriter to purchase its pro rata share (based on the number of Securities which such Underwriter agreed to purchase hereunder) of the Securities of such defaulting Underwriter or Underwriters for which such arrangements have not been made; but nothing herein shall relieve a defaulting Underwriter from liability for its default.

(c) If, after giving effect to any arrangements for the purchase of the Securities of a defaulting Underwriter or Underwriters by the Representatives and the Company as provided in subsection (a) above, the aggregate number of such Securities which remains unpurchased exceeds one-eleventh of the aggregate number of all the Securities to be purchased at such Time of Delivery, or if the Company shall not exercise the right described in subsection (b) above to require non-defaulting Underwriters to purchase Securities of a defaulting Underwriter or Underwriters, then this Agreement (or, with respect to the Second Time of Delivery, the obligations of the Underwriters to purchase and of the Company to sell the Optional Securities) shall thereupon terminate, without liability on the part of any non-defaulting Underwriter or the Company, except for the expenses to be borne by the Company and the Underwriters as provided in Section 7 hereof and the indemnity and contribution agreements in Section 9 hereof; but nothing herein shall relieve a defaulting Underwriter from liability for its default.

11. The respective indemnities, rights of contribution, agreements, representations, warranties and other statements of the Company and the several Underwriters, as set forth in this Agreement or made by or on behalf of them, respectively, pursuant to this Agreement, shall remain in full force and effect, regardless of any investigation (or any statement as to the results thereof) made by or on behalf of any Underwriter or any director, officer, employee, affiliate or controlling person of any Underwriter, or the Company, or any officer or director or controlling person of the Company, and shall survive delivery of and payment for the Securities.

12. If this Agreement shall be terminated pursuant to Section 10 hereof, the Company shall not then be under any liability to any Underwriter except as provided in Sections 7 and 9 hereof; but, if for any other reason, any Securities are not delivered by or on behalf of the Company as provided herein or the Underwriters decline to purchase the Securities for any reason permitted under this Agreement, the Company will reimburse the Underwriters through the Representatives for all out-of-pocket expenses approved in writing by the Representatives, including fees and disbursements of counsel, reasonably incurred by the Underwriters in making preparations for the purchase, sale and delivery of the Securities not so delivered, but the Company shall then be under no further liability to any Underwriter except as provided in Sections 7 and 9 hereof.

13. In all dealings hereunder, the Representatives shall act on behalf of each of the Underwriters, and the parties hereto shall be entitled to act and rely upon any statement, request, notice or agreement on behalf of any Underwriter made or given by the Representatives jointly.

All statements, requests, notices and agreements hereunder shall be in writing, and if to the Underwriters shall be delivered or sent by mail, telex or facsimile transmission to the Representatives at c/o Goldman Sachs & Co. LLC, 200 West Street, New York, New York 10282-2198, Attention: Registration Department; and at c/o J.P. Morgan Securities LLC, 383 Madison Avenue, New York, New York 10179, Attention: Equity Syndicate Desk; and if to the Company shall be delivered or sent by mail, telex or facsimile transmission to the address of the Company set forth in the Registration Statement, Attention: Secretary; provided, however, that any notice to an Underwriter pursuant to Section 9(c) hereof shall be delivered or sent by mail, telex or facsimile transmission to such Underwriter at its address set forth in its Underwriters' Questionnaire, or telex constituting such Questionnaire, which address will be supplied to the Company by the Representatives upon request provided, however, that notices under subsection 5(d) hereof shall be in writing, and if to the Underwriters shall be delivered or sent by mail, telex or facsimile transmission to the Representatives at Goldman Sachs & Co. LLC, 200 West Street, New York, New York 10282-2198, Attention: Control Room; and J.P. Morgan Securities LLC, 383 Madison Avenue, New York, New York 10179, Attention: Equity Syndicate Desk (Fax: (212) 622-8358). Any such statements, requests, notices or agreements shall take effect upon receipt thereof.

In accordance with the requirements of the USA Patriot Act (Title III of Pub. L. 107-56 (signed into law October 26, 2001)), the Underwriters are required to obtain, verify and record information that identifies their respective clients, including the Company, which information may include the name and address of their respective clients, as well as other information that will allow the Underwriters to properly identify their respective clients.

14. This Agreement shall be binding upon, and inure solely to the benefit of, the Underwriters, the Company and, to the extent provided in Sections 8 and 10 hereof, the officers and directors of the Company and each person who controls the Company or any Underwriter, or any director, officer, employee, or affiliate of any Underwriter, and their respective heirs, executors, administrators, successors and assigns, and no other person shall acquire or have any right under or by virtue of this Agreement. No purchaser of any of the Securities from any Underwriter shall be deemed a successor or assign by reason merely of such purchase.

15. Time shall be of the essence of this Agreement. As used herein, the term “business day” shall mean any day when the Commission’s office in Washington, D.C. is open for business.

16. The Company acknowledges and agrees that (i) the purchase and sale of the Securities pursuant to this Agreement is an arm’s-length commercial transaction between the Company, on the one hand, and the several Underwriters, on the other, (ii) in connection therewith and with the process leading to such transaction each Underwriter is acting solely as a principal and not the agent or fiduciary of the Company, (iii) no Underwriter has assumed an advisory or fiduciary responsibility in favor of the Company with respect to the offering contemplated hereby or the process leading thereto (irrespective of whether such Underwriter has advised or is currently advising the Company on other matters) or any other obligation to the Company except the obligations expressly set forth in this Agreement, (iv) the Company has consulted its own legal and financial advisors to the extent it deemed appropriate, and (v) none of the activities of the Underwriters in connection with the transactions contemplated herein constitutes a recommendation, investment advice, or solicitation of any action by the Underwriters with respect to any entity or natural person. The Company agrees that it will not claim that the Underwriters, or any of them, has rendered advisory services of any nature or respect, or owes a fiduciary or similar duty to the Company, in connection with such transaction or the process leading thereto.

17. This Agreement supersedes all prior agreements and understandings (whether written or oral) between the Company and the Underwriters, or any of them, with respect to the subject matter hereof.

18. This Agreement and any transaction contemplated by this Agreement and any claim, controversy or dispute arising under or related thereto shall be governed by and construed in accordance with the laws of the State of New York without regard to principles of conflict of laws that would result in the application of any other law than the laws of the State of New York. The Company agrees that any suit or proceeding arising in respect of this Agreement or any transaction contemplated by this Agreement will be tried exclusively in the U.S. District Court for the Southern District of New York or, if that court does not have subject matter jurisdiction, in any state court located in The City and County of New York and the Company agrees to submit to the jurisdiction of, and to venue in, such courts.

19. The Company and each of the Underwriters hereby irrevocably waives, to the fullest extent permitted by applicable law, any and all right to trial by jury in any legal proceeding arising out of or relating to this Agreement or the transactions contemplated hereby.

20. Notwithstanding anything herein to the contrary, the Company is authorized to disclose to any persons the U.S. federal and state income tax treatment and tax structure of the potential transaction and all materials of any kind (including tax opinions and other tax analyses) provided to the Company relating to that treatment and structure, without the Underwriters imposing any limitation of any kind. However, any information relating to the tax treatment and tax structure shall remain confidential (and the foregoing sentence shall not apply) to the extent necessary to enable any person to comply with securities laws. For this purpose, “tax structure” is limited to any facts that may be relevant to that treatment.

21. This Agreement may be executed by any one or more of the parties hereto in any number of counterparts, each of which shall be deemed to be an original, but all such counterparts shall together constitute one and the same instrument. Counterparts may be delivered via facsimile, electronic mail (including any electronic signature covered by the U.S. federal ESIGN Act of 2000, Uniform Electronic Transactions Act, the Electronic Signatures and Records Act or other applicable law, e.g., www.docuSign.com) or other transmission method and any counterpart so delivered shall be deemed to have been duly and validly delivered and be valid and effective for all purposes.

22. Recognition of the U.S. Special Resolution Regimes.

In the event that any Underwriter that is a Covered Entity becomes subject to a proceeding under a U.S. Special Resolution Regime, the transfer from such Underwriter of this Agreement, and any interest and obligation in or under this Agreement, will be effective to the same extent as the transfer would be effective under the U.S. Special Resolution Regime if this Agreement, and any such interest and obligation, were governed by the laws of the United States or a state of the United States.

(b) In the event that any Underwriter that is a Covered Entity or a BHC Act Affiliate of such Underwriter becomes subject to a proceeding under a U.S. Special Resolution Regime, Default Rights under this Agreement that may be exercised against such Underwriter are permitted to be exercised to no greater extent than such Default Rights could be exercised under the U.S. Special Resolution Regime if this Agreement were governed by the laws of the United States or a state of the United States.

(c) As used in this section:

“BHC Act Affiliate” has the meaning assigned to the term “affiliate” in, and shall be interpreted in accordance with, 12 U.S.C. § 1841(k).

“Covered Entity” means any of the following:

(i) a “covered entity” as that term is defined in, and interpreted in accordance with, 12 C.F.R. § 252.82(b);

(ii) a “covered bank” as that term is defined in, and interpreted in accordance with, 12 C.F.R. § 47.3(b); or

(iii) a “covered FSI” as that term is defined in, and interpreted in accordance with, 12 C.F.R. § 382.2(b).

“Default Right” has the meaning assigned to that term in, and shall be interpreted in accordance with, 12 C.F.R. §§ 252.81, 47.2 or 382.1, as applicable.

“U.S. Special Resolution Regime” means each of (i) the Federal Deposit Insurance Act and the regulations promulgated thereunder and (ii) Title II of the Dodd-Frank Wall Street Reform and Consumer Protection Act and the regulations promulgated thereunder.

If the foregoing is in accordance with your understanding, please sign and return to us one for the Company and each of the Representatives plus one for each counsel counterparts hereof, and upon the acceptance hereof by the Representatives, on behalf of each of the Underwriters, this letter and such acceptance hereof shall constitute a binding agreement between each of the Underwriters and the Company. It is understood that the Representatives' acceptance of this letter on behalf of each of the Underwriters is pursuant to the authority set forth in a form of Agreement among Underwriters, the form of which shall be submitted to the Company for examination upon request, but without warranty on the part of the Representatives as to the authority of the signers thereof.

Very truly yours,

bluebird bio, Inc.

By: /s/ Andrew Obenshain

Name: Andrew Obenshain

Title: President and Chief Executive Officer

Accepted as of the date hereof:

GOLDMAN SACHS & CO. LLC

By: /s/ Elizabeth Wood

Name: Elizabeth Wood

Title: Managing Director

J.P. MORGAN SECURITIES LLC

By: /s/ David Ke

Name: David Ke

Title: Managing Director

On behalf of each of the Underwriters

SCHEDULE I

	Number of Firm Securities to be Purchased	Number of Optional Securities to be Purchased if Maximum Option Exercised
Underwriters		
Goldman Sachs & Co. LLC	44,166,666	6,625,000
J.P. Morgan Securities LLC	35,000,000	5,250,000
Raymond James & Associates, Inc.	4,166,667	624,999
Total	83,333,333	12,499,999

SCHEDULE II

(a) Issuer Free Writing Prospectuses not included in the Pricing Disclosure Package:

Electronic Roadshow dated December 2023

(b) Additional Documents Incorporated by Reference:

None

(c) Information other than the Pricing Prospectus that comprise the Pricing Disclosure Package:

The initial public offering price per share for the Securities is \$1.50.

The number of Firm Securities purchased by the Underwriters from the Company is 83,333,333.

The number of Optional Securities that may be purchased by the Underwriters from the Company is 12,499,999.

(d) Written Testing-the-Waters Communications:

Reference is made to the materials used in the testing the waters presentations made to potential investors by the Company, to the extent such materials are deemed to be a “written communication” within the meaning of Rule 405 under the Act.

FORM OF LOCK-UP AGREEMENT

[•], 2023

Goldman Sachs & Co. LLC
J.P. Morgan Securities LLC
as Representatives of
the several Underwriters listed in
Schedule I to the Underwriting
Agreement referred to below

c/o Goldman Sachs & Co. LLC
200 West Street
New York, New York 10282

c/o J.P. Morgan Securities LLC
383 Madison Avenue
New York, New York 10179

Re: bluebird bio, Inc. — Public Offering

Ladies and Gentlemen:

The undersigned understands that you, as Representatives of the several Underwriters, propose to enter into an Underwriting Agreement (the “Underwriting Agreement”) with bluebird bio, Inc., a Delaware corporation (the “Company”), providing for the public offering (the “Public Offering”) by the several Underwriters named in Schedule I to the Underwriting Agreement (the “Underwriters”), of common stock, par value \$0.01 per share, of the Company (“Common Stock”). Capitalized terms used herein and not otherwise defined shall have the meanings set forth in the Underwriting Agreement.

In consideration of the Underwriters’ agreement to purchase and make the Public Offering of the Common Stock, and for other good and valuable consideration receipt of which is hereby acknowledged, the undersigned hereby agrees that, without the prior written consent of Goldman Sachs & Co. LLC and J.P. Morgan Securities LLC, on behalf of the Underwriters, the undersigned will not, and will not cause or direct any of its affiliates to, during the period ending 45 days after the date of the final prospectus supplement relating to the Public Offering (the “Prospectus”), (1) offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, or otherwise transfer or dispose of, directly or indirectly, any shares of Common Stock or any securities convertible into or exercisable or exchangeable for Common Stock

(including without limitation, Common Stock or such other securities which may be deemed to be beneficially owned by the undersigned in accordance with the rules and regulations of the Securities and Exchange Commission and securities which may be issued upon exercise of a stock option or warrant), (2) engage in any hedging or other transaction or arrangement (including, without limitation, any short sale or the purchase or sale of, or entry into, any put or call option, or combination thereof, forward, swap or any other derivative transaction or instrument, however described or defined) which is designed to or which reasonably be expected to or result in a sale, loan, pledge or other disposition (whether by the undersigned or someone other than the undersigned), or transfer any of the economic consequences of ownership, in whole or in part, directly or indirectly, of the Common Stock or such other securities, whether any such transaction or agreement (or instrument provided for thereunder) described in clause (1) or (2) above is to be settled by delivery of Common Stock or such other securities, in cash or otherwise (any such sale, loan, pledge or other disposition, or transfer of economic consequences, a "Transfer"), (3) otherwise publicly announce any intention to engage in or cause any action or activity described in clause (1) above or transaction or agreement described in clause (2) above or (4) make any demand for or exercise any right with respect to the registration of any shares of Common Stock or any security convertible into or exercisable or exchangeable for Common Stock, in each case other than (A) transfers of shares of Common Stock or other securities of the Company as a bona fide gift or gifts, (B) transfers of shares of Common Stock or other securities of the Company to a trust or limited family partnership for the direct or indirect benefit of the undersigned or the immediate family of the undersigned, (C) transfers of shares of Common Stock or other securities of the Company by will, other testamentary document or intestate succession to the legal representative, heir, beneficiary or a member of the immediate family of the undersigned in a transaction not involving a disposition for value, (D) transactions relating to shares of Common Stock acquired in open market transactions after the completion of the Public Offering, provided that no filing under Section 16(a) of the Securities Exchange Act of 1934, as amended (the "Exchange Act") shall be required or shall be made during the 45 day period after the date of the Prospectus in connection with subsequent sales of Common Stock acquired in such open market transactions, (E) transfers of Common Stock pursuant to a trading plan established pursuant to Rule 10b5-1 under the Exchange Act prior to the date hereof, which trading plan shall not be amended during the 45 days after the date of the Prospectus but may be terminated during the 45 days after the date of the prospectus and (F) the establishment of a trading plan pursuant to Rule 10b5-1 under the Exchange Act providing for the transfer of shares of Common Stock, to the extent that such plan does not provide for the transfer of shares of Common Stock during the 45 days after the date of the Prospectus; provided that in the case of any transfer or distribution pursuant to clause (A), (B) or (C), each transferee, donee or distributee shall execute and deliver to the Representatives a lock-up letter in the form of this paragraph; and provided, further, that in the case of any transfer or distribution pursuant to clause (A), (B) or (C), no filing by any party (donor, donee, transferor or transferee) under the Exchange Act or other public announcement shall be required or shall be made voluntarily in connection with such transfer or distribution (other than a filing on a Form 5 made after the expiration of the 45 day period referred to above, or with respect to clause (A), a filing on a Form 4, which shall clearly indicate in the footnotes

thereto the nature of such transfer). Notwithstanding the foregoing, the undersigned may transfer or sell such number of shares of Common Stock as is necessary solely to satisfy any tax withholding obligations incurred upon the vesting of any restricted stock units that vest during the 45-day period referred to above, through the surrender to the Company of shares of Common Stock or through sales of shares of Common Stock in the market; provided that any shares of Common Stock received by the undersigned upon such vesting shall be subject to the restrictions provided for in this Letter Agreement; provided, further, that any related filing under Section 16(a) of the Exchange Act must note that such transfer or sale was made solely to satisfy tax withholding obligations.

In furtherance of the foregoing, the Company, and any duly appointed transfer agent for the registration or transfer of the securities described herein, are hereby authorized to decline to make any transfer of securities if such transfer would constitute a violation or breach of this Letter Agreement.

The undersigned hereby represents and warrants that the undersigned has full power and authority to enter into this Letter Agreement. All authority herein conferred or agreed to be conferred and any obligations of the undersigned shall be binding upon the successors, assigns, heirs or personal representatives of the undersigned.

The undersigned understands that, if the Underwriting Agreement does not become effective by December 31, 2023, or if the Underwriting Agreement (other than the provisions thereof which survive termination) shall terminate or be terminated prior to payment for and delivery of the Common Stock to be sold thereunder, or if the Representatives, on behalf of the Underwriters, on the one hand, or the Company, on the other hand, advise the other prior to the execution of the Underwriting Agreement that they have or it has determined not to proceed with the Public Offering contemplated by the Underwriting Agreement, the undersigned shall be released from all obligations under this Letter Agreement. The undersigned understands that the Underwriters are entering into the Underwriting Agreement and proceeding with the Public Offering in reliance upon this Letter Agreement.

This Letter Agreement and any claim, controversy or dispute arising under or related to this Letter Agreement shall be governed by and construed in accordance with the laws of the State of New York, without regard to the conflict of laws principles thereof.

Very truly yours,

[NAME OF STOCKHOLDER]

By: _____
Name:
Title:

LATHAM & WATKINS^{LLP}

200 Clarendon Street
 Boston, Massachusetts 02116
 Tel: +1.617.948.6000 Fax: +1.617.948.6001

www.lw.com

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Hamburg	Silicon Valley
Hong Kong	Singapore
Houston	Tel Aviv
London	Tokyo
Los Angeles	Washington, D.C.
Madrid	

December 20, 2023

bluebird bio, Inc.
 455 Grand Union Boulevard
 Somerville, MA 02145

Re: Registration Statement on Form S-3 (Registration No. 333-271772); 95,833,332 shares of Common Stock, par value \$0.01 per share

To the addressee set forth above:

We have acted as special counsel to bluebird bio, Inc., a Delaware corporation (the “*Company*”), in connection with the proposed issuance of up to 95,833,332 shares (the “*Shares*”) of common stock of the Company, \$0.01 par value per share (the “*Common Stock*”), including up to 12,499,999 shares of Common Stock issuable upon exercise of the underwriters’ option to purchase additional shares. The Shares are included in a registration statement on Form S-3 under the Securities Act of 1933, as amended (the “*Act*”), filed with the Securities and Exchange Commission (the “*Commission*”) on May 9, 2023 (Registration No. 333-271772) (as so filed, the “*Registration Statement*”), a base prospectus dated May 19, 2023 (the “*Base Prospectus*”) and a prospectus supplement dated December 19, 2023 filed with the Commission pursuant to Rule 424(b) under the Act (together with the Base Prospectus, the “*Prospectus*”). The Shares are being sold pursuant to an underwriting agreement dated December 19, 2023 by and among Goldman Sachs & Co. LLC and J.P. Morgan Securities LLC, as representatives of the several underwriters, and the Company (the “*Underwriting Agreement*”). This opinion is being furnished in connection with the requirements of Item 601(b)(5) of Regulation S-K under the Act, and no opinion is expressed herein as to any matter pertaining to the contents of the Registration Statement or the Prospectus, other than as expressly stated herein with respect to the issue of the Shares.

As such counsel, we have examined such matters of fact and questions of law as we have considered appropriate for purposes of this letter. With your consent, we have relied upon certificates and other assurances of officers of the Company and others as to factual matters without having independently verified such factual matters. We are opining herein as to the General Corporation Law of the State of Delaware (the “*DGCL*”), and we express no opinion with respect to any other laws.

LATHAM & WATKINS^{LLP}

Subject to the foregoing and the other matters set forth herein, it is our opinion that, as of the date hereof, when the Shares shall have been duly registered on the books of the transfer agent and registrar therefor in the name or on behalf of the purchasers, and have been issued by the Company against payment therefor (not less than par value) in the circumstances contemplated by the Underwriting Agreement, the issue and sale of the Shares will have been duly authorized by all necessary corporate action of the Company, and the Shares will be validly issued, fully paid and nonassessable. In rendering the foregoing opinion, we have assumed that the Company will comply with all applicable notice requirements regarding uncertificated shares provided in the DGCL.

This opinion is for your benefit in connection with the Registration Statement and may be relied upon by you and by persons entitled to rely upon it pursuant to the applicable provisions of the Act. We consent to your filing this opinion as an exhibit to the Company's Form 8-K dated December 20, 2023, and to the reference to our firm in the Prospectus under the heading "Legal Matters." In giving such consent, we do not thereby admit that we are in the category of persons whose consent is required under Section 7 of the Act or the rules and regulations of the Commission thereunder.

Sincerely,

/s/ Latham & Watkins LLP