

SECTION 12
STORMWATER MANAGEMENT

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A. NARRATIVE

This Plan is in accordance with the Maine Department of Environmental Protection (MDEP) Chapter 500 rules. This project includes the creation of approximately 63,369 square feet of new impervious surface and 837,483 square feet of total developed area. The construction phase of this project will create additional areas of impact that will be returned to existing conditions upon project completion. This stormwater management plan is for the final, post-construction quantities, listed above. Based on the Chapter 500 rules, the Basic Standards, General Standards, and Flooding Standards apply to this project. As a result, it will be required to treat 95% of the impervious area and 80% of the developed area. Additionally, the access road is defined as a linear portion and is only required to treat 75% of new impervious and 50% of developed area for that portion. We are proposing to utilize forested buffers to provide the required treatment for this project.

Basic Standard Submission: Information is provided as required for the Basic Standard Submission in **Section 14.0 - Basic Standards**.

Phosphorous Standard Submission: This development is not located within a lake watershed; this standard does not apply.

Flooding Standard Submission: The watersheds in which the proposed development is located cover approximately 1,150 acres of undeveloped forest, while the proposed development will create only 1.5 acres of impervious area. Given the size of the watersheds, in comparison to the size of the proposed development, we do not expect the project to have a significant impact on peak flows. A curve number analysis has been performed to demonstrate this.

The weighted curve number was calculated for each subcatchment by multiplying the curve number of each cover type by that cover type's respective area quantity, then dividing by the overall subcatchment area quantity. Please see the tables below for a pre-development and post-development comparison of the weighted curve numbers for each subcatchment within the project area. The watershed boundaries can be seen on the Hydrology Plans in **Appendix A**.

PRE-DEVELOPMENT CURVE NUMBER ANALYSIS

	Cover Type	Area (acres)	Curve Number
Subcatchment #1	Woods/grass	424	76
Subcatchment #2	Woods/grass	462	76
Subcatchment #3	Woods/grass	264	76
Overall Site Weighted Curve Number			76

POST-DEVELOPMENT CURVE NUMBER ANALYSIS

	Cover Type	Area (acres)	Curve Number
Subcatchment #1	Woods/grass	423	76
	Grass	1.06	79
	Impervious	0.16	96
Weighted Curve Number			76.01
Net Change (Percent)			0.01
Subcatchment #2	Woods/grass	455.6	76
	Grass	5.42	79
	Impervious	1.18	96
Weighted Curve Number			76.08
Net Change (Percent)			0.11
Subcatchment #3	Woods/grass	261.3	76
	Grass	2.78	79
	Impervious	0.09	96
Weighted Curve Number			76.03
Net Change (Percent)			0.04
Overall Site Weighted Curve Number			76.049
Overall Site Net Change (Percent)			0.06

As seen above, the weighted curve number for the pre-development overall site is 76, and the weighted curve number for post-development overall site is 76.049. This results in a weighted curve number increase of approximately 0.06%. Because of the small magnitude of this change, we do not expect there to be any negative impact on peak flows from this development, meeting the quantity standard.

General Standards Submission: The following information is provided as required in the General Standard Submission.

1. **Narrative:** The proposed development will include five tower pads and an access road. The tower pads (site portion) will create a total of approximately 6,474 square feet of new impervious surface and 497,656 square feet of total developed area. The access road (linear portion) will create a total of approximately 56,895 square feet of new impervious surface and 339,827 square feet of developed area.
2. **Drainage Plans:** A set of Hydrology Plans and Proposed Site Plans are provided in **Appendix A** of this Application. These plans include watershed boundaries and locations of the forested buffers used to treat the stormwater from this development.

3. Calculations: This project will utilize Buffers with Stone Bermed Level Lip Spreader, Buffers Adjacent to the Downhill Sides of a Road, and Ditch Turnout Buffers. These buffers have been designed in accordance with Chapter 5 of the MDEP Stormwater BMP Technical Design Manual, Volume III.
4. Details, Designs, and Specifications: The project is currently proposing to control runoff quality issues using forested buffers.

APPENDIX A

STORMWATER QUALITY CONTROL NARRATIVE

In total the project will develop approximately 19.23 acres of the site. The proposed development is being separated into two different portions, the tower pads (Site) and the access road (Linear.) The Site portion of the project consists of the tower pads. These pads have been sized for spacing needs during construction. Upon completion of the project, the only impervious areas will be the gravel paths leading to the towers, and the towers themselves. The rest of the pads will be allowed to re-vegetate and will be annually maintained.

The linear portion of the project consists of two gravel access roads. These roads have also been sized for construction needs. The first is 2,675 feet long, and the second is 2,834 feet long. During construction, the roads will be approximately 28 feet wide, and the clearing limits will vary due to ditching and down slopes. Upon completion of the project, the roadways will be reduced to 12 feet wide, and the extra width used during construction will be allowed to re-vegetate and will be regularly maintained. Stormwater quality control has been provided for the final, post-construction conditions.

The tower pads cover approximately 497,656 square feet and will consist of approximately 6,474 square feet of new impervious area and 491,182 square feet of new landscaped developed area that will be stabilized with vegetation or other approved permanent measures. The access road will cover approximately 339,827 square feet. The total access road impervious area is 66,108 square feet, however, approximately 9,213 square feet is either existing road or was accounted for in the site portion area, resulting in approximately 56,895 square feet of new impervious and 282,932 square feet of new landscaped developed area.

Based on Maine Department of Environmental Protection stormwater standards, the required treatment is 95% of the impervious surface and 80% of the developed area resulting from the impervious surface, landscaped surface, and stormwater conveyance provisions created by the development. The portion of the project involving the access road qualifies for the linear portion exemption. As a result, this portion of the development is required to treat 75% of the impervious and 50% of the developed area.

The project is proposing forested buffers to meet stormwater quality standards. The buffers will be located at various locations along the access roads and along the tower pads to maximize the treatment of runoff and provide the necessary treatment areas. The locations of these buffers are shown on the Proposed Site Plans (**Appendix A**).

The following tables summarize the impervious and developed area created by the project, as well as the treatment structure, area treated, and relationship with the total developed and impervious areas for the project.

TOWER PADS (SITE PORTION)

PROJECT AREA	IMPERVIOUS AREA	DEVELOPED AREA
Tower Pads	6,474 SF	497,656 SF

STORMWATER TREATMENT SYSTEMS (SITE PORTION)

TREATMENT METHOD	AREA TREATED (SF)	
	IMPERVIOUS AREA	DEVELOPED AREA
Buffer A	3,064	93,322
Buffer G	0	79,524
Buffer H	80	17,208
Buffer K	0	58,131
Buffer L	3,260	77,303
Buffer N	80	71,476
TOTAL	6,404	396,964
PERCENT OF TOTAL AREA TREATED	99%	80%

As can be seen in the table above, we are proposing to treat 99% of the Impervious Area and 80% of the Developed Area from the site portion of the project. This exceeds the standards required by Chapter 500.

BMP DESCRIPTIONS AND SIZING CALCULATIONS

A description of the treatment type follows.

1. Buffer A

Description:

Buffer A is a vegetated buffer with a stone bermed level lip spreader. It is a 150 feet long, forested buffer on HSG C soil, with a slope between 8 and 15%. Buffer A is treating the impervious and developed areas created by the Tower 1 Pad, as well as some of the area from the adjacent access road. This buffer has been sized in accordance with Chapter 500 and based on Table 5.5 of the *MDEP Stormwater BMPs Technical Design Manual*, seen below.

Calculations:

Required Level Spreader Width (For 150' long flow path) = (90*acres of impervious) + (30*acres of lawn)

$$= (90*0.17) + (30*2.7) = 97.30'$$

Provided width = 100'

2. Buffer G

Description:

Buffer G is a vegetated buffer with a stone bermed level lip spreader. It is a 150 feet long, forested buffer on HSG C soil, with a slope between 8 and 15%. Buffer G is treating impervious and developed area created by the Tower 2 pad, as well as some of the adjacent access road. This buffer has been sized in accordance with Chapter 500 and based on Table 5.5 of the *MDEP Stormwater BMPs Technical Design Manual*, seen below.

Calculations:

Required Level Spreader Width (For 150' long flow path) = (90*acres of impervious) + (30*acres of lawn)

$$= (90*.05) + (30*2.0) = 65.65'$$

Provided width = 360'

3. Buffer H

Description:

Buffer H is a vegetated, forested buffer adjacent to the downhill side of the access road. This buffer is treating the Tower 2 pad construction storage area, as well as the right travel lane from STA 12+85 to STA 15+75 and is 55 feet wide. This buffer has been sized in accordance with Chapter 500 and based on Table 5.6 of the *MDEP Stormwater BMPs Technical Design Manual*.

4. Buffer K

Description:

Buffer K is a vegetated buffer with a stone bermed level lip spreader. It is a 150 feet long, forested buffer on HSG C soil, with a slope between 8 and 15%. Buffer K is treating impervious and developed area created by the Tower 3 pad, as well as some of the area from the adjacent access road. This buffer has been sized in accordance with Chapter 500 and based on Table 5.5 of the *MDEP Stormwater BMPs Technical Design Manual*, seen below.

Calculations:

Required Level Spreader Width (For 150' long flow path) = (90*acres of impervious) + (30*acres of lawn)

$$= (90*0.06) + (30*2.41) = 78.23'$$

Provided width = 168'

5. Buffer L

Description:

Buffer L is a vegetated buffer with a stone bermed level lip spreader. It is a 150 feet long, forested buffer on HSG C soil, with a slope between 8 and 15%. Buffer L is treating impervious and developed area created by the Tower 4 pad, as well as some of the area from the adjacent access road. This buffer has been sized in accordance with Chapter 500 and based on Table 5.5 of the *MDEP Stormwater BMPs Technical Design Manual*, seen below.

Calculations:

Required Level Spreader Width (For 150' long flow path) = (90*acres of impervious) + (30*acres of lawn)

$$= (90*0.23) + (30*1.98) = 80.30'$$

Provided width = 360'

6. Buffer N

Description:

Buffer N is a vegetated buffer with a stone bermed level lip spreader. It is a 150 feet long, forested buffer on HSG C soil, with a slope between 8 and 15%. Buffer N is treating impervious and developed area created by the Tower 5 pad, as well as some of the area from the adjacent access road. This buffer has been sized in accordance with Chapter 500 and based on Table 5.5 of the *MDEP Stormwater BMPs Technical Design Manual*, seen below.

Calculations:

Required Level Spreader Width (For 150' long flow path) = (90*acres of impervious) + (30*acres of lawn)

$$= (90*0.0018) + (30*2.47) = 74.54'$$

Provided width = 130'

ACCESS ROAD AREA (LINEAR PORTION)

PROJECT AREA	IMPERVIOUS AREA	DEVELOPED AREA
Access Road	56,895 SF	339,827 SF

STORMWATER TREATMENT SYSTEMS (LINEAR PORTION)

TREATMENT METHOD	AREA TREATED (SF)	
	IMPERVIOUS AREA	DEVELOPED AREA
Buffer A	1,653	5,942
Buffer B	1,710	6,840
Buffer C	1,260	5,040
Buffer D	2,340	11,310
Buffer E	1,260	5,040
Buffer F	2,340	11,310
Buffer G	2,250	7,067
Buffer H	1,740	5,220
Buffer I	5,160	24,940
Buffer J	5,940	28,710
Buffer K	2,846	23,855
Buffer L	6,840	19,093
Buffer M	11,280	35,720
Buffer N	0	5,331
Total	46,619	228,448
PERCENT OF TOTAL AREA TREATED	82%	67%

As can be seen in the table above, we are proposing to treat 82% of the Impervious area and 67% of the Developed area from the linear portion of the project. This exceeds the standards required by Chapter 500.

BMP DESCRIPTIONS AND SIZING CALCULATIONS

A description of the treatment type follows.

1. Buffer A

Description:

See Site Portion section above for description and sizing calculations.

2. Buffer B

Description:

Buffer B is a vegetated, forested buffer adjacent to the downhill side of the access road. Buffer B is treating two travel lanes from STA 4+15 to STA 7+00 and has a flow path of 55 feet. This buffer has been sized in accordance with Chapter 500 and based on Table 5.6 of the *MDEP Stormwater BMPs Technical Design Manual*.

3. Buffer C

Description:

Buffer C is a vegetated, ditch turnout buffer. It is a forested buffer on HSG C soil, with a slope between 0 and 8%. Buffer C is treating the left lane of the access road from STA 7+00 to STA 9+10. This buffer has been sized in accordance with Chapter 500 and based on Table 5.7 of the *MDEP Stormwater BMPs Technical Design Manual*, seen below.

Calculations:

Required Buffer Flow Path (For 210' long ditch) = 60'
 Provided = 60'

4. Buffer D

Description:

Buffer D is a vegetated, ditch turnout buffer. It is a forested buffer on HSG C soil, with a slope between 0 and 8%. Buffer D is treating the left lane of the access road from STA 9+10 to STA 13+00. This buffer has been sized in accordance with Chapter 500 and based on Table 5.7 of the *MDEP Stormwater BMPs Technical Design Manual*, seen below.

Calculations:

Required Buffer Flow Path (For 400' long ditch) = 100'
 Provided = 120'

5. Buffer E

Description:

Buffer E is a vegetated, ditch turnout buffer. It is a forested buffer on HSG C soil, with a slope between 0 and 8%. Buffer E is treating the right lane of the access road from STA 7+00 to STA 9+10. This buffer has been sized in accordance with Chapter 500 and based on Table 5.7 of the *MDEP Stormwater BMPs Technical Design Manual*, seen below.

Calculations:

Required Buffer Flow Path (For 210' long ditch) = 60'
 Provided = 60'

6. Buffer F

Description:

Buffer F is a vegetated, ditch turnout buffer. It is a forested buffer on HSG C soil, with a slope between 0 and 8%. Buffer F is treating the right lane of the access road from STA 9+10 to STA 13+00. This buffer has been sized in accordance with Chapter 500 and based on Table 5.7 of the *MDEP Stormwater BMPs Technical Design Manual*, seen below.

Calculations:

Required Buffer Flow Path (For 400' long ditch) = 100'
Provided = 120'

7. Buffer G

Description:

See Site Portion section above for description and sizing calculations.

8. Buffer H

Description

See Site Portion section above for description and sizing calculations.

9. Buffer I

Description:

Buffer I is a vegetated, forested buffer adjacent to the downhill side of the access road. Buffer I is treating the left travel lane from STA 16+90 to STA 25+50 and has a flow path of 35 feet. This buffer has been sized in accordance with Chapter 500 and based on Table 5.6 of the *MDEP Stormwater BMPs Technical Design Manual*.

10. Buffer J

Description:

Buffer J is a vegetated, forested buffer adjacent to the downhill side of the access road. Buffer J is treating the right travel lane from STA 15+85 to STA 25+75 and has a flow path of 35 feet. This buffer has been sized in accordance with Chapter 500 and based on Table 5.6 of the *MDEP Stormwater BMPs Technical Design Manual*.

11. Buffer K

Description:

See Site Portion section above for description and sizing calculations.

12. Buffer L

Description:

See Site Portion section above for description and sizing calculations.

13. Buffer M

Description:

Buffer M is a vegetated, forested buffer adjacent to the downhill side of the access road. Buffer M is treating two travel lanes from STA 16+10 to STA 25+50 and has a flow path of 55 feet. This buffer has been sized in accordance with Chapter 500 and based on Table 5.6 of the *MDEP Stormwater BMPs Technical Design Manual*.

14. Buffer N

See Site Portion section above for description and calculations.

The proposed stormwater quality control devices have been designed according to the standards outlined in the Stormwater Management for Maine, Volume III BMP Manual, latest edition. Construction and maintenance will be according to standards outlined in this manual.

SAMPLE DEED RESTRICTIONS

Forested buffer, limited disturbance

DECLARATION OF RESTRICTIONS

(Forested Buffer, Limited Disturbance)

THIS DECLARATION OF RESTRICTIONS is made this _____ day of _____, 20____, by

_____ , _____,

(name)

(street address)

_____, _____ County, Maine, _____, (herein referred to as the

(city or town)

(county)

(zip code)

"Declarant"), pursuant to a permit received from the Maine Department of Environmental Protection under the Stormwater Management Law, to preserve a buffer area on a parcel of land near

_____ .

(road name)

(known feature and/or town)

WHEREAS, the Declarant holds title to certain real property situated in _____, Maine

(town)

described in a deed from _____ to _____ dated

(name)

(name of Declarant)

_____, 20____, and recorded in Book ____ Page ____ at the _____ County Registry of Deeds, herein referred to as the "property"; and

WHEREAS, Declarant desires to place certain restrictions, under the terms and conditions herein, over a portion of said real property (hereinafter referred to as the "Restricted Buffer") described as follows:

(Note: Insert description of restricted buffer area location here)

WHEREAS, pursuant to the Stormwater Management Law, 38 M.R.S.A. Section 420-D and Chapter 500 of rules promulgated by the Maine Board of Environmental Protection ("Stormwater Management Rules"), Declarant has agreed to impose certain restrictions on the Restricted Buffer Area as more particularly set forth herein and has agreed that these restrictions may be enforced by the Maine Department of Environmental Protection or any successor (hereinafter the "MDEP"),

NOW, THEREFORE, the Declarant hereby declares that the Restricted Buffer Area is and shall forever be held, transferred, sold, conveyed, occupied and maintained subject to the conditions and restrictions set forth herein. The Restrictions shall run with the Restricted Buffer Area and shall be binding on all parties having any right, title or interest in and to the Restricted Buffer Area, or any portion thereof, and their heirs, personal representatives, successors, and assigns. Any present or future owner or occupant of the Restricted Buffer Area or any portion thereof, by the acceptance of a deed of conveyance of all or part of the Covenant Area or an instrument conveying any interest therein, whether or not the deed or instrument shall so express, shall be deemed to have accepted the Restricted Buffer Area subject to the Restrictions and shall agree to be bound by, to comply with and to be subject to each and every one of the Restrictions hereinafter set forth.

1. Restrictions on Restricted Buffer Area. Unless the owner of the Restricted Buffer Area, or any successors or assigns, obtains the prior written approval of the MDEP, the Restricted Buffer Area must remain undeveloped in perpetuity. To maintain the ability of the Restricted Buffer Area to filter and absorb stormwater, and to maintain compliance with the Stormwater Management Law and the permit issued thereunder to the Declarant, the use of the Restricted Buffer Area is hereinafter limited as follows.
 - a. No soil, loam, peat, sand, gravel, concrete, rock or other mineral substance, refuse, trash, vehicle bodies or parts, rubbish, debris, junk waste, pollutants or other fill material may be placed, stored or dumped on the Restricted Buffer Area, nor may the topography of the area be altered or manipulated in any way;
 - b. Any removal of trees or other vegetation within the Restricted Buffer Area must be limited to the following:

- (i) No purposefully cleared openings may be created and an evenly distributed stand of trees and other vegetation must be maintained. An "evenly distributed stand of trees " is defined as maintaining a minimum rating score of 24 points in any 25 foot by 50 foot square (2500 square feet) area, as determined by the following rating scheme:

Diameter of tree at 4½ feet above ground level	Points
2 - 4 inches	1
4 - 8 inches	2
8 - 12 inches	4
>12 inches	8

Where existing trees and other vegetation result in a rating score less than 24 points, no trees may be cut or sprayed with biocides except for the normal maintenance of dead, windblown or damaged trees and for pruning of tree branches below a height of 12 feet provided two thirds of the tree's canopy is maintained;

- (ii) No undergrowth, ground cover vegetation, leaf litter, organic duff layer or mineral soil may be disturbed except that one winding path, that is no wider than six feet and that does not provide a downhill channel for runoff, is allowed through the area;
- c. No building or other temporary or permanent structure may be constructed, placed or permitted to remain on the Restricted Buffer Area, except for a sign, utility pole or fence;
 - d. No trucks, cars, dirt bikes, ATVs, bulldozers, backhoes, or other motorized vehicles or mechanical equipment may be permitted on the Restricted Buffer Area;
 - e. Any level lip spreader directing flow to the Restricted Buffer Area must be regularly inspected and adequately maintained to preserve the function of the level spreader.

Any activity on or use of the Restricted Buffer Area inconsistent with the purpose of these Restrictions is prohibited. Any future alterations or changes in use of the Restricted Buffer Area must receive prior approval in writing from the MDEP. The MDEP may approve such alterations and changes in use if such alterations and uses do not impede the stormwater control and treatment capability of the Restricted Buffer Area or if adequate and appropriate alternative means of stormwater control and treatment are provided.

2. Enforcement. The MDEP may enforce any of the Restrictions set forth in Section 1 above.

3. Binding Effect. The restrictions set forth herein shall be binding on any present or future owner of the Restricted Buffer Area. If the Restricted Buffer Area is at any time owned by more than one owner, each owner shall be bound by the foregoing restrictions to the extent that any of the Restricted Buffer Area is included within such owner's property.

4. Amendment. Any provision contained in this Declaration may be amended or revoked only by the recording of a written instrument or instruments specifying the amendment or the revocation signed by the owner or owners of the Restricted Buffer Area and by the MDEP.

5. Effective Provisions of Declaration. Each provision of this Declaration, and any agreement, promise, covenant and undertaking to comply with each provision of this Declaration, shall be deemed a land use restriction running with the land as a burden and upon the title to the Restricted Buffer Area.

6. Severability. Invalidity or unenforceability of any provision of this Declaration in whole or in part shall not affect the validity or enforceability of any other provision or any valid and enforceable part of a provision of this Declaration.

7. Governing Law. This Declaration shall be governed by and interpreted in accordance with the laws of the State of Maine.

(NAME)

STATE OF MAINE _____ County, _____, 20__.

(County)

(date)

Personally appeared before me the above named _____, who swore to the truth of the foregoing to the best of (his/her) knowledge, information and belief and acknowledged the foregoing instrument to be (his/her) free act and deed.

Notary Public
