GRADY CONSULTING, L.L.C.
Civil Engineers ♦ Land Surveyors ♦ Landscape Architects

February 2, 2022

Planning Board
Town of Marshfield
807 Moraine St.
Marshfield, MA 02050

RE: Red Gold Farm Subdivision - 202 Moraine St., Marshfield
(Assesor's Map I04 Lot 02 Block 08A) – Definitive Subdivision Plan
Applicant – Sealund Corporation

Dear Members of the Conservation Commission:

On behalf of the applicant we hereby submit this response to various comments received regarding the submission of the Definitive Subdivision Plan for Red Gold Farm on 202 Moraine St. We would like to point out that some items are still ongoing, but we'd like to provide an update of these items. Attached see the following:

1. Definitive Subdivision Plans revised on February 2, 2022;
2. Response to Comments by Amory Engineers;
3. Response to Comments by DPW;
4. Response to Comments of Nitrogen Loading Calculations;
5. Response to Comments from the Planning Board Hearing;

If you have any questions please do not hesitate to call.

Sincerely,
Grady Consulting, L.L.C.

Gabriel A. Padilla
Project Engineer

Cc: Sealund Corporation
794 Washington St.
Pembroke, MA 02359

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RESPONSE TO COMMENTS BY AMORY ENGINEERS

February 2, 2022

Marshfield Conservation Commission
870 Moraine Street
Marshfield, MA 02050

RE: Definitive Subdivision – 202 Moraine St.
Assessors Map I04-02-08A & I05-01-09
Applicant – Sealund Corp

Dear Board Members:

On behalf of the applicant we hereby submit responses to comments received on December 21, 2021. The plans and applications were reviewed by Amory Engineers, PC in a letter dated December 21, 2021. We utilized Amory Engineers' review letter outline and have provided our responses in **bold** and Amory Engineers' comments in *italics.*

December 21, 2021

Marshfield Planning
BoardTown Hall
870 Moraine Street
Marshfield, MA 02050
Subject: ***Red Gold Farm – Definitive Subdivision***

Dear Board Members:

This is to advise that we have reviewed the following documents in support of the proposed Red Gold Farm Definitive Subdivision located off Moraine Street:

- *Red Gold Farm Definitive Subdivision Plan (20 sheets), dated October 28, 2021,prepared by Grady Consulting, L.L.C. (Grady)*
- *Stormwater Management Design Calculations, dated October 28, 2021, prepared byGrady*
- *Transmittal Letter with attachments, dated October 28, 2021, prepared by Grady*

The purpose of our review has been to evaluate conformance with the Marshfield MunicipalCode (MMC), Massachusetts Department of Environmental Protection (DEP) Stormwater Management Standards (SMS) and good engineering practice.

Background

The site is located off the east side of Moraine Street and is comprised of two parcels with atotal area of 125.34 acres. The existing site is mostly undeveloped consisting of woodland, cranberry bogs and wetlands. The area closest to Moraine Street is developed with a single-family dwelling with associated driveways and lawn areas and two barns associated with cranberry operations. The proposed subdivision would create twenty-four new lots, twenty-two single-family residential lots, a drainage lot and an open space lot. The site is within the

Residential-Rural (R-1) Zoning District and the Water Resource Protection District (WRPD). Portions of the site area also within the Inland Wetlands District.

The proposed lots would be accessed by a ±1,755 foot long dead-end roadway off Moraine Street. The proposed road would be classified as a Residential Type "C" road with forty-six footright-of-way, twenty foot travel way, eighteen inch Cape Cod berms on each side (total pavement width of 23 feet), six foot wide grass strips and five foot wide sidewalks on each side.

The stormwater system would consist of catch basins, manholes, piping, proprietary treatment units, pocket wetlands and a subsurface infiltration system consisting of concrete galleys surrounded by crushed stone. There are also crushed stone trenches proposed along the down-gradient perimeter of many of the lots to capture and infiltrate runoff. The proposed lots would be served by individual onsite septic systems. The water system would include new 8-inch ductile iron watermain connected to the Town of Duxbury's distribution system in Moraine Street. Underground electric, telephone, cable television and gas utilities would be installed in the proposed road.

The applicant is requesting the following waivers from the MMC Chapter 405 – Subdivision of Land:

- *§405-9.C (6), to allow one of the proposed pocket wetlands to be within an easement on aresidential lot.*
- *§405-9.D (1), to allow a single access roadway to provide access to more than eight lots,nineteen lots would be accessed by the proposed road.*
- *§405-9.E (1), to allow the length of dead end longer than the maximum of 600 feet. The length of new dead end would be about 1,755 feet.*
- *§405-9.E (4), to allow the subsurface infiltration system to be installed within the centerisland of the cul-de-sac turnaround.*
- *§405-10.E (2), to allow less than 2-1/2 feet of cover over drain pipes with the use ofClass V reinforced concrete pipe.*

Comments

General / Roadway

1. *Note 5 on Sheet 1 should reference the current FEMA flood map and Letter of Map Revision (LOMR).*
    - **References to the LOMR and updated panel effective date have been added to Note 5 on Sheet 1.**

2. *Lot line geometry is missing at the curve along the frontage of Lot 15 and the side linesbetween Lots 11 & 12, 12 & 13 and 13 & 14. The length of the east sideline of Lot 3 isalso missing.*
    - **The referenced lot line geometry has been added to the plan.**

3. *Bounds are required at all front lot corners in accordance with MMC §405-13.*
    - **Bounds on each front lot corner have been added to the plan.**

4. *MMC §405-14 requires vertical granite curbing at all curves with a radius of sixty feet or less and granite curb inlets with transition sections at all catch basins. Cape Cod berm isproposed throughout.*
    - **Vertical granite curbing has been added to the cul-de-sac, granite curb inlets with transition sections have been added to the catch basins. A detail has been added on Sheet 23 of the plan.**

5. *The width of the Cape Cod berm is specified to be 18 inches wide, which is what is required by the Rules and Regulations. However, our experience is that most paving companies do not have the equipment to place 18 inch Cape Cod berms so we recommend that the berms be 12 inches wide and the width of the travel way be increasedby a foot so that the total width of pavement is the same (23 feet).*
    - **The Cape Cod berm width bas been changed to 12 inches.**

6. *There appears to be a contour line (20) missing between the houses on Lots 9 and 10.*
    - **The contour line has been updated on the plan.**

7. *Proposed street signs should be shown on the plans.*
    - **The proposed street signs have been added to Sheet 23 in the plan.**

8. *A sight distance triangle at the proposed road's intersection with Moraine Street should be shown on the plans to verify that adequate sight distance will be provided.*
    - **A sight distance triangle detail has been added to Sheet 23 of the plan.**

Utilities, Stormwater and Erosion Control

1. *In accordance with §405-10.D, the Applicant should demonstrate that there will beadequate water supply for fire protection.*
    - **The applicant is currently in communication with the Town of Duxbury Water Department, this is an ongoing discussion.**
    -
2. *The water main is specified to have a minimum of five feet of cover on the Typical Roadway Section and details on Sheet 18 but 4.5 feet of cover on the Profile on Sheet 14. The Profile should be changed to specify the minimum five feet of cover.*
    - **The plans have been updated to show a 5' minimum cover over the water line.**

3. *The Plan view on Sheet 15 shows the proposed water main to pass through the subsurfaceinfiltration system. This should be corrected to show it outside the footprint of the infiltration system.*
    - **The subsurface infiltration system has been removed from the plans.**

4. *There should be a hydrant or blow-off at the end of the proposed water main to allow forflushing.*
    - **A hydrant has been added to the end of the water main**

5. *Test pits within the footprint of the proposed subsurface infiltration system indicate seasonal high groundwater between about El. 15.8 and 16.8 (test pits 8-3 and 8-2, respectively). The bottom of the proposed subsurface infiltration system is at El. 14.0, which would place it within seasonal high groundwater and not provide the required twofeet of separation. The drainage calculations model infiltration through the system. Modifications to the design are required to provide the required two feet of separation and allow for infiltration.*
    - **The subsurface infiltration system has been removed from the plans**

6. *We note that the proposed subsurface infiltration system is not shown correctly on the Profile on Sheet 15. The top of the galleys should be at El. 19 and the crushed stone base(and side stone) should be shown graphically.*
    - **The subsurface infiltration system has been removed from the plans.**

7. *There have been a number of test pits excavated on site which show varying soil conditions and depths to seasonal high groundwater. Additional test pits would be required at locations of proposed trench drains to verify soil textural analysis (infiltrationrates) and adequate separation to seasonal high groundwater.*
    - **The applicant is currently coordinating the scheduling of the test pits. this is ongoing.**

8. *The proposed trench drain on Lots 20 and 21 in modeled as four feet wide by four feet deep but it scales at three feet wide on the plans. It is also not listed on the Trench DrainData table on Sheet 19. Additionally, we note that the trench drain on Lots 5 and 6 is modeled as two feet wide by two feet deep but it scales at four feet wide on the plans.*
    - **The trench drain on Lots 20 and 21 has been updated in the model as a 3 feet wide by 4 feet deep trench and the details have been added to the drain data table. The trench drain on Lots 5 and 6 has been updated in the plan to reflect the model.**

9. *Both proposed pocket wetlands should be modeled as ponds with storage in the HydroCAD model to more accurately represent post-development runoff rates. With the south pocket wetland modeled as a pond, the time of concentration flow path for post development subcatchment area 13A should be modeled to it, and not through it, as shown on the Post Development Catchment Plan.*
    - **The south pocket wetland has been updated in the model with storage volume. The time of concentration flow path has been updated to the subcatchment area 13A and not through it.**

10. *A number of the time of concentration flow paths/calculations need revision. For example, Post 3 should be the same as Pre 4; Post 13D and Post 14B should be five minutes; Post 13E and Post 14A should be routed to the trench drains, not through them; Post 7 and Post 13B are not shown on the Post Development Catchment Plan but should be less than 281 and 773 feet, respectively. All times of concentration should be verified.*
    - **The time of concentration on Post 3 has been updated to be the same as Pre 4, Post 13D and Post 14B have been changed to 5 minutes, Post 13E and Post 14A have been changed to be routed to their respective trench drains. The times of concentration for Pre 6, 10, 11, 12, 14 & 16 have been adjusted after verification. Times of concentration for Post 3 & 7 have also been adjusted after verification.**

11. *Proposed catch basins CB- I and CB-2 are connected in series. Catch basins should not be connected in series as this allows the resuspension of settled solids in the sump of the flow-through catch basin. Also, MassDEP Stormwater Standards only allow for total suspended solids (TSS) removal credit when the catch basins are off-line. We note that the discharge from these catch basins is proposed to connect to the State drainage system in Moraine Street and MassDOT approval would be required.*
    - **CB-1and CB-2 have been updated in the plan to connect to a drain manhole which discharges into the State drainage system. MassDOT approval will be applied for after municipal approvals are obtained.**

12. *The proposed outlet control structure is modeled with the top elevation at 12.0 in the calculations and the top elevation is specified to be 11.10 on the Outlet Control Structure detail on Sheet 19. According to dimensions on the detail, the top elevation should be 11.72.*
    - **The proposed outlet control structure has been updated in the model du to changes in the constructed wetlands.**

13. *There are discrepancies between the proposed impervious areas utilized in calculating the required recharge and water quality volumes and the HydroCAD models. The recharge calculation indicates a total of 145,062 s.f. of impervious area (pavement and roofs), whereas the HydroCAD model indicates a total of 187,651 s.f. of impervious area (141,979 s.f. additional from existing conditions). The water quality volume calculation is based on 155,744 s.f., whereas the HydroCAD model indicates a total of 122,694 s.f. of proposed pavement (90,361 s.f. additional).*
    - **The stormwater report and Hydrocad model has been updated with the following information:**
        - **Existing impervious area carried over to proposed condition:**
            - **Moraine St. Pavement – 17,038 SF**
        - **Proposed impervious areas:**
            - **Red Gold Road (Pavement and Sidewalk) – 60,385 SF**
            - **Driveways – 36,676 SF**
            - **Structures – 71,755 SF**
            - **TOTAL – 170,613 SF**
        - **Required recharge**
            - **170,613 x 0.60” x 1’/12” = 8,531 CF**
        - **Required water quality volume**
            - **170,613 x 1” x 1’/12” = 14,218 CF**

14. *There is a note in the recharge volume calculation (page 196) that states "the high groundwater encountered along the site does not allow for infiltration." If the required recharge volume cannot me met then this may require a variance from the Wetlands Protection Act (310 CMR I 0.00) which the Conservation Commission would need to approve.*
    - **This note has been removed from the stormwater report.**

15. *The Construction Phase Operation and Maintenance Plan (O&M) states that "construction activities shall follow the Construction Sequence shown on the approved plans." However, a construction sequence is not included on the plans.*
    - **The following construction sequence has been added to the plan**
        - **Mobilization**
        - **Construction of crushed stone entrance and installation of erosion and sediment control**
        - **Clearing and grubbing**
        - **General site grading**
        - **Construction of utilities, drainage and constructed wetlands**
        - **Installation of erosion and sediment controls in newly constructed stormwater BMPs**
        - **Construction of Red Gold Road**
        - **Removal of erosion and sediment controls after stabilization has been achieved**

- **Demobilization**

16. *A stabilized construction entrance should be shown on Sheet 11 of the plans.*
    - **A stabilized construction entrance is shown on Sheet 12 (Grading and Erosion Control 1)**

17. *The inspection and maintenance frequencies specified in the narrative of the post-construction O&M should match the frequencies specified on the Inspection Schedule and Evaluation Checklist.*
    - **Inspection and maintenance frequencies have been updated in the stormwater report.**

18. *Should you have any questions, please give us a call.*

Very truly yours,

AMORY ENGINEERS, P.C.

Patrick G. Brennan, P.E.

PGB

cc: Grady Consulting, LLC

Response to Plan Review for Planning Board by Rod Procaccino

February 2, 2022

Marshfield Planning Board
870 Moraine Street
Marshfield, MA 02050

RE: Definitive Subdivision – 202 Moraine St.
Assessors Map I04-02-08A & I05-01-09
Applicant – Sealund Corp

Dear Board Members:

On behalf of the applicant we hereby submit responses to comments received on January 6, 2022. The plans and applications were reviewed by Rod Procaccino in a letter dated January 6, 2022. We utilized Mr. Procaccino's review letter outline and have provided our responses in **bold** and Mr. Procaccino's comments in *italics.*

Memorandum
January 6, 2022
To: Greg Guimond, Town Planner
Fr: Rod Procaccino, Town Engineer
Re: DPW Comments -Red Gold Farm Definitive Subdivision Plan, 202 Moraine Street, by Grady Consulting, LLC dated October 28, 2021
Water Supply:
The Town of Duxbury is supplying potable water to this Subdivision. The Towns water distribution terminates on Moraine Street near King Phillips Path over 2000 feet away from the proposed subdivision. The Developer should provide written confirmation from the Town of Duxbury. A state road opening Permit may be required for work within Moraine St. road layout.

- **A state road opening permit application is currently ongoing. A letter of confirmation for water distribution has been requested and will be provided upon receipt.**

The Subdivision is located within the Towns WRPD requiring Developer to demonstrate the proposed level of Nitrogen Loading to under 5PPM.

- **A Nitrogen Loading chart was provided and reviewed by Mr. Ed Eichner, we have corrected the calculations and demonstrated Nitrogen Levels less than 5PPM by limiting the amount of grassed areas to 30,000 SF per lot.**

The Town requires a minimum of 5 foot of cover over the buried water main. The profile on sheet 14 specifies 4.5 feet minimum, which conflicts with the detail on sht. 18 of 20. The water main should be shown in profile in proximity of the cul -de- sac. The water main is shown going through the leaching field.

- **The profile has been updated to show a 5' cover over the pipe and is shown in the cul-de-sac area. The leaching field has been removed from the plans and replaced with a rain garden, the water main circles around the rain garden.**

The Water Dept. will require a Hydrant at the end of the Water Main.

- **A fire hydrant has been added to the end of the proposed water main.**

The proposed water main shown along Moraine St. appears to be too close to the Utility Poles. To avoid impacts to water main from emergency pole replacement adequate separation should be provided.

- **A 10' separation has been provided from the pole to the water main.**

The Water Main is dead ended and exceeds 800 foot length. A waiver would be required by the Board of Public Works.

- **A waiver letter has been sent to the Board of Public Works with this submission**

Drainage:
See attached DPW comments dated December 15, 2021.to Conservation Dept. regarding Storm Water Report.

Access for maintenance of drainage leaching trenches and detention areas should be clearly delineated with easements provided.

- **Easements have been provided for the trench drains and constructed wetlands.**

DPW comments continued: Red Gold Farm Definitive Subdivision Plan, 202 Moraine Street, by Grady Consulting, LLC dated October 28, 2021

Leaching galleys located within the cul - de- sac will require a waiver. The high groundwater level should be shown in profile. The 4x4x4 leaching chambers shown in profile view are not to scale. The chamber detail on Sht. 18 shows elevations that are incorrect.

- **The leaching galleys have been removed from the plan, they have been replaced with a rain garden.**

The proposed drainage system utilizes culvert from DMH 1 crossing Moraine St. requiring permission and/ or easement by state MassDOT.

- **A state road opening permit application is currently ongoing.**

Road Work and Site Work:
There appears to be a significant amount of cut and fill. The Contractor should submit calculations indicating net amount.

Zoning:
Lot 4 and Lot 3 don't appear to have adequate frontage.

- **Lot 4 has been removed from the plans, Frontage on lot 3 is 128.53' along Red Gold Road.**

Lot 10 rear boundary is missing a dimension on sht. 6.

- **The dimension has been added to the plan.**

No Further Comments:

Enclosure: DPW comments dated December 15,2021 to Conservation regarding Red Gold Farm Definitive Subdivision plan dated October 28,2021, and Storm Water Management Design Calculations dated October 28,2021 by Grady Consultants LLC.
CC: Charlie Swanson: Grady Consultants Inc.

Response to Nitrogen Loading Comments

February 2, 2022

Marshfield Planning Board
870 Moraine Street
Marshfield, MA 02050

RE: Definitive Subdivision – 202 Moraine St.
Assessors Map I04-02-08A & I05-01-09
Applicant – Sealund Corp

Dear Board Members:

On behalf of the applicant we hereby submit responses to the comments by Mr. Ed Eichner from TMDL received on January 10, 2022, on the Nitrogen Loading calculations submitted on November 3, 2021 We have provided the comments in *italics* and our responses in **bold.**

TMDL Solutions

141 Pine Tree Drive, Centerville, MA 02632
Tel: 508-737-5991
eichner@tmdlsolutions.net

Memorandum

To: Greg Guimond, Town of Marshfield, Town Planner

From: Eduard Eichner, TMDL Solutions, Principal/Water Scientist

RE: WRPD Nitrogen Loading Review: 202 Moraine St. – Red Gold Farm subdivision

Date: January 7, 2022

As requested, I have completed a review of the Special Permit Application for the proposed development at 202 Moraine St. for compliance with the Water Resources Protection District (WRPD) regulations of the Town of Marshfield Zoning Bylaws. This analysis is based on materials submitted on October 28, including project plans and nitrogen loading calculations. This review is exclusively focused on the nitrogen loading calculations. Review of these calculations show that the project currently exceeds the WRPD 5 mg/L nitrogen loading limit, but there are a number of input values for the calculations that will require further discussions.

The proposed project is a 23 lot subdivision located on the upland of a former cranberry bog and mostly within the WRPD (Figure 1). The project site includes portions of Black Mountain Pond (total of 17.2 acres) and 38.6 acres of cranberry bog. The cranberry bog is a flow-through bog with Green Harbor River flowing through the site beginning at the dam that sustains Black Mountain Pond. As might be expected from a cranberry bog site, the soils are a mix of types with 13 classifications identified for the portion of the site within the WRPD (Figure 2).

The applicant submitted nitrogen loading calculations utilize a number of inputs that will require additional clarification. The overall parcel area utilized in the applicant nitrogen loading is 104.3 acres, while the portion of the two lots within the WRPD is 113.3 acres. The 104.3 acres corresponds to the area of the southernmost parcel (Assessor ID I04-02-08A), on which the submitted plan shows 22 proposed residential lots and a separate lot with access to the northernmost parcel (Assessor ID I05-01-09). The subdivision plan lists the total lot area as 125.338 acres or the combined area of the northmost and southernmost lots. Previous reviews of projects that straddle the WRPD boundary have usually used the area within the WRPD. The applicant should clarify how they would like to approach this issue.

The submitted nitrogen loading calculations also include a listed Title 5 flow of 9,240 gallons per day (gpd), which is equivalent to 84 bedrooms. Dividing these equally among the 22 parcels within the WRPD, would result in 3.82 bedrooms. This unequal division means that the Planning Board will need to consider whether to ensure the cumulative number of bedrooms remains below an acceptable level of nitrogen loading. The Board may want to consider options to minimize this type tracking, such as specifying a number of 4 bedroom and 3 bedroom houses.

The submitted calculations list the total amount of turf area as 1,064,337 sq ft or 1.11 acres of fertilized turf area for each of the 22 residential parcels. The applicant and the Board may want to discuss ways to reduce this area for the purposes of long-term water conservation and cost savings on fertilizers.

The submitted calculations included recharge for the areas of the cranberry bog and the area of the bogs appears to be larger than listed. The Town nitrogen loading guidance does not include recharge through either wetlands or surface waters. Wetlands, including cranberry bogs, are designed to retain water and not discharge recharge to the underlying aquifer. Part of cranberry farming is trying to control watering of the bog surface and most bog channels are sealed along the bottoms by fine material. The area of the bogs within the WRPD is 27.87 acres of a total area of 38.58 acres (based on MassDEP Water Management Act permitting). Submitted calculations use 23.89 acres for cranberry bog area. This difference should be clarified.

The submitted calculations also included fertilizer applications on the bogs. Details on proposed application rates, water use (i.e., flooding and harvest), and use of herbicides and pesticides were not found among the submitted materials. Back calculations show that the nitrogen application rate in the submitted calculations was 2.1 lbs N per 1,000 sqft of bog. Past monitoring of cranberry bogs has shown that there is a nitrogen loading difference between flow-through and pump on/pump off bogs, but both N loading rates are less than 0.5 lbs N per 1,000 sqft. Details about the planned use of the bogs would help to inform how they will impact the nitrogen loading calculations.

In order to try to address most of the identified issues, I prepared nitrogen loading calculations that: 1) only considered the area of the project (including the bog areas) within the WRPD, 2) removed the added recharge from bog areas, 3) adjusted the soils mapping within the WRPD to reflect only the non-wetland areas, and 4) did not include nitrogen loading from the bogs. The resulting nitrogen loading concentration was slightly above the WRPD 5 mg/L limit (Table 1). It is likely that the limit could be attained with reductions in fertilized turf area, although further changes may be necessary if planned bog fertilization is extensive.

Please let me know if you have any questions or comments regarding this review.

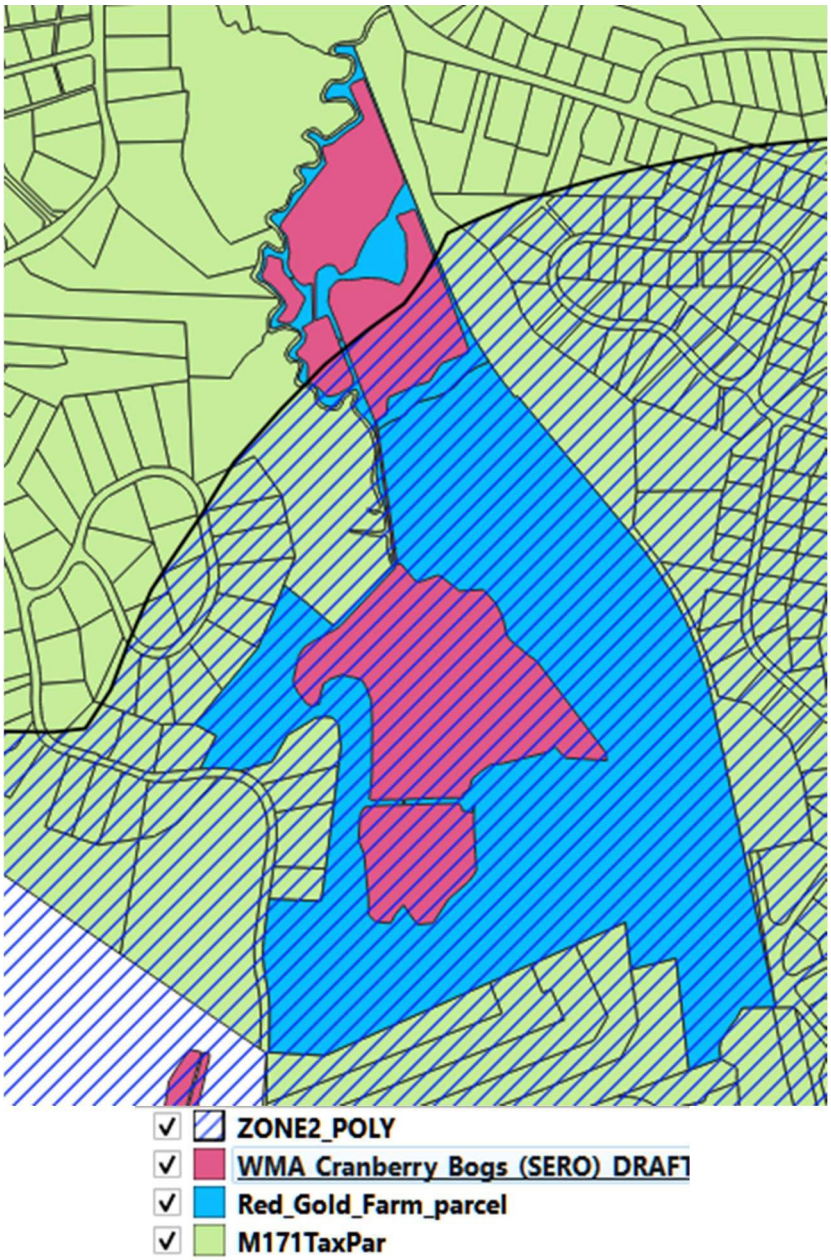

Figure 1. 202 Moraine Street/Red Gold Farm Project Site. *Parcel site is mostly located within the Water Resources Protection District (stippled area). Red areas are permitted cranberry bog areas for MassDEP administration of the Water Management Act.*

Figure 2. Soils Classifications on the portion of the Red Gold Farm within the WRPD. *There are 13 different soils with A, B, and D classifications by the National Resources Conservation Service. These classifications are used to determine recharge rate in the Town nitrogen loading calculations.*

Table 1. Marshfield Nitrogen Loading Calculations: 202 Moraine Street/Red Gold Farm Project Site. *Applicant submitted calculations do not attain the Town WRPD 5 mg/L threshold if appropriately calculated (see corrected 2nd column of calculations). Third calculation column addresses the total project parcel area, while the fourth column addresses only the area within theWRPD. A number of input values need further clarification, including turf areas and fertilizer application on the bog, prior to a final version of these calculations. None of the corrected versions attain the WRPD 5 mg/L threshold.*

PROJECT LOCATION		202 Moraine Street, Marshfield, MA				
DATE		1/7/22 (check by E Eichner)				
APPLICANT						
NAME OF DEVELOPMENT ON SITE PLAN		Red Gold Farm				

LOADING ASSUMPTIONS

A1	Wastewater Effluent from a Standard On-Site System	35	mg/L	35	35	35
	Wastewater Effluent from a DEP Approved Denitrification System	19	mg/L	19	19	19
	Wastewater Effluent from a Centralized Wastewater Treatment Facility	10	mg/L	10	10	10
A2	Runoff from Rooftops	0.75	mg/L	0.75	0.75	0.75
A3	Runoff from Roadways and Driveways	1.5	mg/L	1.5	1.5	1.5
A4	Turf Application	3	lbs/year/1,000 sq feet	3	3	3
A5	Nitrogen leaching rate from turf	25%		25%	25%	25%
A6	Rainfall (Runoff on natural surfaces)	0.05	mg/L	0.05	0.05	0.05

RECHARGE ASSUMPTIONS

	NRCS Soils Group	Recharge Rates				
B1	A Soils	24	inches per year	24	24	24
	B Soils	18	inches per year	18	18	18
	C Soils	10	inches per year	10	10	10
	D Soils	3	inches per year	3	3	3
	Wetlands and Surface Waters	0	inches per year	0	0	0

NITROGEN SOURCES

	Wastewater Flows	Applicant Submitted Loading		Lower Section Review: Match Applicant Submittal	Entire Two Parcel Review	WRPD portion Review
C1	Total Residential Wastewater Flow (Actual Title 5)	9,240	gpd	9,240	9,240	9,240
	Total Residential Wastewater Flow (Modified Title 5)		gpd			
	Total Non-Residential Wastewater Flow (Title 5)		gpd			
	Total Non-Residential Wastewater Flow (Measured)	-	gpd	-	-	-
	TOTAL	9,240	gpd	9,240	9,240	9,240
	Area of Roof					
C2	A Soils	67,980	square feet	67,980	67,980	67,980
	B Soils		square feet			
	C Soils		square feet			
	D Soils		square feet			
	TOTAL	67,980	square feet	67,980	67,980	67,980
	Area of Roads and Driveways					
C3	A Soils	104,922	square feet	104,922	104,922	104,922
	B Soils		square feet			
	C Soils		square feet			
	D Soils		square feet			
	TOTAL	104,922	square feet	104,922	104,922	104,922
	Area of Turf					
C4	A Soils	1,064,337	square feet	1,064,337	1,064,337	1,064,337
	B Soils		square feet			
	C Soils		square feet			
	D Soils		square feet			
	TOTAL	1,064,337	square feet	1,064,337	1,064,337	1,064,337
	Area of Bog					
C4A	A Soils	55,411	square feet			
	B Soils	985,201	square feet			
	C Soils		square feet			
	D Soils		square feet			
	TOTAL	1,040,612	square feet	1,040,612	1,680,458	1,213,913
	Natural Area					
C5	A Soils	329,795	square feet	329,795	329,795	339,633
	B Soils	1,189,693	square feet	1,189,693	1,189,693	1,408,399
	C Soils		square feet			
	D Soils	21,687	square feet	21,687	21,687	17,424
	TOTAL	1,541,175	square feet	1,541,175	1,541,175	1,765,456
Water		722,597		722,597	722,597	718,740
	Total Site Area					
C6		4,541,623	square feet	4,541,623	5,181,469	4,935,348

Table 1. Marshfield Nitrogen Loading Calculations: 202 Moraine Street/Red Gold Farm Project Site (continued). *Applicant submitted calculations do not attain the Town WRPD 5 mg/L threshold if appropriately calculated (see corrected 2nd column of calculations). Third calculation column addresses the total project parcel area, while the fourth column addresses only the area within the WRPD. A number of input values need further clarification, including turf areas and fertilizer application on the bog, prior to a final version of these calculations. None of the corrected versions attain the WRPD 5 mg/L threshold.*

RECHARGE VOLUMES FROM IMPERVIOUS SURFACES

D1	Roofs gallons per year Rooftop Area x Recharge Rates for Underlying Soil Types	135,960	cubic feet/yr	135,960	135,960	135,960
D2	Roadways and Driveways gallons per year Roadways and Driveways Area for Underlying Soil Types	209,844	cubic feet/yr	209,844	209,844	209,844
D3	Alternative Calculation in Redevelopment Scenario gallons per year		cubic feet/yr			
D4	TOTAL	345,804	cubic feet/yr	345,804	345,804	345,804

RECHARGE VOLUMES FROM PERVIOUS SURFACES

E1	Turf square feet Turf Area x Recharge Rates for Underlying Soil Types	2,128,674	cubic feet/yr	2,128,674	2,128,674	2,128,674
E1A	Bog Area	1,588,624	cubic feet/yr	-	-	-
E2	Natural Areas square feet Natural Area x Recharge Rates for Underlying Soil Types	2,449,551	cubic feet/yr	2,449,551	2,449,551	2,796,221
E3	TOTAL	6,166,849	cubic feet/yr	4,578,225	4,578,225	4,924,895

LOADING CALCULATION

F1	Load from Wastewater lbs N per year Wastewater Flow x N Concentration in Wastewater (C1 x A1)	985.10	lbs/yr	985.10	985.10	985.10
F2	Load from Rooftops lbs N per year Volume of Recharge from Roof Runoff x N Concentration in Roof Runoff (D1 x A2)	6.37	lbs/yr	6.37	6.37	6.37
F3	Load from Roadways and Driveways lbs N per year Volume of Recharge from Roadways and Driveways x N and Driveways (D2 x A3)Concentration in and Driveways (D2 x A3)	19.65	lbs/yr	19.65	19.65	19.65
F4	Load from Turf lbs N per year Turf Application Rate x Area of Turf/1,000 x Leaching Rate (A4 x C4/1,000 x A5)	798.25	lbs/yr	798.25	798.25	798.25
F4A	Load from Bog Fertilizer lbs N per year Turf Application Rate x Areaof Turf/1,000 x Leaching Rate (A4 x C4/1,000 x A5)	208.12	lbs/yr	-	-	-
F5	Load from Natural Area lbs N per year Volume of Recharge from Natural Areas x N Concentration in Rainfall (C5 x A6)	7.65	lbs/yr	7.65	7.65	8.73
F6	TOTAL	2,025.13	lbs/yr	1,817.01	1,817.01	1,818.10

Total N load	918,585,532	mg/yr	824,185,068	824,185,068	824,675,896
Total Recharge (+wastewater)	197,184,159	liters/yr	152,199,425	152,199,425	162,015,989
N LOADING CONCENTRATION	4.66	mg/l	5.42	5.42	5.09

We have adjusted our calculations based on the "Entire Two Parcel Review" column. Lot 4 has been eliminated; therefore, the analysis considers 21 structures (each with 4 bedrooms) and the relocated barn (67,198 sf; 9,240 GPD); 1,680,458 sf of bog; and 806,882 sf of grass, which will limit the amount of grass per lot to 30,000 sf/lot. This results in a Nitrogen Loading of 4.85 mg/L.

PROJECT LOCATION	**202 Moraine Street Marshfield**
DATE	**10/28/21**
REVISION DATE	**1/13/22**
APPLICANT	**Sealund Corp**
NAME OF DEVELOPMENT ON SITE PLAN	**Red Gold Farm (Proposed Condition)**

LOADING ASSUMPTIONS			
A1	**Wastewater Effluent from a Standard On-Site System**	**35**	**mg/L**
	Wastewater Effluent from a DEP Approved Denitrification System	**19**	**mg/L**
	Wastewater Effluent from a Centralized Wastewater Treatment Facility	**10**	**mg/L**
A2	**Runoff from Rooftops**	**0.75**	**mg/L**
A3	**Runoff from Roadways and Driveways**	**1.5**	**mg/L**
A4	**Turf Application**	**3**	**lbs/year/1,000 sq feet**
A5	**Nitrogen leaching rate from turf**	**25%**	
A6	**Rainfall (Runoff on natural surfaces)**	**0.05**	**mg/L**

RECHARGE ASSUMPTIONS			
	NRCS Soils Group	**Recharge Rates**	
B1	**A Soils**	**24**	**inches per year**
	B Soils	**18**	**inches per year**
	C Soils	**10**	**inches per year**
	D Soils	**3**	**inches per year**
	Wetlands and Surface Waters	**0**	**inches per year**

NITROGEN SOURCES			
Wastewater Flows			
C1	**Total Residential Wastewater Flow (Actual Title 5)**	**9,240**	**gpd**
	Total Residential Wastewater Flow (Modified Title 5)	**-**	**gpd**
	Total Non-Residential Wastewater Flow (Title 5) gpd		**gpd**
	Total Non-Residential Wastewater Flow (Measured)		**gpd**
	TOTAL	**9,240**	**gpd**
Area of Roof			
C2	**A Soils**	**67,198**	**square feet**
	B Soils		**square feet**
	C Soils		**square feet**
	D Soils		**square feet**
	TOTAL	**67,198**	**square feet**
Area of Roads and Driveways			
C3	**A Soils**	**114,099**	**square feet**
	B Soils		**square feet**
	C Soils		**square feet**
	D Soils		**square feet**
	TOTAL	**114,099**	**square feet**
Area of Turf			
C4	**A Soils**	**806,882**	**square feet**
	B Soils		**square feet**
	C Soils		**square feet**
	D Soils		**square feet**
	TOTAL	**806,882**	**square feet**

Area of Bog			
C4'	**Bog Soils (No recharge)**	**1,680,458**	**square feet**
			square feet
			square feet
			square feet
	TOTAL	**1,680,458**	**square feet**
Natural Area			
C5	**A Soils**	**578,855**	**square feet**
	B Soils	**1,189,693**	**square feet**
	C Soils		**square feet**
	D Soils	**21,687**	**square feet**
	TOTAL	**1,790,235**	**square feet**
	Water surface area	**722,597**	**square feet**
Total Site Area			
C6		**5,181,469**	**square feet**

RECHARGE VOLUMES FROM IMPERVIOUS SURFACES			
D1	**Roofs gallons per year Rooftop Area x Recharge Rates for Underlying Soil Types**	**134,396**	**cubic feet/yr**
D2	**Roadways and Driveways gallons per year Roadways and Driveways Area for Underlying Soil Types**	**228,198**	**cubic feet/yr**
D3	**Alternative Calculation in Redevelopment Scenario gallons per year**		**cubic feet/yr**
D4	**TOTAL**	**362,594**	**cubic feet/yr**

RECHARGE VOLUMES FROM PERVIOUS SURFACES			
E1	**Turf square feet Turf Area x Recharge Rates for Underlying Soil Types**	**1,613,764**	**cubic feet/yr**
E1'	**Bog square feet Area x Recharge Rates for Underlying Soil Types**		**cubic feet/yr**
E2	**Natural Areas square feet Natural Area x Recharge Rates for Underlying Soil Types**	**2,947,671**	**cubic feet/yr**
E3	**TOTAL**	**4,561,435**	**cubic feet/yr**

LOADING CALCULATION			
F1	Load from Wastewater lbs N per year Wastewater Flow x N Concentration in Wastewater (C1 x A1)	984.99	lbs/yr
F2	Load from Rooftops lbs N per year Volume of Recharge from Roof Runoff x N Concentration in Roof Runoff (D1 x A2)	6.29	lbs/yr
F3	Load from Roadways and Driveways lbs N per year Volume of Recharge from Roadways and Driveways x N and Driveways (D2 x A3) Concentration in and Driveways (D2 x A3)	21.37	lbs/yr
F4	Load from Turf lbs N per year Turf Application Rate x Area of Turf/1,000 x Leaching Rate (A4 x C4/1,000 x A5)	605.16	lbs/yr
F4'	Load from Bog Fertilizer lbs N per year Application Rate x Area of Bog/1,000 x Leaching Rate (A4 x C4/1,000 x A5)		lbs/yr
F5	Load from Natural Area lbs N per year Volume of Recharge from Natural Areas x N Concentration in Rainfall (C5 x A6)	9.20	lbs/yr
F6	TOTAL	1,627.02	lbs/yr
Total N load		738,002,002	mg/yr
Total Recharge (+wastewater)		152,197,811	liters/yr
	N LOADING CONCENTRATION	4.85	mg/l

Response to Planning Board Hearing Comments

February 2, 2022

Marshfield Planning Board
870 Moraine Street
Marshfield, MA 02050

RE: Definitive Subdivision – 202 Moraine St.
Assessors Map I04-02-08A & I05-01-09
Applicant – Sealund Corp

Dear Board Members:

On behalf of the applicant we hereby submit responses to some of the comments by the board and abutters during the Planning Board hearing on January 10, 2022. We have provided the discussed comments in *italics* and our responses in **bold.**

Pat Brennan

- *The width of the Cape Cod berm is specified to be 18 inches wide, which is what is required by the Rules and Regulations. However, our experience is that most paving companies do not have the equipment to place 18 inch Cape Cod berms so we recommend that the berms be 12 inches wide and the width of the travel way be increasedby a foot so that the total width of pavement is the same (23 feet).*
    - **The plans have been updated to show a 12" Cape Cod berm.**

- *A sight distance triangle at the proposed road's intersection with Moraine Street should be shown on the plans to verify that adequate sight distance will be provided.*
    - **A detail for the stopping sight distance has been added to the plan on sheet 23**

- *In accordance with §405-10.D, the Applicant should demonstrate that there will be adequate water supply for fire protection.*
    - **The applicant is currently in communication with the Town of Duxbury Water Department, this is an ongoing discussion.**

- *There have been a number of test pits excavated on site which show varying soil conditions and depths to seasonal high groundwater. Additional test pits would be required at locations of proposed trench drains to verify soil textural analysis (infiltrationrates) and adequate separation to seasonal high groundwater.*
    - **The applicant is currently coordinating the scheduling of the test pits. this is ongoing.**

- *Proposed catch basins CB- I and CB-2 are connected in series. Catch basins should not be connected in series as this allows the resuspension of settled solids in the sump of the flow-through catch basin. Also, MassDEP Stormwater Standards only allow for total suspended solids (TSS) removal credit when the catch basins are off-line. We note that the discharge from these catch basins is proposed to connect to the State drainage system in Moraine Street and MassDOT approval would be required.*
    - **CB-1 and CB-2 have been updated in the plan to connect to a drain manhole which discharges into the State drainage system. MassDOT applications will submitted, this is ongoing.**

Katherine O'Donnell

- *Lots 3 & 4 will have a shared driveway which is prohibited in our regulations.*
    - **Lot 4 has been eliminated from the proposed subdivision, no shared driveways are being proposed**

George Driscoll (Abutter – 56 Whitford Circle)

- *Will there be any development in the bogs?*
    - **No development is being proposed in the bog areas, the bogs are being proposed to be leased to a company that will continue to operate them**

- *There's a drainage easement close to the bog on the north side of the pond, will the drainage mitigation affect the bogs and wetlands?*
    - **The outlet for the pond will have an outlet control structure, where the proposed flow rate will be at or below existing flow rates. The outflow from the ponds will be treated before discharged as required by local and state regulations.**

Michael Biviano

- *Who will own the bog after the subdivision is built?*
    - **The applicant will maintain ownership of the bogs and is considering leasing the bogs for continued operation.**

Beth Casoni (Abutter – 96 Meetinghouse Ln)

- *With the removal of the wooded areas and the addition of lawns, how will contaminants such as Nitrogen will be managed?*
    - **The site is within a Water Resource Protection District which has strict limits on the amounts of Nitrogen that can be leached into the ground. We received comments from Mr. Eduard Eichner regarding our Nitrogen Loading analysis and we reviewed our calculations and requirements in order to comply with the regulations.**

- *A 20' undisturbed buffer is proposed at the back lot lines, will this include the lots adjacent to the Black Mountain Pond?*
    - **The 20' undisturbed buffer is proposed at the south lots that abut other properties. The lots adjacent to the Black Mountain Pond (as well as other lots abutting a wetland or bogs) will have a 75' buffer as required by the Conservation Commission.**

- *Who will maintain the dam after the Garretsons are gone?*
    - **This is an ongoing discussion**

- *Who will maintain the path and decks along the back of the Black Mountain Pond?*
    - **This is an ongoing discussion**

Karen Shanley (Abutter - 64 Meetinghouse Ln)

- *Any studies on the effect of the development on the water level of the pond?*
    - **There are no proposed changes to the water level due to the development**

- *Is the development in a flood plain?*
    - **The bogs and part of the subdivision are in a flood plain, any reduction of volume due to grading within the floodplain, will be compensated for in another location within the development.**

Beth Casoni (Abutter – 96 Meetinghouse Ln)

- *In regards with the water level, if the bogs won't be harvested, what will happen with the water level when it increases and decreases?*
    - **The applicant is considering continuous operation of the bogs through a lease on the bogs.**