

REPORT OF FINDINGS  
EVERGREEN ESTATES & GOLF COURSE  
NEWBURYPORT, MASSACHUSETTS

FOR

BOARD OF WATER COMMISSIONERS  
NEWBURYPORT, MASSACHUSETTS

BY

M. ANTHONY LALLY ASSOCIATES  
CONSULTING ENVIRONMENTAL ENGINEERS  
NORTH ANDOVER, MASSACHUSETTS 01845

TABLE OF CONTENTS

LETTER OF TRANSMITTAL

I. REPORT OF FINDINGS

II. SUGGESTED CONDITIONS

III. LETTER REPORT ARCH ASSOCIATES

by JOHN A. MOSER, CONSULTING HYDROGEOLOGIST

# M. Anthony Lally Associates

Consulting Environmental Engineers

M. Anthony Lally, P.E.

200 Sutton Street

North Andover, Massachusetts 01845

Tel. (617) 688-1763

September 17, 1985

Board of Water Commissioners  
Newburyport Water Department  
City Hall  
Newburyport, MA. 01950

Re: Review of Proposed Project Development  
Ferry Road Gravel Pit  
Evergreen Estates & Golf Course  
Newburyport, Massachusetts

Gentlemen:

As requested we have reviewed the documents provided and obtained regarding the proposed Ribot Realty Trust Golf Course and appropriate portion of the related Definitive Subdivision Plan.

Attached to this letter of transmittal is the Report of our Findings and suggested conditions. It has been represented that no evidence of groundwater contamination has been found with other golf course operations. However, previous history of this site is indicative of an interrelationship between the surface and groundwater at the proposed development site and Well No. 2.

Also, there are currently studies underway and proposed investigation by the Massachusetts Department of Environmental Quality Engineering (DEQE) and the Federal Environmental Protection Agency (EPA) to determine the impact of golf courses, specifically in sandy areas, on the groundwater quality.

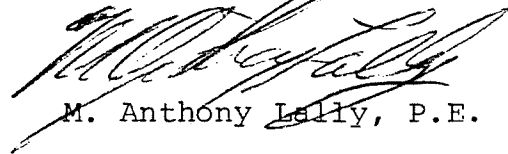
It is strongly recommended that the construction and operation of the proposed project be carefully inspected and monitored to insure against the possible contamination of City Well No. 2. The installation of three (3) or four (4) monitoring wells is suggested in the attached conditions. In addition, a minimum thickness of loam to develop the maximum retention of fertilizer, pesticides, herbicides and fungicides is advised. The optimum site grading and surface vegetation is recommended for this project if it receives the favorable approval of the Board of Water Commissioners and the other necessary City Boards (i.e. Zoning Board of Appeals, Planning Board, and if necessary, the Conservation Commission.

Board of Water Commissioners  
September 17, 1985  
Page Two

Please do not hesitate to contact this office if we can provide any additional information regarding this correspondence, or if you have any further questions regarding this matter.

Very truly yours,

M. ANTHONY LALLY ASSOCIATES

A handwritten signature in dark ink, appearing to read "M. Anthony Lally", is written over the typed name.

M. Anthony Lally, P.E.

MAL/jk  
Enclosures

I

REPORT OF FINDINGS  
REVIEW OF DEFINITIVE PLAN  
EVERGREEN ESTATES & COUNTRY CLUB  
RIBOT REALTY TRUST  
NEWBURYPORT, MASSACHUSETTS

BY

M. ANTHONY LALLY ASSOCIATES  
CONSULTING ENVIRONMENTAL ENGINEERS  
NORTH ANDOVER, MASSACHUSETTS 01845

SEPTEMBER 1985

REPORT OF FINDINGS  
REVIEW OF DEFINITIVE PLAN  
EVERGREEN ESTATES & COUNTRY CLUB  
RIBOT REALTY TRUST  
NEWBURYPORT, MASSACHUSETTS  
M. ANTHONY LALLY ASSOCIATES

As requested, we have reviewed plans and technical data submitted for the referenced subdivision and golf course proposed for the former gravel pit located off Ferry Road. The primary objective of our review is to consider the project as it relates to the operation and water quality of the City's water supply Well No. 2.

The potential impact on Well No. 2 from activity on this site is based on historic information from the Newburyport Water Department relating to recorded changes in water quality. Increased sodium, sulfate, chloride and specific conductance readings were recorded during the spring and summer of 1974 during when it is understood, that extensive filling of this abutting land took place with salt marsh dredging material from off site locations.

The proposed project as presented includes a subdivision of a portion of the land, creating twenty (20) house lots and the remaining area to be developed into a nine (9) hole public golf course. The total acreage for this parcel of land is indicated to be approximately 51.15 acres. The proposed building lots will contain a minimum of 20,000 square feet each and will be located off Ferry Road on the southeasterly portion of the site.

Existing water and sewer utilities are proposed to be extended to serve the residential subdivision. No extension of the sewer or water lines are planned for the golf course, except to serve the proposed club house to be located off the subdivision access roadway. No municipal water has been indicated for irrigation of the golf course itself.

Drainage from the subdivision access roadway is shown to flow into the proposed golf course holding ponds. This drainage will be conducted into the retention ponds for quality control and for probable irrigation purposes. Catch basins within the street as requested have been equipped with typical oil and grease traps and sumps to collect road sand and salt. Regular maintenance of these catch basins will be necessary as indicated in the attached list of suggested conditions.

Our review of this project is to assess the potential impact from the proposed development and its operation on the City's Municipal Well No. 2. This well provides a significant percentage of the Newburyport water supply and is an essential part of the City overall water sources.

The following list of documents have been submitted and considered as part of this engineering and technical review.

- 1) Preliminary Subdivision Plan and Correspondence dated April 1985.
- 2) Traffic Impact Assessment, Evergreen Estates and Country Club, Newburyport, MA., dated May 1985.
- 3) Environmental Impact Statement, Evergreen Estates Subdivision, Ribot Realty Trust, July 25, 1985.
- 4) Schematic Golf Course Grading Plan, dated August 1985.
- 5) Supplemental Data submitted by BSC Engineering, dated August 22, 1985.
- 6) Pesticide and Fertilizer Consideration for Evergreen Golf Course, by Stanley R. Swier and Dr. John M. Roberts, University of New Hampshire, Durham, N.H., received August 29, 1985.

We have also reviewed previous subdivision plans for this area as indicated by our earlier correspondence dated October 30, 1978.

Based on our review of the data as submitted by various consultants and from BSC Associates, it is determined that some risk may be associated with the development of the existing Vitale Pit area. However, it is important to consider alternative land uses to the

proposed twenty (20) lot subdivision and nine (9) hole public golf course in evaluating the potential impact of this project.

Alternatives for the development of the proposed site would include:

- . The existing site condition remaining as is, which would be unacceptable to provide adequate control and monitoring to assure against future pollution of the groundwater and possible well contamination.
- . Higher density residential development in the lower areas of the site can create a situation which is more uncontrolled and may result in accidental groundwater pollution and well contamination.
- . Industrial development of this area would be in conflict with existing zoning regulations and neighborhood land uses. High density industrial use of the area even by so-called dry industry could result in accidental groundwater contamination, even if safeguards were imposed on the development. Multiple industrial land uses would be difficult to monitor and could be a burden on the City of Newburyport to monitor and control.
- . Recreational use of the site will create a risk of accidental contamination, but reasonable safeguards can be implemented to reduce the risk. Recreational use of the land can be by either public or private development. Public development of the land would require the expenditure of City funds for land acquisition and development. Private development would provide outside funding and would result in the land being maintained within the City tax system. Also, monitoring and control of the site can be provided by the City to oversee the land use and restrict the development to reasonable limits.

It has been represented by data submitted by BSC Associates, that a groundwater divide exists between some portion of the proposed development site and the Newburyport Well No. 2. This condition is based on data compiled from two (2) sets of groundwater levels obtained



this summer. Groundwater levels at this time of year are usually low and this year are generally considered to be exceptionally low. The water level readings were taken originally on July 23, 1985 and the second set of readings were taken on August 9, 1985. This data as interpreted by BSC Associates showed two different locations for their projected groundwater divide. Accurate determination of a groundwater divide, if one actually exists, must be based on more comprehensive field information and the use of groundwater modeling techniques. It is therefore considered to be more conservative to take all reasonable steps to control possible groundwater pollution rather than assume it will not affect the City's Well No. 2.

A review of data submitted by Dr. Stanley R. Swier and Dr. John M. Roberts, University of New Hampshire, indicates recommended procedures to be followed to minimize the risk of contamination of Well No. 2. The type and application of fertilizer, insecticide, fungicide and herbicide is suggested in the data by Swier and Roberts for a low maintenance program. It is indicated by this referenced report that "strict adherence to this program will not produce high quality turf, but will significantly reduce the risk of groundwater pollution." The outlined Pesticide-Fertilizer Program indicated the following steps to reduce potential groundwater contamination:

- 1) Avoid herbicides like dicamba and 2,4-D because of the existing low organic sandy soils and relatively high mobility of these substances.
- 2) Avoid fungicides containing mercury, cadmium (such as calo-clor or cadminate) or PCNB (Penta-cloronitrobenzene) which have long term persistence in the environment.
- 3) Avoid Proxol which has low adsorption and high water solubility.
- 4) Avoid highly toxic pesticides which can be identified by the word "Danger".
- 5) Avoid fertilizers that have a synthetic inorganic carrier (like urea or ammonium nitrate).

- 6) Avoid pesticides application prior to heavy rainfall.
- 7) Avoid pesticides and fertilizer application during periods of non growth.
- 8) Avoid soil fumigation.

It is suggested that these steps, together with the additional conditions suggested as attached, be a part of any approval granted for the proposed project.

In addition to the steps to be recommended by Swier and Roberts, it was also indicated that the most important factor in controlling herbicides, pesticides and fertilizer movement is the organic matter present in the soil. It was further stated that the insecticides would be unlikely to leach down to the groundwater at depth of 4 - 23 feet below. This depth has not been verified by spring seasonal readings and is estimated to be higher during this period. Therefore, it is suggested that greater depth of loam, clay and topsoil be provided for the area of the golf course to be treated, which will not have four (4) feet of soil above the maximum groundwater table.

Considering alternative site construction possibilities and the documentation submitted in behalf of Ribot Realty Trust, we have developed the attached suggested conditions which are intended to minimize potential adverse impact on City Well No. 2. The attached conditions are submitted for consideration if the site is approved for private development for limited residential use and for the construction of a public golf course.

II

SUGGESTED CONDITIONS

RECOMMENDED CONDITIONS OF  
SITE DEVELOPMENT

- 1) All areas where pesticides, insecticides, fertilizer and herbicides are to be used shall be lined with an impervious clay type liner, a one (1) foot depth of highly organic loam, or shall be at least four (4) feet above maximum groundwater. Maximum groundwater to be determined for the seasonal high groundwater period.
- 2) All areas within the proposed golf course within the potential recharge area of the City Well No. 2 shall be overlaid with sufficient depth of organic loam and top soil to support adequate vegetation to uptake or adsorb the application of pesticides, insecticides, fertilizer and herbicides. A minimum depth of 12-inches is recommended.
- 3) All areas within the potential recharge area of Well No. 2 shall be sloped to drain away from the Well and into the lined retention pond areas. A minimum one (1%) percent slope shall be provided and a more desirable two (2%) percent slope shall be provided wherever possible.
- 4) All retention pond areas shall be made impervious by use of a clay liner or other impervious material. Total retention of the lined pond areas shall be provided for a ten (10) year storm interval. Total retention area within both lined and unlined ponds shall be provided for a twenty-five (25) year storm capacity. These ponds shall be used as monitoring and control systems to maintain acceptable water quality.
- 5) Pond retention areas shall be designed and detail construction drawings shall be submitted for review and approval. (Subdivision plans indicate depth of pond to elevation 48.0 while golf course plan shows pond at elevation 52.0.)
- 6) All drainage calculations shall be submitted to demonstrate the adequacy of the proposed ponds to hold and maintain the design storm frequency.

- 7) All greens, fairways and tees shall be surrounded with a buffer zone of specially selected vegetation and density to decrease the penetration of pesticides and fertilizers. No chemical treatment shall be provided in these areas.
- 8) The location of the pesticide, fertilizer, insecticide and herbicide storage and mixing areas shall be as remote as possible from Well No. 2. Full safety control and spill prevention shall be included in the design of this facility to insure against possible contamination of the groundwater.
- 9) Rinsate from the chemical storage and container areas shall not be disposed of on site. Off site location shall be established for this disposal.
- 10) A certified superintendent shall be responsible for handling and applying all fertilizers, insecticides, pesticides and herbicides. This licensed person must maintain the necessary license renewal and conform to state and federal regulations applicable to this purpose.
- 11) Monitoring wells shall be installed and maintained to evaluate groundwater quality within the recharge area of Well No. 2. At least three (3) wells shall be installed, and if necessary, a fourth (4) well in the vicinity of the chemical storage area shall be provided. The following sampling schedule shall be followed:

Initial sampling - first  
year of operation . . . . . one/3 months

First five (5) years of  
operation after first year. . . . one/6 months

Continuous sampling if no  
evidence of contamination  
exists . . . . . one/year

All samples shall be taken in conjunction with the City of Newburyport and analyzed at a certified laboratory at the Owner's expense.

- 12) The Owner will take all necessary steps to preserve and protect the quality of groundwater and potability of water that flows from the site toward the City's Municipal Well.
- 13) All catch basins within the proposed subdivision and any other on site catch basins shall be provided with standard gas and oil separators to prevent overflow of oil, grease and gasoline into the retention ponds.
- 14) All catch basins shall be provided with oversized sumps, four (4) feet depth, to collect sand and salt from the street drainage.
- 15) The Owner/Developer shall maintain by cleaning twice per year, spring and fall, each catch basin and properly dispose of its contents off site.
- 16) All building lots within the subdivision will be adequately serviced by wastewater collection and transfer to the City sewer system. Fail safe operation and standby power for electrical equipment shall be provided to prevent accidental disposal of sewerage within the project area.
- 17) Continuous monitoring of existing wells shall be provided with data supplied to the City and used to refine golf course design as determined to be necessary and desirable.
- 18) A minimum of two (2) feet above the maximum groundwater level shall be maintained for areas of fertilizer, insecticide, pesticide and herbicide application, with a minimum one (1) foot depth of organic loam, clay and topsoil.
- 19) The City of Newburyport shall be informed of all pesticides purchased by type and quantity. Any change in the type and quality of material used shall be noted.
- 20) Grading of all subdivision lots shall be away from the well and directed by the proposed drainage system to the retention pond as designed.
- 21) Adequate design, installation and maintenance of the drainage retention ponds shall be provided by the Owner.

22) Turf maintenance program to reduce potential groundwater contamination (As suggested by Swier and Roberts.)

- a) All pesticides should be selected with short persistence in soil after application.
- b) Insecticides such as Dursban and Oftand, or other low solubility strongly adsorbed products should be used.
- c) Fertilizer should be applied in more frequent, lighter amounts to maximize fertilizer efficiency (fertilizer rate should not exceed 0.5 lbs of nitrogen per 1000 feet, not less than every fourteen (14) days).

d) Use low maintenance fertilizer and pesticide program

<u>Location</u> Lbs.	<u>Fertilizer</u> Lb. a.i.	<u>Insecticide</u> Lb. a.i.	<u>Fungicide</u> Lb. a.i.	<u>Herbicide</u> Lb. a.i.
Greens-aprons	180	0.3	24.6	4.9
Tees	90	0.1	none	none
Fairways	1,741	6.8	none	none
Total	2,001	7.2	24.6	4.9

Based on 871,000 S.F. - Fairway  
 22,000 S.F. - Green  
 35,000 S.F. - Apron

- e) Insecticides - Greens and aprons will need to be sprayed twice per year using Dursban EC (liquid) at a rate of 1.5 oz. active ingredient (a.i.) per 1000 ft. Tees do not have to be sprayed if some damage is accepted. For grub control, fairway will need to be sprayed. Use Oftanol 2E (22% a.i.) at .7 oz. a.i./1000 sq. ft.<sup>2</sup> on half the fairways, once every three (3) years.

- f) Herbicides - For grassy weed control on greens-aprons only, use Betasan at 10 lbs. a.i./ac every other year.
- g) Fungicides - For green-aprons only, use Tersan SP WP (65% a.i.) at 5.2 oz. a.i./1000 ft.<sup>2</sup> and Daconil 2787 WP (75% a.i.) at 6 oz. a.i./1000 ft.<sup>2</sup>.
- h) Fertilizers - Use fertilizer formulations containing a d/1/2 (N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O formulation) applied at 3, 2 and 1 lb.(s) actual nitrogen/1000 ft.<sup>2</sup> annually to the greens, apron, tees and fairways respectively.

#### SUPPLEMENTAL STIPULATIONS

- . Minimum six (6) inches of loam must be placed over entire site and adequately vegetated.
- . Inspection of grading and construction shall be provided by the Water Department's consulting engineers, M. Anthony Lally Associates, the cost of which, if required on a full time basis, shall be reimbursed by the Developer.
- . Approval shall be reviewed annually to determine compliance with conditions and impact on City Well No. 2.
- . If at any time it is determined that City Well No. 2 is being adversely affected by the construction or operation of the golf course, it shall be terminated immediately and all necessary corrective action shall be implemented by the Developer/Owner.



III

LETTER REPORT  
ARCH ASSOCIATES



CONSULTING HYDROGEOLOGISTS

161 HACKETT ST., YARMOUTH PORT, MASS. 02675  
(617) 362-9518

September 3, 1985

Mr. M. Anthony Lally  
M. Anthony Lally Associates  
200 Sutton Street, Suite 220  
North Andover, Massachusetts 01845

Subject: Newburyport, Massachusetts - Well No. 2  
Evergreen Estates proposal

Dear Tony:

As you requested at our meeting of Wednesday, August 28, 1985, following are my comments on the ground-water analysis at the subject project.

BSC has presented an interpretation of the hydrogeologic conditions that is reasonable with respect to the data that they have made available. There appear to be two sub-parallel high-permeability zones running north-south across the Evergreen Estates property. One runs from beneath the cemetery on the southeast border of the property northward through Well No. 2. The other runs northerly across the western side of the property. These are presumably old glacial outwash stream channels. They are separated up to an elevation of about 254-255 feet above sea level by an apparent ridge of bedrock that is indicated by two wells in the housing development to the west of Well No. 2 and an outcrop on the Evergreen Estates property near the west corner of the Well No. 2 property. There is no direct evidence of whether or not it extends to the south across the Evergreen Estates property.

BSC has presented two water table maps. The first was presented in the EIS of July 25, 1985, and was based on water-level measurements made on July 23, 1985. The second was presented at a more recent hearing and was based on water-level measurements made on August 9, 1985, at which I was present. The water level shown at B-7 on August 9 is an estimate as B-7 has apparently been covered by a pile of topsoil. Both of these maps show a ground-water divide extending south from the apparent bedrock ridge, but it is further west in the August 9 water-table map. This "shift" in the position of the divide is an artifact of a revision of the water table contouring to what I consider to be a better interpretation of the water-level data. This divide is a result of the bedrock ridge on its northern half. It is interpreted by BSC to be an indication of the continuance of the ridge to the south across the Evergreen Estates, but it may be a function of hydrology controlled by sedimentation or stratigraphic changes more than by a bedrock high.

The water-table maps show a very reasonable configuration that is consistent with the available data (especially the August 9 water table map), but this is true only for this relatively dry time of year. BSC considers this to be the time of highest demand and greatest pumping from Well No. 2 and so is the best time of year to depict. This has merit, but the wetland vegetation that was present in the northwest corner (between B-5 and B-6) where the elevations were lowest (around 54 feet asl) suggests that the water table may be at least 3-4 feet higher in the wet seasons. This raises the possibility that the bedrock ridge is not always an effective barrier and may sometimes fail to divert the ground water from the western half of the golf course away from Well No. 2.

It is my opinion that a golf course is no more threatening to the quality of the ground water than residential housing, partly because a golf course can be more susceptible to control than private home owners whether it is by self interest (good golf course operators don't like to waste fertilizer or pesticides) or by Town regulation.

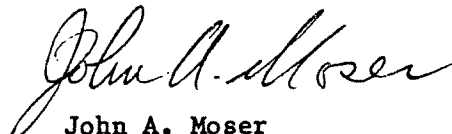
#### Recommendations.

I recommend that the golf course be graded to carry the surface runoff toward the western half of the golf course or to the retention ponds. The current grading plan shows the right idea, but it does not appear that it will be as effective as is desired since the gradient is so flat. Finer material should be required over the entire eastern half of the course (including rough areas) to prevent the rapid infiltration of runoff that would occur through the existing sandy surface.

I recommend that the Town place several monitoring wells (4-6 of them) around the perimeter of the Well No. 2 property. These should be tested at least quarterly for nitrogen and any pesticides that may be used at the golf course. Other tests should also be run for more general pollutants such as road salt (sodium and chloride). Evergreen Estates could be required to pay the costs of the 3-4 wells on the south and east sides of the Well No. 2 property, and also to pay for the analyses of water samples from these wells.

If you have any questions about the foregoing, please call me.

Very truly yours,



John A. Moser

Principal/Hydrogeologist