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April 12, 2011

RECEIVED/DELAWARE RIVER BASIN COMMISSION
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Pamela Bush, Esquire
Commission Secretary
Delaware River Basin Commission
P.O. Box 7360
25 State Police Drive
West Trenton, NJ 08628

Subject: Analysis and Comments on the Delaware River Basin Commission's Proposed Natural Gas Development Regulations

Dear Ms. Bush,

ALL Consulting (ALL) appreciates the opportunity afforded by the Delaware River Basin Commission (Commission) to provide input on the proposed Article 7 Natural Gas Development Regulations published by the Commission on December 9, 2010. Included with this letter is a report titled "*Analysis of Delaware River Basin Commission Proposed Natural Gas Development Regulations*" which presents an independent analysis of, and includes comments on, the proposed Article 7 regulations. This report was prepared by ALL at the request of the Marcellus Shale Coalition and the American Petroleum Institute.

The analyses contained within the report where conducted to provide an overall evaluation of the proposed Article 7 regulations and includes the following:

- ***NGDP Timeline and Cost Analysis***: A timeline and cost analysis was conducted to evaluate the potential schedule and cost implications to natural gas development projects that would result from the proposed Article 7 regulations.
- ***Water and Land Use Comparison Analysis***: An analysis was conducted of the expected land and water use requirements for natural gas development as compared to land and water use requirements for other water users within the Basin.
- ***Regulatory Comparison Analysis***: ALL conducted a regulatory comparison analysis between, and among the proposed Article 7 regulations and the natural gas regulatory programs of the host states and the Susquehanna River Basin Commission.
- ***Restrictions and Constraints Analysis***: An analysis was conducted using Geographic Information Systems (GIS) techniques of the land area within the Basin overlying the Marcellus Shale to determine the surface acreage available for development after siting restrictions, setbacks, and approval-by-rule criteria contained within the proposed Article 7 regulations were included for these areas.

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Additionally, contained within Appendix E of our report are comments which address specific elements of the proposed Article 7 regulations.

ALL has also provided within the report a bibliography (Appendix F) which contains a list of reference documents and reports that we feel the Commission will find useful in providing background information on the analyses and comments contained within our report as well as for addressing issues that may be presented by others related to the proposed Article 7 regulations.

ALL supports the Commission in their mission of protecting the water resources within the Delaware River Basin while also providing for natural gas development and is prepared to assist the Commission in achieving that mission.

Sincerely,
ALL Consulting

J. Daniel Arthur
President

xc: Kathryn Z. Klaber (Marcellus Shale Coalition)
Rolf Hanson (American Petroleum Institute)

ANALYSIS OF DELAWARE RIVER BASIN COMMISSION

PROPOSED (ARTICLE 7) NATURAL GAS DEVELOPMENT REGULATIONS

Prepared at the request of the American Petroleum Institute and the Marcellus Shale Coalition

Analysis By:
ALL Consulting, LLC

April 2011

DISCLAIMER

This report is an independent analysis by ALL Consulting. The analysis and observations contained herein are solely those of ALL Consulting and do not necessarily reflect the opinions of the Marcellus Shale Coalition, the American Petroleum Institute, or any other natural gas entity or industry company.

Principal Investigators:
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Table of Contents

Introduction 1
Scope 1
Key Points 3
Findings and Recommendations 4
Conclusions 18

List of Appendices

Appendix A: Natural Gas Development Timeline and Development Costs
Appendix B: Water and Land Use Comparison Analysis
Appendix C: Regulatory Comparison Analysis
Appendix D: Proposed Article 7 Restrictions and Constraints Analysis
Appendix E: Detailed Comments on Proposed Article 7 Rules
Appendix F: Bibliography

Introduction

The project review responsibilities of the Delaware River Basin Commission (DRBC) extend to projects having a substantial effect on the water resources of the Delaware River Basin (Basin). The recent proposed Article 7 regulations seek to expand the project review function of the Commission to include natural gas regulation. In order to better understand this expansion of regulatory authority, an independent review of the proposed Article 7 regulations was conducted at the request of the American Petroleum Institute (API) and the Marcellus Shale Coalition by ALL Consulting (ALL). This report contains the results of this independent review, which is formatted according to the following major headings:

- Scope: Provides a brief description of the analyses which were conducted to provide background information and data that were used in developing comments and recommendations relative to the proposed Article 7 regulations. Detailed information on the analyses that were conducted is contained within the report Appendices A through D which are as follows:
    - Appendix A – Natural Gas Development Plan (NGDP) Timeline and Cost Analysis
    - Appendix B – Water and Land Use Comparison Analysis
    - Appendix C – Regulatory Comparison Analysis
    - Appendix D – Proposed Article 7 Restrictions and Constraints Analysis
- Key Points: Includes a summary of the issues that relate to the overall applicability of the proposed Article 7 regulations as well as their ability to be effectively implemented.
- Findings and Recommendations: Includes a discussion of the information developed from the analyses that were conducted and provides recommendations that relate to the identified key points.
- Conclusions: Includes a brief summary of the overall findings of the analysis of the proposed Article 7 regulations.

Specific comments on the DRBC's proposed Article 7 regulations are provided in **Appendix E**. References to background reports and documents that may prove useful in providing an overall understanding of natural gas development and shale gas development are contained in **Appendix F**.

Scope

The scope of this independent review includes general information and observations derived from evaluation of the proposed Article 7 regulations including the following topics:

- NGDP Timeline and Cost Analysis
- Water and Land Use Comparison Analysis
- Regulatory Comparison Analysis
- Restrictions and Constraints Analysis

A discussion of the review process and evaluation conducted for each of these topics is provided in the following paragraphs.

NGDP Timeline and Cost Analysis: A timeline and cost analysis were created to evaluate the potential schedule and cost impact to natural gas development projects of the numerous applications and supporting reports that would need to be submitted to the Commission for review and approval. Set timeframes for the review and approval processes are not defined in the proposed Article 7 regulations. In order to predict an estimate of the overall time and costs required to obtain approval for a well pad application and NGDP, ALL constructed a schedule to provide a reasonable approach and estimate of the times and costs associated with developing the applications and supporting reports as well as for the DRBC review and approval efforts.

Water and Land Use Comparison Analysis: A basic premise of the proposed Article 7 regulations is set forth under **7.1(d) Comprehensive Plan and Framework,** where it is stated that *"The Commission has also determined that all natural gas development projects may have a substantial effect on the water resources of the Basin."* The natural gas industry is unique in certain respects just as other water users within the Basin – e.g., agriculture, power generation, and golf courses – are unique in various ways. All water users, however, share commonalities. In order to evaluate the rationale or basis for the above statement, ALL developed expected water use requirements for natural gas development and compared those to water use requirements for other water users within the Basin. ALL also evaluated the land use requirements for natural gas development as compared to other land users within the Basin. This land use comparison was developed to provide context with respect to the potential for the removal of forest cover or impingement on buffer areas around streams, lakes or other water bodies.

Regulatory Comparison Analysis: ALL conducted a regulatory comparison analysis between and among the proposed Article 7 regulations and the natural gas regulatory programs of the following agencies:

- Susquehanna River Basin Commission (SRBC),
- Pennsylvania Department of Environmental Protection (PADEP), and
- New York State Department of Environmental Conservation (NYSDEC) – both current regulations and those proposed for the draft Supplemental Generic Environmental Impact Statement (dSGEIS).

The regulatory analysis was conducted to identify areas where there is regulatory conflict, overlap, or inconsistency with host state requirements, and to compare the approach proposed by DRBC with precedents from other programs, including SRBC. Additionally, the regulatory analysis helped to identify areas of the proposed Article 7 regulations that are ambiguous or lack clarity or that lack a clear rationale or basis.

Restrictions and Constraints Analysis: The proposed Article 7 regulations contain various restrictions and constraints on the location of natural gas well pads. The amount of acreage remaining for well pad placement, however, was not calculated in the proposed Article 7 regulations. ALL conducted an analysis, using Geographic Information Systems (GIS) techniques, of the land area within the Basin overlying Marcellus Shale to determine the surface acreage available for development after siting restrictions, setbacks, and approval-by-rule criteria were included for these areas.

Key Points

The review conducted by ALL resulted in the identification of a number of key points that relate to the overall applicability of the proposed Article 7 regulations as well as their ability to be effectively implemented. These key points are provided in the following paragraphs.

Regulations are Specific to the Natural Gas Industry: The proposed Article 7 regulations are specific to the natural gas industry. However, the Commission has not established a basis for what is unique about the natural gas industry, as opposed to other industries or water users within the Basin, as a justification for regulation of the natural gas industry separate from other water use industries. It remains unclear how or if the Commission intends to apply the proposed Article 7 regulations, or similar regulations, to other industries.

Notification and Appeal Process: The current notification and appeal process lacks clarity, is open-ended, and poses the potential to create significant and unnecessary delays.

Natural Gas Development Plan: The proposed Article 7 regulations require that a project sponsor predict its leasehold development in the future for a 5-year period. Based on uncertainty regarding service company availability and the economics of gas production, accurately predicting development over a 5-year period is not realistic.

Prescriptive Nature of the Proposed Article 7 Regulations: The proposed Article 7 regulations are prescriptive in nature with numerous restrictions, setbacks and constraints without providing guidance on the criteria that would be used to allow variances or adjustments to plans. There is a lack of basis provided for the restrictions, setbacks and constraints contained within the proposed Article 7 regulations. Additionally, the prescriptive nature of the proposed Article 7 regulations does not provide for site-specific conditions or the implementation of an "Adaptive Management" approach which would allow project sponsors to tailor their plans using Best Management Practices (BMPs) and mitigation measures combined with monitoring and feedback to gauge success or needed adjustments.

Submittals/Reporting and Approvals: There are numerous submittals and reporting requirements within the proposed Article 7 regulations, some of which duplicate host state requirements and some, such as the NGDP, which cannot be prepared in as precise a manner as required. Timeframes for approval of submittals and review of reports are not defined.

Fees and Economics: The fees proposed, combined with land use restrictions/constraints, plan development, plan reviews, bonding and other requirements represent a significant economic requirement on project sponsors and impose an economic imbalance on development within the Basin versus development outside of the Basin. A basis for the level of the fees required is not provided and many duplicate fees that are already required by host states for similar or duplicative submittals. The bonding requirements are in excess of, and in addition to, the bonding requirements of the host states. A rationale is not provided for this duplication of host state requirements nor is a rationale provided for the amount of the bonding required.

Data Confidentiality and Hydraulic Fracturing: The disclosure requirements go beyond what is required by the host states. Additionally, only a general reference to the Rules of Practice and Procedure is provided as a description of the data confidentiality protocol that will be followed by the DRBC.

Duplication of Host State Regulatory Programs: The proposed Article 7 regulations contain requirements that in many instances duplicate, or are similar to, existing or proposed (New York State dSGEIS) host state regulatory programs (**Appendix D**).

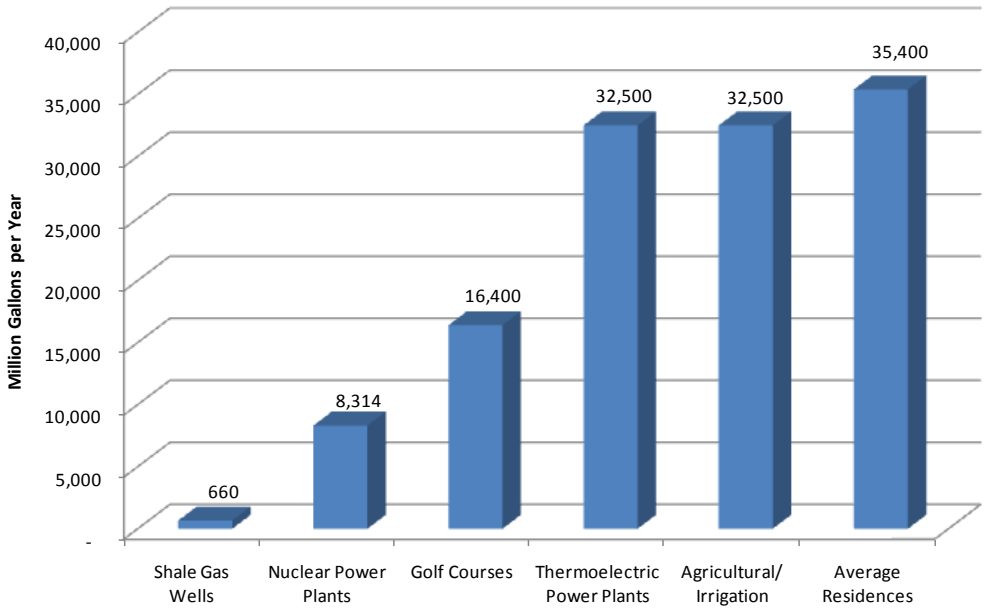
Regulatory Ambiguity: There are a number of areas within the proposed Article 7 regulations that contain language or words that are ambiguous, are not clearly defined, or need clarification. Additionally, there are elements of the proposed Article 7 regulations that require a stated rationale in order to clarify how the regulation will be implemented; that basis or rationale is not provided. An example would be the provision for a "Variance" under 7.5(b)(9) where it is stated that a variance to the restriction and setback requirements under 7.5(b)(3) and 7.5(b)(4) can be obtained but the criteria necessary for obtaining a variance is not provided.

Findings and Recommendations

The following are the findings and recommendations that relate to the key points identified through the review of the proposed Article 7 regulations.

Regulations are Specific to Natural Gas Industry: An analysis of the water use requirements of the natural gas industry (see **Appendix B**) was conducted and is represented below in **Exhibit 1**. Using an initial drilling rate of 200 wells in a 1-year period with an average consumptive water use of 3.3 million gallons per well would yield a volume of 660 million gallons of water that would be consumptively used for natural gas development on an annual basis. Comparatively, the approximate annual volume of consumptive water use for other water users within the Basin is 32.5 billion gallons for 148 thermoelectric power plants; 16.4 billion gallons for 145 golf courses; 35.4 billion gallons for the approximate 2.9 million residences; 8.3 billion gallons for 3 nuclear power plants; and 32.5 billion gallons for the 3,300 square miles of irrigated agricultural land.

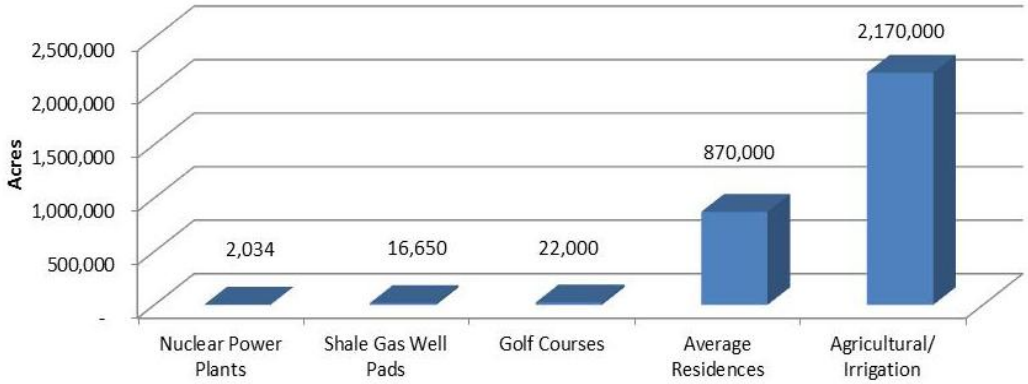
Exhibit 1: Consumptive Water Use in the Delaware River Basin



While the consumptive water use requirements for natural gas development are something that should be considered, they are, when compared to other water uses within the Basin, relatively minor. It is recognized that the rate of natural gas development and wells drilled per year could increase over time; however even a two- or threefold increase in natural gas water use would still be minor compared to other water uses evaluated.

The land footprint for natural gas development is correspondingly minor in comparison with other land uses in the Basin (see **Exhibit 2**). The average acreage requirement for a well pad sufficient in size to support multiple wells and associated facilities such as roads, pipelines and compressor stations has been estimated at 7.4 acres prior to any site restoration (see **Appendix B**). Based on the restrictions and constraints contained within the proposed Article 7 regulations, it has been estimated that there would be approximately 2,250 square miles available for the placement of well pads without requiring a variance (see **Appendix D**). This would allow for approximately 2,250 well pads and associated infrastructure at 7.4 acres per well pad which would yield a total land use requirement of 16,650 acres within the Basin for natural gas development. Data presented in **Appendix B** shows that golf courses require approximately 22,000 acres, residences approximately 870,000 acres, nuclear power plants approximately 2,034 acres, and agriculture approximately 2,170,000 acres.

Exhibit 2: Land Comparison in Delaware River Basin



While land use requirements for natural gas development are a factor to be considered with respect to construction practices and controlling sedimentation and erosion to maintain basin water quality, the overall footprint would be relatively small and temporary. As the well transitions from the drilling and completion phase to the production phase, land disturbance is reduced as a result of restoration activities for the well pad and associated facilities. Additionally, BMPs can be employed to effectively address erosion and sedimentation control during both the construction and operational phases of a natural gas development project.

The analysis conducted on both the water use and land use requirements of natural gas development shows that they would be relatively minor with respect to other water uses and land uses within the Basin.

> ***Recommendation:*** *It is recommended that the proposed Article 7 regulations provide a basis that clearly defines and quantifies those elements of the natural gas industry that would require regulation separate from the regulations that apply to other industry water*

users within the Basin. The Commission should provide an explanation of how it intends to apply similar regulation, to other industries.

Notification and Appeal Process: The current notification and appeal process lacks a defined process by which a project sponsor can continue operations while appeals are being processed.

> ***Recommendation:*** *It is recommended that the DRBC provide a clear set of criteria by which appeals can be timely processed and allow for a project sponsor to continue operations during the appeal process.*

Natural Gas Development Plan: The NGDP of a project sponsor can vary for a number of reasons that would include changes in economics or production trends within their leasehold.

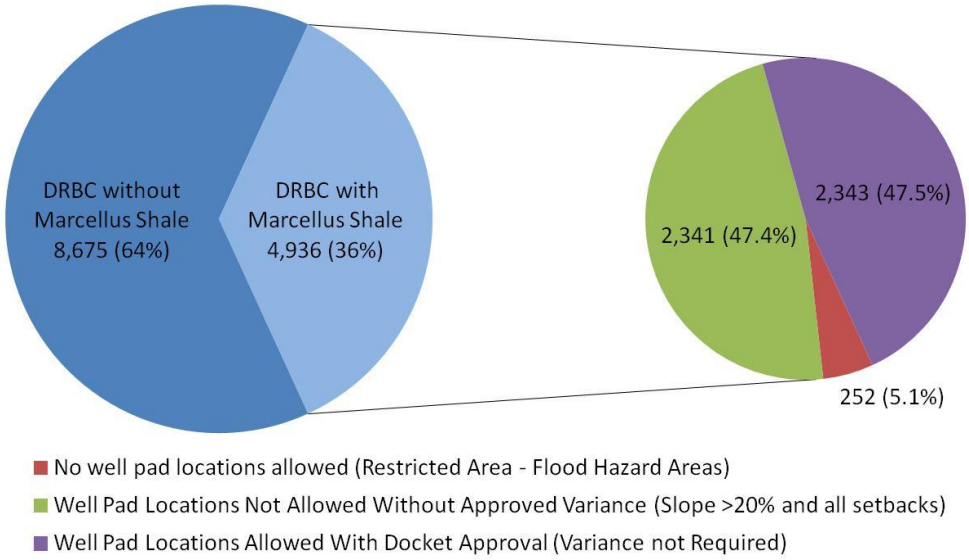
> ***Recommendation:*** *It is recommended that the proposed Article 7 regulations provide for flexibility in the NGDP that allows project sponsors the ability to adjust plans without the need for additional approvals by the Commission.*

Prescriptive Nature of the Proposed Article 7 Regulations: An analysis of the proposed Article 7 regulations using GIS techniques was conducted to determine the amount of surface acreage affected by siting restrictions, setbacks, and approval-by-rule criteria for the portion of the Basin that overlays the Marcellus Shale formation. The results of GIS analysis show that there are 4,936 square miles of the Basin that overlay the Marcellus Shale. The provisions of 7.5(b)(3) would restrict 252 square miles from well pad placement within a Flood Hazard Area. The provisions of 7.5(b)(4) would restrict an additional 2,431 square miles where a variance would be required for well pad placement due to slope or setback requirements. This would leave a total of 2,253 square miles that would be available for well pad placement without a variance (approval for well pad placement would be either by docket or Approval-by-Rule [ABR] with an approved NGDP) (See **Exhibits 3** and **4**). The provisions of the ABR process without an approved NGDP would restrict 3,015 square miles from well pad placement. A total of 1,929 square miles would be available for well pad placement under the ABR process; however, 1,522 square miles of that would be subject to forested site constraints, leaving approximately 407 square miles for well pad placement without restrictions or constraints (see **Exhibits 3** and **5**).

> ***Recommendation:*** *It is recommended that the proposed Article 7 regulations defer to the host states on setbacks and restrictions, as well as include an approach that allows for site specific consideration for individual well pads and associated facilities. This approach would allow project sponsors the ability to propose the use of BMPs and mitigation measures that would be protective of water quality based on specific conditions at a site. The DRBC could then employ an "Adaptive Management" approach that could include monitoring and feedback to gauge success or provide data that could be used to implement adjustments to the mitigation measures employed, as needed. Additionally, the current restrictions incorporated into the ABR process, without an approved NGDP, are essentially unworkable given the amount of acreage that would remain for well pad placement without constraint. It is recommended that the DRBC reconsider the constraints within the ABR process, particularly with respect to the constraint concerning "forested sites."*

Exhibit 3: Development Areas versus Regulatory Restricted Areas within the Delaware River Basin

NGDP Process (also see Map in Exhibit 4)



ABR Process (also see Map in Exhibit 5)

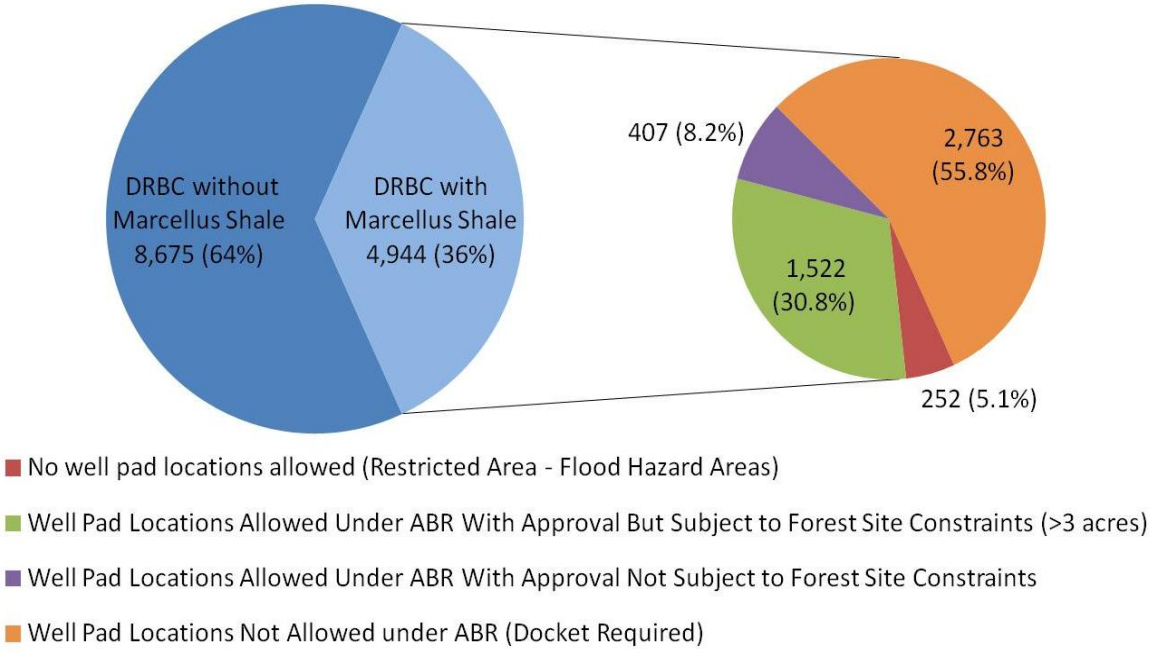


Exhibit 4: Siting Restrictions and Setbacks – Natural Gas Development Plan

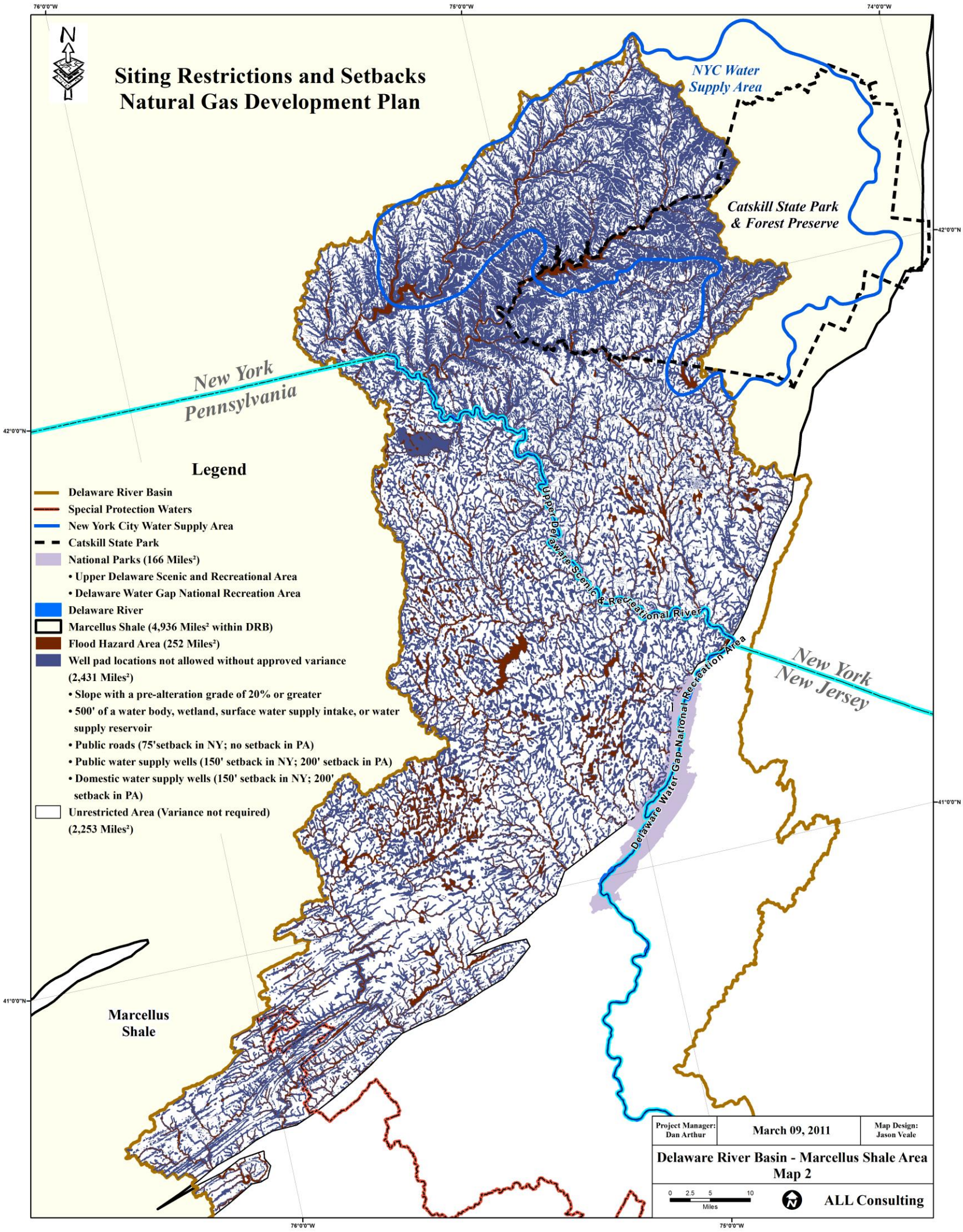
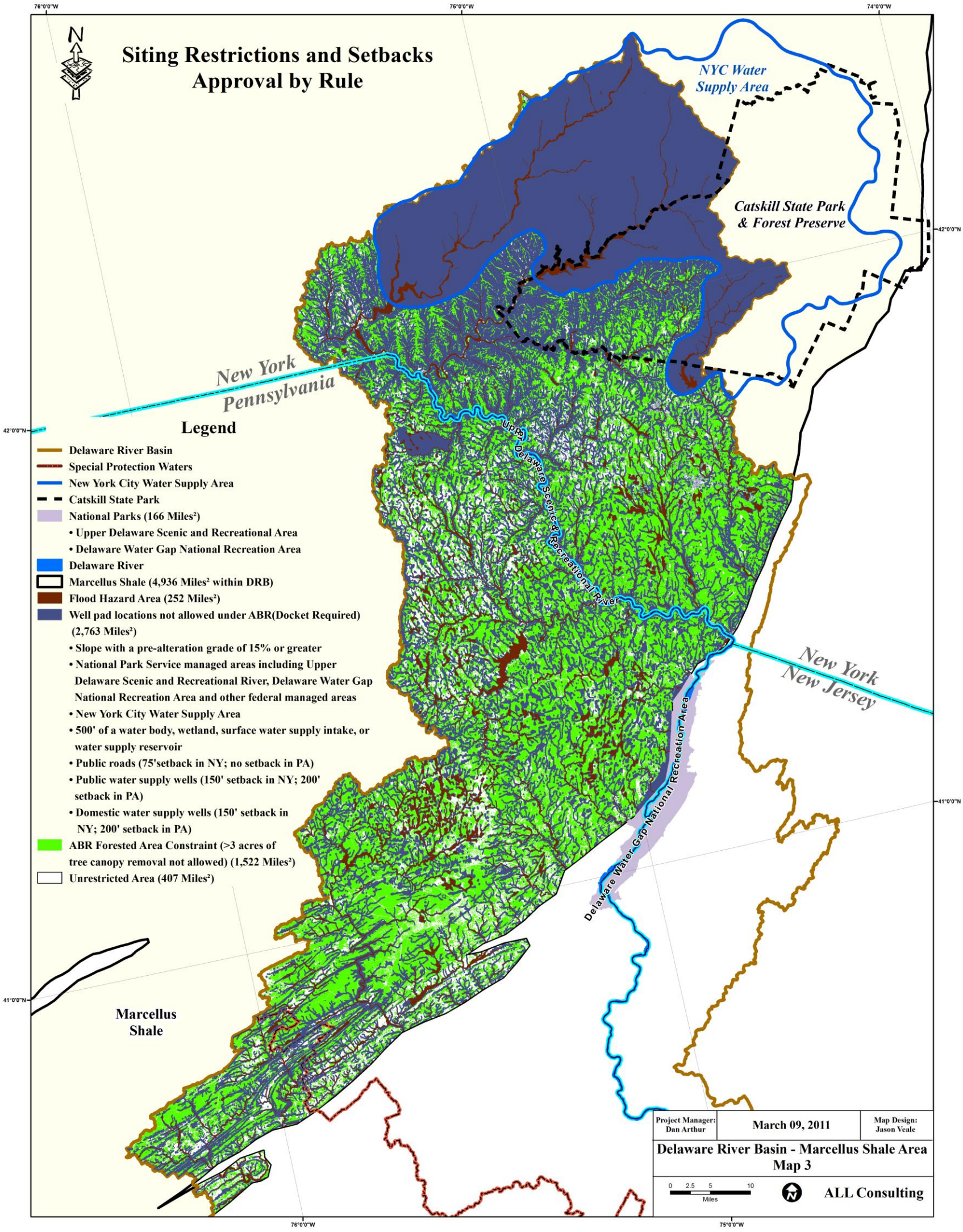


Exhibit 5: Siting Restrictions and Setbacks – Approval by Rule without an NGDP



Submittals/Reporting and Approvals: Various review processes that describe the steps required to obtain approvals for projects such as NGDPs, well pad dockets, well pad ABRs, and new water source applications are prescribed by the proposed Article 7 regulations. However, the regulations fail to prescribe a timeframe in which the review process will be concluded. ALL performed an analysis of the timeframe for obtaining approval for an NGDP and concluded that the entire process is likely to take approximately 18 to 24 months, although the exact timeframe remains an approximation since the turnaround time for technical reviews are not spelled out in the proposed regulations. Additionally, one of the key steps in the approval process is a hearing at a DRBC periodic meeting. The possibility exists that the technical review would be completed on a date immediately prior to or immediately following a DRBC meeting resulting in an extended waiting period before the application is presented at a subsequent meeting. It is also possible that an application may not be addressed at the periodic meeting at which it is first presented. There are a number of items that this extended approval timeframe could affect. Among these is a project sponsor's overall lease position within the Basin. Leases are acquired with differing term lengths and over different time periods. As such, the 18- to 24-month timeframe required for obtaining a well pad or NGDP approval could result in certain leases being subject to expiration prior to a project sponsor being able to secure them through the drilling, completion and production of a natural gas well.

In the process of comparing DRBC's proposed Article 7 regulations against the host states of Pennsylvania and New York, it was determined that multiple submittals, reporting requirements, and notices required by the proposed Article 7 regulations are duplicative of host state requirements. The duplicative reporting requirements of water withdrawal volumes, hydraulic fracturing reporting, well permits, erosion and sedimentation permits, and notices prior to activities such as drilling a well add to the onerous nature of the reporting and review requirements implicated by DRBC's proposed Article 7 regulations.

> ***Recommendation:*** *It is recommended that, wherever state regulations are currently in place, the proposed Article 7 regulations defer to the host states on reporting and notification requirements. This approach would continue to ensure adequate reporting of activities related to natural gas development, while not placing additional or duplicative requirements on the operator. The reduced duplication of effort will in itself promote increased fidelity of reporting. Additionally, it is recommended that the expected timeframes for the various review processes be provided to allow the operators to adequately plan the timing of natural gas projects within the Basin.*

Fees and Economics: In order to evaluate the cost associated with implementation of the proposed Article 7 regulations, a cost estimate was prepared utilizing a hypothetical natural gas development project (see **Exhibit 6**). The project evaluated consists of a 4,480-acre lease with 7 well pads and 6 wells per pad, or 42 total wells. It was assumed that the NGDP would be in place for 10 years and all monitoring and annual fees are included for that period. Only those costs associated with complying with the proposed Article 7 requirements were considered. Cost associated with the actual drilling, transporting of water, labor for site operations, etc., were not included. The costs associated with complying with host state regulations were also not included. Overall it is estimated that complying with the proposed Article 7 regulations would cost a project sponsor an estimated value of nearly $3.7 million over a 10-year time period for

the project. Additional information on the estimated costs associated with this analysis is contained in **Appendix A**.

Exhibit 6: Example Scenario for Natural Gas Development within the DRBC

Assumptions:	Fees	Assurances (Assume 5% fee of actual as cost)	Application Planning Costs	Annual Operational Reports	10-year Operational and Fee Roll up	Total
(1) Six wells per pad developed (42 wells total)	$ -	$ 262,500.00	$ -	$ -	$ -	$ 262,500.00
(2) Average of 3,300,000 gallons per well for each HVHF well based on SRBC published average. (assume 100% consumptive use)	$ 11,100.00	$ -	$ -	$ -	$ -	$ 11,100.00
(3) Average of 84,000 gallons per well for drilling	$ 285.00	$ -	$ -	$ -	$ -	$ 285.00
(4) New Source (Docket Approval for Surface Water Source)	$ 75,000.00	$ -	$ 44,500.00	$ 10,100.00	$ 101,000.00	$ 220,500.00
(5) Existing Source (ABR Application Documentation of Adequacy, ISCP)	$ 5,000.00	$ -	$ 10,000.00	$ 10,100.00	$ 101,000.00	$ 116,000.00
(6) Three separate well pad applications will be prepared prior to NGDP approval	$ 90,000.00	$ -	$ 221,250.00	$ -	$ -	$ 311,250.00
(7) One NGDP will be prepared for the entire project	$ 50,000.00	$ -	$ 159,500.00	$ -	$ -	$ 209,500.00
(8) Four well pad applications will be submitted as ABRs under the approved NGDP	$ 60,000.00	$ -	$ 275,000.00	$ -	$ -	$ 335,000.00
(9) Wastewater discharge will be contracted with one facilities outside the Basin	$ 75,000.00	$ -	$ 10,000.00	$ -	$ 150,000.00	$ 235,000.00
(10) The project will last at least 10 years (Annual Monitoring Fee and Annual Reports)	$ 18,000.00	$ -	$ -	$ 20,750.00	$ 387,500.00	$ 387,500.00
(11) DRBC Post Hydraulic Fracturing Report (42 reports one for each well, Not Annual)	$ -	$ -	$ -	$ 462,000.00	$ -	$ 462,000.00
(12) Annual water reporting will be conducted for each well pad (7) on a quarterly Basis	$ -	$ -	$ -	$ 112,000.00	$ 1,120,000.00	$ 1,120,000.00
(13) Notifications will be prepared and submitted by the project sponsor (10 total)	$ -	$ -	$ 25,000.00	$ -	$ -	$ 25,000.00
Totals	**$384,385.00**	**$262,500.00**	**$745,250.00**	**$614,950.00**	**$1,859,500.00**	**$3,695,635.00**

Assumptions:

- The Project Sponsor has 4,480 contiguous leased acres.
- Spacing is based on one well pad per 640 acres (7 Pads).
- Two water sources will be required for the NGDP, one new and one existing each serving 3 or 4 well pads.
- No NDIAs will be completed by the DRBC.
- Flowback water will be recycle for use in HVHF.

Recommendation: *It is recommended that the DRBC provide a basis for, and justification of, the fees and bonding requirements contained within the proposed Article 7 regulations. It is further recommended that the DRBC reconsider what fees should be charged and what amount the fees and bonding levels should be to avoid an economic requirement on project sponsors that duplicate existing host states requirements. Moreover, these costs unnecessarily add to the project and create excessive economic requirements in comparison to similar natural gas development projects outside of the*

Basin. It is recommended that the DRBC work with industry to establish a basis for the individual well and aggregate financial assurance requirements for a project sponsor.

Data Confidentiality and Hydraulic Fracturing: The disclosure requirements go beyond what is typically required by host states.

> ***Recommendation:*** *It is recommended that the DRBC defer to the host states for reporting of hydraulic fracturing volumes and chemical constituents as well as volumes of water used and volumes of wastewater generated and/or reused on subsequent hydraulic fracturing activities. In addition, any provision regarding reporting of hydraulic fracturing additives should include a specific reference to the DRBC's rules related to protection of trade secret information.*

Duplication of Host State Regulatory Programs: An evaluation of the proposed Article 7 regulations found that they contain requirements that in many instances duplicate, or are similar to, existing or proposed (New York State dSGEIS) host state regulatory programs (**Appendix C**).

The following provides a summary of the comparative analysis by specific regulatory category. Additional detail on the comparison of the DRBC proposed Article 7 regulations to host state and SRBC regulatory programs is provided in **Appendix C** with specific comments on the Article 7 regulations provided in **Appendix E**.

- ***Financial Assurance Coverage and Cost:*** The proposed Article 7 regulations require financial assurance in the amount of $125,000 per well. Pennsylvania and New York have financial security requirements of $2,500 and $700 to $5000 per well. The SRBC's financial security requirements pertain to potential effects of water usage and protecting public health, safety or the environment, ensuring financial obligations are met, and ensuring compliance with docket conditions.
- ***Release from Financial Assurance Liability:*** The proposed Article 7 regulations state that operators in the Basin would be released of financial assurance liability for a well after the final site restoration is complete, two years have passed with no indication of any environmental issue, and no outstanding compliance issue exists in the Basin. In Pennsylvania, liability is released for a well once the well has been properly plugged, a plugging report has been filed, and 1 year has passed without incident. New York releases an operator's financial assurance liability when the well has been plugged and abandoned to the satisfaction of the DEC. The SRBC does not specify the timing for the release of financial assurance requirements.
- ***Compliance and Monitoring Fees:*** The proposed Article 7 regulations include a compliance and monitoring fee of $2,000 for each project, double the compliance and monitoring fee for each consumptive use and water withdrawal in the SRBC for users that pay a consumptive use fee. In the SRBC, a fee of $2,000 is imposed on users who do not pay a consumptive use fee. Neither Pennsylvania nor New York charge a compliance and monitoring fee.
- ***Type of approval and threshold volume:*** For all new water withdrawals, the proposed Article 7 regulations require a site plan and a site operations plan. The SRBC also requires an application for all water withdrawals within the basin.

Water withdrawals of 10,000 gallons per day (gpd) or greater on a 30-day average must be registered in Pennsylvania. An application for a water use license or permit is required in New York for users that are capable of withdrawing greater than 100,000 gpd.

- ***Natural Diversity Inventory Assessment (NDIA):*** An NDIA is required as a part of a new water withdrawal application in the DRBC. SRBC's water withdrawal application must include a description of the anticipated impacts on threatened and endangered species and habitats. In Pennsylvania, an operator must determine the presence of threatened and endangered species within the project site and mitigate all conflicts as part of the required Water Management Plan (WMP). New York requires that all threatened and endangered species be listed in the Environmental Assessment Form Addendum for a well permit.
- ***Invasive Species:*** The proposed Article 7 regulations require an Invasive Species Control Plan (ISCP), if determined by the Commission to be necessary. The SRBC requires that the operator demonstrate that water withdrawal operations will prevent the spread of invasive species. Neither Pennsylvania nor New York requires an ISCP. New York's dSGEIS requires a site-specific ISCP.
- ***Drought Plans:*** The proposed Article 7 regulations require a Drought Contingency Plan. The SRBC does not require drought contingency plans; however, it has the right to impose controls on all water allocations as deemed necessary. Pennsylvania requires drought management plans for industrial withdrawals greater than 500,000 gpd averaged over 30 days. New York does not currently require drought contingency plans.
- ***Floodplain Regulations:*** The proposed Article 7 regulations state that a variance must be given to construct a well pad within the 100-year floodplain; however, a well pad location will not be approved if it is within a floodway. Pennsylvania and New York do not prohibit development in the floodplains; instead they require the approval through the use of permits.
- ***Pass-by flow:*** The proposed Article 7 regulations state that withdrawals must not reduce stream flow to less than the Q7-10 flow. Water withdrawals permitted through the SRBC may never occur when the stream flow is less than the prescribed pass-by flow, which must never be less than the Q7-10 flow. Pennsylvania defers to river basin commissions on pass-by flow regulations. New York requires that withdrawals not impair the water for its best usage.
- ***Groundwater-hydrogeologic report, pumping tests:*** The proposed Article 7 regulations require a hydrogeologic report to be prepared for groundwater withdrawals that includes aquifer pumping tests. The SRBC has requirements similar to DRBC's. Pennsylvania requires pump tests to be performed for the inclusion of groundwater in a WMP, although an aquifer test plan does not need to be approved prior to testing, as is required by the SRBC. New York does not require pumping tests for groundwater withdrawals.
- ***Reporting:*** DRBC's proposed rules require quarterly reporting of monthly and daily water withdrawal volumes, as well as daily volumes of water transferred to individual well pads. SRBC requires quarterly reporting of daily volume of withdrawals, water level measurements in production and monitoring wells (groundwater only), water levels in surface storage facilities, stream flow and pass-by flow, and volume and destination of

transfers of water. New York and Pennsylvania require annual reporting of water withdrawals; however, withdrawals already subject to SRBC or DRBC reporting requirements do not require separate reporting to New York.

- ***Permit and Usage Costs:*** The proposed Article 7 regulations state that the cost for review of a water withdrawal application is 0.4% of the project cost up to $10 million and 0.12% of the project cost greater than $10 million, not to exceed $75,000 or the actual cost of review for the project. The minimum project review fee is $1,000 for private projects. DRBC's proposed regulations also include a water supply charge of $0.08 per 1,000 gallons.

  SRBC's water withdrawal approval costs range from $4,400 to $28,650. Approvals for consumptive water use range from $2,520 to $50,350 or $10,000 for ABR for natural gas projects. The SRBC also has a consumptive water use fee of $0.28 per 1,000 gallons. Pennsylvania does not have a water use fee. New York requires an annual reporting fee of $50, but it does not impose an additional water use fee.

- ***Permitting:*** Permit approval under the proposed Article 7 regulations can be by well pad docket or ABR, and is for a duration of 10 years. Pennsylvania and New York both require well permits to be approved by the states prior to drilling or altering a well, and the permits are active for a period of 1 year and 180 days, respectively.

- ***Erosion & Sedimentation:*** The proposed Article 7 regulations requires a non-point source pollution control plan if a facility is to be located within a special protection waters (SPW) area. SRBC defers to the host state to regulate erosion and sedimentation. Both New York and Pennsylvania require erosion and sedimentation control permits when earth disturbance activities exceed 1 acre.

- ***Water Quality Testing:*** For any wells that are going to be high volume hydraulically fractured, the proposed Article 7 regulations require a water quality testing program be implemented. Neither Pennsylvania nor New York require water quality monitoring when drilling a well that will be hydraulically fractured, although Pennsylvania's regulations state that the operator may perform a pre-alteration water quality survey in order to limit liability and preserve its defense in a case of water pollution litigation. New York's dSGEIS would require water wells within 1,000 feet of the well pad to be sampled prior to site disturbance and for a period of one year after the last well on the well pad has been hydraulically fractured. Additionally, neither Pennsylvania nor New York requires the sampling of benthic macroinvertebrates as a part of the pre-alteration water quality sampling.

  The SRBC does not require water quality testing to be conducted by the operator. Instead, the SRBC has instituted a real-time surface water quality monitoring network to identify changes in several water quality parameters throughout the Basin.

- ***Public Notice Requirements:*** The proposed Article 7 regulations require that operators drilling a well in the Basin must provide proof that public notice was submitted to the host state agency, the appropriate municipality, property owners within 2,000 feet of the well pad (twice the 1,000-foot requirement for both NY and PA), a local newspaper, and the county planning agency at the time of application and within 48 hours prior to drilling

(twice the time required for PA). The SRBC does not have any requirements mandating notice of when drilling will occur.

- ***Hydraulic Fracturing Notice:*** The proposed Article 7 regulations require that prior to hydraulic fracturing, notice must be provided to the DRBC 48 hours in advance. The SRBC also requires notification, although the notification is required four weeks prior to stimulation and may be in the form of a weekly or monthly schedule. Pennsylvania and New York do not require notices prior to hydraulic fracturing events. New York's dSGEIS would require a Pre-Fracturing Checklist and Certification form to be submitted within 48 hours of hydraulically fracturing a well.

- ***Setbacks:*** The proposed Article 7 regulations institute 500-foot setbacks from water bodies, wetlands, water supply reservoirs, and water supply intakes, and defer to state regulations for any other setbacks. The proposed Article 7 regulation setbacks are greater than Pennsylvania's setbacks of 100 feet for water bodies and wetlands, and 200 feet for water supply reservoirs and water supply intakes. DRBC's setback for water bodies and wetlands of 500 feet is also greater than New York's setback of 150 feet. In both Pennsylvania and New York, variances are allowed for the setbacks with proper approval and implementation of mitigation measures to reduce the potential impact to the protected area. The proposed Article 7 regulations allow for variances but do not provide guidance as to how variances would be granted.

- ***Flowback and Produced Water Storage Requirements:*** The proposed Article 7 regulations would require flowback and produced water to be stored only in tanks. Both Pennsylvania and New York allow flowback water and produced water to be stored in tanks or impoundments. New York's dSGEIS would require storage of produced water in steel tanks at the well site and centralized impoundments containing flowback water may not be located within the boundary of primary aquifers, unfiltered water supplies, or 100-year floodplains.

- ***Disposal Plans:*** A Wastewater Treatment and Disposal Plan would be required by the proposed Article 7 regulations. Pennsylvania requires a Control and Disposal Plan. Operators in New York are required to prepare and implement a Fluid Disposal Plan.

- ***Reporting Requirements:*** The proposed Article 7 regulations would require quarterly reporting of produced water and flowback volumes, twice as frequently as Pennsylvania. Additionally, it is required that a Post Hydraulic Fracturing Report be submitted to the Commission within 60 days of each stimulation. Pennsylvania requires the annual submission of Form 26R which is used to record the chemical characterization, type, volume, and destination of waste transported for disposal from each well pad.

  Although New York's current completion report form does not include a section for the reporting of chemical additives used in the fracture, Mr. Jack Dahl (NYSDEC) stated that the Department is requiring the description of these chemicals prior to approval of the completion report. The dSGEIS would require a completion report that contains an inventory of all volumes of materials used in the fracture. Additionally, New York's Annual Well Report requires the reporting of produced water volumes per well. New York's dSGEIS requires the generator, hauler, and receiver of flowback water to maintain a copy of the Drilling and Production Waste Tracking Form.

The SRBC requires that the volumes of fresh water and recycled water used in each hydraulic fracturing event, and the volume and destination of produced water transported off-site, be recorded on the Post-Hydrofracture Stimulation Report.

- ***Wastewater Sampling:*** The proposed Article 7 regulations would require samples to be collected that are representative of all flowback water and produced water. The results of these samples must be reported to the Commission along with the quarterly wastewater reports. Pennsylvania's requires the chemical analysis of wastewater transported to disposal wells to be reported annually to the Residual Waste Program via Form 26R. New York does not have requirements for sampling flowback water; however, the dSGEIS requires that all flowback water and produced water be tested for naturally occurring radioactive material (NORM) prior to being transported off-site.

  Recommendation: *It is recommended that the DRBC carefully review the proposed Article 7 regulations to identify areas where there is overlap and duplication with existing or proposed host state regulatory programs and defer to the host state where existing programs are duplicative. Additional information is provided in* ***Appendix C*** *with additional recommendations specific to individual proposed Article 7 regulations provided in* ***Appendix E****.*

Regulatory Ambiguity: There are a number of areas within the proposed Article 7 regulations that contain language or words that are ambiguous or not clearly defined. Additionally, there are elements of the proposed Article 7 regulations which require a basis or rationale be provided in order to understand how the regulation will be implemented. The following provides a summary of those provisions within the proposed Article 7 regulations that require additional definition, clarification or rationale stated to provide an understanding of how the regulatory provision would be applied or implemented. A complete list of comments is provided within **Appendix E**.

- 7.1(a) Purpose: A basis is not provided for why natural gas is regulated separately from other water users within the Basin.
- 7.1(c) Scope: The Scope of the proposed article does not differentiate between "existing" and "new" natural gas development projects.
- 7.1(d) Comprehensive Plan and Project Review: The term "substantial affect" used in this provision is not defined.
- 7.1(e)(1)(i) Planning Framework: The term "National Park Unit" is not defined.
- 7.1(e)(1)(ii) Planning Framework: The term "Park Unit Management Plans" is not defined.
- 7.1(e)(1)(iii) Planning Framework: The Management Plan Goals are not provided or defined.
- 7.1(e)(2)(i) Planning Framework: The term "other resources" is not defined.
- 7.1(e)(2)(ii) Planning Framework: The terms "social" and "institutional systems" are not defined.
- 7.1(e)(2)(iii) Planning Framework: The means for establishing aquifer boundaries is not included.
- 7.1(e)(4)(iii) Planning Framework: The term "environmentally sensitive landscapes" is not defined.
- 7.1(e)(4)(iv) Planning Framework: The term "receiving waters" is not defined.
- 7.2 Definitions: A definition for "natural gas" is not provided.

- 7.2 Agricultural land: The definition includes the use of state orthophotography prior to January 2010. This is unclear in that the use of state orthophotography from any year prior to 2010 could yield conflicting results as land can be converted from forested to agriculture and vice versa.
- 7.2 Docket: The term "substantial effect," as used within this definition, is not defined.
- 7.2 Flowback: The term "flowback" is incorrectly defined.
- 7.2 Forested site: The definition includes the use of "state orthophotography prior to January 2010." This is unclear in that the use of state orthophotography from any year prior to 2010 could yield conflicting results.
- 7.2 Natural gas development project: There are elements within this definition, such as mid-stream "gas collection and transmission infrastructure", that may be beyond the control of the project sponsor.
- 7.2 Setback: The words "zones" and "boundaries," as used in this definition, are not defined.
- 7.3(e)(4) Duration of an Approval: A rationale is not provided for why the term of an approval for a well pad used exclusively for exploratory or low volume hydraulically fractured wells would follow host state natural gas well construction permit terms while the approval term of well pads for natural gas development cited in 7.3(e)(3), presumably applying to any well pad not used exclusively for exploratory or low volume hydraulic fracturing, would have a different term limit.
- 7.3(h) Docket protected area permit and ABR modification or suspension by Director: A rationale is not provided for the decision process that would be used to modify or suspend an approval or require mitigating measures pending additional review.
- 7.3(j) Site Access: The term "authorized representative" is not defined.
- 7.3(k)(8) Financial Assurance Requirements: A rationale for financial assurance in the amount of $125,000 per natural gas well is not provided.
- 7.3(k)(15)(i) Financial Assurance Requirements: The criteria by which the successful installation of well casing would be determined is not provided.
- 7.3(m)(1) Reporting Violations: The term "significant harm" is not defined.
- 7.3(m)(2) Reporting Violations: The term "designated uses of ground or surface water" is not defined. The term "significantly affects" is not defined.
- 7.4(c)(3) Alternate review and approval process for sources previously approved by the Commission: A definition of what constitutes the physical boundaries of an approved NGDP is not provided.
- 7.5(b)(9)(i) Variances: Clarification needs to be provided on whether a "floodway" as used in this section is, or is not, the same as a "Flood Hazard Area" or "100-year floodplain" as used in 7.5(b)(3). The criteria necessary for obtaining a variance are not provided.
- 7.5(c)(3)(iv) Circulation Plan: The term "well field development area" is not defined.
- 7.5(h)(1)(iii)(A) Water Source Requirements: Clarification should be provided to indicate that this provision does not apply to water used for "domestic" purposes, such as drinking water, at the well pad.
- 7.5(h)(1)(iii)(E) Water supply charge: Clarification should be provided to show that consumptive use water supply charges do not apply to water recovered during well flowback operations that is recycled and reused.

- 7.5(h)(2)(i)(A) Pre-alteration Report: Clarification should be provided as to whether it is a Pre-Alteration Report or a Pre-Drilling Report that is required.
- 7.5(h)(2)(v)(F) Wastewater Treatment and Disposal Plan: The term "UIC" is not defined.

Recommendation: *In general, it is recommended that the proposed Article 7 regulations provide additional definition and clarification as required to provide project sponsors with a clear understanding of the requirements and how they will be implemented. Additional comments and detailed recommendations specific to individual proposed Article 7 regulations are provided in* ***Appendix E****.*

Conclusions

The following provides a brief description of the overall information that was developed from the analyses conducted. This Conclusion is not inclusive and the reader is referred to the other sections of this report as well as the appendices for additional detail. References to background reports and documents that may prove useful in providing an overall understanding of natural gas development and shale gas development are contained in **Appendix F**.

- **NGDP Timeline and Cost Analysis:** A timeline was developed that evaluates the time that would be required for obtaining approval of a new well pad and NGDP as well as the approval necessary for water supply and wastewater disposal. Overall, it was determined that this process would require between 18 and 24 months. The extended timeframes required for approval of a well pad and NGDP has the potential to adversely affect a project sponsor's overall lease position within the Basin should certain leases expire before approvals can be acquired.

  To evaluate the cost of complying with the proposed Article 7 regulations, a cost estimate was prepared utilizing a hypothetical natural gas development project. Overall it is estimated that complying with the proposed Article 7 regulations would cost a project sponsor nearly $3.7 million over a 10-year time period for the project.

- **Water and Land Use Comparison Analysis:** A basic premise of the proposed Article 7 regulations is set forth under **7.1(d) Comprehensive Plan and Framework** where it is stated that "The Commission has also determined that all natural gas development projects may have a substantial effect on the water resources of the Basin." In order to evaluate the rationale or basis for the above statement, an analysis was conducted to estimate what the expected water and land use requirements would be for natural gas development within the Basin. The findings of these analyses show that the water and land use requirements for natural gas development would be relatively minor compared to other water and land use within the Basin.

- **Regulatory Comparison Analysis:** A regulatory comparison was conducted of the DRBC's proposed Article 7 regulations to existing requirements enforced by the SRBC, PADEP, and the NYSDEC. The comparison was conducted to identify the similarities and differences between the natural gas regulatory programs of these agencies, and to identify overlap and duplication with host state requirements. The results of this comparison are numerous and provided in detail in **Appendix C** and in the comments provided in **Appendix E**. The following are general findings of the comparative analysis:

- The proposed Article 7 regulations contain a number of provisions that duplicate existing host state regulatory programs.
- The proposed Article 7 regulations would benefit from providing additional clarification and definition as well as the inclusion of a basis or rationale for a number of the provisions that are included in the regulations.
- The proposed Article 7 regulations do not include a timeframe for the application review and approval process. This lack of detail makes it difficult for project sponsors to plan and schedule proposed development activities.

- **Restrictions and Constraints Analysis:** The proposed Article 7 regulations are prescriptive in nature and include a number of restrictions, setbacks, and constraints on natural gas development that will remove a considerable portion of the area overlying the Marcellus Shale (natural gas development area) from development without an approved variance.

Appendix A

Natural Gas Development Timeline and Development Costs

Natural Gas Development Timeline and Development Costs

The DRBC proposed Article 7 regulations contain numerous application and submittal requirements that affect both the time and cost for obtaining approvals to develop natural gas within the Delaware River Basin. A careful review of the proposed regulation was conducted to identify implications from embedded requirements so that projections for a cost estimate and approval schedule could be forecast. The forecasted schedule includes activities and tasks associated with obtaining a new water source, wastewater disposal facility, well pad, and Natural Gas Development Plan approvals. The cost estimate includes application fees, financial assurances, application and plan preparation expenses, public notifications, and required operational reporting charges for a modest conjectural development scenario. Details for both of these projections can be found in the following sections.

General Schedule Preparation

The proposed Article 7 regulations identify numerous applications and supporting reports that will need to be submitted to the Commission for review and approval but do not provide set timeframes for the review and approval process. In order to predict an estimate of the overall time required to obtain approval for a well pad application and Natural Gas Development Plan (NGDP), ALL Consulting (ALL) constructed a schedule to provide a reasonable approach and estimate of the times associated with developing the applications and supporting reports as well as for the Delaware River Basic Commission (DRBC) review and approval efforts.

In preparing the schedule for obtaining a DRBC approval for a NGDP certain assumptions and regulation interpretations were necessary so that the timeframe could be determined in its entirety. For example, Article 7 regulations state that one must include a water source approval docket number and a wastewater disposal approval with each well pad application. Therefore, based on these requirements, a New Water Source application (NWS) and Wastewater Treatment Facility (WTF) application were placed at the beginning of the chart so that these approvals could be obtained before the well pad application is submitted. Furthermore, the NWS and WTF approvals are not dependent upon one another so the preparation periods are concurrent to represent an expedited effort.

Once the NWS and WTF approvals are obtained the well pad application can be submitted. To expedite the well pad application process, the preparation of the supporting plans and reports that must accompany the Well Pad application are identified on the chart as being prepared prior to receiving the NWS and WTF approvals. Using this approach there is only a two-week period after receiving the NWS and WTF approvals to accommodate the required public notification before the initial well pad application is submitted.

The NGDP application must be submitted 90 days after the initial well pad application provided the project sponsor is required to prepare a NGDP. With this in mind we used the time immediately following the well pad application submittal to prepare the NGDP supporting plans, maps, and reports so that the NGDP could be submitted within the 90-day period. Although it is conceivable that the NGDP could be submitted only a few days after the initial well pad application, it was assumed that the DRBC would not be prepared to review the NGDP

application simultaneously with the initial well pad application as there are several similar supporting maps and plans that must accompany the applications and the DRBC may want to review how a particular applicant has complied with the well pad application prior to reviewing the NGDP application.

With regard to well pad applications, a project sponsor may submit up to five well pad applications before obtaining NGDP approval. However, we did not identify the subsequent well pad applications in the Gantt chart because any subsequent well pad applications would not affect the approval time associated with the NGDP.

Finally, it is understood that the NWS, WTF, initial well pad, and NGDP applications must receive DRBC approval via a docket addressed at one of the DRBC's periodic meetings. Therefore the DRBC's action to approve these applications is identified as happening at the next available meeting following the completion of the DRBC technical review and public hearing process. Thus, the Gantt chart represents a best-case scenario or fast-tracked approval time frame. However, it should be recognized that the completion of the technical review and public hearing process could fall on a date that would result in an extended waiting period before the application is presented at a meeting. It is also possible that an application may not be acted on at the meeting at which it is first presented. These potential consequences have not been included in the Gantt chart.

Assumptions and variables considered in developing a reasonable timeline are included in the following sections. However, overall it is estimated that from the time of first submitting a Natural Gas Development Plan and applying for a well pad permit to actual approval would take approximately 18 to 24 months (see **Exhibits A1** and **A2** for specific scheduled activities and associated timelines).

New Well Pad Application

The New Well Pad application includes the preparation of the supporting plans, reports, specifications, and maps prior to receiving the NWS and WTF approvals. It is assumed these supporting documents will be prepared simultaneously over a six-week period. This period may be longer depending on the number of internal reviews required between the operator and the plan preparers; however it was assumed that the majority of these efforts would be rather concise and become routine as these plans are prepared more often. Furthermore, no delay associated with the identification of threatened and endangered species or habitat was assumed. Also, it was assumed that any state requirements, permits, or approval would be received prior to or during the DRBC approval process and therefore these have not been included in the overall timeline.

The Pre-alteration Groundwater and Surface Water Monitoring Study Report timeframe includes a two-week coordination period with the DRBC to address format and analytical criteria. It was assumed that this report could be prepared concurrently with the application support plans and specification, providing the information for the artificial penetrations inventory is readily available. Also, since this report requires the installation of groundwater monitoring wells and the sampling of surface water upstream and downstream, the logistics for the drilling and analysis are assumed to be in place so no delays are created while waiting for the subcontractors to deliver either analytical results or install the wells.

The Wastewater Treatment & Disposal Plan is assumed to only take a month to prepare and will largely draw from the information provided in the Wastewater Treatment Facility Application.

The notification process is based on the operator initiating the public and agency/owner notifications early enough to obtain both United States Postal Service (USPS) return receipts and the commission's certification form as not to delay the submittal of the application. Any fees or fee worksheet would also be prepared in sufficient time as to accompany the application without delay.

The DRBC review process includes estimates of time for the technical review conducted by internal staff (two months), and for the public hearing process following the publication of a draft docket. The linked tasks for the public review process are based on the regulation required notification times and the hearing officers finding report submittal times. Again it is assumed that the commission will take action at the next available meeting following the completion of the review process.

New Water Source Application

The NWS application includes an initial two-week coordination period with the DRBC to address application requirements and formats. The preparation of the supporting plans, reports, and specifications are assumed to be conducted simultaneously over a six-week period. As with the well pad application, this period may be longer depending on the number of internal reviews.

A Final Hydrogeologic Report (FHR) is required as part of a NWS application if an operator intends to obtain fresh water from a groundwater source. This was assumed to be the case and therefore the FHR is shown as being prepared concurrently with the NWS support documents. Also, since this report requires a pump test and static water level measurements from existing surrounding wells it was assumed that the supply well was in place and that there were sufficient existing wells to take measurements from and therefore no drilling was required. Understandably, if a new groundwater source well or any monitoring wells have to be installed this process could take considerably longer.

Natural Gas Wastewater Treatment Facility Application

Similar to the Well Pad and NWS application assumptions regarding plan preparation and coordination, times were coupled with similar times for the notification and DRBC review periods.

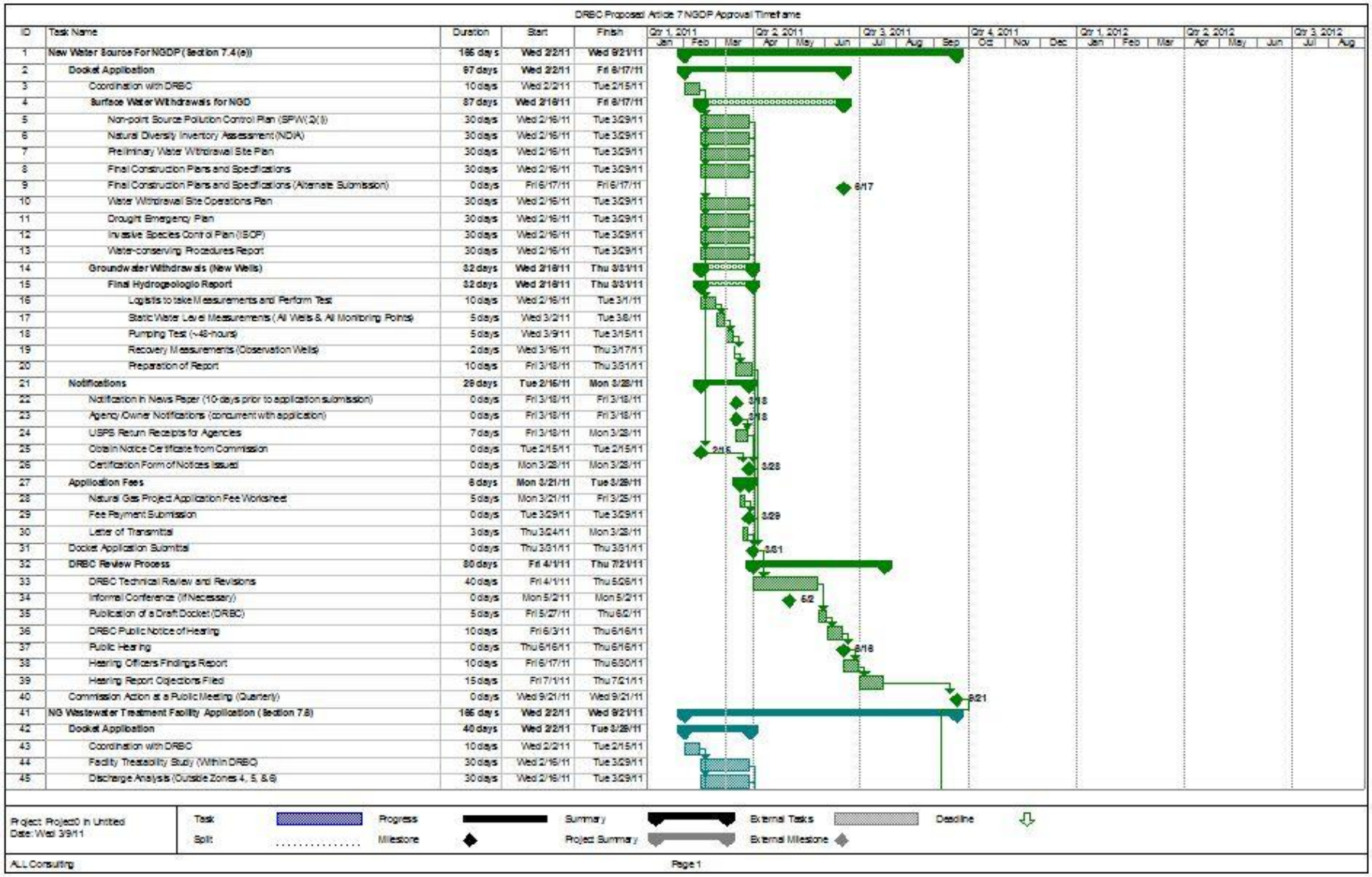
Natural Gas Development Plan Application

Similar to the Well Pad and NWS application assumptions regarding plan preparation and coordination, times were coupled with similar times for the notification and DRBC review periods.

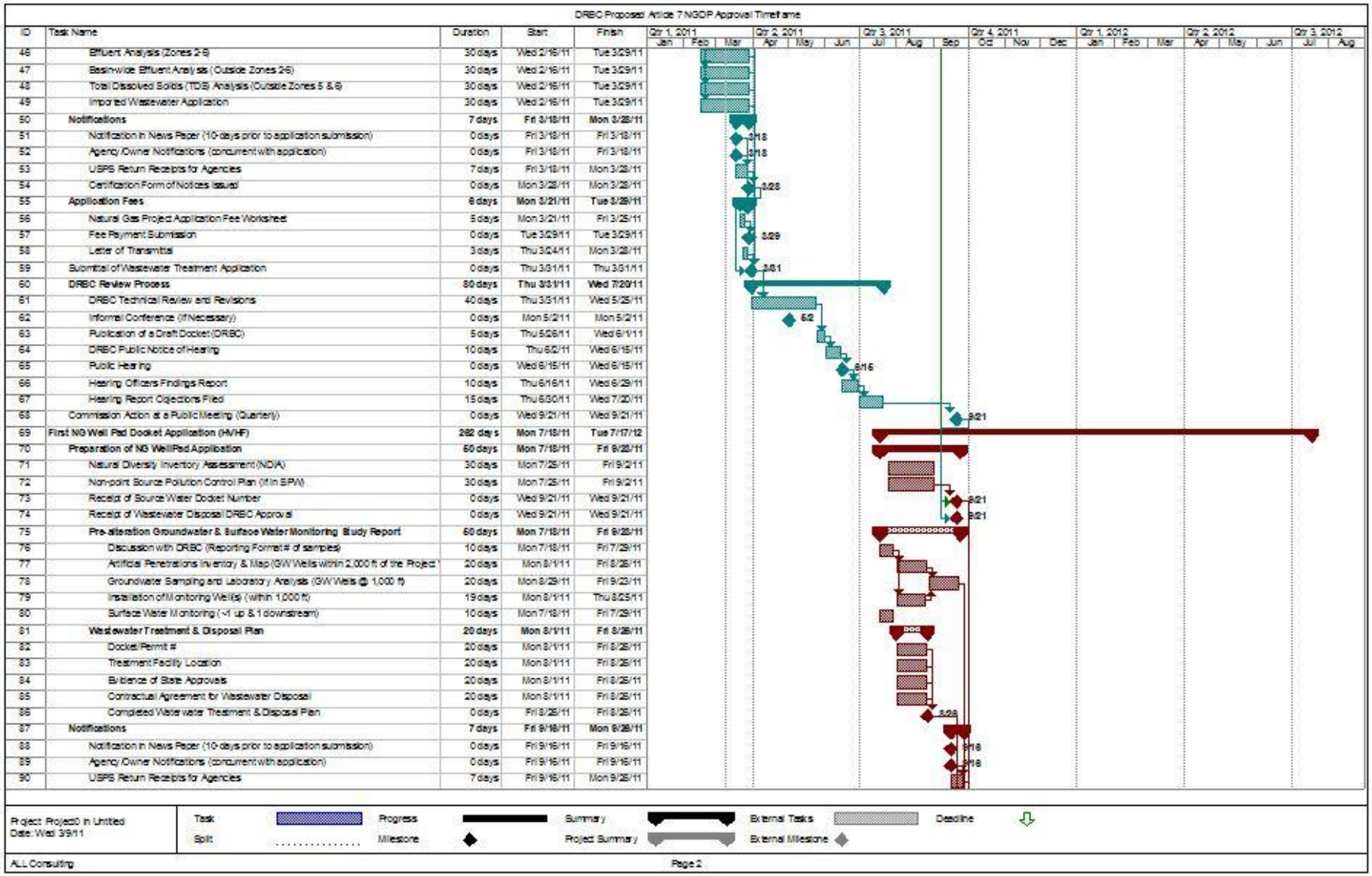
Exhibit A1: Natural Gas Development Approval Process Summary Schedule

ID	Task Name	Duration	Start	Finish
1	New Water Source For NGDP (Section 7.4 (e))	185 days	Wed 2/2/11	Wed 9/21/11
2	Docket Application	97 days	Wed 2/2/11	Fri 6/17/11
21	Notifications	29 days	Tue 2/15/11	Mon 3/28/11
27	Application Fees	8 days	Mon 3/21/11	Tue 3/29/11
31	Docket Application Submittal	0 days	Thu 3/31/11	Thu 3/31/11
32	DRBC Review Process	80 days	Fri 4/1/11	Thu 7/21/11
40	Commission Action at a Public Meeting (Quarterly)	0 days	Wed 9/21/11	Wed 9/21/11
41	NG Wastewater Treatment Facility Application (Section 7.8)	185 days	Wed 2/2/11	Wed 9/21/11
42	Docket Application	40 days	Wed 2/2/11	Tue 3/29/11
50	Notifications	7 days	Fri 3/18/11	Mon 3/28/11
55	Application Fees	8 days	Mon 3/21/11	Tue 3/29/11
59	Submittal of Wastewater Treatment Application	0 days	Thu 3/31/11	Thu 3/31/11
60	DRBC Review Process	80 days	Thu 3/31/11	Wed 7/20/11
68	Commission Action at a Public Meeting (Quarterly)	0 days	Wed 9/21/11	Wed 9/21/11
69	First NG Well Pad Docket Application (HVHF)	282 days	Mon 7/18/11	Tue 7/17/12
70	Preparation of NG WellPad Application	60 days	Mon 7/18/11	Fri 9/23/11
87	Notifications	7 days	Fri 9/16/11	Mon 9/26/11
92	Application Fees	6 days	Fri 9/16/11	Thu 9/22/11
96	Submittal of Well Pad Application	0 days	Mon 9/26/11	Tue 9/27/11
97	DRBC Review Process	180 days	Wed 10/26/11	Tue 7/17/12
105	Commission Action at a Public Meeting (Quarterly)	0 days	Tue 7/17/12	Tue 7/17/12
106	Natural Gas Development Plan Docket(Section 7.6 (g))	187 days	Mon 8/15/11	Tue 5/15/12
107	Preparation of NGDP	187 days	Mon 8/15/11	Tue 5/15/12
115	Notifications	7 days	Mon 12/12/11	Tue 12/20/11
120	Application Fees	10 days	Mon 12/12/11	Mon 12/26/11
124	Submittal of NGDP	0 days	Mon 12/26/11	Mon 12/26/11
125	DRBC Review Process	80 days	Mon 12/26/11	Fri 4/13/12
133	Commission Action at a Public Meeting (Quarterly)	0 days	Wed 6/13/12	Wed 6/13/12

Exhibit A2: Natural Gas Development Approval Process Detailed Schedule



ID	Task Name	Duration	Start	Finish
1	**New Water Source For NGDP (Section 7.4 (e))**	**186 days**	**Wed 2/2/11**	**Wed 9/21/11**
2	**Docket Application**	**97 days**	**Wed 2/2/11**	**Fri 6/17/11**
3	Coordination with DRBC	10 days	Wed 2/2/11	Tue 2/15/11
4	**Surface Water Withdrawals for NGD**	**87 days**	**Wed 2/16/11**	**Fri 6/17/11**
5	Non-point Source Pollution Control Plan (SPW\(2(i))	30 days	Wed 2/16/11	Tue 3/29/11
6	Natural Diversity Inventory Assessment (NDIA)	30 days	Wed 2/16/11	Tue 3/29/11
7	Preliminary Water Withdrawal Site Plan	30 days	Wed 2/16/11	Tue 3/29/11
8	Final Construction Plans and Specifications	30 days	Wed 2/16/11	Tue 3/29/11
9	Final Construction Plans and Specifications (Alternate Submission)	0 days	Fri 6/17/11	Fri 6/17/11
10	Water Withdrawal Site Operations Plan	30 days	Wed 2/16/11	Tue 3/29/11
11	Drought Emergency Plan	30 days	Wed 2/16/11	Tue 3/29/11
12	Invasive Species Control Plan (ISCP)	30 days	Wed 2/16/11	Tue 3/29/11
13	Water-conserving Procedures Report	30 days	Wed 2/16/11	Tue 3/29/11
14	**Groundwater Withdrawals (New Wells)**	**32 days**	**Wed 2/16/11**	**Thu 3/31/11**
15	Final Hydrogeologic Report	32 days	Wed 2/16/11	Thu 3/31/11
16	Logistis to take Measurements and Perform Test	10 days	Wed 2/16/11	Tue 3/1/11
17	Static Water Level Measurements (All Wells & All Monitoring Points)	5 days	Wed 3/2/11	Tue 3/8/11
18	Pumping Test (~48-hours)	5 days	Wed 3/9/11	Tue 3/15/11
19	Recovery Measurements (Observation Wells)	2 days	Wed 3/16/11	Thu 3/17/11
20	Preparation of Report	10 days	Fri 3/18/11	Thu 3/31/11
21	**Notifications**	**28 days**	**Tue 2/15/11**	**Mon 3/28/11**
22	Notification in News Paper (10-days prior to application submission)	0 days	Fri 3/18/11	Fri 3/18/11
23	Agency /Owner Notifications (concurrent with application)	0 days	Fri 3/18/11	Fri 3/18/11
24	USPS Return Receipts for Agencies	7 days	Fri 3/18/11	Mon 3/28/11
25	Obtain Notice Certificate from Commission	0 days	Tue 2/15/11	Tue 2/15/11
26	Certification Form of Notices Issued	0 days	Mon 3/28/11	Mon 3/28/11
27	**Application Fees**	**6 days**	**Mon 3/21/11**	**Tue 3/29/11**
28	Natural Gas Project Application Fee Worksheet	5 days	Mon 3/21/11	Fri 3/25/11
29	Fee Payment Submission	0 days	Tue 3/29/11	Tue 3/29/11
30	Letter of Transmittal	3 days	Thu 3/24/11	Mon 3/28/11
31	Docket Application Submittal	0 days	Thu 3/31/11	Thu 3/31/11
32	**DRBC Review Process**	**80 days**	**Fri 4/1/11**	**Thu 7/21/11**
33	DRBC Technical Review and Revisions	40 days	Fri 4/1/11	Thu 5/26/11
34	Informal Conference (If Necessary)	0 days	Mon 5/2/11	Mon 5/2/11
35	Publication of a Draft Docket (DRBC)	5 days	Fri 5/27/11	Thu 6/2/11
36	DRBC Public Notice of Hearing	10 days	Fri 6/3/11	Thu 6/16/11
37	Public Hearing	0 days	Thu 6/16/11	Thu 6/16/11
38	Hearing Officers Findings Report	10 days	Fri 6/17/11	Thu 6/30/11
39	Hearing Report Objections Filed	15 days	Fri 7/1/11	Thu 7/21/11
40	Commission Action at a Public Meeting (Quarterly)	0 days	Wed 9/21/11	Wed 9/21/11
41	**NG Wastewater Treatment Facility Application (Section 7.8)**	**186 days**	**Wed 2/2/11**	**Wed 9/21/11**
42	**Docket Application**	**40 days**	**Wed 2/2/11**	**Tue 3/29/11**
43	Coordination with DRBC	10 days	Wed 2/2/11	Tue 2/15/11
44	Facility Treatability Study (Within DRBC)	30 days	Wed 2/16/11	Tue 3/29/11
45	Discharge Analysis (Outside Zones 4, 5, & 6)	30 days	Wed 2/16/11	Tue 3/29/11


DRBC Proposed Article 7 NGDP Approval Timeframe
Qtr 1, 2011
Qtr 2, 2011
Qtr 3, 2011
Qtr 4, 2011
Qtr 1, 2012
Qtr 2, 2012
Qtr 3, 2012
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug
ID Task Name Duration Start Finish
46 Effluent Analysis (Zones 2-6) 30 days Wed 2/16/11 Tue 3/29/11
47 Basinwide Effluent Analysis (Outside Zones 2-6) 30 days Wed 2/16/11 Tue 3/29/11
48 Total Dissolved Solids (TDS) Analysis (Outside Zones 5 & 6) 30 days Wed 2/16/11 Tue 3/29/11
49 Imported Wastewater Application 30 days Wed 2/16/11 Tue 3/29/11
50 Notifications 7 days Fri 3/18/11 Mon 3/28/11
51 Notification in News Paper (10-days prior to application submission) 0 days Fri 3/18/11 Fri 3/18/11
52 Agency/Owner Notifications (concurrent with application) 0 days Fri 3/18/11 Fri 3/18/11
53 USPS Return Receipts for Agencies 7 days Fri 3/18/11 Mon 3/28/11
54 Certification Form of Notices Issued 0 days Mon 3/28/11 Mon 3/28/11
55 Application Fees 6 days Mon 3/21/11 Tue 3/29/11
56 Natural Gas Project Application Fee Worksheet 5 days Mon 3/21/11 Fri 3/25/11
57 Fee Payment Submission 0 days Tue 3/29/11 Tue 3/29/11
58 Letter of Transmittal 3 days Thu 3/24/11 Mon 3/28/11
59 Submittal of Wastewater Treatment Application 0 days Thu 3/31/11 Thu 3/31/11
60 DRBC Review Process 80 days Thu 3/31/11 Wed 7/20/11
61 DRBC Technical Review and Revisions 40 days Thu 3/31/11 Wed 5/25/11
62 Informal Conference (If Necessary) 0 days Mon 5/2/11 Mon 5/2/11
63 Publication of a Draft Docket (DRBC) 5 days Thu 5/26/11 Wed 6/1/11
64 DRBC Public Notice of Hearing 10 days Thu 6/2/11 Wed 6/15/11
65 Public Hearing 0 days Wed 6/15/11 Wed 6/15/11
66 Hearing Officers Findings Report 10 days Thu 6/16/11 Wed 6/29/11
67 Hearing Report Objections Filed 15 days Thu 6/30/11 Wed 7/20/11
68 Commission Action at a Public Meeting (Quarterly) 0 days Wed 9/21/11 Wed 9/21/11
69 First NG Well Pad Docket Application (HVHF) 282 days Mon 7/18/11 Tue 7/17/12
70 Preparation of NG Well Pad Application 60 days Mon 7/18/11 Fri 9/25/11
71 Natural Diversity Inventory Assessment (NDA) 30 days Mon 7/25/11 Fri 9/2/11
72 Non-point Source Pollution Control Plan (if in SPA) 30 days Mon 7/25/11 Fri 9/2/11
73 Receipt of Source Water Docket Number 0 days Wed 9/21/11 Wed 9/21/11
74 Receipt of Wastewater Disposal DRBC Approval 0 days Wed 9/21/11 Wed 9/21/11
75 Pre-alteration Groundwater & Surface Water Monitoring Study Report 60 days Mon 7/18/11 Fri 9/25/11
76 Discussion with DRBC (Reporting Format # of samples) 10 days Mon 7/18/11 Fri 7/29/11
77 Artificial Penetrations Inventory & Map (GW Wells within 2,000 ft of the Project 20 days Mon 8/1/11 Fri 8/26/11
78 Groundwater Sampling and Laboratory Analysis (GW Wells @ 1,000 ft) 20 days Mon 8/29/11 Fri 9/23/11
79 Installation of Monitoring Well(s) (within 1,000 ft) 19 days Mon 8/1/11 Thu 8/25/11
80 Surface Water Monitoring (-1 up & 1 downstream) 10 days Mon 7/18/11 Fri 7/29/11
81 Wastewater Treatment & Disposal Plan 20 days Mon 8/1/11 Fri 8/26/11
82 Docket/Permit # 20 days Mon 8/1/11 Fri 8/26/11
83 Treatment Facility Location 20 days Mon 8/1/11 Fri 8/26/11
84 Evidence of State Approvals 20 days Mon 8/1/11 Fri 8/26/11
85 Contractual Agreement for Wastewater Disposal 20 days Mon 8/1/11 Fri 8/26/11
86 Completed Wastewater Treatment & Disposal Plan 0 days Fri 8/26/11 Fri 8/26/11
87 Notifications 7 days Fri 9/16/11 Mon 9/26/11
88 Notification in News Paper (10-days prior to application submission) 0 days Fri 9/16/11 Fri 9/16/11
89 Agency/Owner Notifications (concurrent with application) 0 days Fri 9/16/11 Fri 9/16/11
90 USPS Return Receipts for Agencies 7 days Fri 9/16/11 Mon 9/26/11
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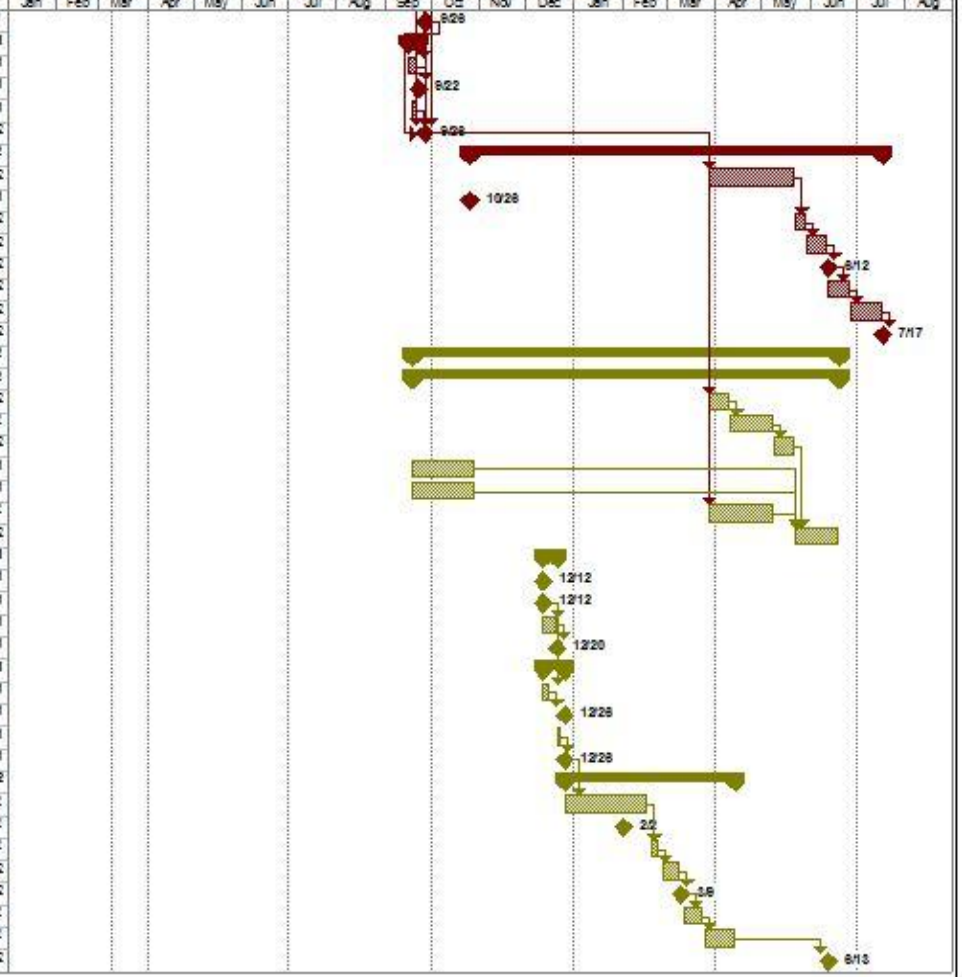
9/16
9/16
Project: Project0 in Untitled
Date: Wed 3/9/11
Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline
ALL Consulting
Page 2

DRBC Proposed Article 7 NGDP Approval Timeframe

ID	Task Name	Duration	Start	Finish
91	Certification Form of Notices Issued	0 days	Mon 9/26/11	Mon 9/26/11
92	**Application Fees**	**5 days**	**Fri 9/16/11**	**Thu 9/22/11**
93	Natural Gas Project Application Fee Worksheet	5 days	Fri 9/16/11	Thu 9/22/11
94	Fee Payment Submission	0 days	Thu 9/22/11	Thu 9/22/11
95	Letter of Transmittal	3 days	Mon 9/19/11	Wed 9/21/11
96	Submittal of Well Pad Application	0 days	Mon 9/26/11	Tue 3/27/12
97	**DRBC Review Process**	**180 days**	**Wed 10/26/11**	**Tue 7/17/12**
98	DRBC Technical Review and Revisions	40 days	Wed 3/28/12	Tue 5/22/12
99	Informal Conference (If Necessary)	0 days	Wed 10/26/11	Wed 10/26/11
100	Publication of a Draft Docket (DRBC)	5 days	Wed 5/23/12	Tue 5/29/12
101	DRBC Public Notice of Hearing	10 days	Wed 5/30/12	Tue 6/12/12
102	Public Hearing	0 days	Tue 6/12/12	Tue 6/12/12
103	Hearing Officers Findings Report	10 days	Wed 6/13/12	Tue 6/26/12
104	Hearing Report Objections Filed	15 days	Wed 6/27/12	Tue 7/17/12
105	Commission Action at a Public Meeting (Quarterly)	0 days	Tue 7/17/12	Tue 7/17/12
106	**Natural Gas Development Plan Docket(Section 7.6 (d))**	**187 days**	**Mon 9/19/11**	**Tue 6/19/12**
107	**Preparation of NGDP**	**187 days**	**Mon 9/19/11**	**Tue 6/19/12**
108	Lease Area Map	10 days	Wed 3/28/12	Tue 4/10/12
109	Landscape Map	20 days	Wed 4/11/12	Tue 5/8/12
110	Constraints Analysis Map	10 days	Wed 5/9/12	Tue 5/22/12
111	Circulation Plan (12 months after NGDP approval)	30 days	Mon 9/19/11	Fri 10/28/11
112	Monitoring Program Map	30 days	Mon 9/19/11	Fri 10/28/11
113	Natural Diversity Inventory Assessment (NDIA)	30 days	Wed 3/28/12	Tue 5/8/12
114	NGDP Application Document	20 days	Wed 5/23/12	Tue 6/19/12
115	**Notifications**	**7 days**	**Mon 12/12/11**	**Tue 12/20/11**
116	Notification in News Paper (10 days prior to application submission)	0 days	Mon 12/12/11	Mon 12/12/11
117	Agency/Owner Notifications (concurrent with application)	0 days	Mon 12/12/11	Mon 12/12/11
118	USPS Return Receipts for Agencies	7 days	Mon 12/12/11	Tue 12/20/11
119	Certification Form of Notices Issued	0 days	Tue 12/20/11	Tue 12/20/11
120	**Application Fees**	**10 days**	**Mon 12/12/11**	**Mon 12/26/11**
121	Natural Gas Project Application Fee Worksheet	5 days	Mon 12/12/11	Fri 12/16/11
122	Fee Payment Submission	0 days	Mon 12/26/11	Mon 12/26/11
123	Letter of Transmittal	3 days	Wed 12/21/11	Fri 12/23/11
124	Submittal of NGDP	0 days	Mon 12/26/11	Mon 12/26/11
125	**DRBC Review Process**	**80 days**	**Mon 12/26/11**	**Fri 4/13/12**
126	DRBC Technical Review and Revisions	40 days	Mon 12/26/11	Fri 2/17/12
127	Informal Conference (If Necessary)	0 days	Thu 2/2/12	Thu 2/2/12
128	Publication of a Draft Docket (DRBC)	5 days	Mon 2/20/12	Fri 2/24/12
129	DRBC Public Notice of Hearing	10 days	Mon 2/27/12	Fri 3/9/12
130	Public Hearing	0 days	Fri 3/9/12	Fri 3/9/12
131	Hearing Officers Findings Report	10 days	Mon 3/12/12	Fri 3/23/12
132	Hearing Report Objections Filed	15 days	Mon 3/26/12	Fri 4/13/12
133	Commission Action at a Public Meeting (Quarterly)	0 days	Wed 6/13/12	Wed 6/13/12



Project: Project0 in Untitled
Date: Wed 3/9/11

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

ALL Consulting

Page 3

Cost Estimate Preparation

To prepare a cost estimate for the DRBC proposed Article 7 regulations a number of assumptions were made with regards to the size of the project, as well as with the costs to prepare and review the various applications and supporting documentation. Only those costs associated with complying with the proposed Article 7 requirements were considered. Costs associated with the actual drilling, transporting of water, labor for site operations, etc., were not included as it is understood the individual operators would be familiar with their own costs for these activities. Additionally, the costs associated with complying with host state regulations were not included.

Project assumptions center on a hypothetical natural gas development project which would be conducted within the DRBC and involve High Volume Hydraulic Fracturing (HVHF) of the Marcellus Shale at a number of locations. The project would be sufficient in size of leased acreage (>3,200 acres) or in planned well pads (>5 pads) to necessitate an application for a Natural Gas Development Plan. The estimated costs for this evaluation are based on a project that would consist of a 4,480-acre lease with 7 well pads and 6 wells per pad or 42 total wells. It was assumed that the NGDP would be in place for 10 years and all monitoring and annual fees are included for that period. The general assumptions for the project are presented in **Exhibit A9** along with the rolled up cost summary.

Fee Costs

Fees consist of application review fees and water charges as well as annual monitoring and report fees. The application review fees are assumed to be the maximum as proposed by the DRBC for each application. The option is given in the Article 7 regulations to pay the actual cost of conducting the review by DRBC versus the proposed fees but, in lieu of knowing the actual costs, assuming the proposed fees seems prudent for planning purposes. A schedule of these fees is provided in **Exhibit A3**.

Exhibit A3: DRBC Proposed NG Exploration and Development Application Fees

	Application Types	Amount
1	Water Withdrawal (Docket or Protected Area Permit)	$ 75,000.00
2	Water Withdrawal (ABR)	$ 5,000.00
3	Water Use at a Well Pad (ABR) (Where Well Pads are State Approved)	$ 10,000.00
4	Individual Well Pad (No NGDP) (ABR)	$ 20,000.00
5	Individual Well Pad (No NGDP) (Docket)	$ 30,000.00
6	Natural Gas Development Plan (NGDP) (Up to 5,000 acres) (Docket)	$ 50,000.00
7	Natural Gas Development Plan (NGDP) (Over 5,000 acres) (Docket)	$ 75,000.00
8	Low Volume Hydraulically Fractured or Exploration Wells (ABR)	$ 3,000.00
9	Addition of Well Pad(s) in an Approved NGDP (ABR)	$ 15,000.00
10	NG Wastewater Discharge Treatment/Disposal (Docket)	$ 75,000.00
11	Change in Ownership of any Approved Action	$ 1,000.00
12	Change in Name of Project Owner or Sponsor	$ 500.00
13	Natural Diversity Index Assessment (If performed by DRBC)	$ 15,000.00
14	Modification of an Existing Approval	$ 5,000.00
15	Consumptive Water Use Charge per 1,000 gallons	$ 0.08

Exhibit A3: DRBC Proposed NG Exploration and Development Application Fees

	Application Types	Amount
16	Any Project Diverting Water or Wastewater out of the Basin (#1-5, 8, 10, 14)	Double
17	Annual Monitoring and Compliance	$ 2,000.00

Financial Assurances

The financial assurances requirements within the proposed Article 7 regulations are based on plugging and abandonment or restoration of land disturbances on an individual well basis and set at $125,000.00 per well. Financial assurance in the amount of $5,250,000.00 would be required for our hypothetical project with 42 wells. The proposed Article 7 identifies several methods by which an operator can obtain the financial assurance and present it to the commission. In order to provide a cost estimate we assume a bond would be purchased for the total financial assurance amount and a fee of 5 percent, or $262,500.00, would need to be paid for this assurance. It is understood that there is a means of reducing the amount of financial assurance necessary after one operates the wells for one year but given the potential for the continued development of the Marcellus in the Basin over a number of years and the uncertainty of the reduction options, we choose not to include this potential saving in the cost estimate.

Application Preparation Costs (Planning)

The costs to prepare the supporting reports, maps, specifications, plans, and other required documentation that accompany an application have been estimated. We did not prepare detailed estimates that identified labor categories and hourly efforts for tasks associated with each plan or report as would be done when one is preparing the project; however we did provide an overall cost for each plan, report, specification, etc., based on our experience with similar activities. Assumptions associated with preparing some of these plans, maps, etc., are identified on **Exhibit A6** where appropriate. For example, it is assumed that digitized data will be made available by the survey crew for each leased parcel within the DRBC that is included in the NGDP so the preparation of the lease holdings area map will only be a couple days effort. However, if the leases have to be digitized based on legal descriptions or township section range descriptions the cost of preparing this one map could increase fivefold, hence it is these types of assumptions that have been documented in the following tables so it is apparent the level of effort which was estimated. The application planning costs are presented in **Exhibits A4**, **A5**, **A6** and **A7**.

Exhibit A4: Notifications for All Applications

Notifications (Rolled-up)	$ 2,500.00
Notification in News Paper (10-days prior to application submission)	$ 1,000.00
Agency/Owner Notifications (concurrent with application)	$ 500.00
USPS Return Receipts for Agencies	$ 500.00
Obtain Notice Certificate from Commission	$ -
Certification Form of Notices Issued	$ 500.00

Exhibit A5: New Water Withdrawal Application Preparation and Planning Costs

New Water Withdrawal Source For NGDP (Section 7.4 (e))	New Water Withdrawal Source	Previously Approved Sources
Surface Water Withdrawals for NGD (Rolled-up)	**$ 44,500.00**	**$ 10,000.00**
Non-point Source Pollution Control Plan (SPW (2)(i))	$ 2,000.00	$ -
Hydrograph Analysis (Pre & Post Construction)	$ 5,000.00	$ -
Natural Diversity Inventory Assessment (NDIA)	$ 7,500.00	$ -
Preliminary Water Withdrawal Site Plan	$ 5,000.00	$ -
Final Construction Plans and Specifications	$ 2,500.00	$ -
Water Withdrawal Site Operations Plan	$ 5,000.00	$ 2,500.00
Pass-by flow Method & Equipment Explanation	$ -	$ -
Drought Emergency Plan	$ 5,000.00	$ -
Invasive Species Control Plan (ISCP)	$ 5,000.00	$ 5,000.00
Water-conserving Procedures Report	$ 5,000.00	$ -
Application Documentation/Contractual Agreements	$ 2,500.00	$ 2,500.00
Groundwater Withdrawals (New Wells)		Doesn't appear to be necessary for existing GW Wells.
Final Hydrogeologic Report (Rolled-up)	**$ 75,000.00**	
Field Procedures	$ 1,000.00	
Listing of Gathered Data	$ 500.00	
Data Analysis	$ 2,500.00	
Evaluation of Proposed Withdrawal Impacts	$ 2,500.00	
All Relevant Data (Geologic Map / well log / water level charts / tables / graphs / monitoring wells / streams / wetlands / etc.)	$ 2,500.00	
Pumping Test (~48-hours)	$ 17,500.00	
Logistic to take Measurements and Perform Test	$ 1,000.00	
Install Monitoring Wells (3)	$ 30,000.00	
Static Water Level Measurements (All Wells & All Monitoring Points)	$ 2,500.00	
Recovery Measurements (Observation Wells)	$ 2,500.00	
Maps	$ 2,500.00	
Preparation of Report	$ 10,000.00	

Exhibit A6: Natural Gas Wastewater Treatment Facility Application

Facility Treatability Study (within DRBC)	In Basin	Out Basin
	$ 10,000.00	$ 10,000.00
Discharge Analysis (Outside Zones 4, 5, & 6)	To Be determined if necessary	
Effluent Analysis (Zones 2-6)	To Be determined if necessary	
Basin-wide Effluent Analysis (Outside Zones 2-6)	To Be determined if necessary	
Total Dissolved Solids (TDS) Analysis (Outside Zones 5 & 6)	To Be determined if necessary	
Imported Wastewater Application	Not Typical	
UIC Injection Application	Not Typical	

Exhibit A7: Well Pad and Natural Gas Development Plan Application Preparation and Planning Costs

Natural Gas Well Pad Application/NGDP	Well Pads		NGDP Docket (7 well pads)
	Docket	ABR	
Preparation of NG Well Pad Application (Rolled-up)	**$ 73,750.00**	**$ 68,750.00**	**$ 159,500.00**
Lease Area Map (All basin Leaseholds, 4,480 acres)	**$ 1,500.00**	**$ 1,500.00**	**$ 5,000.00**
If Digitizing Required	$ 10,000.00	$ 10,000.00	$ 10,000.00
Surveyor Supplied Spatially Referenced Geo Data	$ 1,500.00	$ 1,500.00	$ 5,000.00
Landscape Maps (9 @ 0.5 mile of well pad)(Surveyors Data)	**$ 9,800.00**	**$ 9,800.00**	**$ 126,000.00**
State Orthophotography	$ 800.00	$ 800.00	$ 2,000.00
Property Owners/Mineral Rights Owners	$ 1,500.00	$ 1,500.00	$ 3,500.00
Roads/ROW/UPT lines/Existing Penetrations/Bldgs, etc.	$ 1,500.00	$ 1,500.00	$ 4,000.00
Hydrology Map	$ 500.00	$ 500.00	$ 1,500.00
Geology Map	$ 500.00	$ 500.00	$ 1,500.00
Soil Series Map	$ 500.00	$ 500.00	$ 1,500.00
Slope Map (>15%)	$ 500.00	$ 500.00	$ 1,500.00
Critical Habitat Map	$ -	$ -	$ -
Assume Wildlife Biologist can deduce habitat from Aerial Photos and Topographical coverage	$ 2,500.00	$ 2,500.00	$ 5,000.00
Natural Heritage Sites - Based on available State data only	$ 1,000.00	$ 1,000.00	$ 4,000.00
If Archeological Survey is Required	$ 25,000.00	$ 25,000.00	$ 100,000.00
Forested Landscapes Map based on State and USFS data only	$ 500.00	$ 500.00	$ 1,500.00
Constraints Analysis Map (0.5 mile of well pad)	**$ 5,000.00**	**$ 5,000.00**	**$ 10,000.00**
Circulation Plan (0.5 mile of well pad)	**$ 2,500.00**	**$ 2,500.00**	**$ 5,000.00**
Natural Diversity Inventory Assessment (NDIA)	**$ 5,000.00**	**N/A**	**$ 10,000.00**
Monitoring Program (Map of monitoring Points)	**N/A**	**N/A**	**$ 1,000.00**
Non-point Source Pollution Control Plan (If In SPW)	**$ 2,500.00**	**$ 2,500.00**	**$ 2,500.00**
Water Conservation Program	**$ 2,000.00**	**$ 2,000.00**	**N/A**
Pre-alteration Ground/Surface Water Monitoring Study	**$ 43,950.00**	**$ 43,950.00**	N/A
Discussion with DRBC (Reporting Format # of samples)	$ -	$ -	N/A
Artificial Penetrations Inventory & Map	$ 2,000.00	$ 2,000.00	N/A
GW Sampling and Laboratory Analysis (3 GW Wells @ 1,000 ft) 3 samples with Drinking Water Analysis at $750/each	$ 3,850.00	$ 3,850.00	N/A
Installation of Monitoring Well(s) (within 1,000 ft) (assume 3)	$ 30,000.00	$ 30,000.00	N/A
Surface Water Monitoring (~1 up & 1 downstream)	$ 3,100.00	$ 3,100.00	N/A
Report preparation	$ 5,000.00	$ 5,000.00	N/A
Wastewater Treatment & Disposal Plan (Rolled-up)	**$ 3,500.00**	**$ 3,500.00**	N/A
Docket/Permit #	$ -	$ -	N/A
Treatment Facility Location	$ 500.00	$ 500.00	N/A
Evidence of State/DRBC Approvals	$ 500.00	$ 500.00	N/A
Wastewater Facility Capacity and Capability Verification	$ -	$ -	N/A
Contractual Agreement for Wastewater Disposal	$ -	$ -	N/A
Completed Wastewater Treatment & Disposal Plan	$ 2,500.00	$ 2,500.00	N/A

Operational Costs

The proposed Article 7 regulations require that several annual and a few one-time reports be prepared and submitted to the commission during the course of the development activities. For example, a DRBC Post Hydraulic Fracturing Report must be submitted 60 days after completing each hydraulic fracturing event; therefore it was assumed one report per well would be required, or 42 total reports. This report also requires an unspecified number of analytical samples be analyzed and the results included in the report. Assumptions for the number of samples and the analytical parameters are identified in **Exhibit A8** along with the costs to prepare the report. Since our scenario is based on obtaining a NGDP and operating the proposed wells for 10 years we included reoccurring, Article 7-required, operational costs in a separate 10-year roll-up column on Tablet F1. The column accounts for the annual monitoring fees that have to be paid per well pad, water source, and these multiple Post Hydraulic Fracturing Reports. Operational costs are presented on **Exhibit A8**.

Exhibit A8: Operational Reporting Costs

Operational Reporting	Estimate	Assumptions
Water Source		
Withdrawals and Transfers Quarterly Report (Water Source)	$ 10,000.00	Assume $2500 each quarter
Construction Initiation/Completion Reports	$ 100.00	Assume this is a simple letter report
Well Pads		
Water Recording	$ 16,000.00	
Quarterly Reporting - Coupled with consumptive use water supply charges	$ 8,000.00	Assume $2,000 per quarter
Quarterly Transportation Record	$ 8,000.00	Assume $2,000 per quarter
DRBC Post Hydraulic Fracturing Report (60-days after Complete HVHF)	$ 11,000.00	
Flowback and Production Water Sampling	$ 6,000.00	Assume 10 samples at $600 each, Same parameters as pre-alteration GW & Surface water Sampling Report
Production Water Quarterly Reports	$ 2,500.00	
Well Pad Post Construction Annual Monitoring Report (Surface and GW sampling) (March 1 each year)	$ 20,750.00	This is an Annual report cost includes analysis and $7,500 report preparation costs
Monitored for the same parameters monitored in the pre-alteration monitoring study on an annual basis	$ 7,200.00	Assume 3 samples each quarter at $600 each
Surface water monitoring must also continue at the same locations	$ 4,800.00	Assume 2 samples each quarter at $600 each
Well Owner Reports (Monitoring Samples Primary & Secondary Water Analysis Annually)	$ 1,250.00	Assume 5 owners within the 0.5 mile of well pad at $250 report, one report/year
Well Stimulation Notification (48-hours in advance)	$ 500.00	Assume simple letter
Drilling Completion Notification (48-hours after completion)	$ 500.00	Assume simple letter

Scenario Costs

The scenario costs summaries the fees, planning, operational, and roll-up costs associated with developing a hypothetical natural gas project within the DRBC. This summary estimate can be found in **Exhibit A9**.

Exhibit A9: Example Scenario for Natural Gas Development within the DRBC

Assumptions:	Fees	Assurances (Assume 5% fee of actual as cost)	Application Planning Costs	Annual Operational Reports	10-year Operational and Fee Roll up	Total
(1) The Project Sponsor has 4,480 contiguous leased acres	$ -	$ -	$ -	$ -	$ -	$ -
(2) Six wells per pad developed (42 wells total)	$ -	$ 262,500.00	$ -	$ -	$ -	$ 262,500.00
(3) Spacing is based on one well pad per 640 acres (7 Pads)	$ -	$ -	$ -	$ -	$ -	$ -
(4) Average of 3,300,000 gallons per well for each HVHF well based on SRBC published average. (assume 100% consumptive use)	$ 11,100.00	$ -	$ -	$ -	$ -	$ 11,100.00
(5) Average of 84,000 gallons per well for drilling	$ 285.00	$ -	$ -	$ -	$ -	$ 285.00
(6) Two water sources will be required for the NGDP, one new and one existing each serving 3 or 4 well pads.	$ -	$ -	$ -	$ -	$ -	$ -
New Source (Docket Approval for Surface Water Source)	$ 75,000.00	$ -	$ 44,500.00	$ 10,100.00	$ 101,000.00	$ 220,500.00
Existing Source (ABR Application Documentation of Adequacy, ISCP)	$ 5,000.00	$ -	$ 10,000.00	$ 10,100.00	$ 101,000.00	$ 116,000.00
(7) Three separate well pad applications will be prepared prior to NGDP approval	$ 90,000.00	$ -	$ 221,250.00	$ -	$ -	$ 311,250.00
(8) One NGDP will be prepared for the entire project	$ 50,000.00	$ -	$ 159,500.00	$ -	$ -	$ 209,500.00
(9) Four well pad applications will be submitted as ABRs under the approved NGDP	$ 60,000.00	$ -	$ 275,000.00	$ -	$ -	$ 335,000.00
(10) No NDIAs will be completed by the DRBC	$ -	$ -	$ -	$ -	$ -	$ -
(11) Wastewater discharge will be contracted with one facilities outside the Basin	$ 75,000.00	$ -	$ 10,000.00	$ -	$ 150,000.00	$ 235,000.00
(12) Flowback water will be recycle for use in HVHF	$ -	$ -	$ -	$ -	$ -	$ -
(13) The project will last at least 10 years (Annual Monitoring Fee and Annual Reports)	$ 18,000.00	$ -	$ -	$ 20,750.00	$ 387,500.00	$ 387,500.00
(14) DRBC Post Hydraulic Fracturing Report (42 reports one for each well, Not Annual)	$ -	$ -	$ -	$ 462,000.00	$ -	$ 462,000.00
(15) Annual water reporting will be conducted for each well pad (7) on a quarterly Basis	$ -	$ -	$ -	$ 112,000.00	$ 1,120,000.00	$ 1,120,000.00
(16) Notifications will be prepared and submitted by the project sponsor (10 total)	$ -	$ -	$ 25,000.00	$ -	$ -	$ 25,000.00
Totals	**$384,385.00**	**$262,500.00**	**$745,250.00**	**$614,950.00**	**$1,859,500.00**	**$3,695,635.00**

Appendix B

Water and Land Use Comparison Analysis

Water and Land Use Comparison Analysis

Water and Land Use Comparison

A basic premise of the proposed Article 7 regulations is set forth under **7.1(d) Comprehensive Plan and Framework** where it is stated that "The Commission has also determined that all natural gas development projects may have a substantial effect on the water resources of the Basin." The natural gas industry is unique in certain respects just as other water users within the Basin – e.g., agriculture, power generation, and golf courses – are unique in various ways. All water users, however, share commonalities. In order to evaluate the rationale or basis for the above statement, ALL Consulting (ALL) developed expected water use requirements for natural gas development and compared those to other water users within the Delaware River Basin (Basin). ALL also evaluated the land use requirements for natural gas development as compared to other land users within the Basin to provide context with respect to the potential for the removal of forest cover or impingement on buffer areas around streams, lakes or other water bodies.

Consumptive Water Use

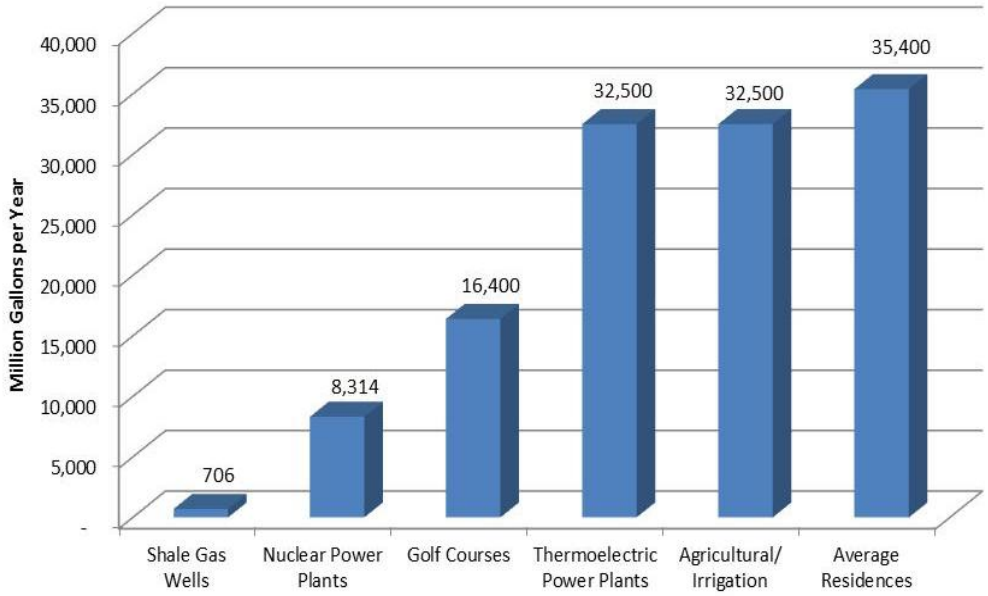
In Article 7, the DRBC states that "one hundred percent (100 %) of water used by a natural gas extraction and development project is considered to be consumptive..." (DRBC, 2010a). To accurately compare water uses in this analysis, only consumptive water uses were analyzed. Comparisons were made between natural gas and other industrial and non-industrial consumptive water uses. The industrial and non-industrial consumptive water uses analyzed included thermoelectric power production, residences, irrigation, golf courses, and nuclear power production. Thermoelectric power, residential use, and irrigation/agricultural uses were selected for comparison because they are the three largest consumptive water uses presented by the DRBC in Figure 6 of the Water Resource Plan FY 2010-2015 (DRBC, 2010b). Golf courses were selected for comparison due to high water uses prompting the release of *Water Conservation Guidelines for Golf Courses* by the DRBC in 2002. Nuclear power facilities were selected based on the large quantities of water utilized throughout the U.S. **Exhibit B1** and **Exhibit B2** present data that compares these water uses to natural gas water use followed by an explanation of the data presented for each water use.

Exhibit B1: Comparison of Consumptive Water Use in the Delaware River Basin

Water Consumer	Approximate Units within the Basin	Approximate Consumptive Water Use (Mgal/yr)
Natural Gas Wells*	214	706
Thermoelectric Power Plants	148	32,500
Golf Courses	145	16,400
Average Residences	2,900,000	35,400
Nuclear Power Plants	3	8,314
Agricultural/Irrigated Land**	3,390	32,500

* Projected number of wells to be drilled each year within the Delaware River Basin.
**Square miles of agricultural/irrigated land within the Delaware River Basin.

Exhibit B2: Consumptive Water Use in the Delaware River Basin



Natural Gas Wells: An approximate water use of 3,300,000 gallons per natural gas well was applied based on data gathered from 302 Marcellus wells drilled and hydraulically fractured in the Susquehanna River Basin (SRB) from June 1, 2008, through September 14, 2010 (SRBC, 2010).

Annual water use for the potential natural gas wells in the Basin was determined by estimating a reasonable number of wells that might be drilled within the Basin in a year and by utilizing the water use per well data from the SRB. A reasonable number of wells that might be drilled within the Basin was calculated based on a total of 1,290 Marcellus Shale wells drilled in the SRB in 2010. The total wells drilled in the SRB only occurred in the Commonwealth of Pennsylvania so, in order to estimate a comparable number of wells that might be drilled in the Basin, only the land area lying within the Pennsylvania portion of the Basin was used. The land area overlying the Marcellus Shale and within the Pennsylvania portion of the Basin represents 16.6% of the land area of Pennsylvania portion of the SRB that overlies the Marcellus Shale and is currently undergoing natural gas development.

$$\frac{2{,}237\ sq.mi.\ DRB\ in\ PA}{13{,}480\ sq.mi.\ SRB\ in\ PA} = .1656 \times 100\% = 16.6\%$$

By using 16.6% of 1,290 Marcellus wells drilled in the Pennsylvania portion of the SRB, a reasonable estimate of 214 natural gas wells drilled on a yearly basis can be derived for the Basin. An approximated initial drilling rate of 200 wells annually was used in the body of this report for clarity; here, the un-rounded figure of 214 wells drilled annually is used.

$$16.6\% \times 1{,}290\ wells\ in\ SRB = 214\ wells\ in\ DRB$$

By combining the SRBC calculated water use per natural gas well and the estimated rate of development in the Basin, a total of approximately 706,000,000 gallons of water is estimated to be used per year by natural gas development in the Basin.

Thermoelectric Power Plants: The total consumptive use per day for thermoelectric power plants within the Basin was listed as 89,000,000 gallons per day in Figure 6 of the DRBC Water Resource Plan FY 2010-2015 (DRBC, 2010b). This total was then converted to an annual rate. A total of 148 fossil fuel plants were determined by Geographic Information Systems (GIS) analysis of the Basin.

Golf Courses: The approximate annualized water use for golf courses in the Basin was estimated using a total of 312,000 gallons per day per golf course (Deford, 2008). The daily water use of 312,000 gallons/day/course was then multiplied by 145 golf courses, which was determined by GIS analysis; this yielded an estimate of approximately 45,000,000 gallons/day water use or 16,400,000,000 gallons annually.

Average Residences: The approximate annual consumptive water use by residences within the Basin was estimated using a population of 7,600,000 (U.S. Census Bureau, 2000). The number of residences was determined by using a number of 2.6 persons per residence, based on the average persons per residence in New York (2.63 persons per residence), Pennsylvania (2.48 persons per residence), Delaware (2.59 persons per residence), and New Jersey (2.71 persons per residence) (U.S. Census Bureau, 2004). The population of 7,600,000 divided by 2.6 persons per residence yields an estimate of 2,923,077 residences within the Basin. The total consumptive water use per day for average residences within the Basin was estimated as the combined total of "Public Water Supply" and "Domestic*"* as presented in Figure 6 of the DRBC Water Resource Plan FY 2010-2015 (DRBC, 2010b).

Nuclear Power Facilities: The approximate annual consumptive water use by nuclear power facilities within the Basin was estimated using a volume of 2,050,000,000 gallons of surface water used per day for nuclear power reactors in Pennsylvania (USGS, 1995). Pennsylvania has nine nuclear power reactors within the Commonwealth, leading to an average of approximately 228,000,000 gallons of water used per reactor. The Basin by contrast has five nuclear power reactors housed in three nuclear power facilities based on GIS analysis. We assumed the same water use at the reactors located in the Basin and a consumptive use of 2% (98% pass through) (Nuclear Energy Institute, 2010). Two percent of the original 228,000,000 gallons used per reactor gives a final average of approximately 4,500,000 gallons of consumptive water use per nuclear power reactor per day or approximately 1,663,000,000 gallons of water used consumptively annually. By multiplying this annual total by the five nuclear power reactors present in the Basin, the final estimated annual consumptive water use by nuclear power facilities in the Basin is determined to be approximately 8,314,000,000 gallons.

Agricultural/Irrigation: The approximate consumptive use per day for agricultural/irrigation within the Basin was calculated from the combined totals for "Agriculture" and "Non-agricultural Irrigation" as stated in Figure 6 of the DRBC Water Resource Plan FY 2010-2015 (DRBC, 2010b). This total was then converted to an annual rate. The total of approximately 3,300 square miles of agriculturally used land within the Basin was based on GIS analysis.

Land Use

To further examine whether "natural gas development projects may have a substantial effect on the water resources of the Basin," an analysis was conducted comparing the land use required for natural gas development to other land uses within the Basin. **Exhibit B3** and **Exhibit B4** present data comparing land use for natural gas well pads and supporting infrastructure to other specified land uses. The exhibits are followed by an explanation of data that was utilized.

Exhibit B3: Comparison of Land Uses in the Delaware River Basin

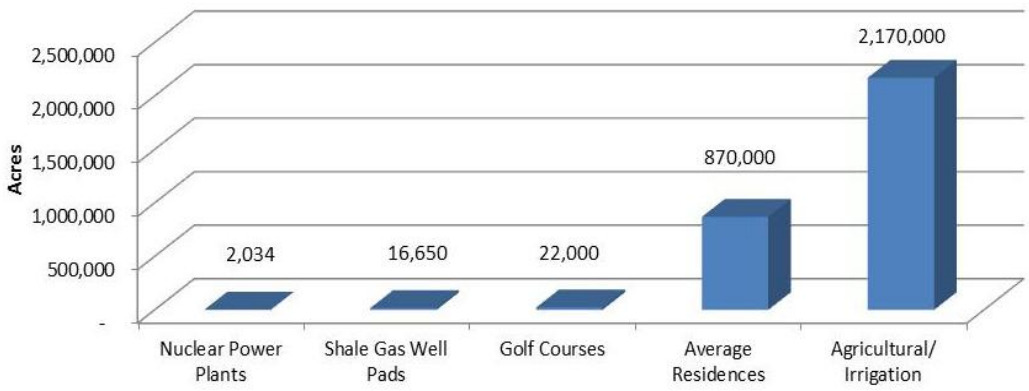
Land Use	Approximate Number of Units within the Basin	Approximate Footprint per Unit (acres)	Approximate Total Footprint (acres)
Natural Gas Well Pads*	2,250	7.4***	16,650***
Golf Courses	145	150	22,000
Residences	2,900,000	0.3	870,000
Nuclear Power Plants	3	678	2,034
Agricultural/Irrigation**	3,390	-	2,170,000

* Based on the acreage available for well pads approved through the docket process or ABR process with an approved NGDP, and without variances.
** Square miles of agricultural/irrigated land within the Delaware River Basin.
*** Acreage shown is prior to any well site restoration activities.

Natural Gas Well Pads and Supporting Infrastructure Land Use: A GIS analysis of the Basin was conducted to determine the available land area which may be used as potential well pad placement sites taking into account the restrictions, setbacks, and constraints contained within the proposed Article 7 regulations (see **Appendix D**).

An area of approximately 2,253 square miles was determined to be available without any variances required based on DRBC restrictions, setbacks and constraints outlined in the proposed Article 7 regulations. The number of well pads was determined based on total square miles available, after these constraints were taken into account, and using a general well spacing of one well pad per square mile, which is typical of current natural gas development spacing within the SRB.

Exhibit B4: Land Comparison in Delaware River Basin



An average land area footprint for natural gas wells and all supporting infrastructure is approximately 7.4 acres (ALL Consulting and GWPC, 2009).

Other Land Uses: There are approximately 145 golf course located within the Basin based on GIS analysis. The total average acreage used per golf course is approximately 150 acres (Environmental Institute for Golf, n.d.; DRBC, 2002).

The approximate number of residences located within the Basin was estimated at 2,923,077. An average residential lot size is approximately 0.3 acres (Mason, 2011), which yields a residential land use number of 870,000 acres.

The total number of nuclear power plants within the Basin and average land area footprint was based on GIS analysis.

The total amount of land used for agriculture, 3,390 square miles, was based on GIS analysis of agricultural land within the Basin.

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Appendix C

Regulatory Comparison Analysis

Regulatory Comparison of DRBC's Proposed Article 7

ALL Consulting (ALL) conducted a comparison of the Delaware River Basin Commission's (DRBC) proposed Article 7 regulations to existing requirements enforced by the Susquehanna River Basin Commission (SRBC), Pennsylvania Department of Environmental Protection (PADEP), and the New York State Department of Environmental Conservation (NYSDEC). These comparisons have been conducted to identify the similarities and differences between the natural gas regulatory programs of these agencies. The following discussion addresses the comparative analysis by specific regulatory category.

Administrative

Financial Assurance Cost: The proposed Article 7 regulations require financial assurance in the amount of $125,000 per well. These financial assurance requirements are separate from any financial assurance requirements of the host states. Operators, together or separately, may obtain excess financial assurance in the amount of $25,000,000 which will reduce the amount of financial assurance required for each individual well.

The SRBC's financial security requirements pertain to potential effects of water usage and the amount required is determined by the Commission based on potential for threat to the environment, proximity to water supplies, and cost of appropriate remedies. PADEP requires financial assurance in the amount of $2,500 per well with blanket coverage available in the amount of $25,000. NYSDEC's financial assurance requirements are based on a sliding scale and range from $700 to $5000 per well depending on the number and depth of wells, with a maximum total financial assurance requirement of $2,000,000 for all wells.

Coverage of Financial Assurance: Financial requirements within the proposed Article 7 regulations will be used to cover costs of plugging and abandoning of wells, restoration of the well pad and associated structures, as well as mitigating and remediating releases. SRBC's financial assurance requirements are for protecting public health, safety, or the environment, ensuring financial obligations are met, and ensuring compliance with docket conditions. PADEP's financial assurance covers plugging and abandonment, restoration, and replacement of water supplies. NYSDEC's financial security requirements cover plugging and abandoning of wells.

Exhibit C1: Coverage of Financial Assurance

	P&A	Site Restoration	Pollution Mitigation	Water Usage Impacts
DRBC	X	X	X	
SRBC				X
PADEP	X	X	X	
NYSDEC	X			

Release from Financial Assurance Liability: The proposed Article 7 regulations state that operators are released of financial assurance liability for a well once the final site restoration is complete, two years have passed with no indication of any environmental issues, and no

outstanding compliance issues exist. SRBC does not specify when the operator is no longer liable for financial assurance requirements. For the PADEP, financial assurance is no longer required for a well once the well has been properly plugged, a plugging report has been filed, and 1 year has passed without incident. NYSDEC releases an operator of financial assurance liability when the well has been plugged and abandoned to the satisfaction of the Department.

Compliance and Monitoring Fee: The proposed Article 7 regulations include a compliance and monitoring fee of $2,000 for each project. SRBC requires a compliance and monitoring fee of $1,000 for each consumptive use and water withdrawal for those users that pay a consumptive use fee. Those users that do not pay a consumptive use fee are subject to a compliance and monitoring fee of $2,000. Neither Pennsylvania nor New York charge a compliance and monitoring fee.

Water Withdrawals and Use

Type of approval and threshold volume: Water withdrawals in the proposed Article 7 regulations will be approved either through a withdrawal docket or through an Approval-by-Rule (ABR) process, regardless of the volume of the withdrawal. Water withdrawals in the SRBC require a water withdrawal application and as with to the DRBC, the application is required regardless of the volume of water being withdrawn. Pennsylvania requires registration of water sources having withdrawals of 10,000 gallons per day (gpd) or greater on a 30-day average. New York requires a water use license or permit for users that are capable of withdrawing greater than 100,000 gpd.

Non-Point Source Pollution Control Plan: If the well pad is located within a Special Protection Waters (SPW) area, a Non-Point Source Pollution Control Plan (NPSPCP) which includes measures to control stormwater both before and after construction must be developed. The SRBC does not specifically regulate erosion and sedimentation or require any associated permits. Pennsylvania and New York require erosion and sedimentation plans and general permits for earth disturbances greater than 5 acres and 1 acre, respectively.

Natural Diversity Inventory Assessment: The proposed Article 7 regulations require a Natural Diversity Inventory Assessment (NDIA) as a part of a new water withdrawal application. If the DRBC deems it necessary, they have the right to conduct a separate NDIA at the cost of the operator ($15,000). SRBC's water withdrawal application must include a description of the anticipated impacts on threatened and endangered species and habitats which may be affected by the project. The SRBC may require assessments to be performed on the impact of the project and any alternatives to fish and wildlife. Similar to DRBC, the SRBC has the right to conduct an NDIA at the cost of the project sponsor ($5,720). As a part of Pennsylvania's Water Management Plan (WMP), the operator is required to conduct a search of the Pennsylvania Natural Diversity Inventory to determine the presence of threatened and endangered species within the project site. The WMP will not be considered complete until all conflicts regarding threatened and endangered species are resolved. Natural diversity or threatened and endangered species surveys are not required as a part of New York's water diversion and use license.

Invasive Species: The proposed Article 7 regulations require an invasive species control plan (ISCP) to be developed for surface water withdrawals including a treatment and control plan to be implemented to prevent the spread of potentially invasive species within the Delaware River Basin (Basin). The SRBC does not specifically require an ISCP; however the operator must demonstrate that the water withdrawal operations will prevent the spread of invasive species in

the basin. Neither Pennsylvania nor New York requires an invasive species control plan to be prepared for the withdrawal site; however, New York's draft Supplemental Generic Environmental Impact Statement (dSGEIS) requires a site specific invasive species control plan to be developed that will include best management practices to be employed as well as the physical and chemical methods that will be used to control the spread of invasive weeds during operations.

Site Plans: The proposed Article 7 regulations require that for new water withdrawals a site plan and a site operations plan be developed which includes descriptions of the site and proposed facilities, as well as plans for metering, recording, and reporting pass-by flow and the usage, transport and destination of water withdrawals. SRBC's water withdrawal applications must include a map of the location of the project, intakes, sources, facilities, and well locations. A metering plan must also be included with the SRBC water withdrawal application and include the intake design, metering procedures, and equipment, and maps of withdrawals, metering point, and flow diagrams. Pennsylvania's WMP requires that a water source and use monitoring plan including the monitoring, reporting, and recordkeeping practices, maximum rate compliance, and pass-by flow monitoring. Metering and monitoring plans meeting SRBC or DRBC criteria satisfy this requirement. New York's Diversion and use license requires project plans to be submitted with the application for license.

Drought Plans: The proposed Article 7 regulations require a Drought Contingency Plan to be submitted as a part of the water withdrawal application and include a copy of the drought contingency notice which will be sent to all users and provide for the cessation of water uses in the event of a drought. The SRBC does not specifically require drought emergency plans to be submitted; however, the Commission has the right to impose controls on all water allocations as deemed necessary. Pennsylvania requires drought management plans for industrial withdrawals greater than 500,000 gpd averaged over 30 days. New York does not require drought emergency plans.

Floodplain Regulations: The proposed Article 7 regulations state that a variance must be obtained to construct a well pad within the 100-year floodplain; however, a well pad location will not be approved if it is within a floodway. Pennsylvania requires approval and an encroachment permit for structures located within a floodplain. In New York, development within a floodplain requires a permit from the Department.

Pass-by flow: According to the proposed Article 7 regulations, withdrawals must not reduce stream flow to less than the Q7-10 flow. Water withdrawals permitted through the SRBC may never occur when the stream flow is less than the prescribed pass-by flow. The pass-by flow volume will be determined at the time of application, but may never be less than the Q7-10 flow. Pennsylvania defers to river basin commissions on pass-by flow regulations. New York does not enforce specific pass-by flow regulations; instead, they require that withdrawals not the water for its best usage.

Groundwater-hydrogeologic report, pump tests: The proposed Article 7 regulations require a hydrogeologic report to be prepared for groundwater withdrawals. The hydrogeologic report must include a map of all nearby wells that could be affected by the withdrawal, monitoring of sufficient wells to determine possible interference, record of a 48-hour (minimum) pumping rate test, date and time of all static, pumping, and recovery water level measurements, and an analysis of data and aquifer impact. Similar to DRBC's requirement, the SRBC's regulation requires a

constant rate aquifer test to be conducted for groundwater withdrawals. The test includes monitoring of sufficient wells to determine possible interference, a record of the pumping rate measured throughout the 48-hour test (minimum), and the date at time of all static, pumping, and recovery water level measurements. Neither Pennsylvania nor New York has requirements for pump tests for groundwater withdrawals.

Reporting: DRBC's proposed rules require quarterly reporting of monthly and daily water withdrawal volumes, as well as daily volumes of water transferred to individual well pads. SRBC requires quarterly reporting of daily volume of withdrawals, water level measurements in production and monitoring wells (groundwater only), water levels in surface storage facilities, stream flow and pass-by flow, and volume and destination of transfers of water. Pennsylvania requires annual reporting of water withdrawal volumes. New York requires annual reporting of the gallons of water withdrawn, consumed, transferred, or diverted per month for each water source. Water usage volumes are not required to be reported to New York if they are subject to SRBC or DRBC reporting requirements, or if reclaimed wastewater is being used.

Permit and Usage Costs: The proposed Article 7 regulations state that the cost for review of a water withdrawal application is 0.4% of the project cost up to $10 million and 0.12% of the project cost greater than $10 million, not to exceed $75,000 or the actual cost of review for the project. The minimum project review fee is $1,000 for private projects. DRBC's proposed rules require operators to submit a water source application which identifies all of the water sources to be used at the well pad. The volumes used must be reported quarterly and this report is the basis for the water supply charge ($0.08 per 1,000 gallons).

SRBC's consumptive use application requires a map of all facilities, water sources, and discharges, a metering plan, and certification that all produced fluids are treated and/or disposed of in accordance with applicable regulations. SRBC's water withdrawal approval costs range from $4,400 to $28,650. Approvals for consumptive water use range from $2,520 to $50,350 or $10,000 for ABR for natural gas projects. Consumptive use must be reported quarterly and are the basis for the consumptive water use fee ($0.28 per 1,000 gallons). Pennsylvania's WMP requires a listing of water sources, but there is no water use fee. New York requires annual reporting and an annual reporting fee of $50 for the gallons of water withdrawn, consumed, transferred, or diverted per month for each water source, but it does not impose an additional water use fee.

Well Pads

***Permitting*:** According to the proposed Article 7 regulations, natural gas development projects may be approved through a Natural Gas Development Plan (NGDP) for leases with greater than 3,200 acres or with the intention to construct more than 5 well pads, a well pad docket, or a well pad ABR. The NGDP docket must include a lease area map, a landscape map, a constraints analysis map, a circulation plan, and a monitoring program plan. Permitting a well through the Docket and ABR process both require the submission of a lease area map, a landscape map, a constraints analysis map, and circulation plan. Approval under DRBC is for a duration of 10 years, but may expire if no development occurs within 3 years of approval. Pennsylvania and New York both require well permits to be approved by the states prior to drilling or altering a well and require a location plat to be submitted with the permit application. The permits are active for a period of 1 year and 180 days, respectively.

Cultural Requirements: As a part of the well permitting process in New York, the NYSDEC requires the submission of an Environmental Assessment Form (EAF) addendum which requires information on, among other things, cultural resources. Pennsylvania's well permit takes into consideration the locations of public parks, forests, game lands, wildlife areas, national and state scenic rivers, national natural landmarks, habitats of rare flora and fauna, and historical and archaeological sites.

Natural Diversity Inventory Assessment: The proposed Article 7 regulations require that a NDIA be performed as a part of the NGDP docket and individual well pad docket. DRBC's proposed rules state that a Pennsylvania Natural Diversity Inventory (PNDI) or an assessment in accordance with 6 NYCRR Part 182 will satisfy this requirement. Pennsylvania requires that a well permit include the results of a check of the PNDI and New York requires that threatened and endangered species be listed on the EAF Addendum for a well permit.

Erosion & Sedimentation: The proposed Article 7 regulations require a Non-point source pollution control plan to be submitted with a well pad application if the well pad is to be located within a SPW area. Their proposed rules state that the operator must comply with the more stringent of DRBC's or the host state's requirements. Both New York and Pennsylvania require erosion and sedimentation control permits when earth disturbance activities exceed 1 acre; therefore, erosion and sedimentation control plans and permits are already required to be in place whether or not the disturbance is within the SPW area.

Water Quality Testing: For any wells that are going to be high volume hydraulically fractured, the DRBC requires a water quality testing program be implemented for water contamination caused by the drilling and hydraulic fracturing processes. The program requires sampling of ground water and surface water bodies up- and down-gradient from the well pad both prior to drilling and on an annual basis after the well has been completed. Neither Pennsylvania nor New York require water quality monitoring when drilling a well that will be hydraulically fractured, although Pennsylvania's regulations state that the operator may perform a pre-alteration water quality survey in order to limit liability and preserve its defense in a case of water pollution litigation. New York's dSGEIS requires water wells within 1,000' of the well pad to be sampled prior to site disturbance and for a period of one year after the last well on the well pad has been hydraulically fractured. The SRBC also does not require water quality testing to be conducted by the operator. Instead, the SRBC has instituted a real-time surface water quality monitoring network to identify changes in several water quality parameters throughout the basin.

Public Notice Requirements: The proposed Article 7 regulations require that operators drilling a well in the Basin must provide proof that public notice was submitted to the host state agency, the appropriate municipality, property owners within 2,000' of the well pad, a local newspaper, and the county planning agency at the time of application. The public notice requirement for Pennsylvania requires that public notice be provided to landowners within 1,000' of the well. In New York, operators are required to notify by mail landowners within 1,000' of the well and any local government that may be affected.

The proposed Article 7 regulations require notification 48 hours prior to drilling. Additionally, if located in New York, the operator must notify the NYSDEC prior to drilling, and if located in Pennsylvania, the operator must notify the PADEP, landowners, and local political subdivision 24 hours prior to drilling. The SRBC does not have any requirements mandating notice of when drilling will occur.

Hydraulic Fracturing Notice: The proposed Article 7 regulations require that, prior to hydraulic fracturing, notice must be provided to the DRBC 48 hours in advance. SRBC also requires notification, although the notification is required four weeks prior to stimulation and may be in the form of a weekly or monthly schedule. Pennsylvania and New York do not require notices prior to hydraulic fracturing events. New York's dSGEIS requires a Pre-Fracturing Checklist and Certification form to be submitted within 48 hours of hydraulically fracturing a well, and the notice requires the operator to list the expected date of the fracture stimulation.

Setbacks: The proposed Article 7 regulations institute 500' setbacks from water bodies, wetlands, water supply reservoirs, and water supply intakes, and defer to state regulations for any other setbacks. DRBC's setbacks are greater than Pennsylvania's setbacks of 100' for water bodies and wetlands, and 200' for water supply reservoirs and water supply intakes. DRBC's setback for water bodies and wetlands of 500' is also greater than New York's setback of 150'. New York's setback from water supply reservoirs of 2,640', as suggested by the 1992 GEIS and the dSGEIS, is five times greater than DRBC's setback of 500'.

Exhibit C2: Setbacks

State/Agency	Water Body	Wetland	Water Supply Reservoir	Water Supply Intake
DRBC	500'	500'	500'	500'
SRBC	None	None	None	None
PADEP	100'	100'	200'	200'
NYSDEC*	150'	150'	2,640'	None

*Setbacks are those recommended in New York's 1992 GEIS. Setbacks apply to well pad and associated structures.

Variances: In the DRBC, as well as in both Pennsylvania and New York, variances are allowed for the setbacks with proper approval.

Wastewater Storage and Disposal

Flowback and Produced Water Storage Requirements: The proposed Article 7 regulations require flowback and produced water to be stored in tanks, and do not allow the use of lined or unlined impoundments. Both Pennsylvania and New York allow flowback water and produced water to be stored in tanks or impoundments. In Pennsylvania, the impoundments are required to be lined with a synthetic liner. In New York, a synthetic liner is not required as long as the impoundments are water tight. New York's dSGEIS states flowback must be stored in steel tanks at the well site and centralized impoundments containing flowback water may not be located within the boundary of primary aquifers, unfiltered water supplies, or 100-year floodplains.

Disposal Plans: The proposed Article 7 regulations require a Wastewater Treatment and Disposal Plan which must include the location that waste will be transported to for disposal, proof that the facility has the appropriate approvals and permits, as well as a copy of the written contract between the operator and the disposal facility. Pennsylvania already requires a Control and Disposal Plan to be implemented which details how wastes from each well will be managed and disposed of. Operators in New York are required to prepare and implement a Fluid Disposal

Plan which describes how the wastes will be managed to ensure the environmentally safe and proper ultimate disposal of fluids from the well site.

Reporting Requirements: The proposed Article 7 regulations require quarterly reporting of produced water and flowback volumes which will include monthly and daily volumes collected and transported off-site and the results of any flowback water or produced water samples that were analyzed. Additionally, DRBC would require a Post Hydraulic Fracturing Report to be submitted to the Commission within 60 days of each stimulation. The Post Hydraulic Fracturing Report will include the reporting of the volumes and types of chemical additives used in the fracture treatment and flowback water volumes.

Pennsylvania has several wastewater reporting requirements which DRBC's rules duplicate. Pennsylvania requires the submission of a semi-annual Production and Status Report for each well that includes the type, volume, and destination of wastewater generated at the well. Pennsylvania's completion report requires the listing of the types of chemical additives used in the stimulation as well as their percent by volume. Additionally, the completion report requires the reporting of the volume of base fluid and recycled water used in the fracture stimulation. Pennsylvania requires the annual submission of Form 26R which used to record the chemical characterization, type, volume, and destination of waste transported for disposal from each well pad.

Although New York's current completion report form does not include a section for the reporting of chemical additives used in the fracture, Mr. Jack Dahl (NYSDEC) stated that the Department is requiring the description of these chemicals prior to approval of the completion report. The dSGEIS includes a completion report that requires the reporting of all volumes of materials used in the fracture, including chemical additives, as well as the volume of flowback water generated. Additionally, New York's Annual Well Report requires the reporting of produced water volumes per well.

New York's dSGEIS requires the generator, hauler, and receiver of flowback water to maintain a copy of the Drilling and Production Waste Tracking Form. The form will be required regardless of whether the flowback is sent to a facility, a centralized impoundment, or another well pad.

The SRBC requires that the volumes of fresh water and recycled water used in each hydraulic fracturing event, and the volume and destination of produced water transported off-site be recorded on the Post-Hydrofracture Stimulation Report. Additionally, the volume of water consumed at each well pad is required to be reported quarterly.

Wastewater Sampling: The proposed Article 7 regulations require samples to be collected that are representative of all flowback water and produced water. The results of these samples will be reported to the Commission along with the quarterly wastewater reports. Pennsylvania's requires the chemical analysis of wastewater transported to disposal wells to be reported annually to the Residual Waste Program via Form 26R. New York does not have requirements for sampling flowback water; however, the dSGEIS requires that all flowback water and produced water be tested for naturally occurring radioactive material (NORM) prior to being transported off-site.

Exhibit C3: Wastewater Reporting Requirements

	DRBC	SRBC	PADEP	NYSDEC
Water Volumes Used in the Fracture	Required to be Recorded	Post-Hydrofracture Stimulation Report	Completion Report	None
Flowback Water Volumes Generated	Post Hydraulic Fracturing Report	Post-Hydrofracture Stimulation Report	Form 26R and Semi-Annual Production and Status Report	Completion Report (dSGEIS)
Produced Water Volumes and Destination	Quarterly Wastewater Report	None	Form 26R and Semi-Annual Production and Status Report	Annual Well Report (volumes only)
Chemicals Additives Used in the Fracture	Post Hydraulic Fracturing Report	None	Completion Report	Completion Report
Chemical Analysis of Produced Water/Flowback	Quarterly Wastewater Report	None	Form 26R	None

Exhibit C4: DRBC Proposed Rules Regulatory Comparison

Rule Category		DRBC	SRBC	PADEP	NYSDEC, Pre-dSGEIS	NYSDEC, Post-dSGEIS
Administrative						
Administrative	Duration of Approval	10 years: • water withdrawals, water use • natural gas development plans (NGDPs), well pads 5 years: wastewater treatment & disposal/disposal approval	Consumptive use ABR approval - 5 years. Water withdrawal approval duration = host state duration, but not to exceed 15 years.	Water Management plans must be renewed every 5 years.	Water Diversion or Use Permits issued for 1 year.	No change
	Expirations	Without commencement of construction or operation: •NGDP- 3 years •New water withdrawal-3 years (extension available)	If no withdrawal or consumptive use - 3 years.	One year after issuance if drilling has not commenced.	180 days after approval if operations have not commenced.	No change
	Violations	In the case of pollution: • immediate verbal notification, written follow-up • potentially affected user must be notified in writing • complaints must be investigated by operator • water sources must be replaced or repaired if impacted	Violations reported 5 days or less: • water withdrawal approval violations • loss of metering capabilities	In the event of a release: • verbal notification to Department w/in 2 hours • Dept investigation, determinations w/in 45 days	In case of spill: • immediate vertbal report • written report w/in 5 days	No change
Financial Assurance		**FINANCIAL ASSURANCE**				
	Financial Assurance Amount	$125,000 per well, but eligible for reduction if: •well bore, casing successfully installed •no further HF is planned •1 year w/out incident •excess financial assurance obtained ($25 million)	Amount depends on: • potential for threat to HSE • proximity & potential threat to water supplies • appropriate remedy if issues arise • estimated cost of remedial actions	$2,500 per well Blanket bond of $25,000	• $700-5,000 per well • >6,000' financial assurance decided by Dept • Max = $2,000,000	No change
	Coverage	• well plugging, abandoning, and restoration • restoration of well pad site, structures, & disturbances • mitigation of release	• protecting public health, safety or the environment • ensuring financial obligations are met • ensuring compliance with docket conditions	• drilling of the well • water supply replacement • restoration and plugging	Plugging and abandoning of the well.	No change
	Release from liability	Eligible for release if: • final site restoration complete • 2 year has passed without incident • no outstanding compliance issues	Not Specified	Eligible for release if: • well has been properly plugged • plugging report filed • 1 year has passed without incident	Until the well has been plugged and abandoned to the satisfaction of the Department.	No change
Fees		**FINANCIAL ASSURANCE**				
	Water Withdrawal Docket	0.4% of total project cost up to $10 million 0.12% of project cost > $10 million Not to exceed $75,000 or - min. project review fee: $500 public; $1,000 private or - actual cost of review	Consumptive Water Use Application: • 20,000 gpd – 99,999 gpd = $2,520 • 100,000 gpd – 499,999 gpd = $5,060 • 500,000 gpd – 999,999 gpd = $10,070 • 1 million gpd (mgd) – 5 mgd = $30,200 • Over 5 mgd = $50,350 • Natural Gas ABR = $10,000 Water Withdrawals Application: • Less than 100,000 gpd = $4,400 • 100,000 gpd – 249,999 gpd = $6,600 • 250,000 gpd – 499,999 gpd = $8,800 • 500,000 gpd – 999,999 gpd = $11,000 • 1 mgd – 5 mgd = $13,200 • 5,000,001 gpd – 10 mgd = $28,650 • > 10 mgd = $28,650 + $4,875 / 1 mgd	None	Water Use License, permit- Determined by NYSDEC Water Withdrawal Report- $50 (annual)	No change
	Water Withdrawal (ABR)	$5,000 Renewal- $1,000	N/A	N/A	N/A	N/A
	Water use at Well Pad (ABR)	$1,0000 Renewal- $1,000	N/A	N/A	N/A	N/A
	Individual Well Pad (non-NGDP)	ABR: $20,000 Docket: $30,000 or actual cost of review Renewal- $5,000	N/A	Well Permit Fee $900 - $3,000	$290 - 11,500 (at 30,000 ft)	N/A
	Natural Gas Development Plan (NGDP)	< 5,000 acres: $50,000 ; > 5,000 acres: $75,000 actual cost of review Renewal- $10,000	N/A	N/A	N/A	N/A
	Exploratory or low volume HF Well (ABR)	$3,000 per well pad Renewal- $3,000	N/A	N/A	N/A	N/A
	Additional Well Pads w/in approved NGDP (ABR)	$15,000 per well pad	N/A	N/A	N/A	N/A
	Wastewater Discharge Docket	• 0.4% of total project cost up to $10 million • 0.12% of project cost > $10 million • Not to exceed $75,000 or - min project review fee: $500 public, $1,000 private or - actual cost of review	N/A	None	N/A	N/A
	Natural Diversity Inventory Assessment (NDIA)	$15,000 (if performed by the Commission)	$5,720 (if performed by the Commission)	N/A	N/A	N/A

Exhibit C4: DRBC Proposed Rules Regulatory Comparison

Rule Category		DRBC	SRBC	PADEP	NYSDEC, Pre-dSGEIS	NYSDEC, Post-dSGEIS
Fees	Modification of Approval	$5,000 or actual cost of review	None	None	N/A	N/A
	Consumptive water use	$0.08 per 1,000 gal used ($80 per million gal)	Consumptive use mitigation fee:$0.28 per 1,000 gallons consumed ($280 per MM gal)	None	None	N/A
	Annual Monitoring & Compliance Fee	$2,000 for each water withdrawal docket, well pad docket, and well pad ABR	• Max - $5,000 • $1,000 - consumptive use, GW, SW withdrawal, ABR • $2,000 -diversions & consumptive use not paying mitigation fee	None	None	No change
WATER SOURCES						
Water Withdrawal	Permitting	**TYPE OF APPROVAL**				
		• Water Withdrawal Docket • Water Withdrawal ABR	• Water Withdrawal Application • Consumptive Use Application • Consumptive Use ABR • Diversions of water into and out of basin	• Water Registration - Water Source Application • Water Management Plan	• Water use license (time specified by license) • Water use permit may be issued instead of license (1 yr permit)	No change
		TYPE OF SOURCE				
		• Fresh groundwater or surface water • Produced water • Flowback water • Non-contact cooling water • mine drainage • reclaimed wastewater (w/approved discharge docket)	• surface water • groundwater • public water supplies • wastewater discharge • other reclaimed water • other water approved by the Commission	• surface water • groundwater • wastewater • mine water • cooling water discharge • public water supplies	• surface water • ground water • reclaimed wastewater	No change
		PERMIT THRESHOLD VOLUME				
		• any volume withdrawn or consumed must be approved	• any volume withdrawn or consumed for natural gas.	• avg withdrawal > 10,000 gpd (over 30-day per) • water from a supplier of 100,000 gpd (30-day per)	• capacity to withdraw >100,000 gpd	No change
	Water Withdrawal	**APPROVAL-BY-RULE**				
		Eligible for ABR if: • water source is pre-approved • in accordance with approved withdrawal docket • importation of water into basin (exports not eligible) • no increase in withdrawal volume • project using water must be within DRB • new source located w/in & used w/in approved NGDP Must demonstrate • existing allocation adequate to meet needs of area • other wells not affected by incr. in well allocation. • Removal of 100% of allocated vol will not adversely affect stream flow Application Requirements: • Invasive Species Control Plan may be required (sw) • Pass-by Flow: must maintain Q7-10 stream flow	N/A	N/A	N/A	N/A
		DOCKET APPLICATION	**DOCKET APPLICATION**	**SOURCE REGISTRATION**	**WATER DIVERSION & USE LICENSE**	
		• Non-Point Source Pollution Control Plan (NPSPCP) • if within special protection waters area • Natural Diversity Inventory Assessment • water withdrawal site plan - site and proposed facilities • water withdrawal site operations plan - metering, recording, and reporting: • pass-by flow • drought emergency plan • comply with floodplain regulations • access to site must be restricted • site may not be used for excess storage of chemicals • ISCP may be required (sw) • Pass-by Flow - must maintain Q7-10 stream flow (sw) • hydro-geologic report (gw): • procedures, data gathered, data analysis, aquifer impact • static, pumping, recovery level measurements • Results of (min) 48 hr. pump test • Results of monitoring wells • map of nearby wells that could be affected	• map of project, intakes, sources, facilities, gw wells • safe yield computation • description of present and future use • alternate sources of water supply • well record of proposed and existing wells (gw only) • constant rate aquifer test results (gw only) • static, pumping (48 hr), recovery measurements • monitoring of sufficient wells to determine possible interference • copy of chemical analysis (gw only) • disinfection plan may be required • Invasive Species Plan • Pass-by Flow limits • metering plan - intake design, metering procedures & equipment; maps of withdrawals, metering points, and flow diagrams • evidence of water registration with member states • Floodplain • Commission approval required • flood damage potential may be required	• description of registrant • description, location • volume of water withdrawn Water Management Plan (WMP): • water source and use monitoring plan • monitoring, reporting, and recordkeeping • maximum rate compliance • pass-by flow monitoring • river basin commission approvals • low flow analysis • stream classifications and uses • Penn Natural Diversity Inventory (PNDI) review • withdrawal impact analysis • NYSDEC approval for structures within floodplains • Encroachment permit for structures in floodplains • Drought Mgmt Plan: w/drawals >500 mgpd avg (30 days) E&S Plan /permit: earth disturbance >5 acres	• location and nature of applicant's business • volume used • supply source w/ annual avg min & max flow • water quality affect on source • amount of loss prior to discharge • landowner names at intake and discharge loc. • period of time license is sought • info. relevant to pollution or sedimentation • project plans Groundwater Pump Test: 72 hr min • raw test data and analysis • monitoring & production well water level Drought: contingency plan for water shortages Floodplain: development w/in requires a floodplain permit Erosion and Sedimentation: • >1 acre: Gen stormwater permit incl Pass-by flow: • no pass-by flows are established • no alteration may impair water for best usage	Invasive Species: • survey of invasive species w/i project site • map of all occurrences of invasive plants • part of the EAF addendum • Invasive species mitigation plan • site specific • physical and chemical controls

Exhibit C4: DRBC Proposed Rules Regulatory Comparison

Rule Category		DRBC	SRBC	PADEP	NYSDEC, Pre-dSGEIS	NYSDEC, Post-dSGEIS
Water Withdrawal	Water Withdrawal	**REVIEW PROCESS**				
		• application • technical review • publication of draft docket • public hearing • commission action at public hearing • (est. 180 days)	• pre-application • administrative review • interagency coordination • technical review • formal action • post-approval • 6-9 months	• administrative review • technical review • review duration is 60 days	• administrative review • technical review • duration approx 6-8 weeks	No change
		REQUIRED NOTICES				
		Notices Required to Commission: • prior to construction • w/i 30 of construction completion • includes cost and proposed operation start date	Retain proof of following public notices with submission of application: • municipality • county planning agency • contiguous property owner • at least one newspaper Notice of Intent required prior to project initiation.	Notice Required: • notification letter of WMP submission sent to municipality and county • SRBC and DRBC notifications satisfy req. • notify DEP 48 hours prior to first withdrawal • Department must be notified 7 days prior to start of construction	None	No change
	Reporting	Recordkeeping (ABR and Non-ABR): • daily withdrawal volumes • volume and destination of each transfer • records kept at withdrawal site for 10 years ABR Reporting: • quarterly report of monthly withdrawal volume • destination of transfers Non-ABR Reporting: • quarterly report of monthly and daily (Non-ABR only) withdrawal volume • daily volumes transferred to individual well pads	Recordkeeping: • total daily volume of withdrawals • groundwater levels in production & monitoring wells (gw only) • water levels in surface storage facilities • stream flow and pass-by flow (sw only) • volume and destination of water transfers Quarterly Reporting: • total daily volume of withdrawals • groundwater levels in production & monitoring wells (groundwater only) • water levels in surface storage facilities • stream flow and pass-by flow (surface water only) • volume and destination of water transfers	Recordkeeping: • daily water withdrawal volumes Reporting: • water withdrawal volumes reported annually on Water Withdrawal and Use Registration	Water Withdrawal Report: • gallons withdrawn / consumed / transferred / diverted per month • description of use • estimated volume • annual report Not required to report on withdrawal report: • if subject to DRBC & SRBC requirements • if using reclaimed wastewater Water Withdrawal Report: submitted annually • Source of water • gallons withdrawn / consumed / transferred / diverted per month	No change
	Imports and Exports	**IMPORTS AND EXPORTS**				
		Imports into the basin requires DRBC approval	Diversions into, out of the basin require SRBC approval. Transfer must not restrict mgmt of SRB's water resources. Must demonstrate no impact to water quality	None	Diversions into or out of basin are reported on Annual Water Withdrawal Report	No change
	Use of Flowback and Produced Water	**USE OF FLOWBACK AND PRODUCED WATER**				
		May be recycled in accordance with well pad approval.	Reuse is allowed and must be recorded in water consumption report. Produced water may be reused on-site or transferred to another pad	With approval, Flowback and Produced water may be: • reused on-site • transported to a centralized impoundment • or transported off-site to an approved facility	Flowback reuse is allowed with Department approval	No change
Water Consumption	Approval	**CONSUMPTIVE USE**				
		Only approved water sources may be used at well pads	Eligible for consumptive use ABR if: • increasing a previously approved quantity, and • using a previously approved water source Retain proof of following public notices with submission of application: • municipality • county planning agency • contiguous property owner • at least one newspaper	None	None	No change
		Application Requirements: • proposed sources • source water docket number • or compliance with Article 2, Section 2.30 of Water Code (imports)	Subject to normal review process if: • applying for water use at a new well pad Application Requirements (non-ABR): • certify produced fluids treated/disposed in accordance with regulations • map of facility, water sources, discharges • metering plan incl. procedures & equipment • Retain proof of following public notices w/ submission: • municipality • county planning agency • contiguous property owner • at least one newspaper Notice of Intent required prior to project initiation			

Exhibit C4: DRBC Proposed Rules Regulatory Comparison

Rule Category		DRBC	SRBC	PADEP	NYSDEC, Pre-dSGEIS	NYSDEC, Post-dSGEIS
Water Consumption	Reporting	**REPORTING AND RECORDKEEPING**				
		Recordkeeping: • daily volumes delivered to individual well pads Reporting: • quarterly report of daily volumes delivered to well pads • basis for water supply charge	Recordkeeping: • volume delivered to the site per day for each source • volume of fresh water used in well completion • volume of produced water used in well completion - Reporting: • quarterly volumes used per well pad • Post-Hydrofracture Stimulation Report	N/A	N/A	No change
		REPORTING ASSOCIATED WITH HYDRAULIC FRACTURING				
		Post-Hydraulic Fracturing Report • submitted w/i 60 days of stimulation • volume of water • volume and type of chemicals with CAS numbers	Post-Hydrofracture Stimulation Report • vol fresh water used • vol produced water used	Completion Report includes: • types/percent by volume of chemical additives • volume of base fluid • volume of recycled water used in stimulation • list of WMP approved water sources and volume	None	Water sources used for HF reported on EAF addendum Chemical additives required to be recorded.
Well Pads						
Well Pad Siting	Restrictions	**RESTRICTIONS**				
		Well pads may not be sited within: • flood hazard area (100 yr. flood plain) • critical habitat for T&E species • >20% pre-alteration slope ABR • Forested site • >15% pre-alteration slope • National Park Service • Upper Delaware Scenic and Recreational River • Delaware Water Gap National Recreational Area • New York City's DRB Reservoirs	N/A	Potential impact considered for following areas: • public parks, forests, gamelands, and wildlife areas • National or state scenic rivers • National natural landmarks • Habitats of rare and endangered flora and fauna • Historical and archaeological sites	None	Site specific SEQRA determinations: • HVHF project shallower than 2,000' • top of fracture zone shallower than 1,000' • centralized flowback impoundments • pads w/i 300' of a reservoir, lake • pads w/i 150' of pvt water well, water body • surface water withdrawal not consistent with DEC's pass-by flow method • proposed well w/i 1,000' of subsurface water supply infrastructure
		VARIANCES				
		Variances: • may be granted by Commission • may not be granted for flood hazard areas	N/A	Mitigation measures may be approved for variance of setbacks.	Variances may be granted to the setbacks with Department approval.	No change
	Setbacks	**SETBACKS**				
		500' setback from: • water body • wetlands • water supply reservoir • water supply intake	N/A	100' setback from: • surface water body • wetlands > 1 acre 200' setback from: • occupied homes • public buildings • surface water supply intake • water supply reservoir • public water supply well • domestic water well	Setbacks (from well): • water bodies- 50' • occupied homes- 100' • public buildings- 150' • public roads- 75' Setbacks, 1992 GEIS: • water bodies- 150' • wetlands- 150' • private water well- 150' • public water supply well- 2,640'	No change
	Spacing	**WELL SPACING**				
		Defer to host state	N/A	No single spacing requirement is set. Spacing orders are issued by PADEP Spacing order requirements: • plat map showing existing wells • land map showing outline of areas to be spaced • $1,000 fee	Approx 40-60 acre spacing allowed for shale gas well pads. Spacing order issued by NYSDEC, application includes: • plat showing spacing area, well locations, unit boundaries W/out spacing order, 1,320' between wells in same pool.	No change

Exhibit C4: DRBC Proposed Rules Regulatory Comparison

Rule Category		DRBC	SRBC	PADEP	NYSDEC, Pre-dSGEIS	NYSDEC, Post-dSGEIS
Well Pad Approval	Well Pad Approval	**WELL APPROVAL**				
		• NGDP Docket • Well Pad ABR • Well Pad Docket	N/A	Well permit	Well permit	No change
		WELL LOCATION MODIFICATION				
		Well locations change <100' don't require a modification.	N/A	None	No new permit required for well modification <75'	No change
		INSPECTIONS ALLOWED				
		Required to be available for inspection: • commission approved facilities - 2 hours notice • well- 2 hours notice • well pad site- 2 hours notice • records - 2 days notice	To verify proper operation at site, Commission representative may: • gain access • inspect • sample	Required to be available for inspection: • sites • properties • operations • records	Inspection of properties allowed for: • inspecting sites • inspecting records • investigating compliance	No change
		NATURAL GAS DEVELOPMENT PLAN				
		NGDP required for: • leaseholds >3,200 acres in the DRB • intent to construct >5 well pads Application Requirements: • lease area map (5 yr development increments • landscape map • constraints analysis map • circulation plan- existing & proposed roads and ROWs • monitoring program map- proposed locations • NPSPCP if w/i SPW area • comply w/ most stringent between DRBC & state • defer to state for exploratory or low volume HF wells Proof of Public Notice for: • host state agency, municipality • property owners w/i 2,000' • local newspaper, county planning agency	N/A	N/A	N/A	N/A
		Well Pad Docket	**N/A**	**Well Permit**	**Well Permit**	**Well Permit**
		Docket required if not in conformance with an NGDP. • lease area map • constraints analysis map • circulation plan • requirements • defer to state for exploratory or low volume hydraulically fractured wells	N/A	Well permit required to drill or alter a well. • Water Management Plan • Location Plat • buildings w/i 200' of well • water supplies w/i 200' of well • water supplies w/i 1,000' of well • wetlands w/i 100' of disturbed areas • names of landowners • names of water users within 1,000' of well • waste handling and disposal plan • Proof of landowner notification	• plat map w/ well spacing & lease boundaries • Full Environmental Assessment Form (EAF) • Fluid Disposal Plan	Locate public or private wells: • evidence of diligent effort to locate wells • wells w/i 2,640' of proposed drilling locations Topographic map in EAF identifies following features: • springs w/i 2,640' • water supply reservoirs w/i 1,320' • wetland, water body, storm drains w/i 660' • occupied structures w/i 1,320' • capacity of rig fuel tank and distance to aquifers, wells, springs, storm drains, water bodies w/i 500'
		NATURAL DIVERSITY				
		• NDIA req. may be satisfied by NY or PA assessments	N/A	PA Natural Diversity Inventory (PNDI) review	EAF requires listing of any T&E species	Survey of invasive plant species (proj. site) Map of all occurrences of invasive plants Invasive species mitigation plan.
		EROSION & SEDIMENTATION				
		NPSPCP required if w/i SPW area • may comply w/ state regs if more stringent	N/A	>5 acres: pre- and post- construction controls	>1 acre: Gen. stormwater permit >5 acres: Additional approval Both require pre- and post- construction control	Multi-sector ind. stormwater permit

Exhibit C4: DRBC Proposed Rules Regulatory Comparison

Rule Category		DRBC	SRBC	PADEP	NYSDEC, Pre-dSGEIS	NYSDEC, Post-dSGEIS
Well Pad Approval	Well Pad Approval	**FLOODPLAIN REQUIREMENTS**				
		Development not allowed w/i floodway.	N/A	Requires Department approval and encroachment permit.	Requires a floodplain permit from DEP.	Closed-loop mud systems must be used .
		PUBLIC NOTICE REQUIREMENTS				
		Proof of Public Notice for: • host state agency • municipality • property owners w/i 2,000' • local newspaper • county planning agency	N/A	Notice of well permit application submitted to: • surface landowners • people with water supplies w/i 1,000' of well • owner/lessee of coal seams required to be notified • include plat map • notify by certified mail	Public Notice Requirements: • intent to issue drilling permit or spacing order • prior to issuance, NYSDEC will publish notice of intent in bulletin • prior to drilling, operator must notify the following by certified mail: • any affected local government • all landowners within 1,000' of well	No Change
		WELL PAD APPROVAL-BY-RULE				
		• in conformance with an approved NGDP; or • meets all well pad siting restrictions Submission Requirements: • lease area map • landscape map • constraints analysis map • circulation plan • NPSPCP if w/i SPW area • may comply w/ state regs if more stringent • defer to state for exploratory or low volume HF Same as for well docket.	N/A	N/A	N/A	N/A
Hydraulic Fracturing	Ground & Surface Water Monitoring	**GROUND WATER AND SURFACE WATER MONITORING**				
		pre-alteration survey • maps of penetrations within 2,000' of well pad • lab results of gw sampling of representative # of wells w/i 1,000' of well pad • map of sw monitoring points up- and down-gradient • lab results of surface water sampling post-construction monitoring report: • sampling results of wells in pre-alteration report • submitted annually	N/A	Pre-alteration water survey suggested to preserve defense in the case of water pollution litigation.	None	Residential water well sampling: • prior to site disturbance • sample wells w/i 1,000' of well pad • wells w/i 2,000' must be sampled if none w/i 1,000' • continued sampling until 1 year after last well has been fractured on well pad Produced fluids must be tested for NORM prior to transporation off-site.
Reporting	Notices	**HYDRAULIC FRACTURING NOTICE**				
		Notify Commission at least 48 hours prior to stimulation	Hydrofracing Schedule- 4 weeks in advance	None	None	Pre-Frac Checklist and Certification: • submit 48 hours prior to fracture • include estimated date of fracture
		DRILLING NOTICE				
		Commission must be notified at least 48 prior to completion of drilling	Drilling Schedule - 4 weeks in advance	24 hours prior to drilling notify the following: • Department, landowners, and local political subdivision • 24 hrs prior to drilling 30 days after completion of drilling or alterting a well: • complete well record and submit to Department.	prior to drilling, operator must notify the following by certified mail: • any affected local government • all landowners within 1,000' of well DEC must be notified prior to start of drilling.	No change

Exhibit C4: DRBC Proposed Rules Regulatory Comparison

Rule Category		DRBC	SRBC	PADEP	NYSDEC, Pre-dSGEIS	NYSDEC, Post-dSGEIS
Waste						
Storage	Storage Requirements	Flowback and produced water must be stored in tanks.	None	Flowback, produced water may be stored in: • tanks • pits Drill Cuttings may be stored in: • tanks • pits	Drill cuttings may be stored in pits Wastewater may be stored in: • tanks or impoundments • flowback and produced water storage must be water tight (tanks or pits)	Centralized flowback impoundments not approved w/in: • boundary of primary aquifers • unfiltered water supplies • mapped 100-year floodplains The following flowback impoundments require site specific SEQRA determinations: • w/i 1,000' of reservoir • w/i 500' of water body • w/i 300' of water well Flowback stored on-site must be stored in tanks.
Waste Management	Approval	Disposal of wastewater requires DRBC approval. Application Requirements: contract with disposal facility	N/A	Waste Procedures must be outlined in the Control and Disposal Plan.	A permit for disposal may be required depending on disposal type.	No change
	Disposal Practices	**DISPOSAL PRACTICES**				
		Acceptable practices: • disposal or injection at an approved facility Prohibited practices: • roadspreading • discharge onto any other surface Flowback: • transported to treatment/discharge facility • reused at other natural gas wells • must be reused or transferred w/in 45 days • transfer or reuse must be approved by DRBC Drilling Fluid/Cuttings: reused or transferred w/in 45 days	SRBC does not regulate disposal of wastewater Operator must certify all waste fluids have been treated and disposed of in accordance with applicable state and federal regulations. Unused wastewater cannot be discharged to waters of the SRB w/o appropriate controls and treatment.	Produced fluids may be: • treated and recycled on-site, at centralized impoundment or at off-site facility • disposed of at off-site facility • injected via Class II well Drilling Fluid/Cuttings may be disposed of by: • pit burial • land application	Drill Cuttings/Drilling Fluid: • if uncontaminated, may be disposed of by burial • recycled/reuse Brine: • may be injected for disposal • roadspreading Flowback: • treated and discharged • injected for disposal	Flowback may not be: • roadspread Produced Water may be: • roadspread
	Record Keeping and Reporting	Recordkeeping: • daily volumes of wastewater produced • transportation record • volume shipped • name, permit, docket number of receiving facility • confirmation wastewater was received Reporting: • quarterly reporting of produced water and flowback volumes • monthly and daily volumes transported off-site • results of flowback/produced water samples	Recordkeeping: • volume and destination of produced water Reporting: • Post-Hydrofracture Stimulation Report • volume, dest. of produced water transported off-site	Recordkeeping/Reporting: • Annual report of wastes transported for treatment/disposal (Form 26R) • volume of waste • type of waste • chemical analysis of waste • destination of waste • Semi-Annual Production and Status Report reporting requirements • volume of water • type of water • destination • semi-annually per well • satisfies biennial reporting requirement of residual waste Transporter Recordkeeping Requirement: • type and volume of waste • generator ID • receiving facility ID • keep records for 5 years	Annual Well Report: • Produced water volumes • per well • Reported annually	Same as current NYSDEC regulations. Operator must maintain a record of fluids moved off-site by piping including: • date and time of transport • quantity • destination • use at destination
	Record Keeping and Reporting	**REPORTING ASSOCIATED WITH HYDRAULIC FRACTURING**				
		Hydraulic Fracturing: • flowback must be continuously metered • Post-Hydraulic Fracturing Report • submitted w/i 60 days of stimulation • flowback water volumes • written verification to DRBC receiving facilities are approved • if reuse is not planned	Reporting: • Post-Hydrofracture Stimulation Report • volume and destination of produced water transported off-site	Hydraulic Fracturing: • Annual Production & Status Report reporting • volume of water • type of water • destination • semi-annually per well • satisfies biennial reporting req. of resid waste	Completion Report: • filed w/i 30 days of completion • description of chemical additives used (The completion report does not indicate that chemical additives must be reported; however, Mr. Jack Dahl (NYSDEC) stated that the reporting of the types of additives used is required prior to approval of the completion report.	Completion Report: • volumes of materials (chemical additives) • flowback volume Drilling and Production Waste Tracking Form: • required for generators, haulers, and receivers of flowback • required regardless of the destination of the waste (well pad, disposal facility..) • must be retained for 3 years

Exhibit C4: DRBC Proposed Rules Regulatory Comparison

Rule Category		DRBC	SRBC	PADEP	NYSDEC, Pre-dSGEIS	NYSDEC, Post-dSGEIS
		WASTE MANAGEMENT PLANS				
Waste Management	Record Keeping and Reporting	Wastewater Treatment and Disposal Plan identifies: • disposal facility location • disposal facility docket number • evidence disposal facility has obtained all approvals • contractual agreement with disposal facility	None	Control and Disposal Plan A Preparedness, Prevention, and Countermeasure Plan (PPC Plan) Wastewater Source Reduction Strategy : procedures to maximize recycling and reuse.	Fluid Disposal Plan: • prior to issuance of well permit • safe and proper ultimate disposal of fluids	No change
		Disposal/Discharge Facilities				
Disposal Facilities	Approval	Wastewater Treatment/Disposal facilities must: • obtain commission approval prior to receiving natural gas waste • Treatability Study: • perform sampling to demonstrate compliance with: • EPA's primary & Secondary Standards • applicable effluent limits • TDS limit of 133% of background or 500 ppm max.	None	Treatment and Disposal facilities must be approved by the Department prior to accepting wastewater from natural gas operations. Wastewater dischargers must: • have an NPDES permit • not have discharge in excess of 500 ppm TDS	Point source discharge requires SPDES permit approval. SPDES permits require compliance with: • effluent limitations • standards of performance for new sources • toxic and pretreatment effluent standards	No change
	Injection Facilities	Facilities must receive Commission approval prior to disposal	None	Injection wells must be permitted and approved by the Department.	Approval must be obtained prior to injection for disposal. Injection wells must be constructed in accordance with NYSDEC and USEPA standards.	No change

Appendix D

Proposed Article 7 Restrictions and Constraints Analysis

Proposed Article 7 Restrictions and Constraint Analysis

An analysis of the proposed Article 7 regulations using Geographic Information System (GIS) techniques was conducted to determine affected surface acreage for siting restrictions, setbacks, approval-by-rule criteria, and combinations of these (variance, no variance, forested site constraints) for the portion of the Delaware River Basin (Basin) that overlays the Marcellus Shale formation. Initially, administrative boundaries for areas managed by state and federal agencies and the DRBC were determined and obtained from various sources, each in its own projection. These boundaries were then re-projected and stored in a Geodatabase using NAD83 (North American Datum of 1983) geographic coordinate system. These administrative areas were measured for acreage in their entirety, for that portion overlaying the Marcellus Shale and for the portions over the Marcellus Shale within the Basin. These areas are presented in **Exhibit D1** in square miles and as a percentage within the Basin overlaying the Marcellus Shale. This method allows for consideration of how a particular restriction or constraint within the proposed Article 7 regulations will affect the area available for well pad placement.

The data gathered for the analyses was obtained from various geo-database sources; for example the 100-year floodplain dataset was obtained from the Federal Emergency Management Agency (FEMA) Digital Q3 Flood Zone Data which are derived from Flood Insurance Rate Maps. Other datasets obtained are as follows:

- Forest – National Land Cover Database, United States Geological Survey (USGS)
- Streams & Waterbodies – National Hydrography Dataset, April 2010, USGS
- Wetlands – National Wetlands Inventory, United States Fish and Wildlife Service (USFWS)
- Watersheds – Hydrologic Unit Code Level 12 dataset, National Resources Conservation Service
- Water wells – Pennsylvania Groundwater Information System (PaGWIS) and New York Department of Environmental Protection points and attributes for water wells in NY State.
- Elevation Slope - Shuttle Radar Topography Mission (SRTM) Version2 Data
- Counties, States, Roads – ESRI Street Map Dataset
- National Park Service Boundaries – National Park Service Dataset

These datasets were used to develop representative polygons of the various restrictions, setbacks, and Approval by Rule (ABR) criteria so that analysis of the Marcellus Shale area within the Basin could be queried and summary acreages for each criteria generated. For example, once the elevation dataset was obtained, it was clipped to the analysis area, and a slope layer was created from it using Spatial Analyst in ArcGIS 10.

The slope percentages were reclassified into greater than 15 percent, 15-20 percent and 20 percent and greater. Polygons representing each of these slope areas were created and analysis of the total representative acreages calculated. We were careful to merge overlapping layers and dissolve the areas that overlapped so acreages were not counted twice. We also clipped the polygons to the DRBC boundary or other boundaries of interest when calculating so as not to put the small areas that overlapped or fall outside the boundaries into the area calculation statistics. The merging and dissolving was also conducted similarly when we combined various restrictions or setbacks or combinations, so again acreages were not represented twice.

This general approach was used to analyze a specific restriction or setback; for example, the 100-year floodplain restriction was analyzed as a separate layer within the DRBC over Marcellus Shale and quantities representing areas within the Basin, PA and NY were generated. The Floodplain data were merged with the separate pre-alteration slope of 20 percent or greater to generate the total restriction acreages. These two criteria could not simply be added together because there are some 20 percent slope areas that are also 100-year floodplains, hence using the merge and dissolve approach. Again the same method was used for individual setbacks and for total setbacks and again when setbacks and restriction were overlaid to generate areas where a variance would be required.

This approach to generate acreages for all the various criteria and combinations coupled with the known total acreage within the Basin or in PA and NY over the Marcellus Shale allowed both the area affected by restriction, setbacks, or ABR criteria to be generated as well as the area without restrictions, setbacks, or ABR criteria, and combinations such as areas requiring a variance or areas subject to forest site constraints to be generated.

Exhibit D1: GIS Analysis of DRBC Restrictions, Setbacks, and ABR Criteria

	GIS Layer Analysis Areas (All Quantities in Miles^2)	In DRBC Over Marcellus	% in DRBC Over Marcellus
1	DRBC (Entire Area 13,611 miles^2)	4,936	100%
2	Special Protection Waters (Entire Area 6,878 miles^2)	4,667	94.6%
3	Marcellus Shale outside Special Protection Waters area	269	5.4%
4	Southeastern Groundwater Protected Area (Entire Area 1,164 miles^2)	0	0%
5	Catskill State Park and Forest Preserve (Entire Area 1,087 miles^2)	427	8.6%
6	Upper Delaware Scenic and Recreational River (Entire Area 59 miles^2)	59	1.2%
7	Delaware River Water Gap National Recreation Area (Entire Area 107 miles^2)	11	0.2%
8	NYC Water Supply Area (Entire Area 1,612 miles^2)	911	18.5%
	Restricted Areas		
9	Flood hazard Areas (100-year Floodplains)	252	5.1%
10	Slope Pre-alteration Grade 20% or Greater	885	17.9%
11	T&E Critical Habitat (Data not released by states, must identify on project specific basis)	No Data	
	Setbacks		
12	DRBC Water Body Setback (500')	1,670	33.8%
13	DRBC Wetlands Setback (500')	1,099	22.3%
14	Public and Domestic Water Supply Wells (Number of wells PA-1,280, NY-533) (Host State; PA-200'; NY-150')	7	0.1%
15	Surface Water Supply Intake (500')(Assumed included within 500' setback for streams & waterbodies)	No Data	
16	Water Supply Reservoirs (500')(Assumed included within 500' setback for waterbodies)	No Data	
17	Occupied Homes (Host State)	No Data	
18	Public Buildings (Host State)	No Data	
19	Public Roads (Host State - NY 75', PA No Setback)	106	2.1%
	Approval By Rule Criteria		
21	Greater than 15%	1,365	27.6%
22	Forested Areas	3,823	77.4%
23	Federal Agency Managed Areas	72	1.4%
24	Upper Delaware Scenic and Recreational River (UPDE)	59	1.2%

Exhibit D1: GIS Analysis of DRBC Restrictions, Setbacks, and ABR Criteria

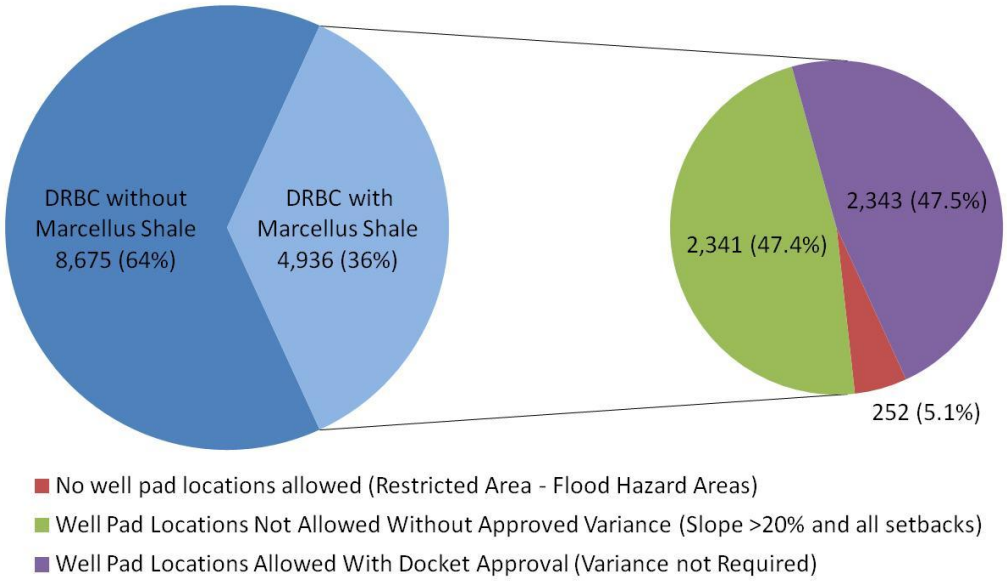
	GIS Layer Analysis Areas (All Quantities in Miles^2)	In DRBC Over Marcellus	% in DRBC Over Marcellus
25	Delaware Water Gap National Recreational Area (DEWA) (Entire Area 107 miles^2)	11	0.2%
26	USFWS Areas	0	0%
27	DOD Areas	2	0.04%
28	Watersheds that Drain to NYC Delaware River Basin Reservoirs (NYC Water Supply Area - 1,612 miles^2)	911	18.5%
29	Surface Area Affected by Restrictions and Setbacks	2,667	53.5%
	Analysis		
30	No well pad locations allowed (Restricted Area - Flood Hazard Areas)	252	5.1%
31	Well Pad Locations Not Allowed Without Approved Variance (Slope >20% and all setbacks)	2,431	47.4%
32	Well Pad Locations Allowed With Docket Approval (Variance not Required)	2,253	47.5%
33	Well Pad Locations Allowed Under ABR With Approval But Subject to Forest Site Constraints (>3 acres)	1,522	30.8%
34	Well Pad Locations Allowed Under ABR With Approval Not Subject to Forest Site Constraints	407	8.2%

A graphical depiction of the available areas for development under the natural gas development plan and ABR criteria is shown in the pie charts in **Exhibit D2**.

On the basis of the GIS analysis conducted for the Basin, three maps were prepared. These maps visually depict (1) the administrative boundaries within the Basin – **Exhibit D3**; (2) the affect of the restrictions and setbacks contained within Sections 7.5(b)(3) and 7.5(b)(4) of the proposed Article 7 regulations – **Exhibit D4**; and (3) the affect of the constraints listed within the Approval by Rule (ABR) process without a Natural Gas Development Plan under Section 7.5(e) of the proposed Article 7 regulations – **Exhibit D5**.

Exhibit D2: Development Areas versus Regulatory Restricted Areas within the Delaware River Basin

NGDP Process



ABR Process

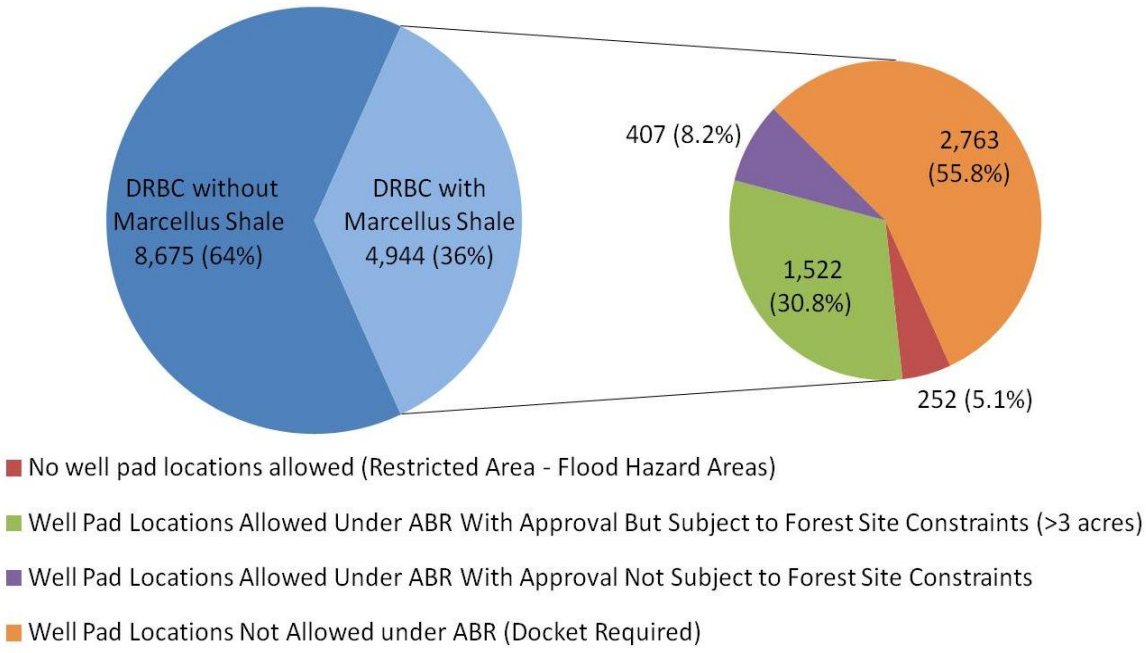


Exhibit D3: Map 1 – Delaware River Basin Administrative Boundaries

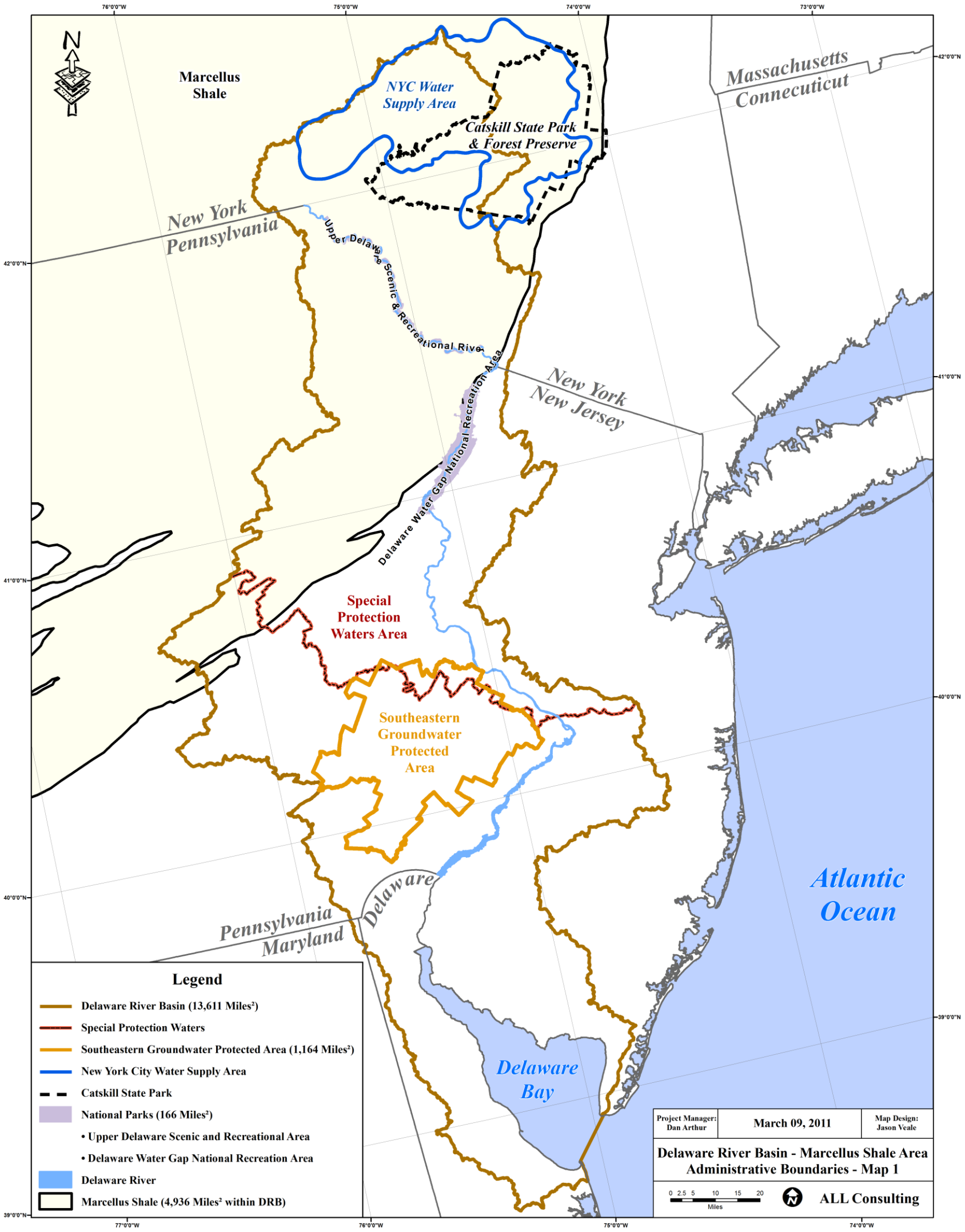


Exhibit D4: Map 2 – Siting Restrictions and Setbacks – Natural Gas Development Plan

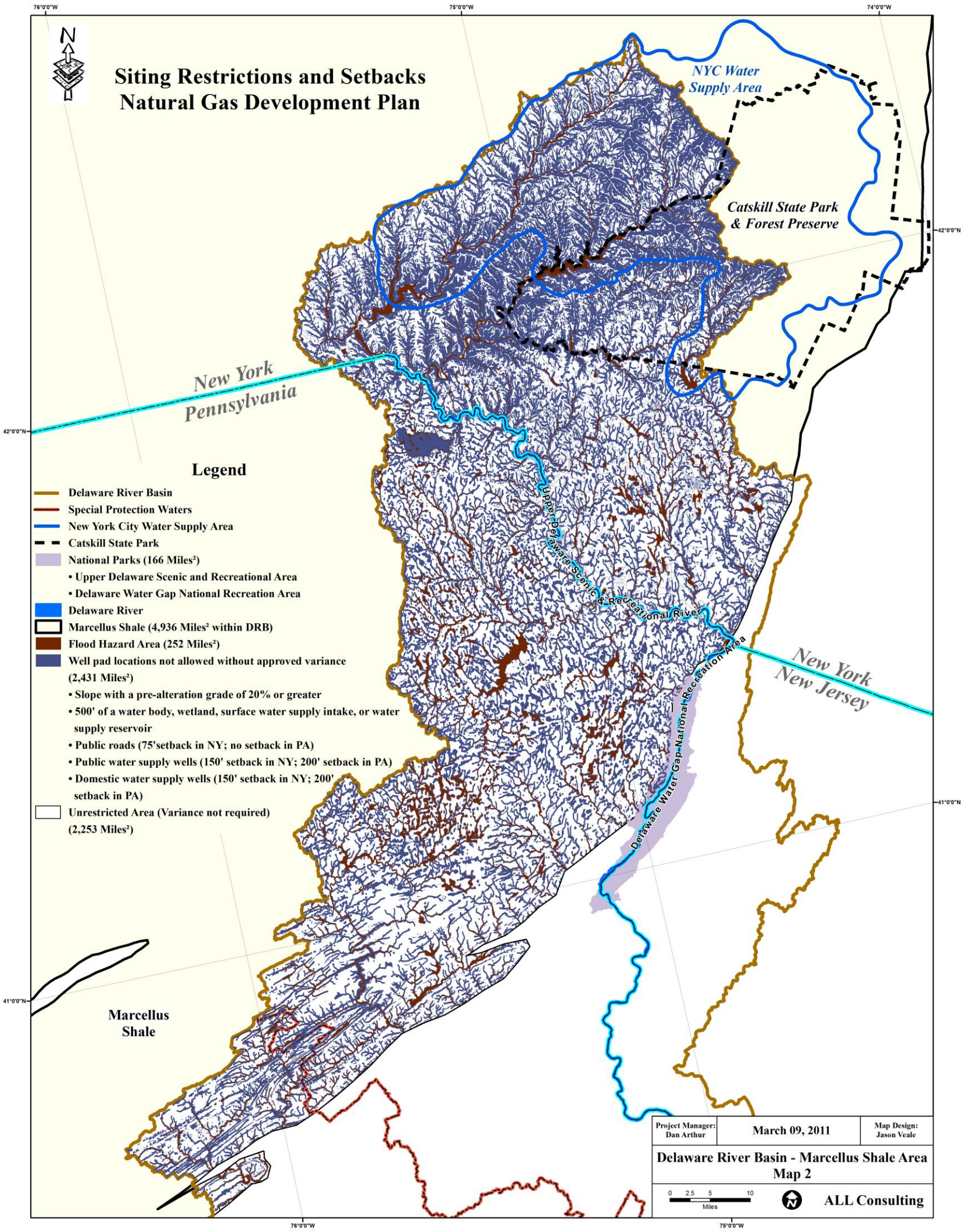
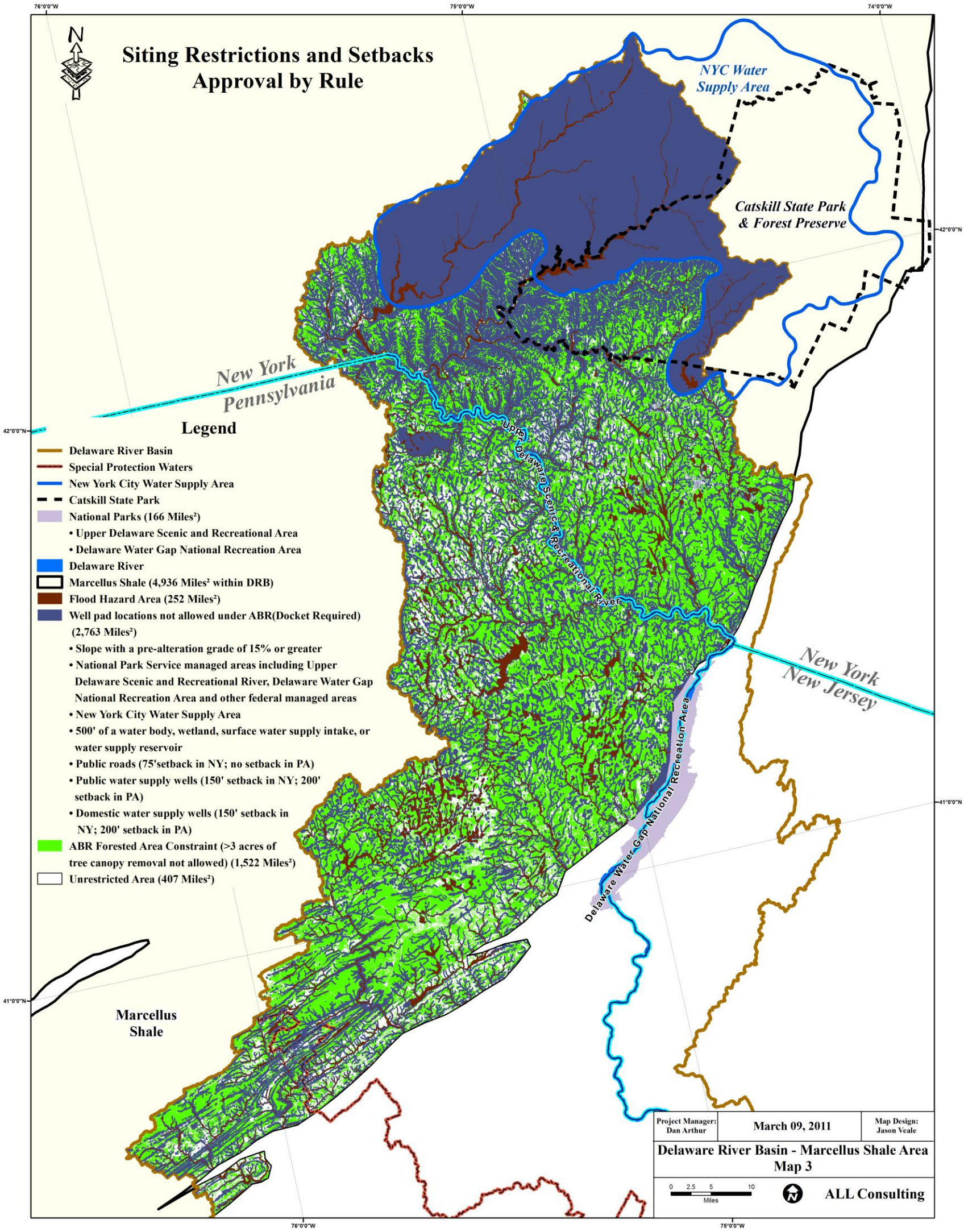


Exhibit D5: Map 3 – Siting Restrictions and Setbacks – Approval by Rule without an NGDP



Appendix E

Detailed Comments on Proposed Article 7 Rules

Detailed Comments on Proposed Article 7 Rules

The following comments have been prepared at the request of the American Petroleum Institute and the Marcellus Shale Coalition and are submitted to the Delaware River Basin Commission in response to the proposed Article 7 regulations for Natural Gas Development within the Delaware River Basin.

Section 7.1 Purpose, Authority, Scope and Relationship to other Requirements and Rules

Comment No. 1) **7.1(a) Purpose:** There are elements of the natural gas industry that are unique to the industry just as there are unique elements to other industries such as agriculture, forestry, or power generation. The proposed Article 7 regulations do not establish a basis for what is unique about the natural gas industry, as opposed to other industries or water users within the basin, as a justification for regulation of the natural gas industry separate from other water use industries. As an example, the estimated water use and land footprint for natural gas development is relatively minor in comparison to other water users such as thermoelectric power plants, agriculture, and golf courses within the Delaware River Basin (Basin) (see **Appendix B** for additional details). *It is recommended that the proposed Article 7 regulations provide a basis that clearly defines and quantifies those elements of the natural gas industry that would require regulation separate from the regulations that apply to other industry water users within the Basin. The principal activities of natural gas development that impact water resources – water withdrawal and wastewater disposal – are not materially different from those activities as conducted by other industries in the Basin.*

Comment No. 2) **7.1(c) Scope:** The scope of the proposed Article 7 regulations is very broad and would include parties other than operators of natural gas development wells such as mid-stream operators of gas transmission pipelines and compressor stations, yet the proposed Article 7 regulations do not address mid-stream operations. *It is recommended that the proposed Article 7 regulations include provisions that address mid-stream operations (construction and operation of natural gas gathering and transmission systems) are not subject to the regulations.*

The wording in this provision – "This Article applies to all natural gas development projects…" – is all-inclusive and does not specifically differentiate between "new," as opposed to "existing," natural gas development projects. Is it the intent of the Commission that the Scope of the proposed Article 7 regulations address only "new" natural gas development and that "existing" natural gas development would be "grandfathered" in some way? *It is recommended that the proposed Article 7 regulations provide guidance on how "existing" as well as "new" natural gas development projects would be addressed.*

Comment No. 3) **7.1(d) Comprehensive Plan and Project Review:** The proposed Article 7 regulations do not provide a basis for the statement that "The Commission has also

determined that all natural gas development projects may have a substantial effect on the water resources of the Basin"; it is recommended that this basis be included. Additionally, the proposed Article 7 regulations do not establish what would constitute a "substantial effect"; *it is recommended that a definition of what constitutes a "substantial effect" be included.*

Comment No. 4) 7.1(e)(1)(i) Planning Framework: *It is recommended that the term "National Park Unit" be defined.*

Comment No. 5) 7.1(e)(1)(ii) Planning Framework: *It is recommended that the term "Park Unit Management Plans" be defined. It is recommended that the word "forested" be removed from this language.*

Comment No. 6) 7.1(e)(1)(iii) Planning Framework: The Management Plan Goals are not provided or defined in the proposed Article 7 regulations nor is a reference included to a particular plan currently in use by the DRBC. *It is recommended that the Management Plan Goals be provided or referenced to allow for review and comment as they relate to the proposed Article 7 regulations.*

Comment No. 7) 7.1(e)(2)(i) Planning Framework: *It is recommended that the "other resources" be listed and the rationale for linking them to water quality and water quantity be included.*

Comment No. 8) 7.1(e)(2)(ii) Planning Framework: The terms "social" and "institutional systems" are not defined or further referenced within the proposed Article 7 regulations and therefore serve no apparent purpose within these proposed regulations. *It is recommended that the terms "social" and "institutional systems" be removed.*

Comment No. 9) 7.1(e)(2)(iii) Planning Framework: *It is recommended that the means for establishing aquifer boundaries be included.*

Comment No. 10) 7.1(e)(2)(iv) Planning Framework: A set of new, or proposed, regulations is not the appropriate venue to "push the boundaries of technological possibility." Water resource management decisions should be based on sound science that is technologically achievable while balancing economic development. *It is recommended that the language be changed to: "and employ sound science that is technologically achievable while balancing economic development."*

Comment No. 11) 7.1(e)(3) Planning Framework: *It is recommended that the term "land management" be replaced with "land development decisions."*

Comment No. 12) 7.1(e)(3)(i) Planning Framework: *It is recommended that the language after the word "principles" be deleted.*

Comment No. 13) 7.1(e)(3)(iii) Planning Framework: *It is recommended that the words "land and" be deleted.*

Comment No. 14) 7.1(e)(4)(ii) Planning Framework: *It is recommended that the language after "groundwater resources" be deleted.*

Comment No. 15) 7.1(e)(4)(iii) Planning Framework: *It is recommended that the language "through broad scale, rather than limited site-by-site decision making," be deleted. It is recommended that the term "environmentally sensitive landscapes" be defined.*

Comment No. 16) 7.1(e)(4)(iv) Planning Framework: *It is recommended that the term "receiving waters" be defined.*

Comment No. 17) 7.1(i) Host State Regulation of Natural Gas and Exploratory Well Construction and Operation: The proposed Article 7 regulations recognize the authorities of the Basin states of New York and Pennsylvania but fail to recognize the authorities of the states of New Jersey or Delaware. Additionally, the proposed regulations fail to recognize the regulatory authority of the U.S. Army Corps of Engineers to manage "waters of the United States" including wetlands under provisions of the Clean Water Act and "navigable waters" under provisions of the Rivers and Harbors Act. *It is recommended that the proposed Article 7 regulations recognize the authority of the Basin states of New Jersey and Delaware as well as the authority of the appropriate Federal Agencies such as U.S. Army Corps of Engineers.*

Comment No. 18) 7.1(i) Host State Regulation of Natural Gas and Exploratory Well Construction and Operation: As this section notes, the Basin states of New York and Pennsylvania have enacted statutes and promulgated regulations governing the natural gas industry. The Basin states of New York and Pennsylvania have also developed the background and guidance documents necessary for the implementation and enforcement of those statutes and regulations. Within the context of the proposed Article 7 regulations, the DRBC is proposing regulations that are in many respects duplicative of and more restrictive and complicated than those of the Basin states of New York and Pennsylvania without the benefit of the background and guidance documents necessary for effective implementation and enforcement. *It is recommended that the DRBC defer to existing host state requirements in all instances where existing state programs regulate the subject activity.*

Comment No. 19) 7.1(i)(2) Host State Regulation of Natural Gas and Exploratory Well Construction and Operation: The numbering of this Section appears to be incorrect. *It is recommended that "Administrative Agreements" in the first sentence of this section be changed to "Administrative Agreement."*

Section 7.2 Definitions

Comment No. 20) **7.2 Definitions***: It is recommended that a definition for "natural gas" be added to the definitions within Section 7.2 as follows: "Natural gas - a naturally occurring mixture of hydrocarbon gases that is highly compressible and expansible. Methane [CH_4] is the chief constituent of most natural gas (constituting as much as 85% of some natural gases), with lesser amounts of ethane [C_2H_6], propane [C_3H_8], butane [C_4H_{10}], and pentane [C_5H_{12}]. Impurities can also be present in large proportions, including carbon dioxide, helium, nitrogen, and hydrogen sulfide."*

Comment No. 21) **7.2 Access road:** Access roads for drilling and fracturing operations are reduced and partially restored during the production phase of natural gas development projects; *it is recommended that this be considered when assessing project magnitude.*

Comment No. 22) **7.2 Agriculture, agricultural operations:** *It is recommended that the use of land for "timber" be added to this definition.*

Comment No. 23) **7.2 Agricultural land:** The definition includes the use of state orthophotography prior to January 2010. This is unclear and *it is recommended that it be revised to a specific year.* The use of state orthophotography from any year prior to 2010 could yield conflicting results as land can be converted from forested to agriculture and vice versa.

Comment No. 24) **7.2 Approval by rule (ABR):** *It is recommended that the wording in this definition read "natural gas development project," as opposed to "natural gas development activities," to be consistent with other portions of the proposed Article 7 regulations.*

Comment No. 25) **7.2 Artificial penetration:** This definition is too broad in that it could potentially include residential basements, cellars, water wells, and ponds. Additionally, the definition only addresses the upward migration of contaminants existing or injected below the ground surface and therefore presumes that this is the only means that contaminants might migrate via an artificial penetration.

Comment No. 26) **7.2 Best management practices (BMPs):** *It is recommended that this definition be deleted and replaced with the following: "Best management practices (BMPs) are state-of-the-art mitigation measures applied to oil and natural gas drilling and production operations to help ensure that energy development is conducted in an environmentally responsible manner."*

Comment No. 27) **7.2 Centralized wastewater storage facility:** *It is recommended that this definition be revised to read, "Centralized storage facility."*

Comment No. 28) **7.2 Contiguous:** *It is recommended that the words "and adjacent" be added after the word "side."*

Comment No. 29) **7.2 Critical habitat:** *It is recommended that "specific geographic areas, whether occupied by federal or state listed species or not, that are determined" be rewritten to read: "specific geographic areas occupied by federal or state listed species that are determined."*

Comment No. 30) **7.2 Disturbed area:** This term is not used within the proposed Article 7 regulations and *it is therefore recommended that it be deleted from the definitions.*

Comment No. 31) **7.2 Diversion:** This definition is too broad and *it is therefore recommended that it be clarified to include the types of water subject to diversion. Additionally, the proposed Article 7 regulations should provide clarification on whether they address diversions within the Basin or diversions into or out of the jurisdictional boundaries of the Basin as well.*

Comment No. 32) **7.2 Docket:** *It is recommended that the term "substantial effect," as used within this definition, be defined.*

Comment No. 33) **7.2 Domestic wastewater:** *It is recommended that the wording after "residences" be deleted.*

Comment No. 34) **7.2 Domestic water supply well:** *It is recommended that the second sentence of this definition be deleted.*

Comment No. 35) **7.2 Earth disturbance activity:** This definition is too broad in its scope. *It is recommended that it be rewritten as follows: "a construction activity that disturbs the surface of the land, including, but not limited to, clearing and grubbing, grading, excavations, creating embankments, land development, agricultural plowing or tilling, road construction or maintenance activities, and mineral extraction."*

Comment No. 36) **7.2 Flood hazard area:** Is the "regulatory flood" as used in this definition the same as the "Flood, regulatory" as defined in this Section?

Comment No. 37) **7.2 Flowback:** Flowback, as used in the oil and gas industry, is the process of recovering fluids used in well stimulation or hydraulic fracturing. The term "flowback" is not used to describe the fluid itself. The state of New York Draft Supplemental Generic Environmental Impact Statement (SGEIS) defines "Flowback" as the "Return of fluid, used in the stimulation process, to the surface." *It is recommended that this definition be revised to correspond with that of the New York State Draft SGEIS and that language concerning "flowback" used within the proposed Article 7 regulations be revised accordingly.*

Comment No. 38) **7.2 Forested landscape:** This definition does not include consideration of lands deforested due to development or converted to agricultural or other uses. *It is recommended that the definition be revised to consider these aspects of the landscape.*

Comment No. 39) **7.2 Forested site:** The definition includes the use of "state orthophotography prior to January 2010." This language is unclear and it is therefore recommended that it be revised to require orthophotography from a specific year. The use of state orthophotography from any year prior to 2010 could yield conflicting results. *It is recommended that the definition be rewritten as follows: "any parcel of land identified for a well pad which will require removal of 3 or more acres of tree canopy, for the project."*

Comment No. 40) **7.2 Groundwater:** This definition is too broad. As stated, it would include high TDS water produced from deep formations as well as shallow water suitable for consumption by humans or livestock or for use in agriculture. The USGS defines groundwater as "water in the ground that is in the zone of saturation, from which wells,

springs, and groundwater runoff are supplied." *It is recommended that this definition be revised to correspond with that of the USGS.*

Comment No. 41) **7.2 High volume hydraulically fractured wells***: It is recommended that this definition be rewritten as follows: "natural gas wells that use or are expected to use greater than 80,000 gallons of water."*

Comment No. 42) **7.2 Horizontal wellbore:** To provide additional clarification, *it is recommended that this definition be rewritten as follows: "the portion of a well drilled intentionally to deviate from a vertical axis and with the intention of drilling horizontally."*

Comment No. 43) **7.2 Hydraulic fracturing:** *It is recommended that the words "other fluids" be deleted from this definition.*

Comment No. 44) **7.2 Impoundment:** *It is recommended that requirements not be included as a part of a definition. It is recommended that the second sentence of this definition starting with "Impoundments are required…" be deleted.*

Comment No. 45) **7.2 Leasehold:** This definition is confusing in that a natural gas development company may have an interest in multiple leases but may not have a controlling interest and therefore would not be the project sponsor. *It is recommended that the definition be rewritten as follows: "all parcels of land or mineral estates in which a project sponsor or its direct or indirect parent, subsidiary or affiliated entities has individual ownership, or common ownership, and control."*

Comment No. 46) **7.2 Natural gas development plan (NGDP):** Does the word "accessing" as used in this definition refer to accessing the resource or accessing the site?

Comment No. 47) **7.2 Natural gas development project:** There are elements within this definition that may be beyond the control of the project sponsor of a natural gas development project. These would include mid-stream "gas collection and transmission infrastructure (e.g., pipelines, compressor stations)" which may be operated independently. As such, they would not be part of a project sponsor's natural gas development project. *It is recommended that the references to "transportation" of natural gas and "transmission infrastructure (e.g., pipelines, compression stations)" be deleted. It is also recommended that the words "domestic and" be deleted from the definition as it refers to the disposal of domestic wastewaters as being a part of the natural gas development project.* There is nothing unique about domestic wastewater associated with a natural gas project that would require special attention.

Comment No. 48) **7.2 Non-domestic wastewater:** Drilling muds, hydraulic fracturing fluids, well servicing fluid, and oil are substances that are not inherently a waste. *It is recommended that this definition be revised to include the following: "waste drilling mud," "waste hydraulic fracturing fluids," "waste well servicing fluids," and "waste oil." It also is recommended that the reference to "flowback" be deleted, as discussed above.*

Comment No. 49) **7.2 Pollutants:** This definition, as stated, is confusing in that there are items included, such as rocks, which would not normally result in the pollution of surface water or groundwater. *It is recommended that the definition be rewritten as follows: "any substance which when introduced into surface water or groundwater renders them harmful or unsuitable for a specific purpose."*

Comment No. 50) **7.2 Practicable:** Does this definition include the concept of pushing the "boundaries of technological possibility" as presented in 7.1(e)(2)(iv).

Comment No. 51) **7.2 Production water:** *It is recommended that the definition be changed to read, "Produced water" and all references to "production water" in the text be changed accordingly. It is recommended that the words "oil or" be deleted as the proposed Article 7 regulations address only the development of natural gas.*

Comment No. 52) **7.2 Private water supply well:** *It is recommended that this definition be revised to account for privately owned public supply wells such as for Aqua, PA.*

Comment No. 53) **7.2 Proppant or propping agent:** *It is recommended that the word "treatment" be replaced with "stimulation."*

Comment No. 54) **7.2 Public water supply*:*** *It is recommended that the definition be rewritten as follows: "a supply of drinking water for a public or community water system."*

Comment No. 55) **7.2 Public water supply well:** *It is recommended that the language "that serves a community, transient non-community or non-transient non-community water system" be deleted.*

Comment No. 56) **7.2 Setback*:*** *It is recommended that the words "zones" and 'boundaries," as used in this definition, be defined.*

Comment No. 57) **7.2 Substantial funds*:*** *It is recommended that this definition be deleted and replaced with defined funds as necessary to support the proposed Article 7 regulations. Additionally, as this definition is not in alphabetical order, it is recommended that it be relocated between the definitions of "Structure" and "Surface casing."*

Comment No. 58) **7.2 Surface casing:** The definition fails to recognize that the surface casing also provides a structural integrity component to the well as well as serving as the base for the connection of blow out preventers. As the proposed Article 7 regulations relate only to natural gas *it is recommended that the word "oil" be deleted from the definition.* Surface casing is installed to a depth that is deemed necessary by the appropriate state agency to protect groundwater resources; therefore, a designation of "fresh groundwater" is not applicable and *it is recommended that the word "fresh" be deleted from the definition.*

Comment No. 59) **7.2 Wastewater treatment facility:** Under this definition, a tank used to store produced water at a well pad, or a pipeline used to transport produced water to a central storage facility would be considered as a wastewater treatment facility. *It is recommended that the definition be revised to read, "any facility storing, intercepting, transporting and treating or discharging wastewater."*

Comment No. 60) **7.2 Water body:** This definition is too broad to be effective. Wetlands are included as a separate definition and it is therefore recommended that it be excluded from the definition of a water body. The inclusion of ditches and similar drainageways would include drainage ditches along the side of roads and would potentially render the proposed Article 7 regulations unworkable given the setback requirements under 7.5(b)(4); as such, *it is recommended that the terms "ditches" and "drainageways" be excluded. It is recommended that that the definition of a "water body" be rewritten as follows: "a natural or constructed landscape feature containing or conveying surface water on a permanent, seasonal, or intermittent basis, including 1) depressional features such as reservoirs, lakes,*

ponds, and embayments; 2) natural or constructed channels that convey flowing water such as canals or permanent, seasonal, or intermittent streams."

Comment No. 61) **7.2 Wellbore:** Since the proposed Article 7 regulations specifically address natural gas development; *it is recommended that the definition of "wellbore" be rewritten as follows: "any hole drilled for the purpose of exploration or for production of natural gas or other liquid hydrocarbons or injection of water. It is often used interchangeably with well or borehole. A wellbore may have casing in it or it may be open (uncased); or partially cased."*

Comment No. 62) **7.2 Wetlands:** In an effort to avoid confusion over what may or may not be a wetland, *it is recommended that this definition be revised to correspond with the definition utilized by the U.S. Army Corps of Engineers which uses three criteria to define a jurisdictional wetland; the three criteria include vegetation, soil and hydrology which would have the following characteristics:*

a. Vegetation - The prevalent vegetation consists of macrophytes that are typically adapted to areas having specified hydrologic and soil conditions.

b. Soil - Soils are present and have been classified as hydric, or they possess characteristics that are associated with reducing soil conditions.

c. *Hydrology - The area is inundated either permanently or periodically at mean water depths <6.6 ft, or the soil is saturated to the surface at some time during the growing season of the prevalent vegetation.*

By employing the definition used by the U.S. Army Corps of Engineers, the Commission can take advantage of a well established and effective program that is already in place for the identification of wetland areas.

Section 7.3 Administration

Comment No. 63) **7.3(b) Types of Review and Approval:** In order to provide project sponsors with the ability to schedule their natural gas development projects, *it is recommended that set timeframes for reviews and approvals be incorporated into the docket, protected area permit, and ABR process.* As detailed within **Appendix A**, it is estimated that from the time of first submitting a Natural Gas Development Plan and applying for a well pad permit to actual approval would take approximately 18 to 24 months. The extended timeframes required for approval of a well pad and NGDP has the potential to adversely affect a project sponsor's overall lease position within the Basin should certain leases expire before approvals can be acquired for the drilling, completion and production of the natural gas wells necessary to secure a lease. *It is recommended that the DRBC provide a streamlined process that allows for the timely approval of well pads and NGDPs that will not adversely affect a project sponsor's lease position within the Basin.*

Comment No. 64) **7.3(c) Approval by Rule for Natural Gas Development Projects:** In order to provide project sponsors with the ability to schedule their natural gas development projects, *it is recommended that set timeframes for reviews and approvals be incorporated into the ABR process.*

Comment No. 65) **7.3(e) Duration of an Approval:** In order to affect consistency between the host state rules and the proposed DRBC Article 7 regulations, *it is recommended that DRBC approvals be for the same time period as those of the host state.*

Comment No. 66) **7.3(e)(1) Duration of an Approval:** Since the Natural Gas Development Plan (NGDP) may be extended for an additional 10 years beyond the initial 10 years as stated under citation 7.3(e)(2), *it is recommended that the approval of water withdrawals and water uses also contain a provision for a an extension as a means to support the natural gas development projects of the NGDP. In other words, it does little good to extend the NGDP if the water necessary to implement the NGDP is not also extended.*

It is recommended that set timeframes for reviews and approvals be incorporated into the water withdrawal approval process.

Comment No. 67) **7.3(e)(2) Duration of an Approval:** Given the expected life of a well and the number of wells that would be covered within a NGDP, *it is recommended that the term of an NGDP be extended to 30 years.*

Comment No. 68) **7.3(e)(4) Duration of an Approval:** The proposed Article 7 regulations do not supply a rationale for why the term of an approval for a well pad used exclusively for exploratory or low volume hydraulically fractured wells would follow host state natural gas well construction permit terms while the approval term of well pads for natural gas development cited in 7.3(e)(3), presumably applying to any well pad not used exclusively for exploratory or low volume hydraulic fracturing, would have a different term limit. *It is recommended that term of an approval for all well pads follow host state regulations.*

Comment No. 69) **7.3(e)(5) Duration of an Approval:** *It is recommended that the language be rewritten to read, "Other than wastewater treatment and disposal treatment plants provided for in the NGDP, approvals for wastewater treatment and disposal/discharge…"*

It is recommended that the approvals for wastewater treatment and disposal/discharge have the same term as the NGDP with the same provision for an extension. This is necessary for project sponsors of NGDPs to ensure that they can effectively implement the NGDP.

Comment No. 70) 7.3(f) Expiration: The term "substantial" used in this provision is subjective. *It is recommended that the second sentence of this provision be reworded to read, "A one-year extension may be granted by the Executive Director if it is submitted in advance of the three-year anniversary of the approval and states that it is still the project sponsor's intent to implement the natural gas project."* Additionally, submittal of a renewal application at least one year before the expiration date is unrealistic given the many unknowns concerning the success of a particular project. *It is recommended that the last sentence be rewritten to read, "Project sponsors must submit a renewal application at least ninety days before the expiration date in order to qualify for an administrative continuance of the approval."*

Comment No. 71) 7.3(h) Docket protected area permit and ABR modification or suspension by Director: The powers afforded the Executive Director within 7.3(h) are very broad with no guidance or protocols provided on the rationale for the decision process that would be used to modify or suspend an approval or require mitigating measures pending additional review. *It is recommended that the protocols and guidance within which the Executive Director would operate in modifying or suspending an approval or require mitigating measures be provided.*

Comment No. 72) 7.3(i)(1) Public Notice Procedure: Notices as described are currently being handled by the Department of Environmental Protection in Pennsylvania (PADEP) and Department of Conservation in New York (NYSDEC) and therefore this provision duplicates the state's efforts. *Additionally, it is recommended that the "2,000 ft" requirement for notification to adjacent landowners be revised to 1,000 ft to conform to PADEP and NYSDEC requirements (58 P.S. §601.201 and ECL §23-0305.13) (see **Appendix C**). It is recommended that the words "electronic mail address, and phone number" in the last sentence be deleted as these are inadequate means of tracking comments or responses to a public notice.*

Comment No. 73) 7.3(i)(1) Public Notice Procedure: The requirement that return receipts and notification forms be provided to the Commission is too onerous and it is recommended that it be removed. *It is recommended that the project sponsors responsibility for providing notification be limited to showing that the notifications were sent, not received.*

Comment No. 74) 7.3(j) Site Access: *It is recommended that the term "authorized representative" be defined.*

Comment No. 75) 7.3(j)(2) Site Access: The requirement for providing access to a facility within two hours of a request may not be achievable given the likely remote nature of some locations and potential distance from area offices. *It is recommended that the language be revised to reflect that access will be provided within a reasonably agreed upon timeframe but not greater than 24 hours.*

Comment No. 76) 7.3(j)(3) Site Access: *It is recommended that the term "personal safety equipment (PSE)" be changed to "personal protective equipment (PPE)" which is more commonly used by both industry and the U.S. EPA.*

Comment No. 77) 7.3(j)(4) Site Access: *It is recommended that this provision list the facility records that need to be kept. Requiring records to be kept at the withdrawal site may not be feasible. It is recommended that this wording be revised to reflect that records be kept by the project sponsor at a designated office or location. Further, it is recommended that ten days be allowed for making records available to the Commission representatives after request to allow project sponsors sufficient time to retrieve the records and provide them to the Commission.*

Comment No. 78) 7.3(j)(5) Site Access: *It is recommended that this language be revised to include the provision that all clothing be rated as fire retardant.*

Comment No. 79) 7.3(k)(1) Financial Assurance Requirements: *The financial assurance required under 7.3(k)(1) duplicates financial assurance mechanisms already required by the Basin states and it is therefore recommended that it be deleted.* Financial assurance for plugging and abandoning wells is covered by both Pennsylvania (58 P.S. §601.215) and New York (6 NYCRR §551.5) and Pennsylvania's financial assurance requirements specifically cover site restoration activities (58 P.S. §601.25) (see **Appendix C**).

Comment No. 80) 7.3(k)(2) Financial Assurance Requirements: *The financial assurance required under 7.3(k)(2) duplicates financial assurance mechanisms already required by the Basin states and it is therefore recommended that it be deleted.* DRBC's requirement for financial assurance to cover pollution mitigation is duplicative of Pennsylvania's financial assurance requirement for water supply replacement (58 P.S. §601.215) (see **Appendix C**).

Comment No. 81) 7.3(k)(7)(iv) Financial Assurance Requirements: If a financial assurance mechanism is already established with the host state, and the host state already has a regulatory framework for utilizing those mechanisms for effecting closure and remediation, what is the rationale for making those proceeds available to the Commission to perform closure and remediation?

Comment No. 82) 7.3(k)(8) Financial Assurance Requirements: *It is recommended that a rationale for financial assurance in the amount of $125,000 per natural gas well be provided, particularly in light of this duplication of host state requirements.* The financial assurance requirements of the host states are $2,500 per well in Pennsylvania (58 P.S. §601.215) and $700-$5,000 per well in New York (6 NYCRR §551.5) (see **Appendix C**), as compared with DRBC's $125,000 per well requirement. *It also is recommended that the aggregate bond amount for a single project sponsor be "capped" at a reasonable level.*

Comment No. 83) 7.3(k)(9) Financial Assurance Requirements: The proposed Article 7 regulations do not provide a rationale for requiring a financial assurance which is separate from, and in addition to, that already required by the host state. *It is recommended that a rationale be provided for this duplication of financial commitment required of project sponsors.*

Comment No. 84) 7.3(k)(12)(iii) Financial Assurance Requirements: *It is recommended that the language "a property interest in the surety's guarantee of payment under the bond which is not affected by the bankruptcy, insolvency or other financial incapacity of the operator or principal on the bond." be further explained and justified.*

Comment No. 85) 7.3(k)(15)(i) Financial Assurance Requirements: *It is recommended that this provision provide the criteria by which the successful installation of well casing would be determined.*

Comment No. 86) 7.3(K)(15)(iii) Financial Assurance Requirements: *Use of the term "alleged" is too broad in scope and therefore inappropriate and it is recommended that it be removed.*

Comment No. 87) 7.3(k)(16)(v) Financial Assurance Requirements: The wording of 7.3(K)(16)(iv) and (v) would seem to suggest that project sponsors will work in unity and form an association to maintain the excess financial assurance aggregate of $25M required under 7.3(k)(16)(i). How does the Commission propose assessing the purchase of excess financial assurance among the many potential project sponsors to maintain the limit of $25 M if the project sponsors choose not to form an association for the purpose of purchasing excess financial assurance?

Comment No. 88) 7.3(k)(17) Financial Assurance Requirements: *It is recommended that this subsection include a provision for the release from financial assurance in the event that the project sponsor sells the asset.*

Comment No. 89) 7.3(k)(17)(ii) Financial Assurance Requirements: *It is recommended that the conditions of release from financial assurance liability be consistent with that of the host state.* In Pennsylvania, release from financial assurance liability may be granted one year after plugging assuming no incidents occur and in New York financial assurance liability ends when the well has been plugged and abandoned to the satisfaction of the NYSDEC.

Comment No. 90) 7.3(l) Project Review Fees: The fee structure as proposed is unreasonable and excessive. As an example, if a project sponsor developed a moderate-sized lease (4,480 acres) with 7 well pads (1 well pad/640 acres) and a total of 42 wells (6 wells/well pad), the fees required would add to a total estimated cost of approximately $545,000 (including 10 years of annual monitoring fees). These fees represent a cost structure of over $78,000 for the approval of one well pad. The proposed fees and assumptions utilized in this example are representative of a hypothetical development scenario for area requiring a NGDP. The following table identifies the fees and assumptions associated with the example cost estimate:

Example Scenario for NG Development within Basin

Assumptions:	**Fees**
(1) The Project Sponsor has 4,480 contiguous leased acres within the DRBC	$ -
(2) Six wells per pad developed (42 wells total)	$ -
(3) Spacing is based on one well pad per 640 acres (7 Pads)	$ -
(4) Average of 3,300,000 gallons per well for each HVHF well based on SRBC published average. (assume 100% consumptive use)	$ 11,000.00
(5) Average of 84,000 gallons per well for drilling	$ 285.00
(6) Two water sources will be required for the NGDP, one new and one existing each serving 3 or 4 well pads.	$ -

New Source (Docket Approval for Surface Water Source)	$ 75,000.00
Existing Source (ABR Application Documentation of Adequacy, ISCP)	$ 5,000.00
(7) Three separate well pad applications will be prepared prior to NGDP approval	$ 90,000.00
(8) One NGDP will be prepared for the entire project	$ 50,000.00
(9) Four well pad applications will be submitted as ABRs under the approved NGDP	$ 60,000.00

Example Scenario for NG Development within Basin

Assumptions:	**Fees**
(10) No NDIAs will be completed by the DRBC	$ -
(11) Wastewater discharge will be contracted with one facilities outside the Basin	$ 75,000.00
(12) Flowback water will be recycled for use in HVHF	$ -
(13) The project will last at least 10 years (Annual Monitoring Fee/year)	$ 180,000.00
(14) Notifications will be prepared and submitted by the project sponsor (10 total)	$ -
	$ 546,285.00

The proposed fees are not insubstantial and when combined with the fees already required by the host states would represent a considerable economic requirement on the project sponsor. *It is recommended that the Commission reconsider what fees should be charged and what amount the fee should be to avoid an economic requirement on project sponsors that is in addition to those fees already imposed by the host states (see **Appendix A**).*

Comment No. 91) 7.3(l)(1)(xii) Project Review Fees: *It is recommended that the review fee for a NDIA not be required.* Threatened and endangered species surveys are already required as a part of the well permitting process in both Pennsylvania and New York (PADEP's Water Management Plan and NYSDEC's Environmental Assessment Form).

Comment No. 92) 7.3(l)(5) Project Review Fees: The provisions of 7.3(l)(5) are open ended with an unknown limit to the potential review fees that might be assessed to a project sponsor. If the review fees assessed during a calendar year are found to be insufficient to cover actual costs then it is recommended that a new fee schedule be prepared and presented to the Commission with a rationale for any increases. In this manner, project sponsors will not be assessed review fees that are, in essence, completely unknown. *It is recommended that the provision allowing the Executive Director to impose a fee in the amount of up to 100 percent of the Commission's actual cost be removed.*

Comment No. 93) 7.3(m)(1) Reporting Violations: *It is recommended that the Commission follow NYSDEC requirements for reporting violations; specifically oral notification immediately following identification of the spill followed by a written report within five days (6 NYCRR 556.4(d) (see **Appendix C**). It is recommended that the term "significant harm" in the second sentence be defined.*

Comment No. 94) 7.3(m)(2) Reporting Violations: *It is recommended that the term "designated uses of ground or surface water" in the first sentence be defined. The term "complaint" is too broad and it is recommended that it be limited to "complaints of potential contamination" It is recommended that the first sentence be rewritten as follows: "If the*

monitoring required herein, or any other data or information demonstrates that the operation of this project significantly affects or interferes with any designated uses of ground or surface water, or if the project sponsor receives a complaint of potential contamination regarding this project, the project sponsor must, within twenty four hours, notify the Executive Director of such condition and unless excused by the Executive Director, must investigate such condition." It is recommended that the third sentence starting with "In addition…" and the fourth sentence starting with "Any ground or surface…" be deleted as these actions are already required in Pennsylvania and New York. It is recommended that the term "significantly affects" in the first sentence be defined.

Comment No. 95) 7.3(n)(1)(i) Enforcement: *The language in the first sentence "or poses a threat to the water resources of the basin" is ambiguous and it is recommended that it be deleted.*

Comment No. 96) 7.3(n)(2)(i) Enforcement: *The language "or when in the judgment of the Executive Director or Commission, such action is necessary to protect the water resources of the basin or to effectuate the Comprehensive Plan" is too open ended and it is recommended that it be deleted.*

Comment No. 97) 7.3(n)(2)(ii) Enforcement: The notification and appeal process lacks clarity, is open-ended, and poses the potential to create significant and unnecessary delays. *It is recommended that the DRBC provide a clear set of criteria by which appeals can be timely processed and allows for a project sponsors to continue operations during the appeal process.*

Comment No. 98) 7.3(n)(2)(iii) Enforcement: The language of this section appears to be broad. Specifically, the following language, "…the violation or condition upon which the suspension or termination or modification is based is corrected so as to bring all natural gas development by the project sponsor into full compliance with this Article…" The language "All natural gas development by the project sponsor" may imply that if there remains a minor violation at some other location which was not the subject of the specific violation, gas development activities would be halted at that location as well. *It is recommended that this provision be modified and the following language deleted "so as to bring all natural gas development by the project sponsor into full compliance with this Article."*

Section 7.4 Water Sources for Uses Related to Natural Gas Well Development

Comment No. 99) 7.4(a)(6) Recovered flowback and production water: *It is recommended that an approval not be required for the use of water recovered during flowback operations or produced water.* Approval is required for the reuse and disposal of water by both PADEP's Water Management Plan and NYSEC's Fluid Disposal Plan (Water Management Plan and 6 NYCRR §554.1(c)(1)) (see **Appendix C**).

Comment No. 100) 7.4(b)(1) Substantial effect: The proposed Article 7 regulations provide no basis for how many wells may be drilled within the Basin; as such, *it is recommended that the words "thousands of" be deleted from the first sentence.* The proposed Article 7 regulations provide no basis for what type of effect these wells will have on the surface water and groundwater resources of the basin; as such, *it is recommended that the word "substantial" be deleted from the last sentence.*

Comment No. 101) 7.4(b)(2) Rules of Practice and Procedure (RPP) thresholds not applicable: The proposed Article 7 regulations do not provide a basis for how many natural gas wells might be drilled in the basin or their possible locations within the basin; as such, it is recommended that the first sentence be rewritten as follows: "Natural gas well development within the Delaware River Basin may include drilling sites, possibly proximate to headwater streams in the upper portion of the Delaware Basin that comprises the drainage area of the Commission's Special Protection Waters." The proposed Article 7 regulations do not provide a basis that establishes the differences between water use for natural gas development versus other water users within the basin; as such, *it is recommended that the sixth sentence starting "For this combination of reasons…" and the seventh sentence starting "The thresholds established…" be deleted and the last sentence be revised to read, "Sponsors of natural gas development projects within the Delaware River Basin must obtain Commission approval for all sources of water with the exception of water recovered during flowback operations or produced water."* The second sentence provides a range for the volume of water used for the hydraulic fracturing of a well that is based on current practices and technology which may change over time; as such, *it is recommended that the second sentence be revised to read, "Current estimates of the quantity of water needed to develop these wells and perform hydraulic fracturing range from 3 to 5 million gallons per well, however this range may vary over time due to changes or improvements in technology or natural gas development practices."*

Comment No. 102) 7.4(c)(3) Alternate review and approval process for sources previously approved by the Commission: This provision limits the use of recovered flowback and production water and new water sources approved by ABR to those located within the physical boundaries of an approved NGDP. The boundary of an NGDP will, by necessity, extend beyond a project sponsor's leasehold in order to show access roads and pipelines. Would new water sources that are outside of a project sponsor's leasehold, but identified within an NGDP, be eligible for approval by means of an ABR or only those within the physical boundaries of the lease? *It is recommended that a definition of what constitutes the physical boundaries of an approved NGDP be provided.*

Comment No. 103) 7.4(d)(1)(vi) Approved withdrawals: The language under 7.4(d)(1) states that "An existing ground or surface water withdrawal is eligible for ABR to provide water for uses related to natural gas development if no increase in the withdrawal is required and the project sponsor meets the conditions set forth below." Yet under 7.4(d)(1)(vi) it states that a demonstration showing no adverse affects to stream flow in the vicinity of the withdrawal point must be made if 100% of the water is used for natural gas development. Using one hundred percent of a previously approved source does not constitute an increase in withdrawal; as such, the approval afforded under 7.4(d)(1) is qualified under 7.4(d)(1)(vi). *It is recommended that 7.4(d)(1)(vi) be deleted or modified to conform with 7.4(d)(1).*

Comment No. 104) 7.4(d)(1)(viii) Approved withdrawals: Requiring records to be kept at the withdrawal site may not be feasible particularly in light of the fact that a particular water withdrawal site may only be used for a relatively short period of time by a project sponsor given transport distances. *It is recommended that this wording be revised to reflect that records should be kept by the project sponsor at a designated office or location. Additionally, maintaining records for a period of 10 years is unreasonable; it is recommended that the provision be modified to keep records for a period of five years. It is recommended that the electronic reporting format of this provision be defined in advance in order to comply.*

Comment No. 105) 7.4(e)(1)(i) Docket approval required: *It is recommended that all of the provisions for docket approval of new water sources (Section 7.4(e)) be deleted and replaced with a cross-reference to the existing program for Project Review Under Section 3.8 of the Compact.* DRBC has an existing program to review and approve surface water and groundwater withdrawals. There is no need to duplicate the existing program in Article 7. All of the following comments regarding Section 7.4(e) are made subject to this comment. *It is recommended that clarification be provided for what constitutes the "physical boundaries" of an approved NGDP.* Is it the project sponsor's leasehold or does it extend beyond the leasehold to include access roads and pipelines or the location of a new water source?

Comment No. 106) 7.4(e)(1)(ii) Substantive requirements: *It is recommended that the conditions for approved water source uses be clearly established and contained within these proposed regulations. It is recommended that the wording of this provision be rewritten as follows: "New water sources approved for uses related to natural gas development activities will be subject to the conditions set forth below."*

Comment No. 107) 7.4(e)(2)(ii) Natural diversity inventory assessment: This provision currently reads as though the Commission is allowed to complete the survey to their satisfaction and charge the operator without first notifying the operator. If a NDIA is found to be in some way deficient, *it is recommended that the project sponsor be afforded the opportunity to correct the deficiencies therefore eliminating any need for the DRBC to prepare a separate assessment. If the language of this provision is not changed to reflect the above, it is recommended that any separate assessment required be at the expense of the Commission.* In Pennsylvania, a search of the Pennsylvania Natural Diversity Inventory (PNDI) must be conducted as a part of the Water Management Plan and well permitting process; therefore, *it is recommended that the DRBC defer to the PADEP's natural diversity requirement for those well pads located within in Pennsylvania.*

Comment No. 108) 7.4(e)(2)(iii) Metering and recording of withdrawals and transfers: Requiring records to be kept at the withdrawal site may not be feasible, particularly in light of the fact that a specific water withdrawal site may only be used for a relatively short period of time by a project sponsor given transport distances (i.e. The cost of approval and construction of a new withdrawal site closer to operational activities would be cheaper than transporting water from an existing, more distant, water withdrawal site). *It is recommended that this wording be revised to reflect that records be kept by the project sponsor at a designated office or location. Additionally, maintaining records for a period of 10 years is unreasonable; it is recommended that the provision be modified to keep records for a period of five years. It is recommended that the electronic reporting format of this provision to be defined in advance in order to comply.*

Comment No. 109) 7.4(e)(2)(iv) Reporting of withdrawals and transfers: *It is recommended that the format and timeframe of reporting withdrawals and transfers be consistent with the host states' annual requirements (025 Pa. Code §110.502 and ECL §15-3301(1)) (see Appendix C).* This citation includes the language "...reports indicating monthly and daily total withdrawals and daily total volumes transferred to individual natural gas well sites…" which does not account for withdrawals to, or from, a centralized freshwater impoundment. *It is recommended that the proposed Article 7 regulations include provisions on how withdrawals to and from centralized freshwater impoundments will be treated.*

Comment No. 110) 7.4(e)(2)(vii) Notice of construction start and completion: Thirty days is insufficient time to provide the Commission with final project construction costs. *It is recommended that this provision be revised to allow for the submittal of final construction costs within 90 days as opposed to 30 days.* Extending this requirement to 90 days will provide project sponsors with the necessary time to process project invoices so that actual final construction costs can be determined.

Comment No. 111) 7.4(e)(2)(viii) Expiration of approval: The term substantial is subjective. *It is recommended that this provision be reworded to read, "A one-year extension may be granted by the Executive Director if it is submitted in advance of the three-year anniversary of the approval and states that it is still the project sponsor's intent to implement the new water source project."*

Comment No. 112) 7.4(e)(2)(x) Restricted access and operations: The proposed Article 7 regulations do not provide a basis for why withdrawal sites for natural gas development have access restrictions over and above what is required for other industry withdrawal sites. *It is recommended that this basis be provided or the language of this Section be modified to be consistent with those requirements that apply to other industry water withdrawals. The word "emergency" in the last sentence is extraneous and it is recommended that it be deleted.*

Comment No. 113) 7.4(e)(2)(xii) Invasive species control plan: DRBC requires that water withdrawals within the floodplain must comply with the Commission's Flood Plain Regulations, which indicate that DRBC approval may require a special permit. *It is recommended that DRBC delete this requirement as both Pennsylvania and New York require permits for development within the 100-year flood plain (025 Pa. Code §106.11 and 6 NYCRR §500.6(a)).*

Comment No. 114) 7.4(e)(3)(ii) Pass-by flow requirement: The first sentence allows creation of a pass-by flow as "a more stringent value recommended by the appropriate host state agency." *It is recommended that the "appropriate host state agency" be identified.*

Comment No. 115) 7.4(e)(4) Additional submittals, conditions applicable to new groundwater withdrawals: *It is recommended that this Section include language that states a groundwater withdrawal approval will not be unreasonably withheld.*

Comment No. 116) 7.4(e)(4)(i)(E) Hydrogeologic report: *It is recommended that the proposed Article 7 regulations provide guidance on what number, and placement, of monitoring wells would be sufficient to satisfy this requirement.* In dealing with a subsurface environment, it is impossible to determine all possible interference.

Comment No. 117) 7.4(e)(4)(i)(G) Hydrogeologic report: *It is recommended that this provision be reworded as follows: "A map identifying all nearby wells owned by others, if available, that could be affected by pumping of the new well(s) and the following information for each, if available and the landowner allows such information to be shared with the DRBC and the public in general. Nothing herein shall require the sponsor to obtain the information if the landowner declines to provide such:"*

Comment No. 118) 7.4(e)(4)(ii) Obligations relating to interference: The word "complaint" as used in the first sentence is too broad. *It is recommended that it be replaced with "complaint related to surface water or groundwater" in order to be specific to the topic of this section. Additionally, it is recommended that the proposed Article 7 regulations include a process for determining the zone of influence that would apply to this provision.*

Section 7.5 Well pads for Natural Gas Activities

Comment No. 119) 7.5 Well pads for Natural Gas Activities: A need to regulate well pads independently of existing state programs has not been established. *It is recommended that DRBC defer to existing state programs with respect to the approval of well pads*. All additional comments on Section 7.5 are made subject to this recommendation. *It is recommended that references be supplied for the facts and figures used in this section.*

Comment No. 120) 7.5(a)(1) Purpose and Applicability: The phrase "National Scenic and Recreational" in the fifth sentence is unnecessary and it is recommended that it be deleted. *It is recommended that the sixth sentence be reworded to read, "Protecting the high value water resources implements, and is consistent with, Goal 3.2 of the Water Resources Plan for the Delaware River Basin (Resolution 2004-BP) and with the anti-degradation program codified in the Commission's Special Protection Waters program, DRBC Water Quality Regulations, 18 C.F.R. Part 410, Article 3.10.3.A.2 et seq."*

Comment No. 121) 7.5(a)(2) Purpose and Applicability: The proposed Article 7 regulations do not provide a basis for the statement in the first sentence. Additionally, use of the word "substantial" is subjective. *It is recommended that the first sentence of this provision be deleted.*

Comment No. 122) 7.5(b)(3)(i) Siting Restrictions: Restricting development from the 100 year Flood Hazard Area will remove approximately 252 square miles from the area available for potential well pad placement for natural gas development or 5% of the Delaware River Basin that overlays the Marcellus Shale. Rather than restrict development within the 100 year Flood Hazard Area, *it is recommended that the Commission allow a variance for natural gas development within the 100-year floodplain that conforms to the U. S. Army Corps of Engineers program for development within wetland areas, or rely on the permits required by both PADEP and NYSDEC for development within the floodplain (025 Pa. Code §106.11 and 6 NYCRR 500.6(a)) (see **Appendix C**).* This program has proven to be very effective in both allowing natural gas development and protecting wetlands and flood prone areas.

Comment No. 123) 7.5(b)(3)(ii) Siting Restrictions: Restricting development from slopes with a pre-alteration grade of 20% or greater will remove approximately 885 square miles from the area available for potential well pad placement for natural gas development or 18% of the Delaware River Basin that overlays the Marcellus Shale. Rather than restrict development on slopes with a pre-alteration grade of 20% or greater, *it is recommended that the Commission defer to the host state on this issue or allow a variance for natural gas development that employs BMP construction practices designed to minimize erosion and sedimentation.* BMP construction practices which could be employed, as an example, are those outlined in the Bureau of Land Management's Gold Book, Fourth Edition – Revised 2007.

Comment No. 124) 7.5(b)(3)(iii) Siting Restrictions: While state agencies are aware of the presence of critical habitat for federal or state designated threatened or endangered species, they do not release information on critical habitat locations due to the fear of poaching or collecting. As such, compliance with 7.5(b)(3)(iii) will require a natural resource survey for

all areas that will be disturbed for a natural gas development project, yet the proposed Article 7 regulations do not specifically require a natural resource survey or report. Additionally, the presence of critical habitat at a particular location specified in the NGDP will be unknown until a site specific survey is conducted which will require flexibility on the part of the Commission or Executive Director in allowing location adjustments of natural gas development activities, including pads, roads, pipelines, etc., within the NGDP.

Comment No. 125) 7.5(b)(4) Setbacks: The setbacks set forth in 7.5(b)(4) are substantially greater than those required by the host states for water bodies, wetlands, surface water supply intake, and water supply reservoir (see **Appendix C**) and will remove a considerable amount of area from potential natural gas development due to the project sponsors inability to construct well pads in these areas (see **Appendix D**). *It is recommended that the proposed Article 7 regulations defer to the host state for all setback requirements.* The protection of water resources within the basin can be achieved through the implementation of Best Management Practices and do not require the increased setbacks as contained in the regulation.

Comment No. 126) 7.5(b)(4)(i) Setbacks: Employing a setback of 500 ft from water bodies, streams and water supply reservoirs will remove approximately 2,096 square miles from the area available for potential well pad placement for natural gas development or 41% of the basin that overlays the Marcellus Shale (see **Appendix D**). Complying with state setbacks would remove approximately 353 square miles or 7% of the basin overlaying the Marcellus Shale. The proposed Article 7 regulations do not provide a basis for justifying a setback of 500 ft from water bodies, streams, or water supply reservoirs or why the proposed setbacks are more restrictive those of the host states; as such, *it is recommended that the Commission defer to the host state for these setbacks.*

Pennsylvania's setbacks are 100' for water bodies and 200' for water supply reservoirs (58 P.S. §601.205). NYSDEC's setback for water bodies is 150' (1992 GEIS Chapter 8.E.1) (see **Appendix C**).

Comment No. 127) 7.5(b)(4)(ii) Setbacks: Employing a setback of 500 ft from wetlands will remove approximately 1,099 square miles from the area available for potential well pad placement for natural gas development or 22% of the Delaware River Basin that overlays the Marcellus Shale. Complying with state setbacks would remove approximately 370 square miles or 7.5% of the Delaware River Basin overlaying the Marcellus Shale. The proposed Article 7 regulations do not provide a basis for justifying a setback of 500 ft from wetlands or why the proposed setback is more restrictive those of the host states; as such, *it is recommended that the Commission defer to the host state for these setbacks.*

Setbacks from wetlands in Pennsylvania and New York are 100' and 150', respectively (58 P.S. §601.205 and 1992 GEIS Chapter 8.E.1).

Comment No. 128) 7.5(b)(4)(vii) Setbacks: See comment under 7.5(b)(4)(i).

Comment No. 129) 7.5(b)(4)(viii) Setbacks: Host state setbacks for both public and domestic water supply wells is 200' in Pennsylvania and 150' in New York. These setback requirements would remove approximately 39 square miles (public and domestic water supply wells combined) from potential well pad placement for natural gas development or 0.8% of the Delaware River Basin that overlays the Marcellus Shale (see **Appendix D**).

Comment No. 130) 7.5(b)(4)(ix) Setbacks: See comment for 7.5(b)(4)(viii).

Comment No. 131) 7.5(b)(6) De minimis Change: *It is recommended that the same provision for modifying the location of a well pad apply to roads, pipelines and other elements of a natural gas project.*

Comment No. 132) 7.5(b)(9)(i) Variances: In accordance with the comment provided on Section 7.5(b)(3)(i), *it is recommended that the last sentence of this provision be deleted and that variances be allowed for natural gas well pads within the 100-year floodplain. It is recommended that clarification be provided on whether a "floodway" as used in this section is, or is not, the same as a "Flood Hazard Area" or "100-year floodplain" as used in 7.5(b)(3). Additionally, it is recommended that a basis be provided that list the criteria necessary for obtaining a variance.*

Comment No. 133) 7.5(b)(9)(ii)(A) Variances: The requirement that a project sponsor must demonstrate "undue burden" in order to obtain a variance is unwarranted. *It is recommended that Section 7.5(b)(9)(ii)(A) be deleted.* Assuring that siting conditions will be equally or more protective of water resources, as provided in Section 7.5(b)(9)(ii)(B), should be adequate to obtain a variance.

Comment No. 134) 7.5(b)(9)(iii) Variances: Since the location of well pads, roads, pipelines, etc. will be laid out within the NGDP and it is within the NGDP that variances will be presented and approved; additional notice to property and mineral rights owners would not be necessary; as such, *it is recommended that this section be deleted.*

Comment No. 135) 7.5(c)(1) Applicability: As both Pennsylvania and New York require permits prior to drilling or altering a well (025 Pa. Code §78.11 and 6 NYCRR §552.1(a)), DRBC's requirements for well pad approval are duplicative of the state permits; as such, *it is recommended all provisions relating to DRBC's regulation of well pads be deleted.*

Comment No. 136) *It is recommended that the word "reasonably" be inserted between the words "identify" and "foreseeable" in the first sentence.*

Comment No. 137) 7.5(c)(1) Applicability: *It is recommended that the description of "entire basin leasehold" be revised to include only those leases in which a project sponsor has a controlling or operating interest.* As currently written, a project sponsor with a minor interest in a lease would have to list that lease as part of its entire basin leasehold while a separate project sponsor who had the controlling or operating interest in the same lease would also list it as part of its entire basin leasehold. The description of "entire basin leasehold" as currently written could lead to multiple project sponsors listing the same leases as part of their entire basin leasehold.

Comment No. 138) 7.5(c)(1) Applicability: *It is recommended that the proposed Article 7 regulations allow for an extended approval term for water withdrawals under 7.3(e)(1) and Natural Gas Development Plans and 7.3(e)(2) for project sponsors who propose phased development.* Phased development of a lease or leasehold will typically require longer timeframes.

Comment No. 139) 7.5(c)(3)(i) Lease Area Map: In order to allow for some flexibility between the plans and implementation, *it is recommended that the last sentence be rewritten to read, "The map(s) must show possible development units within the leaseholds that potentially will be developed over a period of time defined by the project sponsor."* The

development plan of a project sponsor can vary for a number of reasons that would include economics or production trends within their leasehold.

Comment No. 140) 7.5(c)(3)(ii)(B) Landscape Map: *It is recommended that a rationale be provided for requiring this list of property and mineral rights owners or it be deleted.*

Comment No. 141) 7.5(c)(3)(ii)(C) Landscape Map: *It is recommended that this provision be rewritten as follows: "7.5 minute USGS quad, or GIS equivalent, showing (lease area plus a 0.5 mile perimeter around the leasehold) if features are available: existing roadways, existing rights of way - utility lines, pipelines, transmission lines, existing oil and gas wells, existing water supply wells – community, domestic (within a 0.5 mile radius of any proposed natural gas well pads and with landowner approval), and any wellhead protection area prescribed by the state, and existing buildings."*

Comment No. 142) 7.5(c)(3)(ii)(D) Landscape Map: *It is recommended that the words "if available and not proprietary" be inserted after the words "Hydrology Map."*

Comment No. 143) 7.5(c)(3)(iv) Circulation Plan: Having the entire project designed prior to the beginning of development is probably not realistic. The identification of well pads and associated facilities should be a conceptual level only and should allow for the flexibility necessary to make adjustments. As such, *it is recommended that a streamlined approach be included that allows for additions, deletions, or changes to a plan.* As an example, an adjustment could be allowed for changes to natural gas well pads, roads, pipelines, compressor stations and other ancillary equipment or features without having to apply to the Executive Director provided the revised locations do not conflict with the provisions of 7.5(b)(3) and (4) and would result in an equal or lesser impact.

It is recommended that the term "well field development area" in the first sentence be defined. It is recommended that the DRBC confirm that the word "plan" in the second sentence refers to the Circulation Plan and provide a definition for Circulation Plan.

Comment No. 144) 7.5(d) Natural Gas Well Pad Docket Application Requirements: This currently reads as though the DRBC is allowed to complete the survey to their satisfaction and charge the operator without first notifying the operator. If a NDIA is found to be in some way deficient, *it is recommended that then the project sponsor be afforded the opportunity to correct the deficiencies therefore eliminating any need for the DRBC to prepare a separate assessment. If the language of this provision is not changed to reflect the above, then it is recommended that any separate assessment required be at the expense of the Commission.*

Comment No. 145) 7.5(e) Approval by Rule (ABR): The applicability of the ABR is not clearly stated. This is due in part to awkward numbering. *The provision should make clear that an ABR is available if (1) a project has been identified and is in conformance with an approved NGDP, or (2) the project meets the specified criteria for forested sites, pre-alteration slopes, etc.* This will clarify that the limiting criteria now stated in (e)(2) – (7) do not apply to projects identified in, and in conformance with, an approved NGDP.

Comment No. 146) 7.5(e)(1) Approval by Rule (ABR): Meeting the following would restrict, or qualify in the case of forested areas and setbacks, natural gas development on approximately 4,537 square miles or 90.2% of the area overlying the Marcellus Shale within the basin from potential natural gas development (see **Appendix D**). This level of restriction

and qualification on potential natural gas development would seem to make the ABR process unusable without an approved NGDP in place.

Comment No. 147) 7.5(e)(2) Approval by Rule (ABR): Including this provision will remove or restrict/constrain approximately 3,823 square miles or 77.4% of the area overlying the Marcellus Shale within the basin for well pads that require 3 or more acres of tree canopy removal (see **Appendix D**). This substantially reduces the area remaining where the removal or disturbance of less than 3 acres of forest cover would allow for a well pad, access road, pipeline etc.

Comment No. 148) 7.5(e)(3) Approval by Rule (ABR): Including this provision will remove approximately 1,365 square miles or 27.6% of the area overlying the Marcellus Shale within the basin from potential natural gas development (see **Appendix D**). This further adds to the ABR process, without a NGDP, being unusable with the level of restrictions that are being applied. Rather than restrict development on slopes with a pre-alteration grade of 15% or greater, *it is recommended that the Commission defer to the host state on this issue or allow a variance for natural gas development that employs BMP construction practices designed to minimize erosion and sediment.* As an example, BMP construction practices which could be employed are those outlined in the Bureau of Land Management's Gold Book, Fourth Edition – Revised 2007.

Comment No. 149) 7.5(e)(4) Approval by Rule (ABR): Locating well pads outside of the National Park Service (NPS) lands, including the Upper Delaware Scenic and Recreational River (UPDE) and the Delaware Water Gap National Recreation Area (DEWA) will remove approximately 70 square miles or 1.2% of the area overlying the Marcellus Shale within the basin from potential natural gas development. Locating well pads outside of other areas in which the National Park Service or other federal agencies have a management interest, the Department of Defense, will remove approximately 2 square miles or 0.04% of the area overlying the Marcellus Shale within the basin from potential natural gas development (see **Appendix D**). This further adds to the ABR process, without a NGDP, being unusable with the level of restrictions that are being applied. *It is recommended that the Commission defer to the appropriate federal agency requirements for natural gas development within these areas.*

Comment No. 150) 7.5(e)(5) Approval by Rule (ABR): Including this provision will remove approximately 911 square miles or 18.5% of the area overlying the Marcellus Shale within the basin from potential natural gas development (see **Appendix D**). This further adds to the ABR process, without a NGDP, being unusable with the level of restrictions that are being applied. *It is recommended that the Commission allow natural gas development within the watersheds that drain to New York City's Delaware River Basin Reservoirs provided the project sponsor demonstrates that, through the use of BMPs, the construction of the proposed well pad and associated features will, to the extent achievable, avoid impacts to the quality or quantity of water within the watersheds of the New York City's Delaware River Basin Reservoirs.*

New York's dSGEIS states the New York City watershed is adequately protected by the various regulatory agencies with authority over oil and gas development in the area (dSGEIS 7.1.11) (see **Appendix C**).

Comment No. 151) 7.5(e)(6) Approval by Rule (ABR): Including this provision will remove approximately 2,667 square miles or 53.5% of the area overlying the Marcellus Shale within the basin from potential natural gas development (see **Appendix D**). This further adds to the ABR process, without a NGDP, being unusable with the level of restrictions that are being applied. *It is recommended that the Commission defer to the host state for restrictions and setbacks as contained within 7.5(b)(3) and 7.5(b)(4).*

Comment No. 152) 7.5(e)(7) Approval by Rule (ABR): *This is already a requirement of the host states for all wells and therefore is duplicative and it is recommended that it be removed (025 Pa. Code §78.11 and 6 NYCRR §552.1(a)) (see **Appendix C**).*

Comment No. 153) 7.5(h)(1)(iii)(A) Water Source Requirements: *It is recommended that the words "within the basin" be inserted between the words "pads" and "obtained." It is recommended that this provision be clarified to indicate that it does not apply to water used for "domestic" purposes, such as drinking water, at the well pad.*

Comment No. 154) 7.5(h)(1)(iii)(C) Water Recording: *It is recommended that the electronic reporting format of this provision be defined in advance in order to comply.*

Comment No. 155) 7.5(h)(1)(iii)(E) Water supply charge: *It is recommended that this provision be clarified to show that consumptive use water supply charges do not apply to water recovered during well flowback operations that is recycled and reused.*

Comment No. 156) 7.5(h)(1)(iii)(F) Water Conservation: The requirement to "…implement a continuous program to encourage water conservation in all types of use within the facilities served by the Commission's well pad approval," is very broad and unclear as to how the DRBC will determine acceptability of the "program." While the intent is appreciated and understood, this requirement seems to be unreasonable and *it is recommended that it be eliminated.*

Comment No. 157) 7.5(h)(1)(iv)(A)(4) Disposal: Does this requirement preclude the beneficial use of salt derived from brine treatment for the purposes of road salt? It seems counterintuitive to ban the use of salts derived from brine for road salt applications instead of using road salt from other sources.

Comment No. 158) 7.5(h)(1)(iv)(B) Recording: *It is recommended that the electronic reporting format of this provision be defined in advance in order to comply.*

Comment No. 159) 7.5(h)(1)(iv)(C)(1) Reporting: Well pad project sponsor must submit a "DRBC Post Hydraulic Fracturing Report" to the Commission within 60 days of completion of each hydraulic fracturing event." The contents of this report appear to contain redundant information to the other reports that need to be submitted monthly and quarterly. *It is recommended that, to reduce the duplicative nature of this report, the timeframe be modified to provide a comprehensive report within 90 days of completion of all hydraulic fracturing events at the well pad.*

The DRBC Post Hydraulic Fracturing Report duplicates the water volume, produced water volume, chemical additive, and flowback chemical analysis reporting requirements of PADEP and NYSDEC.

The proposed Article 7 regulations include the requirement that project sponsors report information related to the hydraulic fracturing fluids used to hydraulically fracture a well as

part of the DRBC Post Hydraulic Fracturing Report after the well has been hydraulically fractured. This is the appropriate time for such information to be provided since it (1) enables the well pad operator to select the most appropriate additives based on conditions determined in the field at each well pad location, (2) facilitates the use of the latest suite of materials that at the time of Docket application may only be in the development stage, and (3) results in reporting the most accurate information. Information of this nature cannot be provided in advance of the approval of a well pad Docket because decisions regarding hydraulic fracturing fluid composition are made only after site-specific information is gathered and thoroughly assessed.

Comment No. 160) 7.5(h)(1)(iv)(C)(2) Reporting: This provision duplicates the requirements under 7.5(h)(1)(iii)(C).

Comment No. 161) 7.5(h)(1)(v) Non-point source pollution control plan: *It is recommended that the provisions of the referenced Administrative Agreement between the Commission and the host state be defined.* The proposed Article 7 regulations do not include a basis for limiting the reliance upon host state erosion and sediment control plan and post construction stormwater management plan requirements for NPSPCPs for well pads approved by an ABR to exploratory or low volume hydraulically fractured wells. As both Pennsylvania and New York require stormwater discharge permits, *it is recommended that the last sentence be revised to apply to all wells.* Additionally, the proposed Article 7 states that the states' stormwater and erosion and sedimentation requirements will satisfy the requirement for development of a NPSPCP so long as they are more stringent then DRBC's requirements and include measures to control stormwater both during and after construction. As both Pennsylvania's and New York's stormwater permits require both pre- and post-construction plans (PADEP ESCGP-1, Form 5500-PM-OG0005 and NYSDEC Permit No. GP-01-10-001), *it is recommended that the DRBC defer to the host state for requirements relating to stormwater and erosion and sedimentation control.*

Comment No. 162) 7.5(h)(1)(vi)(A) Mitigation, Remediation and Restoration: Under Sections 7.5(h)(1)(vi)(A)(B) and (C), the Commission is requiring investigation and reporting of potential groundwater impact. Would the PADEP have sole or joint jurisdiction over certain spill investigations, cleanups and reporting involving, for example, if a transport vehicle has a diesel leak; wouldn't PADEP have primary authority? Also, see comments for section 7.3(m)(1) and (2) as they apply to this section as well. This section has been interpreted as though if a spill occurred that could be cleaned up within 24 hours that the requirements in this section would not apply. Confirmation of this assumption would be helpful. In addition, the DRBC appears to be taking a guilty until proven innocent approach. It seems that the burden of determining if a complaint is valid will fall on the natural gas developers opposed to the DRBC; whereas, in Pennsylvania the DEP is required to investigate complaints of pollution and not the operator (025 Pa. Code §78.51) (see **Appendix C**). In addition there is little clarity as to when the potentially impacted well users are required to be notified. And finally, *it is recommended that a definition of "release" and "threatened release" be provided.*

Comment No. 163) 7.5(h)(1)(vi)(C) Mitigation, Remediation and Restoration: This provision duplicates existing Pennsylvania Department of Environmental Protection requirements and *it is therefore recommended that it be deleted.*

Comment No. 164) 7.5(h)(2)(i)(A) Pre-alteration Report: As Pennsylvania and New York's dSGEIS have provisions relating to pre-construction water surveys, *it is recommended that the proposed Article 7 defer to the host state requirements for sampling of ground water and surface water before and after well construction.* Pennsylvania's regulations state that the operator may conduct a pre-construction water quality survey in order to preserve defense in the case of groundwater pollution allegations (025 Pa. Code §78.52) and New York's dSGEIS recommends that NYSDEC adopt regulations requiring operators to sample water wells within 1,000' of the well pad prior to site disturbance and for a period of one year after the last well on the pad has been hydraulically fractured (dSGEIS7.1.4.1).

Comment No. 165) 7.5(h)(2)(i)(A) Pre-alteration Report: *It is recommended that this provision be clarified as to whether it is a Pre-Alteration Report or a Pre-Drilling Report that is required.* It is unreasonable to require a groundwater and surface water monitoring report prior to having the well pad application approved. Should the well pad application not be approved, then the effort expended for the groundwater and surface water study and report would have been wasted. Additionally, *it is recommended that a maximum distance be instituted for the surface water sampling. It is recommended that, if there are no surface water bodies within a reasonable distance from the well pad, sampling should not be required.*

Comment No. 166) 7.5(h)(2)(i)(A)(1) Pre-alteration Report: Within the first sentence, *it is recommended that the words "if available" be inserted between the words "locations" and "of" and the words "with landowner permission" be inserted between the words "wells" and "within."* As a part of the Pre-Alteration Report, the operator is required to sample and analyze a "representative number" of surrounding groundwater wells within 1,000 feet but gives no basis to determine the "representative number." *It is recommended that if this is a statistically representative number then these procedures be outlined within the regulations to reduce any confusion.*

Additionally, natural gas wells are constructed with multiple layers of cement and steel casing, as required and regulated by the host states, with the express purpose of isolating and protecting groundwater resources from contact with production or hydraulic fracturing fluids. The proposed Article 7 regulations do not provide a basis for why these measures would fail to be protective within the basin, and as such, *it is recommended that the provisions for the installation of monitoring well(s) be deleted.*

Comment No. 167) 7.5(h)(2)(i)(A)(2) Pre-alteration Report: *It is recommended that this provision include a distance limitation for the "nearest water body(ies) up gradient and down gradient of the well pad" that would require monitoring to avoid unnecessary effort if they would not reasonably be affected by activities at a well pad.* Additionally, the location of a particular well pad may be such that there is no up gradient location. *It is recommended that the sampling frequency, sample parameters, analytical methods and required detection limits for both the groundwater and surface water monitoring be specified within the proposed Article 7 regulations to allow for evaluation and comment.*

Comment No. 168) 7.5(h)(2)(i)(A)(3) Pre-alteration Report: *It is recommended that the electronic data deliverable format of this provision be defined in advance in order to comply.*

Comment No. 169) 7.5(h)(2)(i)(A)(4) Pre-alteration Report: *It is recommended that this provision define the parameters that are covered by a basin state program.*

Comment No. 170) 7.5(h)(2)(i)(B) Post Construction Report: The monitoring requirements of this provision are unreasonable unless there is a demonstrated problem, such as a complaint of pollution, that would justify such monitoring; as such, *it is recommended that they be deleted.*

Comment No. 171) 7.5(h)(2)(i)(B)(1) Post Construction Report: See comment to 7.5(h)(2)(i)(B).

Comment No. 172) 7.5(h)(2)(i)(B)(1) Post Construction Report: See comment to 7.5(h)(2)(i)(B).

Comment No. 173) 7.5(h)(2)(ii)(C) Hydraulic Fracturing: *It is recommended that the proposed Article 7 regulations not include requirements that may not be technically feasible. It is recommended that this provision be rewritten as follows: "Project sponsors must meter the volume of water used for each hydraulic fracturing event at each well utilizing an automatic continuous recording device or equivalent."*

Comment No. 174) 7.5(h)(2)(ii)(D) Hydraulic Fracturing: This provision duplicates host state requirements and as such, *it is recommended the wording be as follows: "Project sponsors must maintain a record of the volumes and amounts of chemical additives used for each hydraulic fracturing event as required by host state recordkeeping requirements. Information reported to the host state about chemical additives used for each hydraulic fracturing event must be submitted to the Commision in the DRBC Post Hydraulic Fracturing Report."* Pennsylvania's completion report requires the reporting of chemical additives used in the fracture and New York's dSGEIS requires chemical additives used in the fracture to be recorded (025 Pa. Code §78.122(b)(6) and dSGEIS Appendix 10.34) (see **Appendix C**). *In addition, any provision regarding reporting of hydraulic fracturing additives should include a specific reference to the DRBC's rules related to protection of trade secret information.*

Comment No. 175) 7.5(h)(2)(ii)(E) Hydraulic Fracturing: *It is recommended that submittal of produced water volumes be revised from a quarterly basis to a semi-annual basis in conformance with PADEP requirements (025 Pa. Code §78.121 (see **Appendix C**). It is recommended that the proposed Article 7 regulations not include requirements that may not be technically feasible. It is recommended that this provision be rewritten as follows: "Project sponsors must meter the volume of all flowback water and production water utilizing an automatic continuous recording device or equivalent."*

Comment No. 176) 7.5(h)(2)(ii)(F) Sampling: *It is recommended that the sampling frequency, sample parameters, analytical methods and required detection limits be defined within the proposed regulations to allow for evaluation and comment.* This provision could result in considerable cost dependent on the sampling frequency and parameters required. The water recovered during flowback operations changes in quality with time a sample is only "representative" of the water quality at the time it was collected. *It is recommended that the first sentence be revised to read, "Project sponsors must collect samples of flowback and production water and analyze each sample for the same parameters monitored in the pre-alteration groundwater and surface water monitoring study."*

Comment No. 177) 7.5(h)(2)(ii)(G) Hydraulic Fracturing: *It is recommended that the wording "Subject to approval" be deleted from the beginning of the second sentence. It is*

recommended that a rationale for the 45 day limitation as set out in the last sentence be provided or the limitation be removed or, at a minimum, extended to 90 days to allow project sponsors sufficient leeway to recycle and reuse water recovered during flowback given ongoing operational schedules. Implementing a 45 day limit is overly restrictive and will result in the disposal of water recovered during flowback that otherwise could have been recycled and reused given sufficient time to do so.

Comment No. 178) 7.5(h)(2)(ii)(H) Hydraulic Fracturing: *It is recommended that the transfer of water recovered during flowback operations between well pads contained within a NGDP be allowed without requiring additional approval.* This will allow project sponsors the necessary flexibility to maximize the recycling and reuse of water recovered during flowback by avoiding delays related to acquiring additional approvals.

Comment No. 179) 7.5(h)(2)(iii)(A) Drilling Fluids and Drill Cuttings from Horizontal Wellbores in the target formation: Cuttings from a horizontal well are the same as cuttings from a vertical well; as such, *it is recommended that the reference to cuttings in this provision be deleted. It is recommended that a rationale for the 45 day limitation as set out in the last sentence be provided or the limitation be removed.*

Comment No. 180) 7.5(h)(2)(iii)(B) Drilling Fluids and Drill Cuttings from Horizontal Wellbores in the target formation: To avoid duplication of effort and multiple notification requirements with different timeframes, *it is recommended that the language of this provision be revised to read, "Project sponsors must notify the Commission of the completion of drilling in accordance with host state requirements."* Both Pennsylvania and New York require notice prior to the commencement of drilling operations (58 P.S. §601.201(f) and 6 NYCRR §554.2).

Comment No. 181) 7.5(h)(2)(iv)(B) Wastewater Storage: This section is a restatement of the requirements under 7.5(h)(2)(ii)(G).

Comment No. 182) 7.5(h)(2)(iv)(B)(1) Wastewater Storage: Both Pennsylvania and New York regulate storage of wastewater, including produced water, at the well site. Therefore, *it is recommended that the proposed Article 7 defer to host state requirements on storage of wastewater.* Pennsylvania and New York allow produced water to be stored in either pits or impoundments provided the pits or tanks are water tight (025 Pa. Code §78.57 and 6 NYCRR §554.1(b)(2)).

Comment No. 183) 7.5(h)(2)(iv)(B)(1) Wastewater Storage: *It is recommended that the words "water tight" be replaced with "suitable."*

Comment No. 184) 7.5(h)(2)(v)(F) Wastewater Treatment and Disposal Plan: *It is recommended that the term "UIC" be defined. It is recommended that the requirement for a Wastewater Treatment and Disposal Plan be removed, as this plan duplicates the disposal plan requirements of PADEP's Water Management Plan and Control and Disposal Plan as well as NYSDEC's Fluid Disposal Plan (PADEP Water Management Plan and 6 NYCRR §554.1(c)(1)) (see **Appendix C**).*

Section 7.6 Wastewater Generated by Natural Gas Development

Comment No. 185) 7.6(a) Approval Requirements: *It is recommended that the Commission defer to the host states' Pollutant, Discharge, and Elimination System programs, as approved by the U. S. Environmental Protection Agency and the Commission's existing wastewater program, rather than attempt to instill new and possibly inconsistent or duplicative requirements.*

Comment No. 186) 7.6(b) Treatability Study: See comment under 7.6(a). *It is recommended that this provision be deleted.*

Comment No. 187) 7.6(c) Ensuring non-exceedance of primary and secondary safe drinking water standards: See comment under 7.6(a). *It is recommended that this provision be deleted.*

Comment No. 188) 7.6(d) Basin-wide effluent limitations and stream quality objectives: See comment under 7.6(a). *It is recommended that this provision be deleted.*

Appendix F

Bibliography

Bibliography

The following bibliography contains a list of references for reports and documents on natural gas development in general as well as natural gas development specific to shale gas and in particular, the Marcellus Shale. This Bibliography is included to provide the Delaware River Basin Commission with a list of background documents and reports which may prove useful in responding to issues raised in response to comments received on the proposed Article 7 regulations. The references include those which have been collected as a part of ALL's own comments on the proposed Article 7 regulations as well as those gathered as a part of various research projects and reports conducted by ALL.

Additionally, this bibliography serves as a table of contents for the sources provided on the accompanying CDs. The numbered files on the CDs correspond to the numbered items on this bibliography. Some of the references lead to websites with numerous links to further sources; therefore, those are simply provided as links and not as copied documents. Also, some are paper-based sources that are not available electronically (e.g., text books) and so have not been included on the CDs.

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