ISSUE DATE:

November 30, 2005

DECISION/ORDER NO:

3126

Ontario

PL980499

Ontario Municipal Board
Commission des affaires municipales de l'Ontario

The Corporation of the Township of Limerick and the Limerick Waterways Ratepayers Association appealed to the Ontario Municipal Board under subsection 51(39) of the *Planning Act*, R.S.O. 1990, c. P.13, as amended, from a decision of the County of Hastings to approve a proposed plan of subdivision on lands composed of Part of Lots 12, 13 and 14, Concession 4, in the Township of Limerick
OMB File No. S980045

The Board in its Decision/Order No. 1735, issued November 3, 2004, granted the application by Trident Members Inc. for review under section 43 of the *Ontario Municipal Board Act*, R.S.O. 1990, c. O.28, of its Board's Decision and Order No. 1170, issued on June 17, 1999 and ordered a reconsideration of the previously deleted 53 lots from the plan of subdivision

Trident Members Inc. appealed to the Ontario Municipal Board under subsection 34(11) of the *Planning Act,* R.S.O. 1990, c. P. 13, as amended, from Council of the Township of Limerick's refusal or neglect to enact a proposed amendment to Zoning By-laws 7-77 and 3-80 to permit the development of the proposed plan of subdivision
Township File Z-1-00
OMB File No. Z050026

A P P E A R A N C E S :

Parties	**Counsel*/or Agent**
Trident Members Inc. (Trident)	Jeffrey Wilker* Alstair Burton*
Township of Limerick (Township) Limerick Waterways Ratepayers Association (Association)	John Sewell
Ministry of Municipal Affairs & Housing (MMAH)	Brenda Linington* Catherine Casentino*

DECISION BY DAVID J. CULHAM AND ORDER OF THE BOARD

Limerick Lake and St. Ola Lake lie on the Precambrian rock of the Frontenac Axis, which arches southward from Algonquin Park to the Adirondacks in upper New York State. Further, Limerick Lake lies east of Highway 62 some 85 km north of Belleville, and some 25 km south of Bancroft.

The Applicant received by way of a Section 43 appeal, the reconsideration by the Board of lots previously removed from within 300 metres of Limerick Lake as well as lots draining only to St. Ola Lake. The Board must determine in this Phase 1 of the Hearing whether the new Phosphex^{TM} technology, developed by the University of Waterloo since 1999, and the use of acidic B horizons of local native soils within the proposed tile beds, sufficiently attenuate phosphate sewage effluent so that this cold water Lake Limerick is protected from further degradation.

The applicant asserts that the Board should reinstate 52 lots removed by agreement in 1999 from an adjacent and approved draft Plan of Subdivision of 88 lots. 31 of the lots under consideration drain to Lake Limerick and are within a 300-metre buffer zone considered important by the Province. In addition, the Applicant has 21 proposed lots draining towards Lake St. Ola Lake, which is not a “cold water Lake Trout type-lake”.

The existing approved draft Plan of Subdivision with 88 lots also has an approved recreation centre with a replacement septic tile bed within the 300-metre buffer. In addition, it has an approved dock facility but no boat launching. In dispute is whether a beach of 30 metres by 10 metres in depth is part of the existing approved recreational centre.

Complicating the situation is the existence of cottages on the immediate waterfront whose road access traverses this proposed site. These existing cottages are in front of at least 11 proposed lots within the 300-metre buffer with over 105 metres of intervening vegetative space.

After the lunch break on October 26, 2005, Mr. Sewell, on behalf of the Association, brought a motion requesting the Board limit the witness Mr. Neilson to testimony dealing with the additional lots for which in his view, the Board granted the Section 43 review. Further, Mr. Sewell asserted that the concept of a “beach” on the waterfront is not part of the review. Mr. Wilker, on behalf of the Applicant, responded with his assertion that the beach is a legitimate part of the Section 43 review. Mr. Wilker asserted that the recreational facilities are part of the originally approved draft Plan of Subdivision.

After reviewing the submissions, the Board decided not to limit Mr. Neilson's testimony for the following reasons. Firstly, the Parties had agreed to focus upon the scientific testimony at this Phase 1 of the Hearing. The issue of the shoreline beach has both a scientific component and a planning component. The Board determines that the scientific component must be dealt with during this Phase 1 Hearing. While the Board heard the submissions, it refers the planning component of the motion to the Phase 2 Hearing in January 2006 so as not to distract from the scheduled task.

The previous Board Decision No. 2693, with the agreement of the Parties, required Mr. Wilker, on behalf of his client, to bring a motion requesting consideration of the St. Ola Lake lots to this Hearing. The Board gave this direction in the event that the Board decided against the application of the proposed science relating to Lake Limerick. Mr. Wilker requested the change in this timing until after the Board decision. After some discussion, the Board decided, with the agreement of the Parties, that Mr. Wilker has the option of presenting his motion at the already scheduled January 17, 2006 Hearing after Mr. Sewell's previous motion scheduled on the first day.

Witnesses

The Board qualified the following people who testified in support of the Application: Robert Marttila with 45 years of experience, as an engineer, a hydro-geologist and as a geo-scientist with experience in cold water fisheries; Leon Bryck with many years as a peer reviewer, as an engineer, a hydro-geologist and as a geo-scientist; Alex Campbell, as a soil scientist with special expertise in sewage treatment systems; David Smyth, who is employed as a special researcher at the University of Waterloo, as a hydrologist and a geo-scientist with special expertise in sewage treatment systems and in particular, the Phosphex^{TM} system; Gordon Nielsen, qualified as an aquatic biologist with expertise in assessing fish habitat testified in support of the application especially in support of the shoreline plan; Dr. Neil Hutchinson as an experienced limnologist and aquatic scientist with special expertise in assessing the management of lake capacity, nutrient management in aquatic environments and in environmental and policy management; and Mr. Michael Michalski as an experienced limnologist with special expertise in phosphorus loading, bio-physical inventory and assessment, in the environmental component of storm water management, in the assessment of technologies for small scale sewage and treatment systems, in

environmental policy development, and in environmental impacts of recreational boating.

Ms Katherine Irwin, a qualified and experienced aquatic biologist with the Ministry of Natural Resources (MNR); Dr. David Evans, a senior scientist with the MNR and qualified as a research fisheries biologist with special expertise in Lake Trout habitat; Mr. Robert Putzlocher, a qualified hydro-geologist and engineer; Dr. William Robertson, a senior scientist qualified as a hydro-geologist with special expertise in ground water assessment and septic plumes; Dr. R. (Mano) Manoharan, a qualified environmental engineer with special expertise in waste water treatment and technologies; Victor Castro, a qualified water scientist with specialty in the lake impact assessment and capacity issues; Dr. Andrew Paterson, a qualified aquatic scientist with special expertise in assessing lake impacts and lakeshore capacity modelling; and Ahamed Sharaf, a qualified engineer with special expertise in on site sewage system under the Ontario Building Code all testified in opposition to this Application.

Rick McGregor, qualified as a hydro-geologist and geo-scientist with special expertise in geochemistry and Wayne Longmuir testified as the experienced Reeve of the Township of Limerick, testified on behalf of the Association and the Township.

Lake Limerick

1. The Board finds based upon the testimony of Ms Irvine and Dr. Evans and the general agreement of the Parties, that Lake Limerick represents a special “at capacity” cold water Lake Trout habitat that is especially susceptible to low levels of dissolved oxygen.

2. The present phosphate nutrients from shoreline sewage septic systems acerbate the low levels of dissolved oxygen condition by stimulating algae growth.

3. The cold water Lake Trout type-lake Limerick is a very high priority, high value lake within Ontario.

Ms Irvine and Dr. Evans testified as to the importance of Lake Limerick as one of only 1827 lakes in Ontario, which possess self-sustaining Lake Trout populations. Lake Trout are native only to North America with 90% of such trout locating in lakes of the

Canadian Shield. While this number of special lakes represents less than 1% of Ontario's 250,000 lakes, the populations of Lake Trout represents some 20 to 25% of the world's supply. Ms Irvine testified that the Lake Trout habitat had declined by 5% as represented by Sternberg, Centre, Robinson and Jack Lakes.

Ms Irvine and Dr. Evans testified that phosphate enriched sewage from septic systems in close proximity eventually migrates to such lakes, providing stimulant for the algae growth. During the summer months, bacteria help to decompose algae vegetable mass, further reducing the dissolved oxygen, particularly in the deep waters below 11 metres.

The Province discounted the atmospheric loading of phosphorus from 50 to 37 to 20 $mg/m^2/yr$ in 1993 as indicated in Dr. Hutchinson's 1993 letter in Exhibit 11. Dr. Hutchinson testified as to a 2005 paper by Paterson *et. al*. containing a fourth different estimate for atmospheric phosphorus deposition in a 20-year period.

Dr. Evans testified that the upper lethal temperature for Lake Trout is 23.5°C. Surface waters do not rise above 10-12°C until early summer at which time the Lake Trout seek colder, deeper waters below the thermocline. This environment below the thermocline and above the very deep waters with low dissolved oxygen is known as the hypolimnion. It possesses an average temperature of 7°C. In late summer, the preferred portions of the hypolimnion are squeezed between the increasingly warming waters near the surface and the decreasing oxygen levels near the bottom.

Critically, the adult Lake Trout takes the preferred temperatures of 10 to 12°C with the higher oxygen levels, and by their cannibalism, push, as a survival response, the younger juvenile fish, for which the future of the Lake Trout population is dependent, to the lower depths of the lakes. While the juveniles penetrate only briefly the extremely deprived oxygen areas of 2.6 mg/litre which cause anoxia, they tend to avoid those of less than 4 mg/litre. Dr. Evans testified through the use of graphs that any amounts less than 7mg/litre of oxygen in the water reduces the survival activity level of the Lake Trout. The September adjusted mean for Limerick Lake is 4.49 mg/litre. Because the Lake Trout is late in maturing with first spawning of females occurring at 6-10 years, the young juvenile has a long period of time surviving in the oxygen starved areas of the hypolimnion.

Ms Irvine testified as to six existing spawning grounds on Lake Limerick, all of which are a significant distance from this property's shoreline. Mr. Neilsen testified that the nearest spawning grounds is 700 metres away behind a point of land.

While all agreed upon the importance of this lake, not all agree on the steps taken to preserve it. Dr. Hutchinson testified as to phosphorus not being toxic in its own right and that other better options of "best practices" can be taken. Ms Irvine testified as to mistakes made in the past as well as the extreme efforts made to improve this habitat. She has personally experienced the decline of some lake in her career.

The latest "Phosphex™" Technology for Phosphorus Attenuation

4. The Board finds on the basis of the testimony that the Phosphex™ system, in conjunction with tertiary sand filter attenuation, represents an extremely promising technology with applicability to the cold-water lakes of the Canadian Shield.

5. The Board finds based upon Mr. Bryck's testimony that the monitoring protocol as recommended with additional monitoring instruments in the tile beds and in the down gradient mantle is acceptable and is practical for a monitoring contract with a condominium corporation. The Board would further recommend several monitoring sites in the shoreline buffer area.

Added to the septic tank before the traditional distribution tile bed are two tertiary components. The first is the sand filter with its controlled recirculation of the effluent. This section aerates, further removes solids, and provides chemical preparation of the phosphorus.

The second tertiary treatment is the Phosphex™, which uses the chemical properties of waste slag from steel manufacturing, placed in a chamber to remove phosphorus through mineralization and adsorption. The records for the installation start on December 7, 1999 and operated at the 99% removal level with the exception of two noticeable exceptions on April 17 and July 5, 2000. Over time changes continued to be made resulting in further improvements to the 99.5 to 99.9 % level. In July 2005, the installer replaced the slag because of hydraulic problems caused in Mr. Smyth's and Mr. Campbell's opinion by the small grain size of the slag. Previously, the operator replaced distribution pipes that had very small apertures with typical manufactured

plumbing material. A further advantage of the system is that the Phosphex^{TM} removes virtually all the remaining e-coli and significantly reduces the nitrates in the effluent stream prior to release to the tile bed. The results of the North Bay installation are presented in Exhibit 19.

The Phosphex^{TM} approach further attenuates by adding native soils of very high iron and aluminum content to the tile bed. Mr. Michalski refers to these as B Horizon soils.

Mr. Marttila, Mr. Bryck, Mr. Michalski, Mr. Campbell and Mr. Smyth refer to the Ms Wood research at Harp Lake; Mr. Michalski's monitoring of an engineered tile bed at South Kushog Lake and Dr. Robertson's various research papers pertaining to the natural attenuation of phosphorus by acidic soils high in aluminum and iron. In the Harp Lake situation Ms Wood found that most of the phosphorus remaining within 14 cm of the tile drains over a 30-year period with no maintenance of the system.

Mr. Bryck testified as to the recommended monitoring regime. The condominium corporation retains legal control over the area of the lot with the sewage treatment systems. The ongoing monitoring is conducted by technicians under contract to the condominium corporation and not the individual lot owner. The Ministry of Environment determines the frequency and the extended time of the monitoring through a Certificate of Approval. In addition, Mr. Bryck and Mr. Marttila testified as to the contingency plan. In the event of some failure, the owner set aside land beyond the 300-metre limit to relocate sewage treatment facilities.

Both Mr. Bryck and Marttila as well as Mr. Michalski testified as to the extensive barriers to phosphorus: the sand filter and Phosphex^{TM} system; the mineralization and adsorption in the acid soil engineered tile field; the same processes acting in the native soil mantle of fill material; the uptake of phosphorus in the vegetation on each lot and in the intervening space; the uptake by the vegetative buffer zone, which is much greater than the usually 30 metres recommended by the Ministries elsewhere for cold lake situations; and the contingency plan to relocate systems beyond the 300 metres.

In response to Mr. Castro's concern that the slag may have other pollutants, which may be released, the Board is satisfied from the testimony from Mr. Smyth and

Mr. Campbell. Mr. McGregor, the geo-scientist with a specialty in chemistry, did not reference this as a problem.

The 300-metre Buffer

> 6. In relation to the 300-metre buffer, the Board finds concurrence with Mr. Michalski and Dr. Hutchinson that it is a flawed planning instrument for delineating between a total ban on any septic system, even with several tertiary components added within the 300 metres, while requiring few controls on traditional septic system in the distances beyond or in existing septic systems in the shoreline area.

No one seriously contested Mr. Michalski's interpretation of the origins of the 300 metres as an input into the early preliminary models used to predict impacts of shoreline development and its associated phosphorus production entering Lake Trout type lakes. Specifically in the May 1986 paper relating to the model by Dillon *et. al*. , Mr. Michalski drew reference to Step 2 in which counting related to "units to be situated on the shoreline (defined here as within 300 metres of the lake or any inflowing stream of the lake)".

Mr. Michalski's assertions are supported by Dr. Hutchinson, who had direct experience with this modelling. He testified that a "positive bias" exists in the model when applied to lakes with shoreline development such that it predicted higher levels of phosphorus concentrations than actually measured. As applied to septic phosphorus load assumed by the model, Dr. Hutchinson asserted that the model over estimated by approximately 74% the amounts actually measured. The bias did not exist when applied to undeveloped lakes.

Dr. Hutchinson's testimony remains unchallenged that MNR never attempted to validate "through direct measurement" its early assumption that phosphorus within 300 metres of the shoreline will migrate to the lake. He further asserted that in the Muskoka Model, an application which incorporated the natural phosphorus attenuation of soils with similar characteristics as those of Harp Lake, the bias of 40% still remained when analyzing 10 of 161 lakes for which data existed.

Dr. Hutchinson testified that using phosphorus as a "capacity factor" is not an environmentally sound approach. In his view, it "provides no incentive to implement

environmentally sound lake management practices. The Board finds concurrence with his recommendations about a full range of practices that should apply to all development within the drainage basin of a cold water lake. He testified that other "best management practices" are as follows:

(i) Enhanced setbacks of septic systems from the shoreline of all lakes ("he asserts that the Province allows 15 metres and 30 metres even on sensitive lakes");
(ii) Sitting of lots back from the shoreline;
(iii) Use of acidic soils for use in septic tile beds;
(iv) Require phosphorus attenuation designed into septic system;
(v) Assurance of soil mantles down gradient of septic systems;
(vi) Build in restrictions for maintaining natural vegetation; and
(vii) Require specifically designed storm water management techniques to slow runoff to before development levels or better.

He further testified that the MNR could limit fish catches to the existing carrying capacity. Existing marinas and cottages could be required or persuaded to replace obsolete and non-functioning sewage systems, which are responsible for the present circumstances. Mr. Michalski in testifying as to the appropriate storm water management scheme indicated other preservation steps not taken by the MNR. Shore line denuded in the past, such as at the marina across from this site, could be replanted with native shoreline aquatic species.

Ms Irvine, in not responding to Dr. Hutchinson's and Mr. Michalski's options, testified that increasing development directly related to more disruptive activity in the near shore and shoreline areas. This can be extremely significant in shorelines close to the spawning grounds.

Dr. Paterson testified briefly as to the extensive work in upgrading the "Lake Shore Capacity Model". He noted that the upgraded model is a better predictor than in the past. However, his recommendations related directly to the specific data that shows significantly low levels of dissolved oxygen in Lake Limerick.

Dr. Paterson and Dr. Hutchinson disagree as to the applicability of this 300 metres boundary as an input to the model used as a research tool that assists in the analysis of the overall Lake Trout program. However, as a land use-planning

instrument determining a prohibition on development, the Board concurs with Dr. Hutchinson that it lacks a solid scientific foundation.

Proposed Shoreline Use

7. Based upon Mr. Nielsen's testimony, the Board finds that the proposed shoreline development for the 88-lot subdivision, as already approved as a condition, is minimal with little or no impact on the shoreline and foreshore areas.

Mr. Nielson spent the most time in the field on this site. The Board finds his observations the clearest in terms of this site and its physical context. The proposal presented by Mr. Nielsen for the shoreline use directly impacts some 70 metres of shorefront between the 15 slip docking facility and the outer edge of a proposed beach. The Applicant proposes to remove an old uninhabited shoreline building and an existing degraded boating ramp. Mr. Nielsen proposes a beach constructed from imported native sands, of 30 metres along the shore with ten metres of inland depth. The dock facility lies 40 metres from the beach. The proposed recreation facility with washroom lies some 30 metres in from the shore. A gravel parking lot is associated. Mr. Neilsen proposes well-defined trails between logical destinations. This proposed shoreline plan leaves the remainder of the shoreline in a natural vegetative state. As well this shoreline plan exists within an 80 to 120-metre vegetative buffer held in common by a condominium corporation.

The Applicant plans to replace an existing abandoned septic tank with a modern septic system. This proposal requires MNR approval. The Applicant does not propose any expansion to the shorefront plan for the proposed additional lots.

The Board recognizes the general concerns expressed by Mr. Castro, Dr. Paterson, and Ms Irvine for over use of the shorefront by the development. Their testimony related more to the general context rather than this specific proposal. They are unfamiliar as to how a condominium corporation maintains the common elements such as the shorefront property buffer. They expressed concern about the creation of *ad hoc* trails and potential removal of vegetation in the shoreline buffer. The Board heard no testimony as to the potential impact of the road pattern within this area.

Only about a third of the width of the entire development property at the northeast corner possesses shoreline. Two thirds of the properties width lies behind existing shorefront occupied by existing cottages.

The Non-Calcareous Nature of the Native Parent Soils on Site within 300 Metres

8. The Board finds concurrence with Mr. Marttila and Mr. Bryck's testimony that the soil characteristics are significantly high in aluminium and iron and significantly low in calcium carbonate so as to mineralize and stimulate adsorption of significant amount of phosphorus.

The chemical nature of the soils is very important even as a back up to further remove even the small residual phosphorus; as a further precaution against potential malfunctions; and as a precaution against small amounts of phosphorus invading the storm water system from even beyond the 300 metres.

Witnesses frequently referred to Dr. Robertson's research work. This work established that high concentrations of aluminium and iron in the native soils accompanied with very low levels of carbonate, attenuates phosphorus without other interventions. This attenuation occurs in two ways. The first and dominant way is through mineralization and primarily through Aluminium in which phosphorus precipitates out of the solution. This process appeared relatively stable. The second is through adsorption in which phosphorus bonds in a physical way to the soil particles. Witnesses also noted the problem of remobilization of phosphorus where the phosphorus has adhered to sand particles, if acidic conditions change.

The Board assessed the criticism placed in testimony. Mr. McGregor testified as to hypothetical problems with the laboratory testing that shows low levels of carbonates within the soil. He questioned the level of oxidation especially with increased depth in the overburden. He questioned the "chain of custody" of the samples. The laboratory's methodology of calculating the adsorption rate is unknown to him.

Mr. Putzlocher testified that his review of the Frontenac Axis for this area suggests the presence of some marble and other calcium carbonate rocks. The Canadian Shield is made up of a mix of very old rock, some volcanic and some old sedimentary, both of which later under went further heat and stress through the process

of metamorphism. The site is in the eastern half of the Grenville Province referred to as the Central Meta-sedimentary Belt with a higher propensity to possess marble compared with the Central Gneiss Belt. He implied that this might result in higher calcium carbonate rates in the soils above those appearing in the laboratory tests.

In comparing bedrock in the area for carbonate rock, Mr. Marttila testified that the significant bedrock to the north of Lake Limerick, in his view the source of these native soils through the glaciation process, is mainly non-calcium carbonate rock outcrops. Mr. Marttila supported his assertion with the local map of bedrock Preliminary Geological Map No. 1768. Mr. Marttila located the calcium carbonate rocks off site to the south and west. One rock outcrop with some carbonate content existing on the subject lands is close to the actual soil samples chemically tested. These are all very hard metamorphosed rocks.

Mr. Marttila testified that the chemical test of the three representative soils in the 300-metre buffer area done by Caducein Environmental Laboratories in Peterborough under the supervision of Dr. Ramesh Makhija demonstrate two important attributes. The first is the very high levels of aluminium and iron content. The other is the very low calcium carbonate equivalent content. The measured phosphorus adsorption varied from 400 mg P/100g to 229 mg P/ 100g. The extractible calcium and magnesium are very low. Mr. Marttila testified that he conducted an acid test on each of the soils from all of the nine dug pits in May 2005 with no reaction. Mr. Marttila dug the nine soil profiles himself. Mr. Bryck testified that in his review of the work that he is satisfied that the amount of calcium carbonate is very low and the amount of aluminium and iron very high.

The Board is satisfied with Mr. Marttila's recommendation as corroborated by Mr. Bryck as to the characteristics of the native parent soil within the 300-metre buffer. While it is of concern that the proposed imported acid B Horizon soils are not tested, the field observations by Mr. Marttila and Mr. Michalski are sufficient in a preliminary way. However, the Board concludes from Mr. McGregor's and Mr. Putzlocher's testimony that a standard should be set in the Conditions of Draft Plan of Subdivision even for the existing approved 88 lots beyond the 300-metre limit. The Board concludes also from their testimony that efforts should be made to obtain soil chemical analysis from across

an entire site. Both Mr. Marttila and Mr. Bryck recommend that prior to importation, the testing of the proposed imported native soils.

Movement of Phosphorus in Soils at This Site

> 9. The Board finds concurrence with the testimony of Mr. Marttila, Mr. Bryck, Mr. Michalski, and Dr. Hutchinson that the proposed storm water management system; the proposed lot grading and retention of vegetation; and the use of acidic B Horizon imported native soils in the engineered tile beds; and the very large shoreline buffer zone, ensure control over phosphorus migration to the lake. The Board is concerned based upon the testimony that an opportunity to build greater security is missed by not ensuring that all-important soils be of the same highly acidic standard over the whole of the proposed subdivision. The Board finds that the Applicant requires additional measuring devices in the shoreline buffer area. The Board also recommends tertiary devices for all lots draining to Lake Limerick.

No one seriously questions Mr. Marttila's testimony as to the nature of the topography within the proposed subdivision. Mr. Marttila testified that he agreed with characterization of the soils in Exhibit 4 based upon 68 dug pits. The soils possess an upper horizon of from 0.1 to 0.15 metres with B horizons below of yellowish brown and reddish brown sand-silt with "scattered gravel and cobble and a slight trace of clay". The soil depths varied from 0 to 3.5 metres above the bedrock. Of the nine additional test pits dug in May 2005 by Mr. Marttila within the 300 metres of Limerick, the earthen material varied in depth from 0.3 to one metre in depth above the bedrock.

Mr. Marttila testified that for all the proposed lots, native parent soils generally exceed a minimum of 0.5 metres. The combined parent and imported native soil would be a minimum of 1 metre between the depth of the tile bed and the calculated water table.

The topography and the drainage are bedrock controlled. A water divide occurs in a northeast to southwest direction approximately through the middle of the 81 hectares (200 acres) splitting the ground water flow between Lake Limerick and Lake St. Ola. While a few steep slopes exist, Mr. Marttila described the topography as "rolling" with low to moderate slopes" with "some gently sloping terraces".

Mr. Michalski testified as to the storm water drainage system from the retention beds at the roof leaders, to the strategic positioning of detention devices in the drainage swales and to the detention ponds as inland extensions of the natural wetlands. The retention of vegetative areas on each lot is important in terms of storm water management but also in the uptake of phosphorus by existing mature vegetation. The greater than 80-metre shoreline buffer is important in this regard compared to the present 30-metre standard recommended by the Ministry for cold-water lakes. This buffer is somewhat reduced in the area of the recreation centre and proposed water front activity area. This storm water drainage relates to the whole of the site and holds runoff to the pre-development levels.

Mr. Bryck testified as to the monitoring system and the measuring by consulting staff under the long-term control of a condominium corporation. He recommended in reply, in view of the concerns stated, that additional measuring devices could be placed in the tile bed and the mantle to assuage concerns of phosphorus movement in the water table.

Mr. McGregor testified as to his concern for water untreated for phosphorus passing through to the ground water and making its way to the Lake. He questioned the supply of surfaces for adsorption in the tile bed being as great as Mr. Marttila first estimated due to the low dispersivity. Mr. Marttila estimated the life of the tile bed in terms of the surfaces to deal with phosphorus is 101 years when factored for potential year round use. Mr. Marttila referred to the Muskoka examples in which the septic bed continued to remove phosphorus after 15 years without any of the engineered advantages proposed here. Harp Lake for example had extremely low levels at 0.03 mg/L without the superior oxidation created by the sand filter and without the prior attenuation of the Phosphex^{TM} at greater than 99 % (99.9%) before distribution in the engineered tile bed.

Mr. McGregor postulated that the soil between the lines of tile within the tile bed would be under utilized. He did no calculations but in reference in Exhibit 35B to Cherry and Freeze in their text “Groundwater”, he indicated the movement downward of effluent would be in relatively straight columns. Mr.Marttila’s recalculations during testimony with a revised life span of 88 years with that assumption. Mr. Marttila also testified that the higher silt content in these soils would slow down the distribution of

water providing more opportunity for adsorption. He noted also the reference in Dr. Robertson's July 2002 paper in Exhibit 11 that the major attenuation is through mineralization; that it occurred within one metre of the tiles; and that it is relatively stable over time. In reply testimony, Mr. Campbell later questions Mr. McGregor's assumption due to the pumped pressured distribution into the tile beds with apertures on the sides of the tile.

Dr. Robertson expressed concern that phosphorus may percolate to the storm water system because of high water tables developing in the tile bed and surrounding mantle. He questioned, as did Mr. Putzlocher and Mr. McGregor, the rate of absorption in the acidic tile bed in contact with the high PH liquid from the Phosphex™. He agreed that the Phosphex™ had great promise, based upon the 2½ years of data that he viewed, in removing phosphorus below the 1 mg/L level. He recommended further sites and three years minimum of data. Mr. Smyth presented nearly five years of data at this Hearing with very positive results. Dr. Robertson further suggested additional monitoring devices in the tile bed, and the surrounding mantle down gradient from the sand filter and the Phosphex™ in line with the storm drainage system. Mr. Castro testified as to his concern for phosphorus from lawn fertilizing getting into the storm ater.

Mr. Putzlocher concluded that the soil characteristics, especially as to depth are different for this site than the sites referred to in Dr. Robertson's septic tile bed studies, albeit such tile beds were not engineered, or did not have phosphorus removed before hand. The Board in appreciating this concern reviewed the documents again. Many of the sites in Dr. Robertson's research showed two to three metres of soil depth and some far more. However, Harp Lake also had soils of 1.2 metres to bedrock and 0.75 metres to the water table as shown in the April 1998 paper by Robertson *et.al*. in Exhibit 11. The Board notes, however, Dr. Robertson's latest review that those sites with the best attenuation have greater than five metres of soil. This presents concerns for the septic beds beyond 300 metres because they rely on the B-Horizon soils alone without the Phosphex™.

Mr. Bryck countered in his testimony that many of the concerns raised are dealt with in the standard engineering conditions for tile beds. He testified that the mounding and the high water tables, along with the difference in texture of the parent to imported soils are dealt with in the engineering standards. The Applicant is considering B

Horizon soils for all septic tile systems for all lots. In response to concerns that ground water would be travelling by way of rock fissures to the Lake Limerick, Mr. Bryck testified that the specific test wells required great depth into the bedrock far below Lake Limerick. It is his opinion that rock fissures are minimally based upon his well analysis. The Board is satisfied by the testimony of Mr. Marttila, Mr. Bryck, Dr. Hutchinson and Mr. Campbell as to the nature of the storm water system depth of fill.

The Additional Lots Draining to St. Ola Lake

10. The Board finds that based upon the testimony, there is no scientific reason why these lots cannot be considered in terms of further planning testimony.

Ms Irvine testified that the St. Ola Lake wetlands are a seasonal staging area for waterfowl but did not link this to this development with the exception of increased activity from more people. Dr. Paterson and Mr. Castro agreed with Ms Irvine on the question of adverse impacts with more people or the density question. Their testimony however is directed to increased activity to Lake Limerick and not St. Ola Lake. They based their assumptions on *ad hoc* movement of people through the buffer area with no element of control. They are unfamiliar with the nature of a condominium corporation control as proposed. Mr. Marttila's recommendations responded to the MNR requests and combined certain lots presenting concern.

Based upon the agreed procedure, the Applicant must file a motion for presentation at the January 17, 2006 Hearing for consideration of these lots on their planning merit.

Premature

Based upon Mr. Sharif's testimony, the Parties agree that any approvals for the Phosphex^{TM} must go by way of Certificate of Approval. The Ontario Building Code does not deal with phosphorus.

11. That it is premature at this time, based upon Dr. Manoharan's testimony related to the technology, to designate specific residential lots within the 300 metres arbitrary distance even with the highly promising Phosphex^{TM} until after the full monitoring time period.

12. That it is also premature to rule them out for all time.

13. That it is prudent based upon the evidence to defer consideration of the proposed 31 lots draining to Lake Limerick until the observations and analysis from at least an additional 3 years of monitoring are available.

Without the favourable results from at least a six-year monitoring period, as indicated in Dr. Manoharan's testimony, the Phosphex^{TM} remains in its "experimental period" for lakes of a Lake Limerick's sensitivity. He recognized the promising early results and for that reason, sees merit in applications applied to less sensitivity lakes such as at Bon Echo. Dr. Robertson also expressed concerns about the research being independent though Mr. Smyth and Mr. Campbell testified that the City of North Bay did the sampling and testing because the site is immediately adjacent to the water body from which the City draws its municipal water.

The Phosphex^{TM} system has at best five years of testing. The longevity of the slag has not been sufficiently tested. The lengthened testing period and the monitoring of the tile bed and the down gradient ground water flows could help with the question of high PH levels of treated effluent into the acidic tile bed. Mr. McGregor, Dr. Paterson, Mr. Putzlocher and Dr. Robertson testified as to concerns about the length of the testing period. The Province needs the required additional performance in order to justify imposing this high standard.

Addressing the Issues List for Phase 1

The questions were poised as follows:

Q1 Has water quality been protected pursuant to the provisions of the 1996 Provincial Policy Statement? Should residential lots, roads, private services and resulting site alternations be permitted within 300 metres of Limerick Lake, an 'at capacity' lake trout lake, based on scientific evidence regarding the movement of phosphorus in

soils?

The Board finds that to a great extent the Application gives appropriate regard to the objectives of the Provincial Policy Statement. However, without testing of the Phosphex™ over a longer time span after its major reconfigurations, the Board cannot ignore the present uncertainty especially in relation to this lake. If the Phosphex™ is as good for the long run as it shows in promise then the answer is yes. The testimony of Dr. Hutchinson points to the nature of the development and the implementation of the conservation works that is significant not only its distance back from the shoreline. If development within the 300 metres is structured with the principles of best practices as espoused by Mr. Michalski and Dr. Hutchinson, then the amount of phosphate approaches zero. If however, it is not coupled with best practices beyond the 300-metre limit to the water divide so as to include all drainage and all potential effluents, the Board concludes that the risk remains though reduced. However, without additional abatement beyond the 300 metres, the risk persists for phosphorus getting into the storm water without any actual development within the 300 metres. The Board further concludes that while the monitoring is proposed as short term as a “start up event”, monitoring should be considered in perpetuity on an annual or a periodically acceptable basis by way of contracted professionals.

Q2 How does the current scientific understanding regarding the movement of phosphorus in sub-soils apply to Trident's lands based on site conditions such as topography, soil type and depth, and native vegetation given the proposal to develop lots within 300 metres of Limerick Lake, an 'at capacity' lake trout lake?

The Board answers these questions in its findings.

Q3 Are there appropriate sewage treatment technologies for individual lots to remove phosphorus to address the impact of the proposed development on Limerick Lake? Is there a mechanism in place for the long-term operation and maintenance and ongoing monitoring for these types of systems? Would this mechanism be reasonable

and practical for the homeowner and the municipality?

The recent data shows great promise for the Phosphex^{TM} as the technology of choice. The choice of a condominium corporation with the critical spaces remaining under the corporation's jurisdiction under approved plans, along with central monitoring of the septic and storm water management systems, create a workable and enduring control regime. The Board concludes that the tenure choice is important and probably critical. The nature of the reporting of the monitoring data collected by expert contractors is important. It certainly must have the "once removed" principle missing at Walkerton. The monitoring data should go directly to the involved Ministries copied to the Township and County.

Q4 Will residential lots, roads, private services and resulting site alterations within 300 metres of Limerick Lake result in unacceptable impacts to the fish habitat?

The Application calls for several tertiary abatement features with the 300 metres. Proposed lots are large enough to provide flexibility in the location of the septic system with tertiary treatment. The shoreline buffer zones are much larger than recommended by the MNR for cold water lakes. The shoreline plan uses minimal space. The services are collectively controlled through the condominium corporation.

The witnesses did not deal with the details of the road pattern. Potential exists for improvements to the road pattern and related drainage swales. The proposed shorefront plan with its minimum interruption of the natural shore is acceptable but could be improved and further refined. The proposal as revealed in testimony in and of itself would protect the fish habitat. The problem is as defined by Dr. Hutchinson's testimony that development beyond the 300 metres is insufficiently directed by policy.

The Board is concerned about the low levels of oxygen in September under existing circumstances assuming the correctness in the conclusion about the role of phosphorus as stated in Dr. Evan's and Ms Irvine's testimony and reinforced by the testimony of Dr. Paterson and Mr. Castro. The fourth reduction of the atmospheric contribution may demonstrate some uncertainty of apportioned cause. The Board did

not think to ask of how far back the data is recorded for such low levels in September. The Board is curious about the evolutionary origins of the Lake Trout's cannibalism. However, the obvious goal should be to reduce what is causing these low levels of oxygen. If present and past levels of phosphorus entering the lake from existing septic system on the immediate shoreline are the cause, then removing development potential that approaches zero levels of phosphorus does nothing to improve that situation.

Q5 How will stormwater be managed to address phosphorus loading to Limerick Lake?

The stormwater management scheme as conceptualized in Mr. Michalski's and Dr. Hutchinson's testimony is appropriate. It must, however, be detailed in engineering plans and then appropriately implemented.

Q6 What is the appropriate method to measure a 300-metre~~s~~ setback from Limerick Lake?

Testimony did not address this question. However, a pencil width on the map is of such a scale that it would allow flexibility for whatever methodology is agreed upon by the planners.

Q7 Should residential lots, roads, private servicing and resulting site alterations be permitted in the general location of lots 119 – 136 given the site conditions such as topography, soil type and depth, and native vegetation?

None of the testimony justified the exclusion based upon science of the lots which drain to St.Ola Lake.

Conclusions

The preferred arena to sort out differences of opinion pertaining to the science is within the academic and professional organizations. In this case, the Board has had to

deal with opinions coming from very different perspectives based upon different information with very different frames of references.

Until the advent of the Phosphex™ as developed by University of Waterloo and presented in this case as modified by Mr. Campbell, nothing met the water quality objectives as established in the Provincial Policy Statement. The Board concludes that other technologies, with their 90% or less attenuation, could not challenge the existing 300-metre prohibition zone and the absence of alternative policies. Phosphex™ at 99.9% attenuation level along with other specified best practices does.

The Board concludes from the testimony that a 300-metre buffer is an impediment to policy development in this specific case. The circumstances are unusual. Much of the shoreline in question is already occupied by existing cottages with little improved sewage treatment or other applied conservation. It does not appear to the Board from testimony that the Ministries measured quantitatively or by anecdotal observation existing impact from these existing cottages on the shoreline.

Ms Irvine and Mr. Castro raise legitimate questions about intensity of use. The Board finds concurrence with Dr. Hutchinson that methods other than the 300-metre prohibition may best address these concerns.

The Board concludes sadly from the testimony that the Parties have not contemplated improvements to road pattern or other aspects of the proposed development for the potential lots within the 300 metres and importantly for the existing 88 lot subdivision beyond.

In the end, the Board finds Dr. Manoharan recommendation reasonable that this promising technology requires a further trial period in less threatening locations.

As a result, the Board does not recommend the inclusion of the 31 lots draining to Lake Limerick in the planning considerations on January 17, 2006 at this time. The Board does not total reject the proposed lots. The Board defers consideration of these 31 lots until after the observations and analysis from an additional three years of continuous monitoring as recommended by Dr. Manoharan.

Further, the Board finds no scientific reason for the rejection of the proposed lots draining to St. Ola Lake. They should, be given further consideration based upon their planning merits.

The Board so orders.

“David J. Culham”

DAVID J. CULHAM
MEMBER