

19. Phosphorus

19. PHOSPHORUS

In response to our discussion with LUPC Staff and DEP Staff on the topic of phosphorus within the Plan Area a study has been prepared by Stantec to evaluate the potential phosphorus (“P”) export from development areas, particularly within the Cross Lake watershed. In addition, CD-3b and 3c has been eliminated, the number of lots within CD-3a (now identified as CD-3) has been reduced from 4 to 2, and CD-4 has been reconfigured and the number of lots has been reduced from 30 to 6. The following changes have been made to the Plan:

- **Changes to the Petition for Rezoning (Volume 1)**
 - Add two new documents - *Appendix J: Cross Lake Phosphorus Export Assessment and Evaluation of Phosphorus Export and Allocations for Fish River Chain of Lake Concept Plan*. See Attached.
- **Text Changes to the Concept Plan**
 - **Concept Plan, page 18, add a new provision at E,2,d:**

Phosphorus. The Concept Plan implements a phosphorus control plan to help protect the water quality of Cross Lake that accounts for an upper limit of up to 125 residential units in the five Cross Lake development areas, full build out of the two Community/Economic development areas in the Cross Lake watershed, impacts from current and anticipated forestry operations, including road building, and even possible future residential development in other areas within the Cross Lake watershed after the Plan expires. The phosphorus control plan adopts a budget set by Maine DEP for the total amount of phosphorus export to Cross Lake that cannot be exceeded from lands owned by Petitioners. The total phosphorus budget will be managed by Petitioners but carried out through permitting by LUPC and MDEP by allocating portions of the overall budget for Cross Lake to various residential and community/economic development areas in the Cross Lake watershed. Petitioners and developers will also have the option of mitigating phosphorus export by requiring steps to manage phosphorus, either within development areas (such as through the use of vegetated buffers) or in areas outside the development areas (such as restoration projects that reduce export from roads or other developed areas), so long as the total export numbers remain below the allocated budget for the Petitioner’s portion of Cross Lake as a whole. See Sub-Chapter IV, Section 10.35.

- **Text Changes to the Concept Plan**
 - **Amend 10.25,L,2,a as follows:**

Provision shall be made to limit the export of phosphorus from the site following completion of the development or subdivision so that the project will not exceed the allowable per-acre phosphorus allocation for the water body, determined by the Commission according to the Maine Stormwater Management Design Manual, Phosphorus Control Manual Volume II, Maine Department of Environmental Protection, 2016, “Maine Stormwater Best Practices Manual, Volume II, Phosphorus Control in Lake Watersheds: A Technical Guide to Evaluating New Development” Maine Department of Environmental Protection, 2008, and hereafter cited as the Phosphorus Design Manual. For subdivisions or other development in

development areas within the watershed of Cross Lake, compliance with this provision shall be satisfied pursuant to the provisions of Section 10.35.

- **Add a new provision at 10.35:**

10.35 PHOSPHORUS CONTROL FOR CROSS LAKE WATERSHED

A. Purpose.

This section establishes a flexible program to manage total phosphorus export from development activities in development areas within the watershed of Cross Lake. This program therefore applies to development of subdivisions in the following development areas: Cross Lake A, Cross Lake B, Cross Lake C, Cross Lake D, Cross Lake E, CD-3, and CD-4. The purpose of the program is to protect water quality in Cross Lake by establishing a total phosphorus budget for these development areas and allowing for that budget to be allocated by the Petitioners to development areas or specific subdivisions, or both, provided that the total phosphorus export from such development does not exceed the overall total phosphorus budget for the lake. These provisions are intended to be applied in addition to all other applicable phosphorus regulations, including those established at Section 10,25,L for development projects regulated by the Commissioner and by the Site Location of Development Act for those project regulated by the Department of Environmental Protection. All calculations shall be performed in accordance with “Management Design Manual, Phosphorus Control Manual Volume II, Maine Department of Environmental Protection, 2016”, or as separately reviewed and approved by the Commission.

B. Phosphorus Budget

1. The maximum potential phosphorus export resulting from development of the development areas in the Cross Lake watershed shall be 55.46 pounds (the “Total Phosphorus Budget”). Once the Total Phosphorus Budget is reached, no more development of the Cross Lake development areas may occur absent the use of mitigation projects or phosphorus control measures, as described below.
2. Petitioner shall be responsible for managing development in the development areas to ensure that total phosphorus export from development does not exceed the Total Phosphorus Budget for Cross Lake. Petitioner shall maintain accurate records demonstrating compliance with this program for the life of the Concept Plan.

C. Phosphorus Allocations

1. Petitioner may allocate all or portions of the Total Phosphorus Budget to development areas and/or to individual subdivisions within development areas in any manner that is otherwise consistent with the provisions of the Concept Plan and these rules.

For example, options might include, but are not limited to:

- Petitioner could choose to allocate the entire the Total Phosphorus Budget to only some of the Cross Lake development areas, or to only certain subdivision projects, thus leaving other development areas undeveloped; or
 - Petitioner could choose to allocate a portion of the Total Phosphorus Budget to each development area.
2. When development rights to land in a development area are conveyed, whether by sale, lease, or otherwise, or the land is proposed to be developed, Petitioner shall allocate a specific upper limit for phosphorus that may be exported from the affected land area, measured in pounds of phosphorus per acre per year, known as an “allocation.” Each allocation shall be subtracted from the Total Phosphorus Budget for Cross Lake.
- a. The allocation shall be clearly specified at the time of conveyance, if applicable, and submitted as part of any subdivision or other development application to the Commission and MaineDEP sufficient to allow the Commission to track compliance with this rule.
 - b. The allocation shall be imposed as a condition of approval in any subdivision or other development approval issued for the affected land.
 - c. If Petitioner can demonstrate to the Commission that not all of the allocation for a particular development area was used in a given subdivision project, the remaining allocation will be added back to the Total Phosphorus Budget.
 - d. Allocations may be traded within or between development areas located in the Cross Lake watershed, provided Petitioners and the Commission are notified at the time of the conveyance of the quantity of the allocation, the development areas affected, and the parties involved in the transaction.

D. Mitigation Projects

The Total Phosphorus Budget may be increased through certified mitigation projects that generate mitigation credits by reducing existing sources of phosphorus export. Examples of mitigation projects include, but are not limited to, restoring and revegetating existing forestry roads and improving stormwater drainage for existing forestry roads.

1. Mitigation projects may be conducted by Petitioners or other parties anywhere in the Cross Lake watershed and shall be measured in pounds per acre of phosphorus export that have been eliminated from the watershed by the mitigation project on a 1:1 basis.
2. Mitigation projects must be approved by the Commission, in input from MaineDEP, in advance and fully implemented before the Commission will certify the mitigation credits in writing.

3. Once mitigation credits have been certified by the Commission, the Total Phosphorus Budget shall be increased by the number of mitigation credits. These credits may then be allocated pursuant to subsection C,1 above.

E. Phosphorus Control Measures

The allocation for a subdivision project may be increased through implementation of phosphorus control measures that reduce phosphorus export from the project. Examples of phosphorus control measures include, but are not limited to, the use of vegetated buffers or level lip spreaders to eliminate channelized flow.

1. As part of the subdivision or other development review process, an applicant may propose to implement phosphorus control measures to reduce phosphorus export from a given project, known as “phosphorus reductions.”
2. Phosphorus reductions shall be measured in pounds per acre of phosphorus export that have been eliminated from the watershed by the phosphorus control measures on a 1:1 basis.
3. Phosphorus control measures that generate phosphorus reductions shall be required as a condition of any subdivision or other development approval to increase the allocation to the subdivision or site development.
4. The design and maintenance of phosphorus control measures sufficient to generate phosphorus reductions shall be subject to the requirements of Section 10.25,L,4.

| | | | |
|-------|-------------------------------------|-------|---------------------------------|
| To: | Jeff Dennis, Biologist Maine DEP | From: | Pat Clark Scarborough, Maine |
| File: | Irving Fish River Concept Plan | Date: | April 9, 2018 |

REFERENCE: CROSS LAKE PHOSPHORUS EXPORT ASSESSMENT**Purpose**

The purpose of this memo is to provide additional analysis on the potential phosphorus export from future uses within the area encompassed by the Fish River Lakes Concept Plan (Plan Area). For this exercise we have evaluated the phosphorus export that could be generated from two main sources:

- anticipated development that would be permitted within areas identified as appropriate for future development within the Plan Area (Development Areas or Development Zones), and
- potential future unregulated, non-Concept Plan activities (e.g. new logging roads, upgrades to existing roads, and additional house lots within the watershed after the plan expires).

Previous findings from Maine DEP generally conclude that future development within the Plan Area could reasonably occur without long term impacts to the lakes due to the fairly large lake phosphorus budgets and proposed limited levels of development and associated P export, except for on Cross Lake where existing elevated phosphorus related impacts are an area of concern. Therefore, this analysis primarily focuses on the Cross Lake watershed to ensure that future permitted development can be achieved without the need for more complicated treatment measures, BMPs, lot restrictions, off-site mitigation or long term maintenance requirements, which may not be practical in a rural development setting.

Overall, our analysis concludes there is a reasonable likelihood that water quality within the Cross Lake watershed will be maintained. In addition, that the total export from permitted development within the Cross Lake watershed will not exceed the phosphorus budget for the lake while still allowing some reserve budget capacity for off-site and unregulated activities not associated with the development areas.

Background

This memo refers to the December 7, 2017 Technical Review Memorandum (DEP memo) from Jeff Dennis and Dave Waddell of the Maine Department of Environmental Protection (DEP), regarding the Irving Fish River Chain of Lakes Concept Plan (Concept Plan).(See Attachment 1). The DEP memo was written “to assess the feasibility of being able to develop the numbers of community/economic development lots and residential units proposed for the development areas included in the proposed Concept Plan without exceeding the per acre phosphorus allocations.”. In addition to information contained in the DEP memo, this memorandum includes and addresses related information subsequently discussed with DEP staff, Land Use Planning Commission (LUPC), Terrence DeWan & Associates (TJD&A), The Musson Group, Irving Woodlands, LLC (Irving) and Stantec.

The DEP memo specifically addressed the potential phosphorus (P) export from each of the proposed development areas in the Concept Plan and provided discussion on related information in the Concept Plan. The Concept Plan includes 4 community/economic development areas and 11 residential development areas within the Fish River Chain of Lakes watersheds of Long Lake, Mud Lake, Cross Lake and Square Lake. Irving and its related corporate entities, Aroostook Timberlands, Allagash Timberlands, and Maine Woodlands Realty

(collectively referred to as “Irving”) currently own between 40% to 90% of all land within the Townships (TWP) where development would be allowed for each of these lake watersheds.

Calculations for P export were provided in the DEP memo for each development as determined by the DEP methodology, utilizing the per acre allocation for each TWP portion of the lake watersheds. The DEP made assumptions for a range of development densities for each of the community/economic development areas and residential subdivisions, both with or without deeded restrictions or Best Management Practices (BMPs) at each area. The DEP calculations estimated the amount of P export from each area/scenario. The calculated P export(s) based on these assumed development scenarios were compared against the allocated per acre Project Phosphorus Budget (PPB) for each area, dependent upon the development boundaries and size (acres) of each development parcel and included some basic assumptions for access roads and parking.

The findings of the DEP memo generally conclude that the developments that may be allowed within the Concept Plan are feasible without long term impacts to the lakes. This is mostly a factor of fairly large lake phosphorus budgets available well beyond the estimated levels of P export for each of the lakes, except for Cross Lake. The memo expresses a need to manage potential development within the Cross Lake watershed by limiting the PPB at each area to less than the allowable increase in Phosphorus loading which will support long term lake health and water quality.

Phosphorus Export

The DEP memo evaluated each development area using the per acre phosphorus allocation methodology for each TWP’s watershed portion contributing to each lake where potential development will be allowed. This method calculates a PPB for each development area according to the proposed project area and the individual per acre phosphorus allocation factor for each contributing subwatershed, as provided in Appendix C of the MDEP Phosphorus Control Manual (Manual). This evaluation by DEP was intended to provide a basis for determining feasibility of the possible developments in the Concept Plan and estimated how much P export would result from each area according to typical assumptions described in the Background section above.

For this assessment, each of the residential and community/economic development areas within the Cross Lake watershed were initially evaluated to assess the P export associated with the levels of development that would be possible. Assumptions were made regarding typical residential development based on sketches and descriptions provided by TJD&A for each area (Attachments 2, 3). These assumptions included estimated areas of typical lot coverage from roofs, driveways, septic systems and lawns, new access roads, upgrades to existing roads, common areas, number of potential lots, soils, and limitations due to maximum potential development based on an overall unit cap for Cross Lake of 125 units. The community/economic development areas included assumptions for the maximum developed coverage that would likely occur on each lot. The P exports were initially determined according to these assumptions and Table 3.1 from the MDEP Manual.

This initial approach was later revised for the residential areas based on additional conversations with DEP. DEP recommended that the export from residential house lots should be based on the more conservative export values provided in Table 3.2 of the *Manual for Single Family Residential Lots*. Although it is reasonable to assume that residential lots in this part of Maine would most likely be described as “camp lots,” rather than the much larger development footprints of a typical “single family” house lot that may occur elsewhere in the state, it was agreed that the use of Table would be used to calculate conservatively the export from the residential lots. As a result, the house lot exports increased by approximately 65%, which requires larger phosphorus budgets for each of the residential development areas.

While the per acre phosphorus allocation method is standard for assessing P impacts to Maine lakes for development projects, recent discussions with DEP staff resulted in recommendations to evaluate the Concept Plan using an overall combined P budget for each lake, rather than evaluating each area based on the per acre phosphorus allocations associated with the actual project areas allotted for each development parcel. Because of the unique character of this Concept Plan, which involves extremely large landholding parcels that may encompass large parts of, or even the entire subwatersheds within the TWPs of the lakes involved, the DEP determined that it is reasonable and more practical to establish an overall combined phosphorus budget for each

lake (PB) that would be proportional to the percentage of each total direct lake watershed occupied by the Concept Plan and owned or controlled by Irving. This Concept Plan includes over 51,000 acres, of which only 4% will be rezoned for development. This unique approach will allow Irving to manage how these overall lake phosphorus budgets should be applied or distributed within the Concept Plan areas for each lake and associated development areas.

Based on this concept of providing a total combined phosphorus budget for each lake, the individual project PPB allocations for all development areas within each lake watershed can be determined. The PPB for each area will be assigned so that the aggregate sum of all phosphorus budgets given to each development area will not exceed the PB for each lake, after considering any development limitations based on residential unit caps within each lake watershed, and such that each development area can be fully developed based on the “full-build” PPB until the unit cap is reached and, after which, no further residential development can occur within the lake watershed, unless other measures are taken to reduce P export from other activities in the watershed.

Cross Lake Phosphorus Budget

Pursuant to DEP’s calculations, Cross Lake has an overall PB of 82.19 lbs P/yr for land within the watershed that is owned by Irving. This PB is available and applies to all of the development areas draining to Cross Lake. It will be up to Irving, with the oversight and approval of LUPC, to manage this budget and assign a PPB to each development area to allow for possible levels of development. Each development area will have a maximum PPB allocation to allow for up to the “full build,” or maximum number of lots allowed within each development area, based on the overall allowable distribution of residential lots, totaling 185 lots. The aggregate total of developed lots for the watershed, however, will be capped and limited to 125 lots, and thus Irving will have to manage development of the individual development areas so that they are not all fully built out. The result is that the total export from all residential and community/economic development lots will not exceed the total PB for Cross Lake. This will assure that any area can be fully developed according to the zoning provisions regarding the number of residential lots that can be created at each area, provided that the 125 unit cap will not be exceeded within the Cross Lake Concept Plan area.

The DEP memo asserts that the goal of the phosphorus methodology is to provide protection sufficient to avoid an increase in the lake's trophic state, and to distribute the burden of this protection over the watershed and over time, thus allowing a sustainable level of development potential within any watershed. This works well in typical lake watersheds where most of the new sources of phosphorus are associated with development activities that are subject to regulations and required to meet some version of the lake water quality standard. But in watersheds with other existing and future phosphorus sources generated from off-site activities that may account for a portion of the threat to the lake's water quality, the Phosphorus Standard is not likely to provide sufficient protection, unless some of the allowable increase in phosphorus load (PB) is reserved for these unregulated or under-regulated sources. In fact, the DEP memo states that the principal source of P export to Cross Lake is from non-Irving agricultural activities located primarily in the Dickey Brook watershed, and that runoff from roads and harvesting operations also contributes to the potential degradation of the lake water quality status. With the recognition that there is potential for future P sources not associated with development activities within the Concept Plan area, but with unregulated timber harvesting road construction, a portion of the PB for Cross Lake will be reserved for future harvesting activity and for other potential uncontrolled non-Concept Plan sources.

Since Irving may sell the development areas to developers or other entities in the future, rather than acting as the developer, the DEP also suggested that Irving should decide up front how much of the Concept Plan's phosphorus budget should be allocated and assigned to each development area. These PPB budget numbers would then be included in the zoning, sales agreement and/or any deed restrictions so the buyers would know the potential for development in the area they are purchasing, and the DEP and LUPC would know what the phosphorus budget is for each development parcel. The PPB for each project would be tracked, as development occurs within the Plan area, along with the total unit count, to assure that the Cross Lake PB and/or residential unit cap will not be exceeded.

Although not anticipated, or necessary to meet the assigned full-build PPB, some of these areas could have lots with treatment measures and/or restrictions, and some with none, or any combination thereof at the time of a future development proposal. The many potential issues associated with such restrictions, treatment BMPs, or stormwater management structures that may be proposed should be considered and potential problems of design, construction, long-term maintenance, and the responsibility for that maintenance would need to be worked out. Monitoring, inspecting, policing, and lot clearing maximums or BMP maintenance requirements have caused problems in the past, especially in the Unorganized Territories, and are usually difficult to correct or mitigate once the lot has been cleared or site construction completed. Such restrictive and specific requirements to establish predetermined or prescribed limitations for future and unknown development proposals is beyond the scope and intent of the Concept Plan, which is to provide adequate zoning to accommodate future economic growth and development in the area without adversely impacting water quality.

As a result, the P export associated with potential lot development for each area has been evaluated for full build-out without any such restrictions, covenants, BMPs or mitigation requirements. This has been done to fit strictly within the assigned PPB for each of these areas to assure that the levels of development anticipated in the Concept Plan can be achieved.

Conclusion: Residential and Community Development. The total export from all residential and community development within the Cross Lake watershed, after considering the residential unit cap, will not exceed the PB for the lake while still allowing some reserve budget capacity for off-site and unregulated activities not associated with the development areas. As a result, the water quality of the lake will be protected.

The total export of phosphorus is calculated as described.

Cross Lake Phosphorus Export

Assumptions

Cross Lake watershed has a Phosphorus Budget (PB) of 82.19 lbs P/yr for all land owned by Irving.

The Concept Plan includes 2 community/economic development areas and 5 residential development areas within the watershed of Cross Lake

Assumptions used for this assessment are described in the narrative and shown on lot sketches. Both are included in Attachments 2 and 3.

All lots are forested under existing conditions.

Soils are as shown on the lot sketches per Natural Resources Conservation Service (NRCS) soils mapping. Soils are assumed to have drainage characteristics according to the NRCS Hydrologic Soils Groups (HSG), which may affect the export of phosphorus from vegetated areas.

Phosphorus export values were taken from Tables 3.1 and 3.2. of the MDEP Manual.

Refer to Pre-treatment and Post-treatment Phosphorus Export Calculations worksheets in Attachment 4 for detailed calculations.

P Export for Lots

Residential lot export is **0.29** for HSG C soils and **0.24** for HSG B soils according to Table 3.2 for Single Family Lots with no restrictions on cleared areas or driveway/parking area, and without any buffers.

Community/economic development areas are evaluated based on values provided in Table 3.1 for Commercial Development with no restrictions on fertilizer use, no buffers, and no restrictions on impervious surfaces or ditch design, and using the High Export Option.

P Export for Roads

Export from roads is evaluated based on values provided in Table 3.1 with no restrictions on impervious surfaces or ditch design, and using the High Export Option and assuming (HSG C soils), as follows:

Three types of roads are assumed:

1. New roads will be 20' in width, in a 40' wide clearing (**0.108 lb/100 LF**)
2. Upgraded roads from 12' in width to 20', with a clearing that goes from 24' to 40' in width (**0.054 lb/100LF**)
3. Existing roads suitable for residential development in terms of their current width and condition (**0lb**)

Common areas are separate from residential lots and generally near the water (HSG C soils assumed). These areas are evaluated based on assumed lot coverages and on values provided in Table 3.1 for Commercial Development with no restrictions on fertilizer use, no buffers, and no restrictions on impervious surfaces or ditch design, and using the High Export Option.

Areas A, B, C and D

| | | | |
|---------------------|-----------|---------------------|-----------------|
| Buildings | 400 SF | (0.0092ac) x (.5) | 0.005 lb |
| Parking/Drive/Paths | 5,000 SF | (0.1148ac) x (1.75) | 0.201 lb |
| Lawn/grass Area | 7,000 SF | (0.1607ac) x (.6) | 0.096 lb |
| Canopy Clearing | 12,400 SF | (0.2847ac) | 0.302 lb |

Area E

| | | | |
|---------------------|-----------|---------------------|-----------------|
| Buildings | 800 SF | (0.0184ac) x (.5) | 0.009 lb |
| Parking/Drive/Paths | 8,000 SF | (0.1837ac) x (1.75) | 0.322 lb |
| Lawn Area | 14,000 SF | (0.321ac) x (.6) | 0.193 lb |
| Canopy Clearing | 22,800 SF | (0.2847ac) | 0.524 lb |

. Residential Areas

Cross Lake A (Option 1)

| | | | |
|-------------------------------------|-----------------------------|--|-------------------|
| 110 acres | | | |
| 30 lots x 0.29 lb/lot | | | 8.70 lbs |
| 1,000 ft new roads | 1,000/100 x 0.108 lb/100 LF | | 1.08 lbs |
| 1,400 ft upgraded roads | 1,400/100 x 0.054lb/100 LF | | 0.76 lb |
| Common area | | | 0.30 lb |
| Total export-Cross Lake A(1) | | | 10.84 lbs* |

(*Cross Lake A Option 1 is not included in totals)

Cross Lake A (Option 2)

| | | | |
|-------------------------------------|-----------------------------|--|------------------|
| 110 acres | | | |
| 30 lots x 0.29 lb/lot | | | 8.70 lbs |
| 2,000 ft new roads | 2,000/100 x 0.108 lb/100 LF | | 2.16 lbs |
| 1,400 ft upgraded roads | 1,400/100 x 0.054lb/100 LF | | 0.76 lb |
| Common area | | | 0.30 lb |
| Total export Cross Lake A(2) | | | 11.92 lbs |

April 9, 2018 Jeff Dennis, Biologist

Cross Lake B (HSG B soils)

| | |
|----------------------------------|-----------------|
| 91 acres | |
| 30 lots x 0.24 lb/lot | 7.20 lbs |
| Existing roads | 0.00 lb |
| Common area | <u>0.30 lb</u> |
| Total export Cross Lake B | 7.50 lbs |

Cross Lake C

| | |
|--|------------------|
| 57 acres | |
| 30 lots x 0.29 lb/lot | 8.70 lbs |
| 3,550 ft new roads 3,550/100 x 0.108 lb/100 LF | 3.83 lbs |
| 2,150 ft upgraded roads 2,150/100 x 0.054lb/100 LF | 1.16 lbs |
| Common area | <u>0.30 lb</u> |
| Total export Cross Lake C | 13.99 lbs |

Cross Lake D

| | |
|--|------------------|
| 187 acres | |
| 35 lots x 0.29 lb/lot | 10.15 lbs |
| 1,300 ft new roads 1,300/100 x 0.108 lb/100 LF | 1.40 lbs |
| Common area | <u>0.30 lb</u> |
| Total export Cross Lake D | 11.85 lbs |

Cross Lake E

| | |
|--|------------------|
| 163 acres | |
| 60 lots x 0.29 lb/lot | 17.40 lbs |
| 10,000 ft new roads 10,000/100 x 0.108 lb/100 LF | 10.79 lbs |
| 1,400 ft upgraded roads 1,400/100 x 0.054lb/100 LF | 0.76 lb |
| Common area | <u>0.52 lb</u> |
| Total export Cross Lake E | 29.47 lbs |

Total export: Residential House Lots only, Full-Build (185 units): 52.15 lbs

Total export: Full-Build: Residential Lots, Common Areas, Roads (185 units): 74.73 lbs

Community/Economic Development areas

Cross Lake CD-3

Total area: 11 acres

Maximum number of lots: Assume 2 (eliminated development areas CD-3b and CD-3c and reduced CD-3a [now CD-3] to 2 lots - a reduction from initial proposal of 12 lots total).

Proposed zoning for M-FRL-GN district allows 2,500 SF buildings, with ability to go higher as a special exception (Existing St. Peters Store [not in Concept Plan area] occupies approximately 4,700 SF).

For purposes of this exercise assume:

| | |
|---------------------------------------|--------------------|
| Roof: 5,000 SF (0.1148ac) x (.5) | 0.06 lb |
| Parking: 5,000 SF (0.1148ac) x (1.75) | 0.20 lb |
| Lawn: 7,000 SF (0.1607ac) x (.6) | <u>0.10 lb</u> |
| | 0.36 lb/lot |

| | |
|--|----------------|
| 2 lots x 0.36 lb/lot | 0.72 lb |
| No additional roads; buildings front on Route 161. | <u>0.00 lb</u> |
| Total export Cross Lake CD 3 | 0.72 lb |

Cross Lake CD-4

Total area: Approximately 62 acres

Maximum number of lots: Assume 6 lots (a reduction from initial proposal of 30 lots)

Concept Plan limits development to half of available acreage (31 acres)

Proposed zoning for GN district allows 2,500 SF buildings with greater footprint allowed by Special Exception; for purposes of this exercise, assume 5,000 SF buildings.

New road from Route 161: 1,400 LF: 24' width, HSC B soils, 50' clearing (road is wider, since it will be for commercial use).

Roads

$$33,600 \text{ sf } (0.7713 \text{ ac}) \times (1.75) = \mathbf{1.35 \text{ lbs}} + 36,400 \text{ sf } (0.8356 \text{ ac}) \times (.4) = \mathbf{0.334 \text{ lb}} = \mathbf{\underline{1.684 \text{ lbs}}}$$

Lots

Soils: 4 lots HSG B, 2 lots HSG C

For purposed of this exercise assume:

| | | | |
|----------|----------|----------------------|------------------------------------|
| Roof: | 5,000 SF | (0.1148 ac) x (.5) | 0.057 lb |
| Parking: | 5,000 SF | (0.1148 ac) x (1.75) | 0.201 lb |
| Lawn: | 7,000 SF | (0.1607 ac) x (.6) | <u>0.096 lb</u> |
| | | | 0.354 lb/lot* (HSG C soils) |

*0.322 lb/lot adjusted for HSG B soils

| | |
|-------------------------------------|-------------------|
| 4 lots x 0.322 lb/lot | 1.290 lbs |
| 2 lots x 0.354 lb/lot | 0.708 lb |
| Roads | <u>1.684 lbs</u> |
| Total export Cross Lake CD-4 | 3.682 lbs` |

Cross Lake Export Summary

The primary objective of this assessment is to balance the Cross Lake PB by limiting or restricting the levels of potential development that will be allowed in the Concept Plan, and at the same time, consider any contributing background impacts from existing and future uncontrolled sources of export, to ensure that the possible development of all of the areas can be achieved without the need for more complicated treatment measures, BMPs, lot restrictions or off-site mitigation and long term maintenance requirements. Several contributing factors were evaluated in order to achieve this objective.

For each of the residential areas, the assigned individual PPB will be sufficient to allow for the full build-out for all of the lots considered for each area, including new roads or upgrades of existing roads that may be needed for access. While each area may be fully constructed according to the number of lots allowed by the proposed rezoning, an overall unit cap will limit the total number of new units that can be built to 125. This will ultimately limit the associated P export from all areas combined, to that generated from 125 lots or less. Although this may restrict or prohibit the level of development at some areas, it is likely that some of the areas may not be fully developed and thus allow some development at all of the residential areas.

In order to provide assurance that the PPE from the residential areas will not exceed the assigned PPB, the calculated export was revised to include higher export values (Table 3.2) associated with conventional house lots, which is 65% higher than the "camp lot" exports initially considered in the plan (per Table 3.1). All of the PPE was calculated using the high export options, with no requirements for restrictions, BMPs or mitigation. This provides a comfortable and conservative PPB for each residential area and allows some flexibility for a

potential developer to overcome any restrictive site limitations or access issues by having the option to consider such restrictions, buffers or BMPs, if necessary, and with the approval of the LUPC.

Since the higher export values associated with the residential areas have the effect of reducing the available PPB for the community/economic development areas, it was necessary to reconsider the development potential for these areas. Three commercial areas rezoned D-FRL-GN were included in the May 2017 submittal for the Concept Plan identified as “CD-3a”, “CD-3b” and “CD-3c. These areas are located near the intersection of Route 161 and Route 162. Each of these development areas allowed up to 4 lots for a total of 12 community/economic development lots on a combined area of 28 acres. In order to reduce the PPE to acceptable levels from these areas to meet the overall lake PB, the number of lots allowed has been significantly reduced to only 2 lots within the area originally identified as CD- 3a. CD-3b and CD-3c have been eliminated and this remaining 11-acre parcel (CD-3a) has been renamed as CD-3. The area zoned D-FRL-CI included in the Concept Plan identified as “CD-4,” has been rezoned to D-FRL-GN and re-sized and reduced to approximately 62 acres. The number of lots for this area has been substantially reduced from 30 to 6 lots. The net effect is a reduction in the number of community/economic development lots in the Cross Lake watershed from 42 potential lots to 8 lots. This reduction will significantly reduce the PPE and greatly improve the ability to meet the PB for Cross Lake.

Calculations for total P export to Cross Lake (PE) are as follows:

Cross Lake Export for all Concept Plan Developments w/ Residential Unit Cap

Total P export (full-build) from all residential areas (does not include A-1) = 74.73 lbs (185 units)

Maximum residential unit cap = 125 units
 $(52.15 + 20.86) \times (125/185) + 1.73 = \mathbf{51.06 \text{ lbs}}$ (max. export with cap)

This assumes that approximately 2/3rds of the roads envisioned for the full build-out scenarios would be constructed to achieve the residential unit cap of 125 units.

Total P export from all community/economic development areas

0.72 lb (CD-3) + 3.68 lbs (CD-4) = **4.40 lbs**

Total P export to Cross Lake for all developments (PE) = 55.46 lbs

Total Phosphorus Budget (PB) to Cross Lake = 82.19 lbs/yr

PB – PE = 82.19 - 55.46 = **26.73 lbs (32.5%) = budget reserved for unregulated sources**

Non-Concept Plan Activities

Refer to Summary for Non-Concept Plan; Unregulated Future Activities in Attachment 5 for detailed calculations.

As described above, Irving owns or controls large landholdings that encompass large parts of the subwatersheds within the TWPs of the lakes involved in the 51,000 acre Concept Plan area. For example, Irving owns approximately 15,395 acres within the Cross Lake watershed, approximately 41% of the entire watershed. The 5 residential and 2 remaining community/economic development areas in the Cross Lake watershed total approximately 680 acres, which is about 4.5% of Irving’s land in the watershed. The actual development footprints assumed within each of these areas is significantly smaller than the total area sizes due to accessibility, slopes, soils and developable lot sizes. As a result a very small portion of the watershed will be subject to development under the Concept Plan. The remaining land outside of these designated development zones will be managed for commercial forestry, where anticipated development activities are primarily construction or maintenance of forestry management roads.

For this reason, to protect future water quality the DEP has requested that the Plan consider potential existing and future P sources not associated with development activities within the Concept Plan area for Cross Lake, including unregulated forestry management road construction. LUPC has also suggested that a small P budget should be included to allow for exempt residential lots that may be constructed in the future, after the Concept Plan expires. Therefore, a portion of the PB for Cross Lake will be reserved for future harvesting activity and other potential uncontrolled future non-Concept Plan sources.

In order to assess the other sources of P in the Cross Lake watershed not associated with the Concept Plan development, we evaluated the potential for the construction of 7.9 miles of new logging roads and upgrades to about 2.1 miles of roads that are included in Irving’s long-term forest management plan for the Cross Lake watershed. Irving also plans to decommission approximately 2.0 miles of logging roads. Although no mitigation or credit is taken for these, it is important to note that they will no longer continue to export P once they have revegetated.

Since the logging roads are all located in managed forestry areas that do not have any other associated developments, driveways or connected impervious areas, they are considered as “linear”. In addition, since they traverse undeveloped land that is often several thousand feet, and even miles, from the lake, and are surrounded by naturally vegetated or revegetated terrain that will provide significant buffering from P export to the lake, it is reasonable to assume that only 75% of the road surface and 50% of the cleared area will export phosphorus to the lake, generally in accordance with LUPC Chapter 10.25.3.d. (quoted below):

d. Exception for Linear Portions of a Project. *For a linear portion(s) of a project, runoff control may be reduced to no less than 75 percent of the impervious area and no less than 50 percent of the developed area that is impervious, landscaped or otherwise disturbed.*

In addition we have assumed the addition of 8 future house lots that could be developed after the Concept Plan expires. While Irving has no plans to sell parcels of land outside of the residential development areas, TJD&A identified these locations on existing roads that are either within 0.5 mile of the lake, on the thoroughfare, or in other desirable locations, and thus are a reasonable prediction of future development potential.

The estimated export contribution for these unregulated uses are calculated as follows:

Forestry Management Roads (future)

New roads are assumed to be 14 feet wide with 10' of clearing on both sides. Upgraded roads are assumed to be increased from 12 to 14 feet wide and no additional clearing. Adjustments were made for runoff from linear roads impervious area (0.75) and cleared area (0.50) per LUPC Chapter 10.25.3.d.

| | |
|--|-----------|
| 17 possible new logging roads | |
| 41,750 LF x 14' (584,500 sf; 13.42 ac) x 1.75 x 0.75 = | 17.61 lbs |
| 41,750 LF x 20' (835,000 sf; 19.17 ac) x 0.6 x 0.5 = | 5.75 lbs |

| | |
|---|------------------|
| 3 road upgrades | |
| 11,100 LF x 2' (22,200 sf; 0.51 ac) x 1.75 x 0.75 = | 0.67 lb |
| Total P export from all roads = | 24.03 lbs |

| | |
|---|-----------------|
| <u>Exempt house lots (future)</u> | |
| 8 new single family house lots = 8 x 0.29 = | 2.32 lbs |

| | |
|--|-------------------|
| Total Cross Lake P Export From unregulated Non Concept Plan Sources = | 26.35 lbs* |
|--|-------------------|

*Totals do not include 2.0 miles of forestry roads to be abandoned and revegetated (approximately 5.21 lbs of existing export)

Conclusion

For this assessment we have evaluated the maximum phosphorus export that could be generated from anticipated development that may be allowed within the Concept Plan in the Cross Lake watershed. In addition, we evaluated potential future unregulated, non-Concept Plan activities to account for new logging roads and upgrades and additional house lots within the watershed.

The overall Cross Lake PB for Irving’s land allocated to these combined activities is 82.19 lbs/year. Approximately 55.5 lbs/year export has been allocated by DEP to be distributed to all of the Cross Lake development areas for residential and community/economic development areas. By limiting the combined PPB available for Concept Plan developments to the maximum PPE calculated for the developed areas, a reserve PB of 26.7 lbs/year is set aside for any unregulated activities for long term protection of the Cross lake watershed for all potential sources of P export anticipated for the life of the Concept Plan and beyond. The potential unregulated sources of P export have been estimated to be 26.4 lbs/year, which is less than the reserve PB. The total combined export from all sources is 81.9 lbs/year, which meets the overall PB for Cross Lake.

| | |
|--|----------------|
| Cross Lake P Budget for Irving Land (PPB): | 82.19 lbs/year |
| – P Export from Residential / Community Development: | 55.50 lbs/year |
| Reserved PB for unregulated activities: | 26.70 lb/year |
| Anticipated P export from roads / houselots: | 26.40 lb/year |

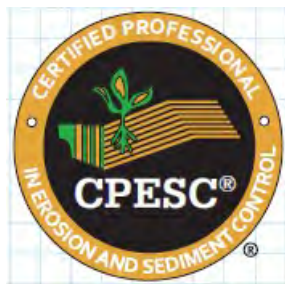
For acceptable site development(s), the Post-PPE needs to be smaller than the PPB for the parcel(s). Based upon the calculations presented in this report, it appears that the level of development envisioned in the Concept Plan is feasible and will be protective of water quality in Cross Lake.

The Concept Plan for Cross Lake development meets the goal of the phosphorus methodology to provide protection from degradation of the lake water quality by limiting all potential development in the watershed sufficient to avoid increase in the lake's trophic state, with no visible effects, and distribute the burden of this protection over the watershed and over time.

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April 9, 2018 Jeff Dennis, Biologist

Attachment

- c. Attachment 1: Maine DEP Technical Review Memorandum, December 7, 2017
- Attachment 2: Cross Lake Narrative (TJD&A), 03/02/18
- Attachment 3: Cross Lake Sketches (TJD&A), 03/07/18
- Attachment 4: Phosphorus Export Calculations worksheets
- Attachment 5: Summary for Non-Concept Plan; Unregulated Future Activities
- Attachment 6: Potential House Lot Locations (TJD&A), 04/10/18

(NOTE: Cross Lake Narrative and Cross Lake Sketches depict initial concepts previously reviewed by DEP and are the basis for this assessment, but may not indicate current assumptions, concepts, or lot arrangements)

ATTACHMENT 1

Maine DEP Technical Review Memorandum, December 7, 2017



PAUL R. LEPAGE
GOVERNOR

PAUL MERCER
COMMISSIONER

TECHNICAL REVIEW MEMORANDUM
Bureau of Water Quality

TO: Billie J. MacLean, Project Manager – Land Use Planning Commission
FROM: Jeff Dennis, Biologist and David A. Waddell, Asst. Env. Eng. -- Division of Environmental Assessment, Bureau of Water Quality
DATE: December 7, 2017
RE: Irving Fish River Concept Plan

Purpose:

The original purpose of this memorandum was to assess the feasibility of being able to develop the number of commercial and residential lots proposed for the development areas in the proposed Fish River Concept Plan without exceeding the per acre phosphorus allocations, as most recently estimated by DEP, for each of the lakes in question. This analysis, which is still included, suggests that, at least for the Cross Lake development areas, there would be insufficient allocation. Given this, a section has been added providing background information about the lakes, the issues, the options considered for limiting phosphorus additions to the lakes and some of the history of development and consideration of these options.

Background:

Water Quality. The water quality standards for Maine lakes require that they have a stable or decreasing trophic state, subject only to natural fluctuations, and must be free of culturally induced algal blooms that impair their use and enjoyment. Of the four lakes included in the proposed plan (Long Lake, Mud Lake, Cross Lake and Square Lake), only Cross Lake fails to meet these standards. Cross Lake has for many years supported mid-summer blue green algal blooms that reduce measured secchi disc transparency, in most years, to 2.0 m or less. Long Lake is a productive lake that, in past years has supported algal blooms, but is currently exhibiting a promising trend of decreasing trophic state. Mud Lake is a productive lake with an apparent stable trophic state, though little water quality data has been collected on the lake in recent years. Square Lake is a moderately productive lake with a stable trophic state.

While the principle reason for impairment of Cross Lake is inputs of phosphorus from agricultural activities located primarily in the Dickey Brook watershed, runoff from roads and harvesting operations also contribute to the problem. Any additional phosphorus load to the lake has the potential to increase the duration and intensity of the algal blooms, so any new phosphorus sources or expansion of existing phosphorus sources should be treated with particular care.

The Phosphorus Standard and the General Standard. The Chapter 500 Stormwater Management Rules require that any project disturbing one acre or more of land and creating 20,000 sq ft or more (in Most at

AUGUSTA
17 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0017
(207) 287-7688 FAX: (207) 287-7826

BANGOR
106 HOGAN ROAD, SUITE 6
BANGOR, MAINE 04401
(207) 941-4570 FAX: (207) 941-4584

PORTLAND
312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04769
(207) 764-0477 FAX: (207) 760-3143

Risk Lake watersheds) or one acre or more (in all other lake watersheds) of new impervious area either meet the Phosphorus Standard or the General Standards. The goal of both of these standards is to insure management and treatment of stormwater runoff sufficient to avoid significant cumulative impacts to downstream lakes. If a project in a lake watershed requires a Site Law permit, it is required to meet the Phosphorus Standard; the option of meeting the General Standard is not available.

The General Standards require that BMPs of approved type and sizing be incorporated such that they provide treatment for runoff from at least 95% of the project's impervious area and at least 80 % of the project's developed area. There are several possible exceptions to this, the most significant one dealing with linear portions of the project (i.e. roads). For a linear portion of the project the area required to be treated may be reduced to no less than 75% of the linear portions impervious cover and no less than 50% of its developed area. All projects are treated the same regardless of the nature of the waterbody to which they drain.

Under the Phosphorus Standard, the amount of phosphorus mitigation and/or stormwater treatment required for a given project is a function of the size of the parcel, the per acre phosphorus allocation for the lake watershed in which the project is located and the potential for the project to export phosphorus in its stormwater. Per acre phosphorus allocations are determined for each lake in a three step process: (1) an allowable increase in phosphorus load to the lake is estimated based on the hydrologic sensitivity of the lake to phosphorus loading, the water quality of the lake and its potential to recycle phosphorus from its sediments and to support cold water fisheries; (2) the area within the watershed that over time will be subject to development is predicted based on the anticipated growth rate in the watershed and the amount of land available for development; and (3) the allowable increase in phosphorus load (lbs P/yr) is divided by the expected area of growth in acres to get the per acre phosphorus allocation (lbs P/acre/year). To determine the phosphorus budget for a project (the Project Phosphorus Budget, PPB) the per acre allocation for the watershed is multiplied by the acreage of the parcel being developed. The project design must then incorporate enough appropriate mitigation measures and/or stormwater treatment BMPs to prevent the projects projected phosphorus export (PPE) from exceeding the project's phosphorus budget. Low density projects in relatively less sensitive watersheds are required to do less stormwater management and treatment than high density projects in sensitive watersheds.

The goal of this methodology is to provide protection sufficient to avoid increase in the lake's trophic state, and to distribute the burden of this protection over the watershed and over time, thus allowing for the maximum development potential within any watershed. This strategy works best in watersheds where most of the new sources of phosphorus are associated with development activities that are subject to regulation and required to meet some version of this standard. In watersheds with other significant, and potentially expanding, phosphorus sources (i.e. agriculture, harvesting roads) account for a substantial portion of the threat to the lake's water quality, the Phosphorus Standard is not likely to provide sufficient protection unless some of the allowable increase in phosphorus load is reserved for these un- or under-regulated sources.

Strategies for protecting lakes in Concept Plan type development. In the southern, more developed part of Maine the activity that is likely to result in increased phosphorus loading to lakes is watershed development, especially development that includes roads and other transportation infrastructure (i.e. parking, driveways, etc.). Usually this type of development is regulated, at least at the local level, and the parcels on which the development takes place are relatively small, not much more than is required for the proposed development. In this situation implementation of the Phosphorus Standard is likely to be

effective. In LUPC jurisdiction, especially in cases of Concept Plan and Planned Development districts, this is not the case. The parcels involved are very large, orders of magnitude bigger than that required for the proposed level of development, and, unlike in the more developed portions of the state, may encompass large parts of, or even the entire watershed of the lake(s) involved. In this case the owner of the land involved in the Concept Plan or Planned Development has complete control of what happens on these lands, and the plan poses a course of management and development that will avoid unacceptable impacts to natural resources. Since the landowner controls much if not all of the watershed it seems reasonable to allocate an appropriate portion of the allowable increase in lake phosphorus loading, call it the Plan's phosphorus budget, to the owner, and let him or her decide how that allocation should be applied within the Plan area, provided that the total net addition of phosphorus to the lake associated with activities in the Plan area does not exceed the Plan phosphorus budget.

This is the strategy that was applied in both the Saddleback Plan and the Plum Creek. In the case of Saddleback, it has worked well, with Saddleback's consultants keeping track of the magnitude of additional phosphorus sources from new development projects as well as the reduction of phosphorus export resulting from retrofitting stormwater management BMPs on many existing, grandfathered sources. As long as the net increase phosphorus load does not exceed the Plan phosphorus budget, Saddleback is in compliance with its Plan requirements. In the case of Saddleback, most, if not all of the potential increased phosphorus load to the lake is associated with new development activities that were regulated under the plan, so there was no issue of not dealing with other potential uncontrolled sources in the watershed.

When we at DEP were initially questioned about the Fish River Lake Concept Plan, we suggested the same strategy be applied, but with a recognition that much of the potential for future phosphorus sources is associated not with proposed development activities, but with unregulated road construction and enhancement servicing harvesting operations. The following table is one developed in 2012 by DEP staff and Conway Elkins, who was working with Irving at the time. It presents a phosphorus allocation proposal where the plan's phosphorus budget is based on the percentage of the lakes' watersheds that were within the plan area, and where a significant portion of the budget was reserved for future harvesting activity and for other potential uncontrolled future sources.

Fish River Chain of Lakes
P Allocation Discussion Meeting 1/19/12

| Lake | Phosphorus allocated to total direct watershed per pop in lake (lbs) | Acceptable increase in lake's phosphorus concentration | Allowable increase in annual phosphorus load to the lake | Direct Watershed per Town Pak (acres) | Direct Watershed per GIS (acres) | Irving Ownership in Direct Watershed per GIS (acres) | Irving Ownership in Direct Watershed per GIS (%) | Possible Irving Allocation for Direct Watershed (lb/yr) | Net Increase due to Proposed Development | Net Increase due to New Roads since 2000 | % of Allocation Used | Remaining Allocation |
|-------------|--|--|--|---------------------------------------|----------------------------------|--|--|---|--|--|----------------------|----------------------|
| | [F] | [C] | [F][C] | | | | | | | | | |
| Long Lake | 707 | 0.75 | 530.25 | 48,260 | 49,450 | 19,449 | 39% | 208.55 | 9.67 | 52 | 29.6% | 146.89 |
| Mud Lake | 115.5 | 1.00 | 115.5 | 7,502 | 7,404 | 6,651 | 90% | 103.75 | 3.28 | 17 | 19.5% | 83.47 |
| Cross Lake | 398 | 0.50 | 199 | 34,654 | 37,267 | 15,392 | 41% | 82.19 | 19.05 | 3 | 26.8% | 60.14 |
| Square Lake | 728 | 0.75 | 546 | 44,558 | 48,402 | 40,613 | 84% | 458.14 | 22.39 | 58 | 17.5% | 377.75 |
| | | | | | | | | 852.63 | 54.39 | 130 | 21.6% | 668.24 |

This table is very similar to Table 3 on page 10 in the Shoreland Criteria section (Question #14) of Volume 1 (Part C) of the Concept Plan shown below.

**TABLE 3
PHOSPHOROUS EXPORT BY DEVELOPMENT AREA ON/ADJACENT TO EACH LAKE**

| Lake | P allocated to total dir. watershed per ppb in lake (lbs) [F] | Acceptable increase in lake P conc. in ppb [C] | Allowable increase in ann. P load to lake (lbs/year) [FC] | Direct Watershed per GIS (acres) | Irving Ownership in Direct Watershed per GIS (acres) | Irving Ownership in Direct Watershed per GIS (%) | Possible Irving Allocation for Direct Watershed (lbs/yr) | Net Increase due to allowed Development | Net Increase due to New Roads since 2000 | % of Allocation Used | Remaining Allocation |
|--------|---|--|---|----------------------------------|--|--|--|---|--|----------------------|----------------------|
| Long | 707 | 0.75 | 530.25 | 49,450 | 19,449 | 59% | 208.55 | 14.02 | 52 | 31.7 | 142.53 |
| Mud | 115.5 | 1 | 115.5 | 7,404 | 6,651 | 90% | 103.75 | 0.58 | 17 | 19 | 84.07 |
| Cross | 598 | 0.5 | 199 | 37,267 | 15,392 | 41% | 82.19 | 21.3 | 3 | 30.5 | 57.14 |
| Square | 728 | 0.75 | 546 | 48,402 | 40,613 | 84% | 458.14 | 22.39 | 58 | 17.5 | 377.75 |
| TOTALS | | | | | | | 852.63 | 58.29 | 130 | 22.4 | 662.24 |

The strategy discussed above works well in the case of the Saddleback Planned Development District in part because Saddleback is the developer of each of the projects implemented under the plan. They therefore determine how much of their available phosphorus budget will be applied to the project (the magnitude of the project and the level of stormwater management applied to it), and have an understanding of what remains available for future projects. In the proposed Fish River Concept Plan a different development process is involved. Rather than acting as the developer of the proposed developed areas, Irving plans to sell the developed areas to other entities to develop as they intend within the limitations (e.g. number of lots) described in the plan. Another difference is that LUPC no longer has jurisdiction over Site Law projects in the Unorganized Territories. They are now handled by DEP, and will be required to meet the phosphorus allocation for the parcel being permitted. Unless Irving is willing to decide up front how much of the Concept Plan’s phosphorus budget is allocated to each developed area and include that in the sales agreement and deed restrictions, the buyers will not know the potential for development in the area they are purchasing, and the DEP will not know what the phosphorus budget is for the parcel.

Since this type of internal allocation was not proposed in the plan, DEP staff developed a straight up per acre allocation for each township’s share of each lake’s watershed (including lands both within and outside the Concept Plan’s boundaries), and assumed a relatively high growth rate of 25% since, in these watersheds, development activities are likely to account for only a part, and probably a minority part, of the potential future increase in phosphorus load to the lake. The allocation and associated assumptions are presented in the table below.

Fish River Lake Concept Plan P Allocations

| Lake Name | Town in which development is located | Watershed Area in Town (acres) DDA | Area not available for development (acres) ANAD | Area available for development (acres) AAD | GF | Expected developed area (acres) D | (lbP/yr) F | Water Quality Category | WQC | LOP | C | FC | Per acre phosphorus allocation (lb/acre/yr) P | Small Watershed Threshold (acres) SWT |
|-------------|--------------------------------------|------------------------------------|---|--|------|-----------------------------------|------------|------------------------|-----|------|--------|-------|---|---------------------------------------|
| Square Lake | T16R5 WELS | 8287 | 1000 | 7287 | 0.25 | 1822 | 135.4 | mod-sensitive | h | 0.75 | 101.55 | 0.056 | 455 | |
| Cross Lake | T16R5 WELS | 3014 | 300 | 2714 | 0.25 | 679 | 34.66 | poor restorable | h | 0.50 | 17.33 | 0.026 | 170 | |
| Cross Lake | Cross Lake Twp | 18018 | 4300 | 13718 | 0.25 | 3430 | 207.13 | poor restorable | h | 0.50 | 103.57 | 0.030 | 857 | |
| Long Lake | T17R3 WELS | 8203 | 400 | 7803 | 0.25 | 1951 | 120.28 | mod-sensitive | h | 0.75 | 90.21 | 0.046 | 488 | |
| Long Lake | T17R4 WELS | 10182 | 500 | 9682 | 0.25 | 2421 | 149.3 | mod-sensitive | h | 0.75 | 111.98 | 0.046 | 605 | |
| Mud Lake | T17R4 WELS | 5715 | 400 | 5315 | 0.25 | 1329 | 88.02 | mod-sensitive | h | 0.75 | 66.02 | 0.050 | 332 | |
| Mud Lake | T17R5 WELS | 1433 | 250 | 1183 | 0.25 | 296 | 22.07 | mod-sensitive | h | 0.75 | 16.55 | 0.056 | 74 | |

The following section evaluates the feasibility of potential development scenarios for each development area, with the phosphorus budget for the development area defined as the product of the developed areas acreage minus any NWI wetlands and the appropriate per acre allocation in the table above (highlighted in yellow).

Analysis of feasibility of proposed development densities in the developed areas:

Proposed under the Irving Concept Plan are 6 Commercial Development areas and 11 Residential Unit areas, one with potential for a multi-unit recreational facility. Evaluation of the plan for its total phosphorous impacts on the four major lakes in the plan area is challenging due to the large amount of land in the plan and difficulty of assessing future phosphorus loads from activities that fall under typical forest management, including roads. The simplest way of looking at the proposed development is to address the areas that are specifically being proposed for development and restricting evaluation of the phosphorous impacts to those areas. The following analysis does that with assumptions as to how development might proceed.

Commercial Development Areas CD-1, CD-2, CD-3A, CD-3B, CD-3C, CD-4.

To analyze the commercial development areas some assumptions about the development were needed. These areas only specified the number of lots and the kind of development i.e. a mix of commercial, light industrial, civic, or multi-unit residential complexes for senior or affordable housing development. The phosphorous methodology only differentiates between cover types. The mix of possibilities would be endless and will come out as specifics of the developments are proposed. For these areas three scenarios were evaluated:

- 20% Lawn, 30% Parking, 50% Roof
- 20% Lawn, 50% Parking, 30% Roof
- 100% Impervious (for comparison)

Also, these scenarios were then adjusted for the use of the Chapter 500 standard suite of Best Management Practices of Storm Water Quality Control (60% phosphorous treatment.)

CD-1

CD-1 sets aside 281 Acres for the development of 30 lots. This lot is divided between Mud Lake and Long Lake. An existing road is on this lot and appears to have been recently upgraded for development. For this analysis, the lake specific Project Phosphorous Budgets (PPB) have been added together. The combined Long Lake and Mud Lake portions have a Project Phosphorous Budget of 7.937 lb/YR of "P". This is reduced by 0.763 lb/YR for the upgraded road.

The following table shows the amount of developable acreage allowed by each scenario.

| | Scenario 1 | Scenario 2 | Scenario 3 |
|------------------|------------|------------|------------|
| w/o BMPs | 9.630 Ac | 8.016 Ac | 5.739 Ac |
| w/ Standard BMPs | 15.408 Ac | 12.826 Ac | 9.183 Ac |

With 30 lots the amount of developable acreage per lot is between 0.191 and 0.514 Acres.

CD-2

CD-2 sets aside 167 Acres for the development of 30 lots. This lot is in the Mud Lake watershed. Wetlands along Rte 162 appear to prevent direct access to the lots. A 1500' access road has been assumed. The Project Phosphorous Budget (PPB) for CD-2 is 6.830 lb/YR of "P".

This is reduced by 1.888 lb/YR for the road w/o treatment. This would be 0.755 lb/YR if treated with standard BMPs. Assume the road is treated.

The following table shows the amount of developable acreage allowed by each scenario.

| | Scenario 1 | Scenario 2 | Scenario 3 |
|------------------|------------|------------|------------|
| w/o BMPs | 8.154 Ac | 6.788 Ac | 4.860 Ac |
| w/ Standard BMPs | 13.047 Ac | 10.861 Ac | 7.776 Ac |

The developable acreage per lot is between 0.162 and 0.435 Acres.

CD-3A

CD-3A allows for 11 acres divided into 4 potential lots. This parcel is in the Cross Lake watershed. The Project Phosphorous Budget is 0.330 lb/YR of "P". It was assumed that the lot would directly access the existing road.

The following table shows the amount of developable acreage allowed by each scenario.

| | Scenario 1 | Scenario 2 | Scenario 3 |
|------------------|------------|------------|------------|
| w/o BMPs | 0.443 Ac | 0.369 Ac | 0.264 Ac |
| w/ Standard BMPs | 0.709 Ac | 0.590 Ac | 0.422 Ac |

The developable acreage per lot is between 0.066 and 0.177 Acres.

CD-3B

CD-3B allows for 6 acres divided into 4 potential lots. This parcel is in the Cross Lake watershed. The Project Phosphorous Budget is 0.180 lb/YR of "P". It was assumed that the lot would directly access the existing road.

The following table shows the amount of developable acreage allowed by each scenario.

| | Scenario 1 | Scenario 2 | Scenario 3 |
|------------------|------------|------------|------------|
| w/o BMPs | 0.242 Ac | 0.201 Ac | 0.144 Ac |
| w/ Standard BMPs | 0.387 Ac | 0.322 Ac | 0.230 Ac |

The developable acreage per lot is between 0.036 and 0.097 Acres.

CD-3C

CD-3C allows for 11 acres divided into 4 potential lots. This parcel is in the Cross Lake watershed. The Project Phosphorous Budget is 0.330 lb/YR of "P". It was assumed that the lot would directly access the existing road.

The following table shows the amount of developable acreage allowed by each scenario.

| | Scenario 1 | Scenario 2 | Scenario 3 |
|------------------|------------|------------|------------|
| w/o BMPs | 0.443 Ac | 0.369 Ac | 0.264 Ac |
| w/ Standard BMPs | 0.709 Ac | 0.590 Ac | 0.422 Ac |

The developable acreage per lot is between 0.066 and 0.177 Acres.

CD-4

The remaining parcel is 73 acres, with a Project Phosphorous Budget of 2.104 lb/YR of “P”. This would be divided into 30 lots. It is hard to determine if the road access needs to be upgraded from the information presented and no reduction was made for upgrades but this would reduce the amount of development the lot could have.

The following table shows the amount of developable acreage allowed by each scenario.

| | Scenario 1 | Scenario 2 | Scenario 3 |
|------------------|------------|------------|------------|
| w/o BMPs | 2.824 Ac | 2.351 Ac | 1.683 Ac |
| w/ Standard BMPs | 4.518 Ac | 3.762 Ac | 2.693 Ac |

Divide by 30 lots the amount of developable acreage per lot is between 0.056 and 0.151 Acres.

Phosphorus export from Commercial Development Areas. The above analysis of the Commercial Development Areas looks at the potential amount of developed land (under 3 scenarios) that could be created in each development area without exceeding the phosphorus budget for the developed area. It does not give any indication of how much phosphorus export would likely be created if all lots were “fully developed”. As stated earlier, this is because there are too many possibilities for types and intensities of development on these lots. In an attempt to provide some perspective on this, we have attempted conservative estimates based on an evaluation of the amount and type of impervious area associated with some typical existing commercial parcels in the local area. Looking at 9 such parcels, it was determined that 0.909 acres of non-roof impervious area and 0.139 acres of building area represented the average for the parcels. This translates into 1.031 lb P/yr being exported from a typical commercial lot. Obviously less is possible and much more is also possible. One large industrial site could export 10 times this amount.

In the Cross Lake Watershed, 42 commercial lots are proposed for 43.3 lb P/yr of impact without treatment and 17.3 lb P/yr with standard best management practices. The new road that would have to be constructed to access lots in CD4 would likely export around 4.5 lb P/yr without treatment and 2.0 lb with standard treatment, though this would depend on the size distribution and arrangement of the lots.

In Mud Lake Watershed, 50 lots are proposed for 53.4 lb P/yr of impact without treatment and 21.3 lb P/yr with standard best management practices.

In Long Lake Watershed, 10 lots are proposed for 10.3 lb P/yr of impact without treatment and 4.1 lb P/yr with standard best management practices.

Residential Development Areas: Long Lake A, B, C; Cross Lake A, B, C, D, E; Square E, W; Yexas

Evaluation of the residential areas is a little easier. The phosphorous methodology (in table 3.2) has defined allocations of individual lots based on the hydrologic soil class. This allocation includes a 150-foot maximum length driveway. Driveways longer than 150 feet need to be assessed as road. The table is further divided by lot restrictions or not. Lots with restrictions are limited on the amount of cleared opening for development and a maximum amount of driveway and parking. It is assumed that the option of 75% drive way buffers being applied is not used due to the complications of making this work on each lot. Calculations then were used to apply standard treatment BMPs that provide 60% removal of phosphorous for use as a comparison.

Access roads were determined by both the length of the road necessary to accommodate a minimum lot frontage of 100', if existing roads were available, if upgrades of the road were necessary, and anticipation of the most desirable lot locations. Upgraded roads were assumed to be 12 foot existing and upgraded to 20' with shoulders and ditches.

Long Lake "A"

Long Lake "A" uses 129 acres of HSG "C" soils to accommodate 50 lots with a PPB of 5.934 lb/YR. Road Conditions are unknown and it is assumed that upgrading will be necessary.

| | w/o restrictions | w/ restrictions |
|-------------------|------------------|-----------------|
| w/o standard BMPs | 14.500 lb/YR | 10.000 lb/YR |
| w/ standard BMPS | 5.800 lb/YR | 4.000 lb/YR |

Potential road upgrade: 0.431 to 1.726 lb/YR.

Lots and road with treatment would be acceptable for this lot number.

Long Lake "B"

Long Lake "B" caps the lots at 15 and uses 56 acres of HSG "C" soils to do so. With a PPB of 2.576 lb/YR, the lots are only applied as the road access other cottages and should be to a reasonable standard.

| | w/o restrictions | w/ restrictions |
|-------------------|------------------|-----------------|
| w/o standard BMPs | 4.350 lb/YR | 3.000 lb/YR |
| w/ standard BMPS | 1.740 lb/YR | 1.200 lb/YR |

Lots with treatment or restrictions would be acceptable.

Long Lake "C"

Long Lake "C" uses 120 acres of HSG "C" soils to accommodate 25 lots along a higher ridge. No existing road accesses these lots and a new road is assumed necessary. This road would appear to need to be 3000' at a minimum. PPB of 5.520 lb/YR.

| | w/o restrictions | w/ restrictions |
|-------------------|------------------|-----------------|
| w/o standard BMPs | 7.250 lb/YR | 5.000 lb/YR |
| w/ standard BMPS | 2.900 lb/YR | 2.000 lb/YR |

Potential road upgrade: 1.096 to 2.739 lb/YR.

Lots and road with treatment would be acceptable for this lot number.

Long Lake "overall cap"

Long Lake impacts are capped at 75 lots for all the projects. To evaluate this all of the PPBs can be added for the parcels and the lots applied with no consideration for road upgrades. This is a combined PPB of 14.030 lb/YR.

| | w/o restrictions | w/ restrictions |
|-------------------|------------------|-----------------|
| w/o standard BMPs | 21.750 lb/YR | 15.000 lb/YR |
| w/ standard BMPs | 8.700 lb/YR | 6.000 lb/YR |

Lots with treatment would be acceptable for this lot number and total property.

Cross Lake "A"

Cross Lake "A" uses 110 acres of HSG "C" and "D" soils to accommodate 30 lots with a PPB of 3,300 lb/YR. There is limited access off the existing road and an access road seems necessary: minimum of 1500 feet.

| | w/o restrictions | w/ restrictions |
|-------------------|------------------|-----------------|
| w/o standard BMPs | 9.450 lb/YR | 6.450 lb/YR |
| w/ standard BMPs | 3.780 lb/YR | 2.580 lb/YR |

Access road: 0.559 to 1.398 lb/YR.

Lots and road with treatment, and restrictions on the lots would be acceptable for this lot number. For no restrictions or treatment on the lots or road the parcel would more likely allow for 6 lots.

Cross Lake "B"

Cross Lake "B" has better HSG "B" soils and access off or an existing road. The 91 acres yields a PPB of 2,730 lb/YR to accommodate 30 lots.

| | w/o restrictions | w/ restrictions |
|-------------------|------------------|-----------------|
| w/o standard BMPs | 7.200 lb/YR | 5.100 lb/YR |
| w/ standard BMPs | 2.880 lb/YR | 2.040 lb/YR |

Lots with treatment and restrictions would be acceptable for this lot number. For no restrictions or treatment on the lots this parcel would accommodate 11 lots.

Cross Lake "C"

Cross Lake "C" uses 57 acres of HSG "C" and "D" soils to accommodate 30 lots with a PPB of 1,710 lb/YR. Access off of the existing road can accommodate 12 lots. A second road on the parcel closer to the lake could accommodate remaining lots with upgrades.

| | w/o restrictions | w/ restrictions |
|-------------------|------------------|-----------------|
| w/o standard BMPs | 9.450 lb/YR | 6.450 lb/YR |
| w/ standard BMPs | 3.780 lb/YR | 2.580 lb/YR |

Potential road export assumed at 1,000 lb/YR.

Road upgrade with treatment and lots with treatment and restrictions allow for 15 lots. Road and lot without restrictions or treatment would allow for 2 lots.

Cross Lake "D"

Cross Lake "D" uses 187 acres to accommodate 35 lots. A 16% of the lot is deducted for the steep slopes that are considered non-buildable or very high export potential under the methodology. Consisting of HSG B, C, and D' soils the PPB of the parcel is 4.108 lb/YR. Access off the existing road is assumed. Lots are apportioned as 11 in B soils, 18 in C soils and 6 in D soils.

| | w/o restrictions | w/ restrictions |
|-------------------|------------------|-----------------|
| w/o standard BMPs | 9.900 lb/YR | 6.850 lb/YR |
| w/ standard BMPs | 3.960 lb/YR | 2.740 lb/YR |

Well distributed lots with treatment will fit in this area.

Cross Lake "E"

To accommodate 60 lots, Irving has set aside 163 acres for Cross Lake "E". 11% of the lot is deducted for the steep slopes and wetlands that are considered non-buildable. Consisting of HSG "C" soils the PPB of the parcel is 3.770 lb/YR. A new access road of 4000' is required.

| | w/o restrictions | w/ restrictions |
|-------------------|------------------|-----------------|
| w/o standard BMPs | 17.400 lb/YR | 12.000 lb/YR |
| w/ standard BMPs | 6.960 lb/YR | 4.800 lb/YR |

Potential road upgrade: 1.460 to 3.652 lb/YR.

Road upgrade with treatment and lots with treatment and restrictions allow for 28 lots. To have lots without restrictions the road would need to be significantly shortened and the number of lots reduced to 10 or less.

Cross Lake "overall cap"

Cross Lake impacts are capped at 125 lots for all the projects. To evaluate this all of the PPBs can be added for the parcels and the lots applied with no consideration for road upgrades. This is a combined PPB of 15.618 lb/YR. Assume C/D soils for lots

| | w/o restrictions | w/ restrictions |
|-------------------|------------------|-----------------|
| w/o standard BMPs | 39.375 lb/YR | 26.875 lb/YR |
| w/ standard BMPs | 15.750 lb/YR | 10.750 lb/YR |

Lots with treatment and restrictions and roads would be acceptable for this total property.

Square Lake "East"

Square Lake "East" uses 278 acres of HSG "C" soils to accommodate 85 lots with a PPB of 15.568 lb/YR. Road upgrades are necessary. Assuming a 100' frontage, 4250 feet of road is necessary.

| | w/o restrictions | w/ restrictions |
|-------------------|------------------|-----------------|
| w/o standard BMPs | 24.650 lb/YR | 17.000 lb/YR |
| w/ standard BMPs | 9.860 lb/YR | 6.800 lb/YR |

Potential road upgrade: 1.534 to 3.835 lb/YR.

Lots w/ BMPs and road would be acceptable.

Square Lake "West"

Square lake "West" uses 121 acres of HSG "C" soils to accommodate 30 lots with a PPB of 6.776 lb/YR. It is assumed that upgrading will be necessary on the road for 3000 ft.

| | w/o restrictions | w/ restrictions |
|-------------------|------------------|-----------------|
| w/o standard BMPs | 8.700 lb/YR | 6.000 lb/YR |
| w/ standard BMPs | 3.480 lb/YR | 2.400 lb/YR |

Potential road upgrade: 1.096 to 2.739 lb/YR.

Lots with treatment and roads would be acceptable.

Square Lake "Yerxas"

The Yerxas lot is more complicated due to the chance for a blended residential setup with either lots or "camps" with amenities, or lodge like areas. The combination would be limitless. To that end, three scenarios have been looked at to provide a basis for evaluation. The parcel is 51 acres of HSG "C" soils. Deducting 3.4 acres of wetland, the PPB is 2.666lb/YR. The parcel is set aside for 67 housing "units". It should be noted that the roads with in the parcel will not accommodate the minimum frontage requirements but this should be expected.

- Scenario One. As in the commercial lots above, a weighted average for development was developed to determine how much acreage could be developed for the lot using a "20% Lawn, 40% Parking, 40% Roof" weighting.

Assume a 1000-foot access road: w/ BMPs = 0.365 lb/YR, w/o = 0.913 lb/YR.

This results in between 2.13 acres and 2.79 acres of development. 48,600 sqft of building and 48,600 of parking with landscaping and lawn.

- Scenario Two. Building off scenario one, set aside 30 units of 20' x 30' camps and use the remaining allocation for a lodge. Assume the same road impacts (with treatment). This results in 30 camps and a lodge of 2.55 acres (landscape, roof, parking). (Note this does not include landscaping around camps or additional access road to camps but is to give a general idea of the impacts and potentials.)
- Scenario Three. 67 "units" could be interpreted as lots. This would be difficult to meet the frontage standard without additional road.

| | w/o restrictions | w/ restrictions |
|-------------------|------------------|-----------------|
| w/o standard BMPs | 19.430 lb/YR | 13.400 lb/YR |
| w/ standard BMPs | 7.772 lb/YR | 5.360 lb/YR |

For this impact a minimum of 96 acres of land would be necessary.

It should be noted that in the analysis above not all of the myriad of lot configurations or limitation or treatment options have been investigated. Developments could have some lots with treatment and restrictions and some with none, or any combination thereof. Also, the political realities of treatment structures should be considered. Potential problems of long-term maintenance and the responsibility for that maintenance need to be worked out. Policing lot clearing maximums has caused problems in the past and is hard to mitigate once the lot has been cleared. It may make far more sense to reduce the number of lots for these parcels to fit within the allocation restrictions.

Assumptions about road impacts were conservative and possibly less than realistic. Offsite access roads were not assessed nor looked at for upgrade requirements. These impacts will need to be considered and balance against the lot development on the parcels. Offsite road construction or upgrades within the lakes' watersheds that are required to access these development areas have as much potential to impact the lake as those within the developed area. Since it would be difficult to determine an appropriate area to define an allocation for this linear off site activity, a possible option would be to require these roads to meet either the General Standards in Chapter 500, or perhaps more reasonably, a natural hydrology standard that insures that runoff from uphill sides of the road would be efficiently distributed on the downhill side of the road with no diversion of uphill runoff to different intermittent catchments. This will require, in most instances, much more frequent culverting than is typically applied, and level spreaders or other distribution devices at culvert outlets.

Evaluation of possible phosphorus loadings from developed areas.

| Phosphorus Export Comparisons | | | | | |
|-------------------------------|-------------------|---|---|--|--|
| Lake | Development Area | lb P/yr w/out restrictions or treatment | lb P/yr with restrictions and treatment | Concept Plan allocation for watershed (lb P/yr) from Table 3 | Concept Plan net increase due to proposed development from Table 3 |
| Long | Commercial Areas | 10.3 | 4.1 | | |
| | Residential Areas | 21.8 | 6 | | |
| | total | 32.1 | 10.1 | 209 | 14 |
| Mud | Commercial Areas | 53.4 | 21.3 | | |
| | total | 53.4 | 21.3 | 104 | 0.6 |
| Cross | Commercial Areas | 47.8 | 19.3 | | |
| | Residential Areas | 39.4 | 10.8 | | |
| | total | 87.2 | 30.1 | 82 | 21 |
| Square | Residential Areas | 52.7 | 22.6 | | |
| | total | 52.7 | 22.6 | 458 | 22 |

The table above shows a summation of the likely increase in phosphorus load from proposed development in the development areas in each lake watershed either with or without restrictions and treatment. It is a very conservative estimate in that it assumes light development on the lots in CD4 and it does not include any export from new or improved roads to access the developed areas. For comparison purposes the table also shows the possible allocation (the Plan Phosphorus Budget) for each watershed and the expected increase in phosphorus load due to development as presented in Table 3 in Voume1(Part C) of the Concept Plan. The only lake that jumps out as a particular concern is Cross Lake. If all proposed lots in the Development Areas in the Cross Lake watershed were developed without restrictions or treatment increase in phosphorus load to the lake would exceed the plan's phosphorus budget, even without taking into account all the increases in phosphorus export that would likely occur over time within the Concept Plan area but outside of the developed areas. If all of the proposed lots

incorporated strict restrictions and relatively high level stormwater BMPs the likely increase in load would use up just less than 40% of the Budget leaving 60% to be allocated for access roads and harvesting related road upgrades. This sounds promising, but implementing and overseeing the long term maintenance of the phosphorus mitigation required to achieve this may not be feasible.

Conclusions:

It appears that the level of development envisioned in the plan is feasible, particularly in the Long, Mud and Square watersheds. Fitting the level of development that is proposed into the Cross Lake watershed will present very significant challenges.

Given the fact that Irving intends to sell the developed areas to other individuals or entities, it will have to be worked out how much of the Plan's Phosphorus Budget will be allocated to each developed area and how much will be reserved to cover future increases in load from other sources outside the developed areas.

In conclusion, it appears that the parcels and lot expectations are not un-realistic with adjustments. Particularly in the Cross Lake watershed, it will be necessary to apply sophisticated BMPs to most of the development activity, unless the number of lots created is significantly reduced. Long term lake health would then hinge on the correct application of the treatment BMPs, good erosion control, and maintenance of both, along with the other non-development specific impacts throughout the watershed whether in the control of Irving or not. This is a tall order left in the hands of LUPC staff, even if relying on third party partners to monitor.

ATTACHMENT 2

Cross Lake Narrative (TJD&A), 03/02/18

(NOTE: Cross Lake Narrative may depict initial concepts previously reviewed by DEP and are the basis for this assessment, but may not indicate current assumptions, concepts, or lot arrangements)



March 2, 2018

TO: Krista Reinhart, Stantec
Pat Clark, Stantec
Steve Bushsey, Stantec
FR: Terry DeWan, TJD&A

RE: CROSS LAKE: POTENTIAL RESIDENTIAL DEVELOPMENT

ASSUMPTIONS

The assumptions used in the sketches for potential residential development are based on the DeLuca Hoffman Due Diligence Analysis and Report, March 2012 that was prepared by Bill Hoffman. The attached Typical Lot Coverage for Waterfront Lots sketch is taken from that report (p. 36). Since there are very few actual waterfront lots, adjustments were made to the dimensions shown on the sketch, which are reflected in the amount of driveway (gravel) that would typically be found. The other numbers used in the determination of lot disturbance should be relatively good as averages. We understand the term 'Canopy clearing' is simply the sum of all the areas required for buildings, driveway and other hard surfaces, the septic field, and lawn areas.

| | |
|-----------------|-----------|
| Buildings | 2,100 SF |
| Driveway | 1,400 SF |
| Septic Field | 2,000 SF |
| Lawn Area | 5,000 SF |
| Canopy Clearing | 10,500 SF |

LAYOUTS

The site sketches for each of the residential development areas should be considered preliminary density studies that test the unit caps assigned to each area. The layouts are based upon an initial consideration of soils, slopes, drainage patterns, existing access roads, setbacks from the water, relationship to existing residential development, and the potential for water access and community space. In two instances (Cross Lake A and Cross Lake D), alternatives are provided for consideration (see notes below).

LOT SIZES

A typical lot size of approximately one acre is used in areas where the underlying soils are rated as Suitable. While this is greater than the minimum lot size (20,000 SF) used

for the Concept Plan, it may be more realistic for purposes of evaluating phosphorus impact since it would account for variability in the land in terms of drainage ways, steep slopes, and other factors that would drive the ultimate layout.

Where the underlying soils are categorized as Limited Suitability or Generally Unsuitable, the lot sizes are increased to approximately two acres, which should provide enough room to find a location that is suitable for a homesite and on-site septic system. However, the underlying assumptions for buildings, driveways, septic fields, and lawn areas do not change.

ROADS

The sketches show three types of roads:

- New roads that would be 20' in width, in a 40' wide clearing. These are shown in red.
- Upgraded roads (primarily haul roads) that would be upgraded from 12' in width to 20', with a clearing that goes from 24' to 40' in width. These are shown in green.
- Existing roads that are suitable for residential development in terms of their current width and condition. These are shown in black.

WATER ACCESS SITE

Most of the sites have a Common Area, generally near the water, that would provide a place for a hand-carry boat launch, temporary dock, picnic tables, and other common amenities to serve the residential community.

CROSS LAKE UNIT CAP

The five sites described below show a total of 185 units. The Concept Plan establishes a cap of 125 units for Cross Lake, which means that 1/3rd of the units shown (60) would never be developed. The final determination will be a function of market demand, site suitability, continued agency input, and other factors.

RESIDENTIAL DEVELOPMENT AREAS

CROSS LAKE A

110 Acres
30 units maximum

Two sketches are provided, one that takes advantage of the existing Irving road, the second would require a new road parallel to the lake.

Option 1: Uses the existing roads on the west and south. A new road would provide frontage and access to 8 interior lots. On the east side there is a woods road that would be upgraded to the West Side Road, which would provide a route to the water access site.

New Roads: 1,000 LF
Upgraded Roads: 1,400 LF

Option 2: Recognizes that road frontage might not be the most desirable, and a better location for lots may be the interior, which offers more privacy and proximity to the lake.

New Roads: 2,000 LF
Upgraded Roads: 1,400 LF

Common Area. There is a site on the water that may be suitable for a hand-carry boat launch. It is located between two existing leased sites and has a small stream running through the middle. Parking would probably have to be on the south side of West Side Road. The Common Area assumes the following:

| | |
|---------------------|-----------|
| Buildings | 400 SF |
| Parking/Drive/Paths | 5,000 SF |
| Lawn Area | 7,000 SF |
| Canopy Clearing | 12,400 SF |

CROSS LAKE B

91 Acres
30 units maximum

All the potential building sites are on existing Irving roads, which come off State Route 161. The roads all seem to be well maintained by the Homeowners Associations, and

should be suitable for access for new individual homes. The lots shown are all well above one acre in size, which may be well received by the residents in the existing lots.

Common Area. There are two potential sites on the water that may be suitable for a hand-carry boat launch. Only one would be developed as a common area. In either location, parking may have to be located several hundred yards away from the lake, due to drainage courses and a desire to minimize views of cars from the water. The Common Area assumes the following:

| | |
|---------------------|-----------|
| Buildings | 400 SF |
| Parking/Drive/Paths | 5,000 SF |
| Lawn Area | 7,000 SF |
| Canopy Clearing | 12,400 SF |

CROSS LAKE C

57 Acres

30 units maximum

This development area is on a relatively level area of well drained soils on the opposite side of Cyr Road. Due to concern for traffic, access may be from an existing woods road off Route 161. The layout should consider the presence of an existing ATV trail that winds through the woods.

| | |
|-----------------|----------|
| New Roads: | 3,550 LF |
| Upgraded Roads: | 2,150 LF |

Common Areas. The sketch indicates a common area within the subdivision, which would be a simple gathering spot with picnic tables, fire rings, and a playground for residents.

Water access may be on the Mud Lake / Cross Lake thoroughfare, where there are several undeveloped lots that may be able to be used for a hand-carry boat launch and related facilities. For purposes of the phosphorus calculations, assume the following:

| | |
|---------------------|-----------|
| Buildings | 400 SF |
| Parking/Drive/Paths | 5,000 SF |
| Lawn Area | 7,000 SF |
| Canopy Clearing | 12,400 SF |

CROSS LAKE D

187 Acres
35 units maximum

The majority of the development area (22 lots) would occur on either the Disy Road (14 lots on either side of the road coming in from the east) or Mifs Lane (8 lots on the east side of the road running north/south from the Landing Road). The remaining 13 lots could either be located on a hillside overlooking the lake on the east side of the existing road, OR on a new road that starts near the boat launch on Landing Road.

New Road east of Disy Road / Mifs Lane: 1,000 LF
New Road south of Landing Road: 1,300 LF

The four lots shown on the water are all set back at least 200 feet, due to the topography and limitations on access.

Common Areas. Cross Lake D already has a significant common area, with a boat launch, picnic area, and sand beach. However, a new common area could be developed on the water at the end of the new southerly road for the new residents. For purposes of the phosphorus calculations, assume the following:

| | |
|---------------------|-----------|
| Buildings | 400 SF |
| Parking/Drive/Paths | 5,000 SF |
| Lawn Area | 7,000 SF |
| Canopy Clearing | 12,400 SF |

CROSS LAKE E

163 Acres
60 units maximum

The residential development is divided into two distinctly different areas. The eastern component (upper area) is located on relatively level topography with suitable soils, just above a section of very steep topography. Access would be from a new road off an existing Irving road.

The lower area is on an area of limited soil suitability at the base of the slope. The site sketch anticipates a common area at the end of the road, with the possibility of a second area along the waterfront.

Upper: New Road: 4,900 LF
Lower: New Roads: 5,100 LF

Upgraded Road: 1,400 LF

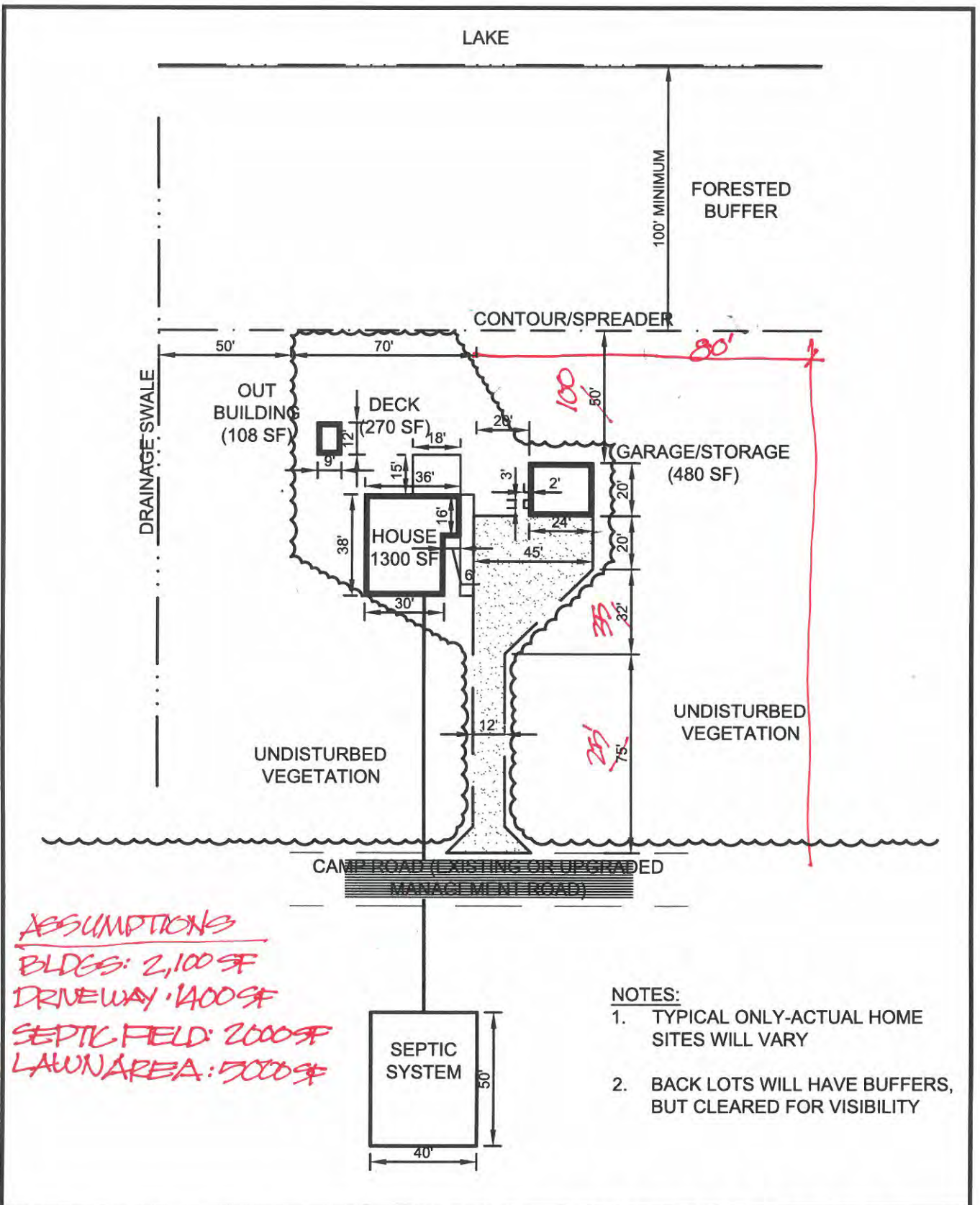
Common Area(s). The Concept Plan allows two water access sites, due to the number of possible residential units. While the sketch only shows one site (at the end of the lower access road), for purposes of the phosphorus calculations, assume the following:

| | |
|---------------------|-----------|
| Buildings | 800 SF |
| Parking/Drive/Paths | 8,000 SF |
| Lawn Area | 14,000 SF |
| Canopy Clearing | 22,800 SF |

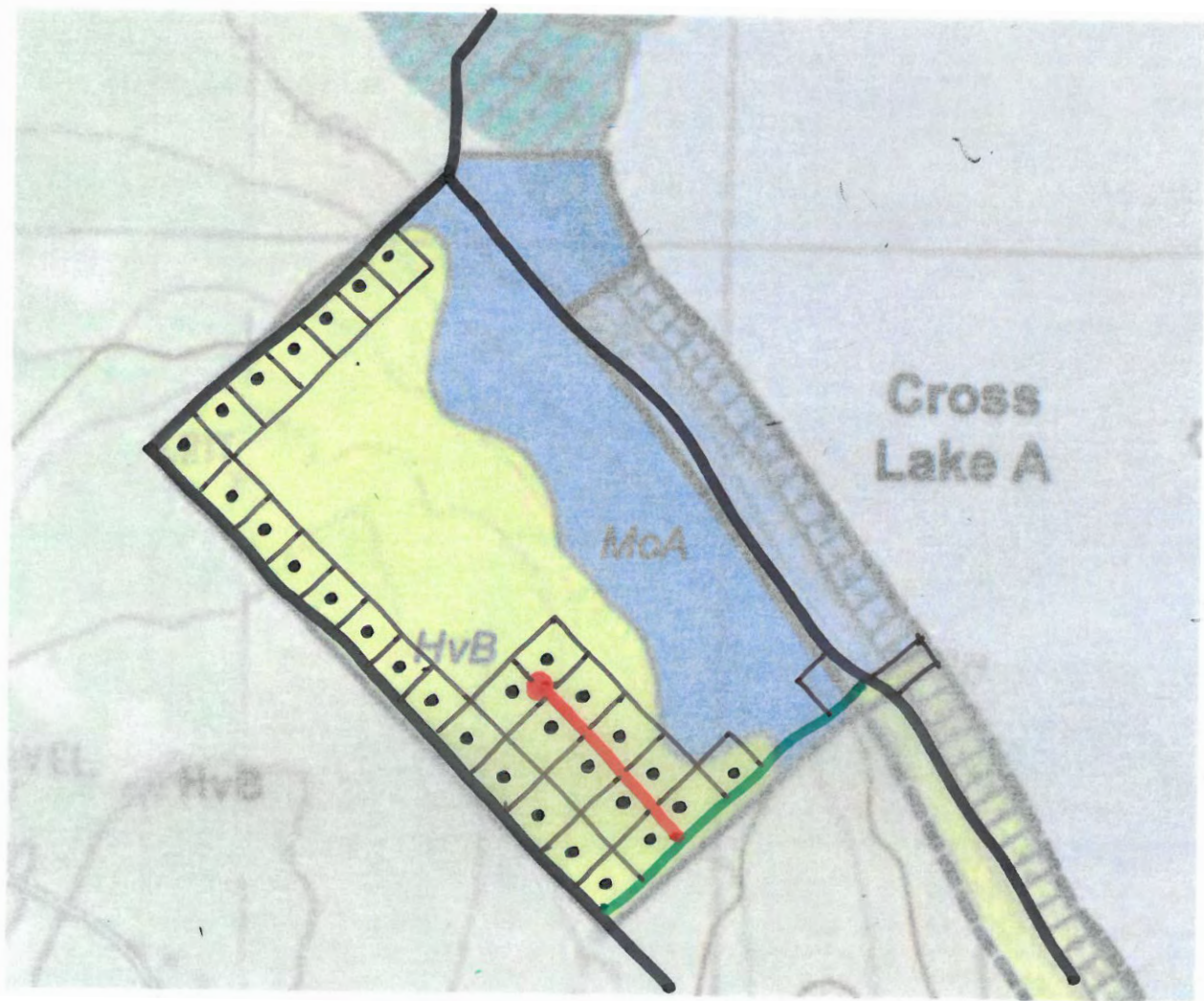
ATTACHMENT 3

Cross Lake Sketches (TJD&A), 03/07/18

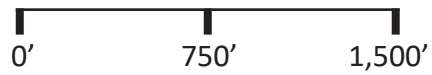
(NOTE: Cross Lake Sketches depict initial concepts previously reviewed by DEP and are the basis for this assessment, but may not indicate current assumptions, concepts, or lot arrangements)







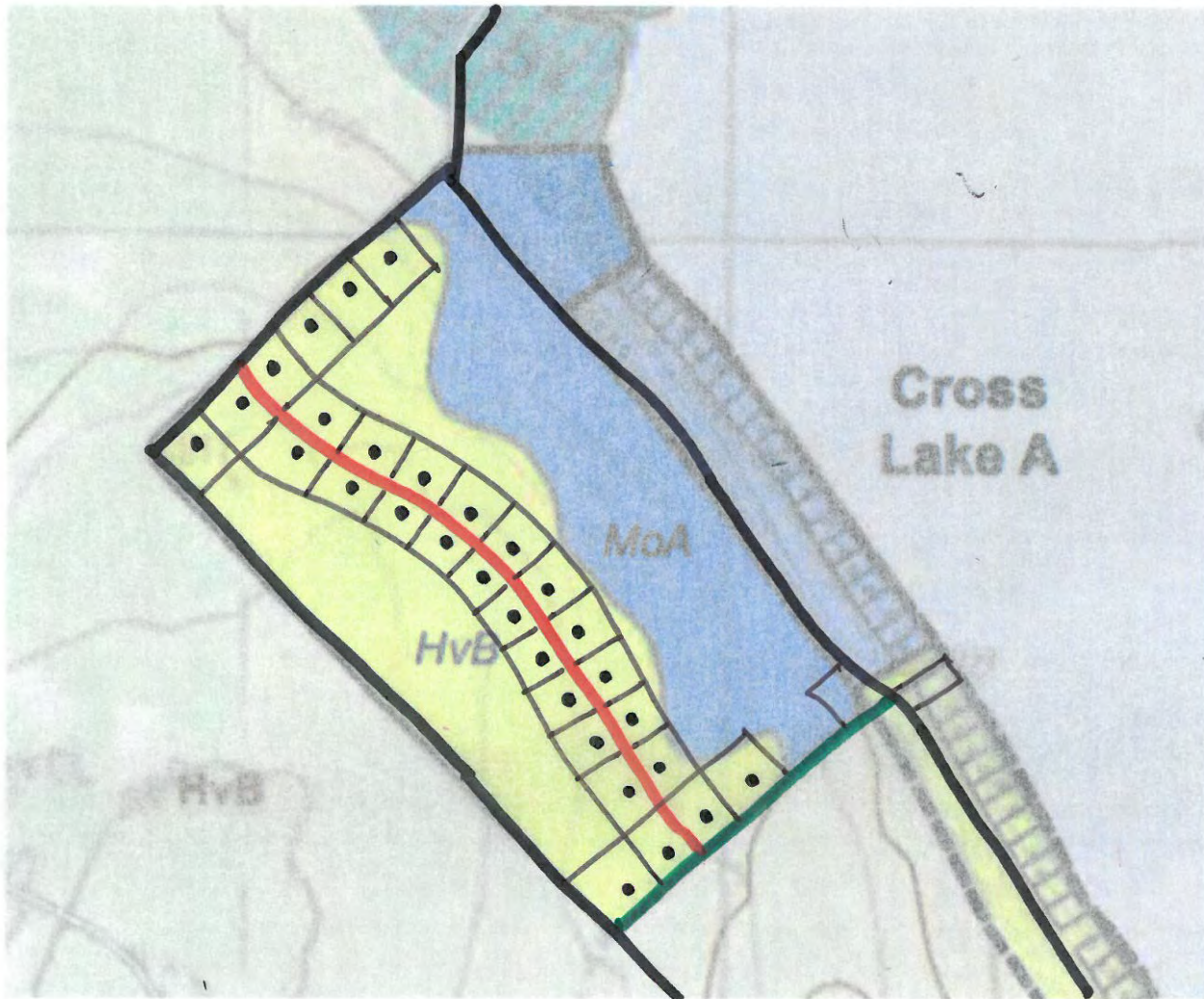
| | | | | |
|----------------------------------|---------------------------------|---|----------------|---|
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| | DeLuca-Hoffman Associates, Inc. | DRAWN: LA | DATE: 01.17.12 | |
| | 778 MAIN STREET, SUITE 8 | DESIGNED: WGH | SCALE: 1"=50' | |
| | SOUTH PORTLAND, ME 04106 | CHECKED: WGH | JOB NO. 3066 | 1 |
| | 207.775.1121 | FILE NAME: 3066-SITE | | |
| WWW.DELUCAHOFFMAN.COM | | | | |



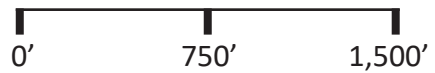
**CROSS LAKE A
OPTION 1**







-  Existing Road
-  Upgraded Road
-  New Road
-  Common Area



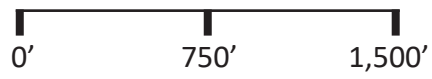
**CROSS LAKE A
OPTION 2**







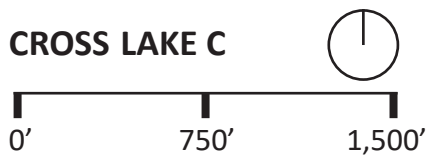
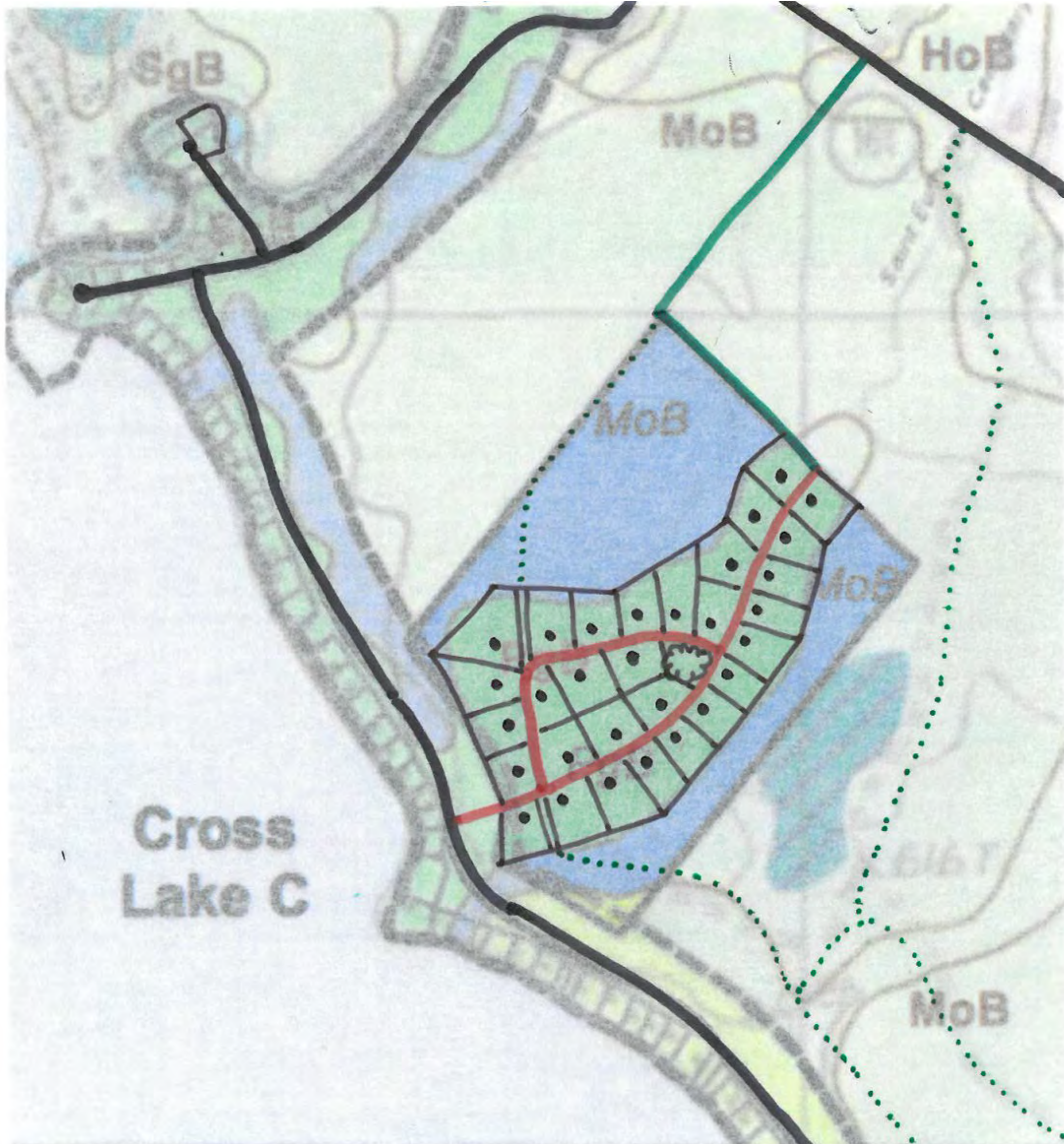
-  Existing Road
-  Upgraded Road
-  New Road
-  Common Area







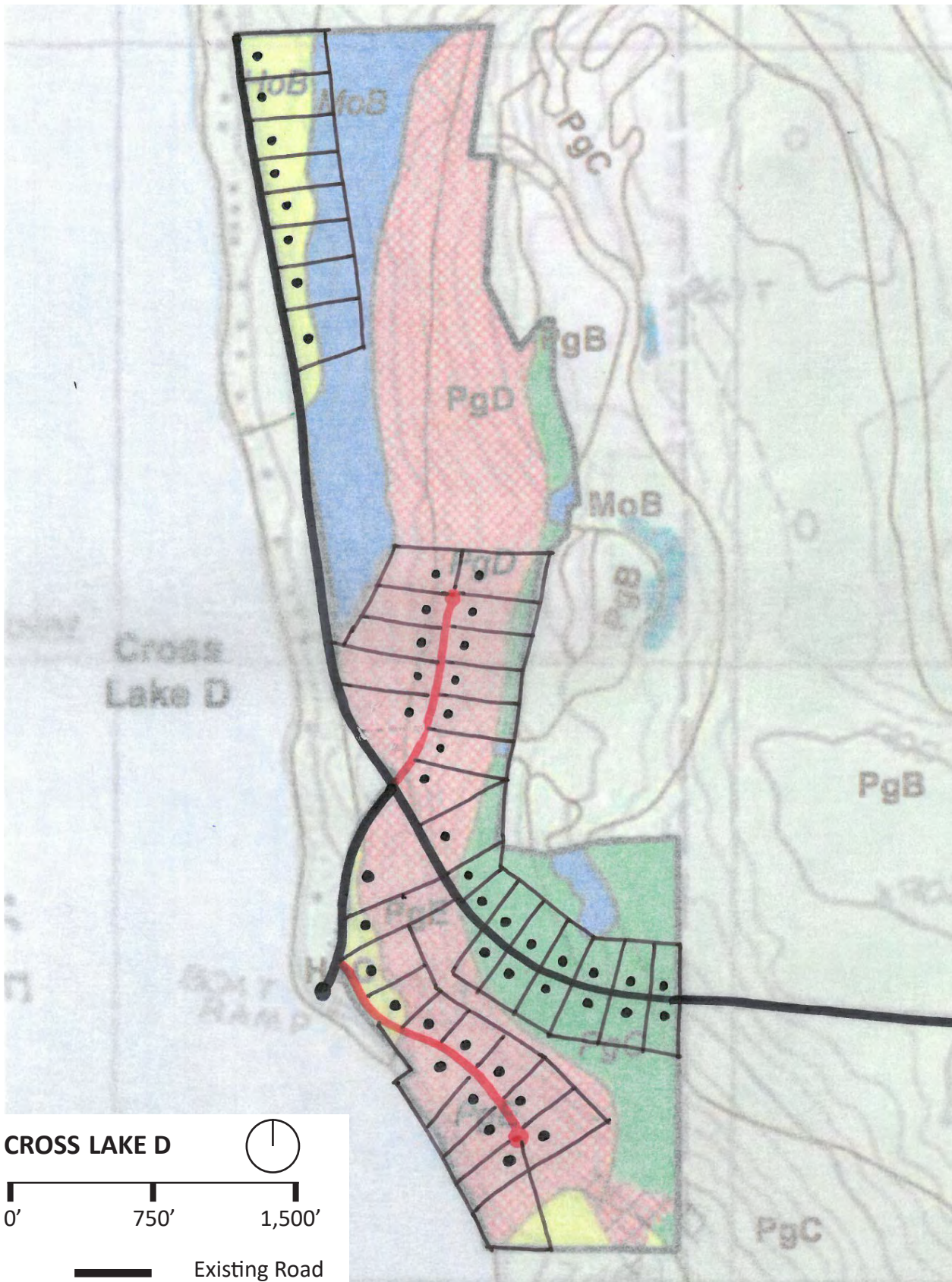
CROSS LAKE B



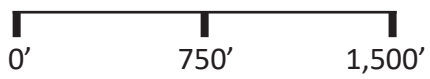
-  Existing Road
-  Upgraded Road
-  New Road
-  Common Area







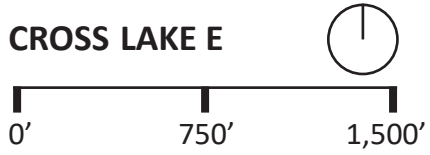
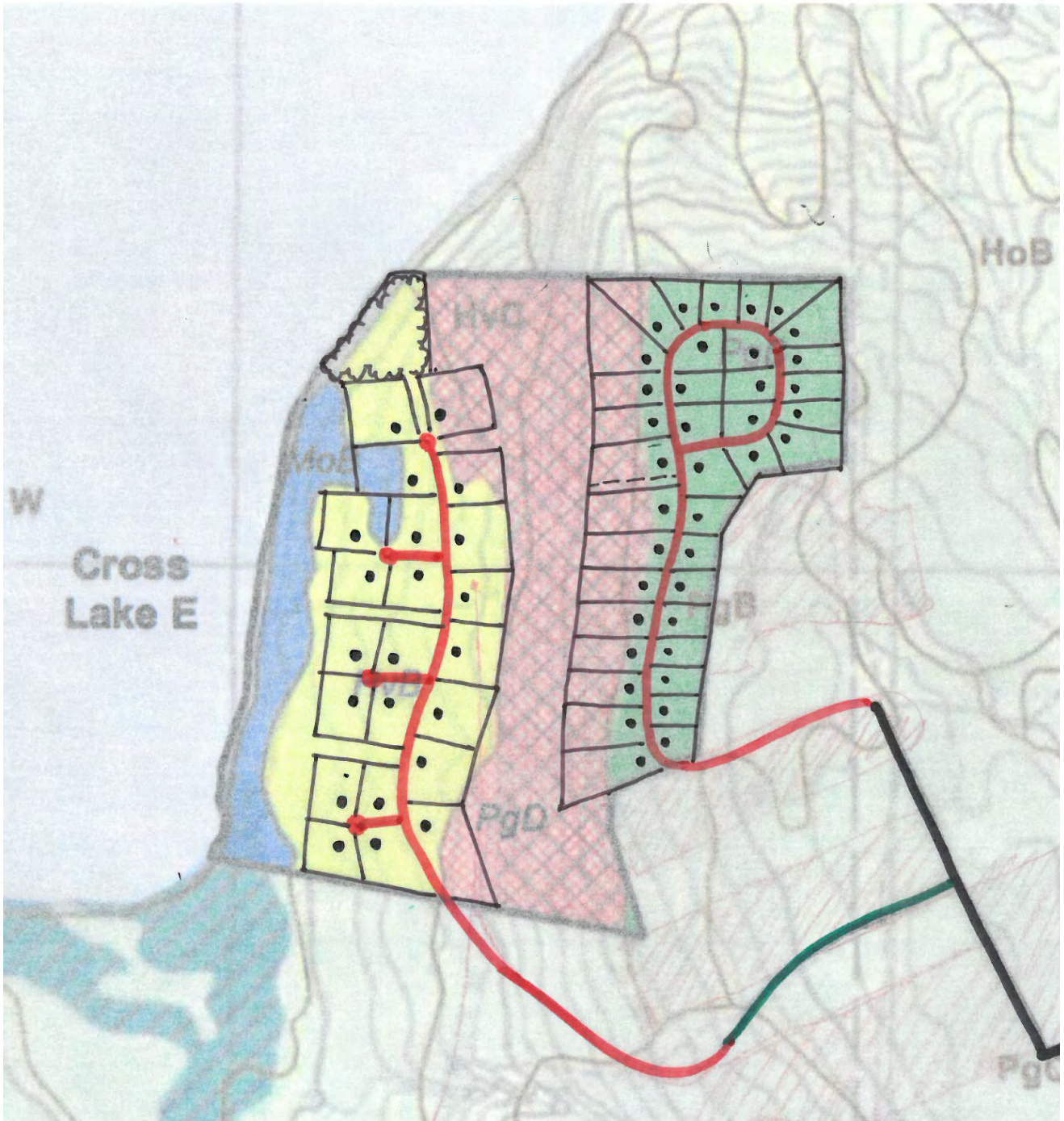
-  Existing Road
-  Upgraded Road
-  New Road
-  Common Area







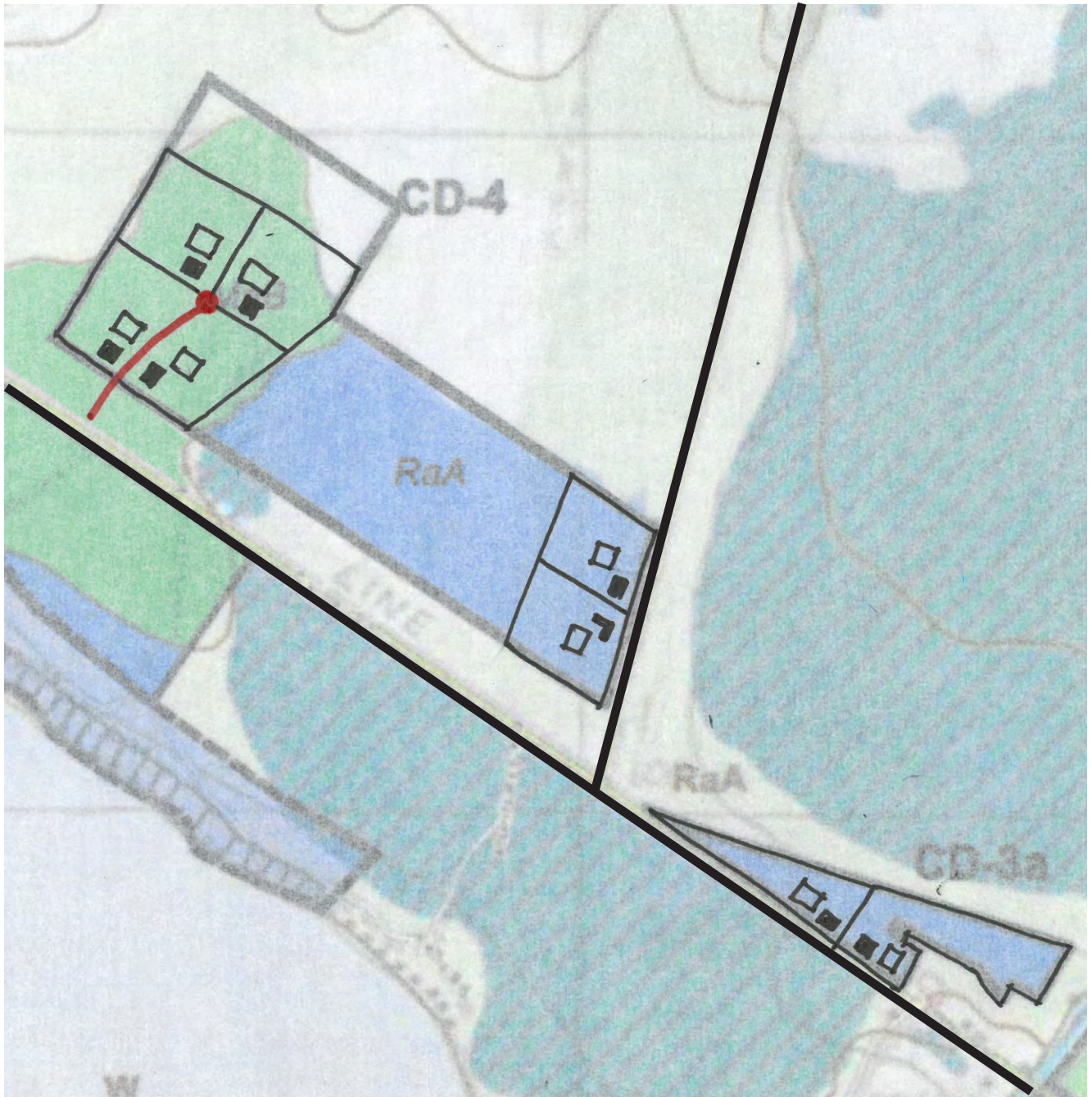
CROSS LAKE D



-  Existing Road
-  Upgraded Road
-  New Road
-  Common Area





-  Existing Road
-  Upgraded Road
-  New Road
-  Common Area



CD-3 & CD-4



0' 750' 1,500'

-  Existing Road
-  New Road

ATTACHMENT 4

Phosphorus Export Calculations worksheets



IRVING WOODLANDS, LLC

FISH RIVER CHAIN OF LAKES CONCEPT PLAN

APRIL 2018

Watershed: CROSS LAKE Development type: RESIDENTIAL _____ Sheet # CROSS LAKE A(2)

| Land Surface Type or Lot #(s) with description | # of lots or (area_sf) | Export Coefficient from Table 3.1 Table 3.2 | Pre-treatment Algal Av. P Export (lbs P/year) | No Treatment or BMP(s) | Post-treatment Algal Av. P Export (lbs P/year) | Description |
|---|------------------------|---|---|-----------------------------------|--|---|
| House lot (typical) including buildings, parking, lawns, leach field, (HSG C) | 30 | 0.29 | 8.7 | 1 | 8.700 | Cross Lake A(2) lots |
| Cross Lake A Common Area high export; HSG C soils | 400 | 0.5 | 0.005 | 1 | 0.005 | buildings/roof |
| | 5000 | 1.75 | 0.201 | 1 | 0.201 | roads/driveways/parking |
| | 7000 | 0.6 | 0.096 | 1 | 0.096 | open lawn/septic/grass |
| | total | | 0.302 | | 0.302 | |
| Cross Lake A Roads high export; HSG C soils | 2000 | 1.75 | 1.607 | 1 | 1.607 | new 20' roads (LF) |
| | 2000 | 0.6 | 0.551 | 1 | 0.551 | new roads (40' ROW) clearing (LF) |
| | 1400 | 1.75 | 0.450 | 1 | 0.450 | upgraded 12' to 20' roads (LF) |
| | 1400 | 0.6 | 0.309 | 1 | 0.309 | upgraded roads (24' to 40') clearing (LF) |
| | total | | 2.916 | | 2.916 | |
| Cross Lake A Export | | Total Pre-PPE (lbs P/year) | 11.918 | Total PostPPE (lbs P/year) | <u>11.918</u> | |
| Total P budget allocated for "Full-Build" Development in Cross Lake A | | | | | 11.9 | Project P budget (PPE) to be assigned to Cross Lake A Development (subject to overall Cross Lake unit cap) |



IRVING WOODLANDS, LLC

FISH RIVER CHAIN OF LAKES CONCEPT PLAN

APRIL 2018

Watershed: CROSS LAKE Development type: RESIDENTIAL _____ Sheet # CROSS LAKE B

| Land Surface Type or Lot #(s) with description | # of lots or (area_sf) | Export Coefficient from Table 3.1 Table 3.2 | Pre-treatment Algal Av. P Export (lbs P/year) | No Treatment or BMP(s) | Post-treatment Algal Av. P Export (lbs P/year) | Description |
|---|--------------------------|---|---|-----------------------------------|--|---|
| House lot (typical) including buildings, parking, lawns, leach field, (HSG B soils) | 30 | 0.24 | 7.2 | 1 | 7.200 | Cross Lake B Lots |
| Cross Lake B Common Area high export; HSG C soils | 400 | 0.5 | 0.005 | 1 | 0.005 | buildings/roof |
| | 5000 | 1.75 | 0.201 | 1 | 0.201 | roads/driveways/parking |
| | 7000 | 0.6 | 0.096 | 1 | 0.096 | open lawn/septic/grass |
| | total | | 0.302 | | 0.302 | |
| Cross Lake B Roads high export; HSG B soils | No new or upgraded roads | | | | | |
| | total | | 0.000 | | 0.000 | |
| Cross Lake B Export | | Total Pre-PPE (lbs P/year) | 7.502 | Total PostPPE (lbs P/year) | 7.502 | |
| Total P budget allocated for "Full-Build" Development in Cross Lake B | | | | | 7.5 | Project P budget (PPE) to be assigned to Cross Lake B Development (subject to overall Cross Lake unit cap) |



IRVING WOODLANDS, LLC

FISH RIVER CHAIN OF LAKES CONCEPT PLAN

APRIL 2018

Watershed: CROSS LAKE Development type: RESIDENTIAL Sheet # CROSS LAKE C

| Land Surface Type or Lot #(s) with description | # of lots or (area_sf) | Export Coefficient from Table 3.1 Table 3.2 | Pre-treatment Algal Av. P Export (lbs P/year) | No Treatment or BMP(s) | Post-treatment Algal Av. P Export (lbs P/year) | Description |
|---|------------------------|---|---|-----------------------------------|--|---|
| House lot (typical) including buildings, parking, lawns, leach field, (HSG C) | 30 | 0.29 | 8.7 | 1 | 8.700 | Cross Lake C lots |
| | | | | | | |
| Cross Lake C Common Area high export; HSG C soils | 400 | 0.5 | 0.005 | 1 | 0.005 | buildings/roof |
| | 5000 | 1.75 | 0.201 | 1 | 0.201 | roads/driveways/parking |
| | 7000 | 0.6 | 0.096 | 1 | 0.096 | open lawn/septic/grass |
| | total | | 0.302 | | 0.302 | |
| | | | | | | |
| Cross Lake C Roads high export; HSG C soils | 3550 | 1.75 | 2.852 | 1 | 2.852 | new 20' roads (LF) |
| | 3550 | 0.6 | 0.978 | 1 | 0.978 | new roads (40' ROW) clearing (LF) |
| | 2150 | 1.75 | 0.691 | 1 | 0.691 | upgraded 12' to 20' roads (LF) |
| | 2150 | 0.6 | 0.474 | 1 | 0.474 | upgraded roads (24' to 40') clearing (LF) |
| | total | | 4.995 | | 4.995 | |
| | | | | | | |
| Cross Lake C Export | | Total Pre-PPE (lbs P/year) | 13.997 | Total PostPPE (lbs P/year) | <u>13.997</u> | |
| Total P budget allocated for "Full-Build" Development in Cross Lake C | | | | | 14.0 | Project P budget (PPE) to be assigned to Cross Lake C Development (subject to overall Cross Lake unit cap) |



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FISH RIVER CHAIN OF LAKES CONCEPT PLAN

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Watershed: CROSS LAKE Development type: RESIDENTIAL _____ Sheet # CROSS LAKE D

| Land Surface Type or Lot #(s) with description | # of lots or (area_sf) | Export Coefficient from Table 3.1 Table 3.2 | Pre-treatment Algal Av. P Export (lbs P/year) | No Treatment or BMP(s) | Post-treatment Algal Av. P Export (lbs P/year) | Description |
|--|------------------------|---|---|-----------------------------------|--|---|
| House lot (typical) including buildings, parking, lawns, leach field (HSG C) | 35 | 0.29 | 10.15 | 1 | 10.150 | Cross Lake D lots |
| Cross Lake D Common Area high export; HSG C soils | 400 | 0.5 | 0.005 | 1 | 0.005 | buildings/roof |
| | 5000 | 1.75 | 0.201 | 1 | 0.201 | roads/driveways/parking |
| | 7000 | 0.6 | 0.096 | 1 | 0.096 | open lawn/septic/grass |
| | total | | 0.302 | | 0.302 | |
| Cross Lake D Roads high export; HSG C soils | 1300 | 1.75 | 1.045 | 1 | 1.045 | new 20' roads (LF) |
| | 1300 | 0.6 | 0.358 | 1 | 0.358 | new roads (40' ROW) clearing (LF) |
| | total | | 1.403 | | 1.403 | |
| Cross Lake D Export | | Total Pre-PPE (lbs P/year) | 11.855 | Total PostPPE (lbs P/year) | 11.855 | |
| Total P budget allocated for "Full-Build" Development in Cross Lake D | | | | | 11.9 | Project P budget (PPE) to be assigned to Cross Lake D Development (subject to overall Cross Lake unit cap) |



IRVING WOODLANDS, LLC

FISH RIVER CHAIN OF LAKES CONCEPT PLAN

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Watershed: CROSS LAKE Development type: RESIDENTIAL _____ Sheet # CROSS LAKE E

| Land Surface Type or Lot #(s) with description | # of lots or (area_sf) | Export Coefficient from Table 3.1 Table 3.2 | Pre-treatment Algal Av. P Export (lbs P/year) | No Treatment or BMP(s) | Post-treatment Algal Av. P Export (lbs P/year) | Description |
|--|------------------------|---|---|-----------------------------------|--|---|
| House lot (typical) including buildings, parking, lawns, leach field (HSG C) | 60 | 0.29 | 17.4 | 1 | 17.400 | Cross Lake E lots |
| Cross Lake E Common Area high export; HSG C soils | 800 | 0.5 | 0.009 | 1 | 0.009 | buildings/roof |
| | 8000 | 1.75 | 0.321 | 1 | 0.321 | roads/driveways/parking |
| | 14000 | 0.6 | 0.193 | 1 | 0.193 | open lawn/septic/grass |
| | total | | 0.523 | | 0.523 | |
| Cross Lake E Roads high export; HSG C soils | 10000 | 1.75 | 8.035 | 1 | 8.035 | new 20' roads (LF) |
| | 10000 | 0.6 | 2.755 | 1 | 2.755 | new roads (40' ROW) clearing (LF) |
| | 1400 | 1.75 | 0.450 | 1 | 0.450 | upgraded 12' to 20' roads (LF) |
| | 1400 | 0.6 | 0.309 | 1 | 0.309 | upgraded roads (24' to 40') clearing (LF) |
| | total | | 11.548 | | 11.548 | |
| Cross Lake E Export | | Total Pre-PPE (lbs P/year) | 29.472 | Total PostPPE (lbs P/year) | <u>29.472</u> | |
| Total P budget allocated for "Full-Build" Development in Cross Lake E | | | | | 29.5 | Project P budget (PPE) to be assigned to Cross Lake E Development (subject to overall Cross Lake unit cap) |



IRVING WOODLANDS, LLC

FISH RIVER CHAIN OF LAKES CONCEPT PLAN

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Watershed: CROSS LAKE Development type: COMM/ECON DEV Sheet # CROSS LAKE CD-3

| Land Surface Type or Lot #(s) with description | # of lots or (area_sf) | Export Coefficient from Table 3.1 | Pre-treatment Algal Av. P Export (lbs P/year) | No Treatment or BMP(s) | Post-treatment Algal Av. P Export (lbs P/year) | Description |
|--|------------------------------------|-----------------------------------|---|-----------------------------------|--|---|
| COMM/ECON DEV lots | 2 | | | | | Cross Lake CD-3 lots |
| COMM/ECON DEV lot (typical) including buildings, parking, lawns, leach field Cross Lake CD-3 high export; HSG C soils | 5000 | 0.5 | 0.057 | 1 | 0.057 | buildings/roof |
| | 5000 | 1.75 | 0.201 | 1 | 0.201 | roads/driveways/parking |
| | 7000 | 0.6 | 0.096 | 1 | 0.096 | open lawn/septic/grass |
| | per lot | | 0.355 | | 0.355 | Cross Lake CD-3/lot (HSG C soils) |
| | total | | 0.709 | | 0.709 | Cross Lake CD-3 lots (HSG C soils) |
| Cross Lake CD-3 Roads high export; HSG C soils | No new or upgraded roads necessary | | | | | |
| | total | | 0.000 | | 0.000 | |
| Cross Lake CD-3 Export | | Total Pre-PPE (lbs P/year) | 0.709 | Total PostPPE (lbs P/year) | <u>0.709</u> | |
| Total P budget allocated for "Full-Build" Development in Cross Lake CD-3 | | | | | 0.7 | Project P budget (PPE) to be assigned to Cross Lake CD-3 Development |



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FISH RIVER CHAIN OF LAKES CONCEPT PLAN

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Watershed: CROSS LAKE Development type: COMM/ECON DEV Sheet # CROSS LAKE CD-4

| Land Surface Type or Lot #(s) with description | # of lots or (area_sf) | Export Coefficient from Table 3.1 | Pre-treatment Algal Av. P Export (lbs P/year) | No Treatment or BMP(s) | Post-treatment Algal Av. P Export (lbs P/year) | Description |
|---|------------------------|-----------------------------------|---|-----------------------------------|--|---|
| COMM/ECON DEV lots Cross Lake CD-4 (HSG B) | 4 | | | | | Cross Lake CD-4 lots |
| COMM/ECON DEV lots Cross Lake CD-4 (HSG C) | 2 | | | | | Cross Lake CD-4 lots |
| COMM/ECON DEV lot (typical) including buildings, parking, lawns, leach field high export; HSG B soils | 5000 | 0.5 | 0.057 | 1 | 0.057 | buildings/roof |
| | 5000 | 1.75 | 0.201 | 1 | 0.201 | roads/driveways/parking |
| | 7000 | 0.4 | 0.064 | 1 | 0.064 | open lawn/septic/grass |
| | per lot | | 0.323 | | 0.323 | Cross Lake CD-4/lot (HSG B soils) |
| total | | | | | 1.290 | Cross Lake CD-4 lots (HSG B soils) |
| COMM/ECON DEV lot (typical) including buildings, parking, lawns, leach field high export; HSG C soils | 5000 | 0.5 | 0.057 | 1 | 0.057 | buildings/roof |
| | 5000 | 1.75 | 0.201 | 1 | 0.201 | roads/driveways/parking |
| | 7000 | 0.6 | 0.096 | 1 | 0.096 | open lawn/septic/grass |
| | per lot | | 0.355 | | 0.355 | Cross Lake CD-4/lot (HSG C soils) |
| total | | | | | 0.709 | Cross Lake CD-4 lots (HSG C soils) |
| Cross Lake D Roads high export; HSG B soils | 1400 | 1.75 | 1.350 | 1 | 1.350 | new 20' roads (LF) |
| | 1400 | 0.4 | 0.334 | 1 | 0.334 | new roads (40' ROW) clearing (LF) |
| | total | | 1.684 | | 1.684 | |
| Cross Lake CD-4 Export | | Total Pre-PPE (lbs P/year) | 3.684 | Total PostPPE (lbs P/year) | 3.684 | |
| Total P budget allocated for "Full-Build" Development in Cross Lake CD-4 | | | | | 3.7 | Project P budget (PPE) to be assigned to Cross Lake CD-4 Development |



IRVING WOODLANDS, LLC

FISH RIVER CHAIN OF LAKES CONCEPT PLAN

APRIL 2018

| SUMMARY FISH RIVER CHAIN OF LAKES CONCEPT PLAN Watershed: CROSS LAKE | | | | | % total cross lake budget |
|---|---|--------|-------|--------------|---------------------------|
| | LOTS | COMMON | ROADS | TOTAL | |
| Cross Lake A | 8.70 | 0.30 | 2.92 | 11.92 | |
| Cross Lake B | 7.20 | 0.30 | 0.00 | 7.50 | |
| Cross Lake C | 8.70 | 0.30 | 5.00 | 14.00 | |
| Cross Lake D | 10.15 | 0.30 | 1.40 | 11.85 | |
| Cross Lake E | 17.40 | 0.52 | 11.55 | 29.47 | |
| CROSS LAKE TOTAL (FULL-BUILD-RESIDENTIAL) | 52.15 | 1.73 | 20.86 | 74.74 | |
| CROSS LAKE TOTAL (RESIDENTIAL CAP=125 UNITS) | 35.24 | 1.73 | 14.10 | 51.06 | 62.1% |
| Maximum allowable P export from all residential development sites | | | | 51.1 | |
| Cross Lake CD-3 | 0.71 | NA | 0.00 | 0.71 | |
| Cross Lake CD-4 (HSG B) | 1.29 | NA | 1.68 | 2.97 | |
| Cross Lake CD-4 (HSG C) | 0.71 | NA | 0.00 | 0.71 | |
| CROSS LAKE TOTAL (COMM/ECONN DEV LOTS) | 2.71 | | 1.68 | 4.393 | 5.3% |
| CROSS LAKE TOTAL (FULL-BUILD) | 54.86 | 1.73 | 22.55 | 79.14 | |
| CROSS LAKE TOTAL (WITH RESIDENTIAL UNIT CAP) | 37.95 | 1.73 | 15.78 | 55.46 | 67.5% |
| total Cross Lake P budget | | | | 82.19 | 100.0% |
| Total P budget allocated for all Concept Plan Development in Cross Lake watershed | (subject to overall Cross Lake Residential unit cap) | | | 55.5 | 67.5% |
| Total Cross Lake P Export from Non Concept Plan sources | | | | 26.35 | |
| Total Cross Lake P Budget available for Non Concept Plan sources | | | | 26.73 | |
| Total P export applied to all Concept Plan and unregulated Development in Cross Lake watershed | | | | 81.81 | 99.5% |

ATTACHMENT 5

Summary for Non-Concept Plan; Unregulated Future Activities

**FISH RIVER CHAIN OF LAKES CONCEPT PLAN
NON-CONCEPT PLAN; UNREGULATED FUTURE ACTIVITIES**

Watershed: **CROSS LAKE** Development type: **unregulated-non concept plan activities** Sheet # **CROSS LAKE CD-3a**

| Estimated Non Concept Plan Activities (assume HSG C soils) | Linear feet of unregulated roads (UPGRADED) | # of lots or (area_sf) | Export Coefficient from Table 3.1 | Adjustment for Linear Roads (note 5) | Post-treatment Algal Av. P Export (lbs P/year) | Description |
|--|---|------------------------|-----------------------------------|--------------------------------------|--|--------------------------------|
| ROAD1 | 2800 | 39200.0 | 1.75 | 0.75 | 1.181 | New Road surface (high export) |
| | 2800 | 56000.0 | 0.6 | 0.5 | 0.386 | Cleared roadway (high export) |
| ROAD2 | 2200 | 30800.0 | 1.75 | 0.75 | 0.928 | New Road surface (high export) |
| | 2200 | 44000.0 | 0.6 | 0.5 | 0.303 | Cleared roadway (high export) |
| ROAD3 | 750 | 10500.0 | 1.75 | 0.75 | 0.316 | New Road surface (high export) |
| | 750 | 15000.0 | 0.6 | 0.5 | 0.103 | Cleared roadway (high export) |
| ROAD4 | 1000 | 14000.0 | 1.75 | 0.75 | 0.422 | New Road surface (high export) |
| | 1000 | 20000.0 | 0.6 | 0.5 | 0.138 | Cleared roadway (high export) |
| ROAD5 | 1200 | 16800.0 | 1.75 | 0.75 | 0.506 | New Road surface (high export) |
| | 1200 | 24000.0 | 0.6 | 0.5 | 0.165 | Cleared roadway (high export) |
| ROAD6 | 2300 | 32200.0 | 1.75 | 0.75 | 0.970 | New Road surface (high export) |
| | 2300 | 46000.0 | 0.6 | 0.5 | 0.317 | Cleared roadway (high export) |
| ROAD7 | 2000 | 28000.0 | 1.75 | 0.75 | 0.844 | New Road surface (high export) |
| | 2000 | 40000.0 | 0.6 | 0.5 | 0.275 | Cleared roadway (high export) |
| ROAD8 | 4000 | 56000.0 | 1.75 | 0.75 | 1.687 | New Road surface (high export) |
| | 4000 | 80000.0 | 0.6 | 0.5 | 0.551 | Cleared roadway (high export) |
| ROAD9 | 3600 | 50400.0 | 1.75 | 0.75 | 1.519 | New Road surface (high export) |
| | 3600 | 72000.0 | 0.6 | 0.5 | 0.496 | Cleared roadway (high export) |
| ROAD10 | 4800 | 67200.0 | 1.75 | 0.75 | 2.025 | New Road surface (high export) |
| | 4800 | 96000.0 | 0.6 | 0.5 | 0.661 | Cleared roadway (high export) |
| ROAD11 | 2800 | 39200.0 | 1.75 | 0.75 | 1.181 | New Road surface (high export) |
| | 2800 | 56000.0 | 0.6 | 0.5 | 0.386 | Cleared roadway (high export) |
| ROAD12 | 4400 | 61600.0 | 1.75 | 0.75 | 1.856 | New Road surface (high export) |
| | 4400 | 88000.0 | 0.6 | 0.5 | 0.606 | Cleared roadway (high export) |
| ROAD13 | 1100 | 15400.0 | 1.75 | 0.75 | 0.464 | New Road surface (high export) |
| | 1100 | 22000.0 | 0.6 | 0.5 | 0.152 | Cleared roadway (high export) |
| ROAD14 | 1700 | 3400.0 | 1.75 | 0.75 | 0.102 | Upgraded Road (high export) |
| | 0 | 0.0 | 0.6 | 0.5 | 0.000 | |
| ROAD15 | 1200 | 16800.0 | 1.75 | 0.75 | 0.506 | New Road surface (high export) |
| | 1200 | 24000.0 | 0.6 | 0.5 | 0.165 | Cleared roadway (high export) |
| ROAD16 | 4200 | 8400.0 | 1.75 | 0.75 | 0.253 | Upgraded Road (high export) |
| | 0 | 0.0 | 0.6 | 0.5 | 0.000 | |
| ROAD17 | 2800 | 39200.0 | 1.75 | 0.75 | 1.181 | New Road surface (high export) |
| | 2800 | 56000.0 | 0.6 | 0.5 | 0.386 | Cleared roadway (high export) |
| ROAD18 | 2100 | 29400.0 | 1.75 | 0.75 | 0.886 | buildings/roof |
| | 2100 | 42000.0 | 0.6 | 0.5 | 0.289 | roads/driveways/parking |
| ROAD19 | 2700 | 37800.0 | 1.75 | 0.75 | 1.139 | New Road surface (high export) |
| | 2700 | 54000.0 | 0.6 | 0.5 | 0.372 | Cleared roadway (high export) |
| ROAD20 | 5200 | 10400.0 | 1.75 | 0.75 | 0.313 | Upgraded Road (high export) |
| | 0 | 0.0 | 0.6 | 0.5 | 0.000 | |
| NEW ROAD TOTALS | 41750 | 584500.0 | | | 23.362 | |
| UPGRADED | 11100 | 22200.0 | | | 0.669 | |
| TOTAL ALL ROADS | 52850 | | | | 24.031 | |

| | | | | | | |
|-------------------|--|-----|------|---|-------|--|
| FUTURE HOUSE LOTS | | 8.0 | 0.29 | 1 | 2.320 | Future House lots (typical) including buildings, parking, lawns, leach field (HSG C) |
|-------------------|--|-----|------|---|-------|--|

| | | | | | | |
|--|-------------------------------|---------------|--|--|--|--|
| Total Cross Lake Reserve P Export From unregulated Non Concept Plan Sources | Total PPE (lbs P/year) | 26.351 | Unassigned P budget reserved for all non-Concept Plan unregulated activities | | | |
|--|-------------------------------|---------------|--|--|--|--|

- LOCATIONS OF UNREGULATED ACTIVITIES FOR CONSTRUCTION OF NEW FORESTRY MANAGEMENT ROADS AND UPGRADES ARE SHOWN ON ROADS KEY MAP PROVIDED BY IRVING FOR ESTIMATED FUTURE ACTIVITIES WITHIN CROSS LAKE WATERSHED
- NEW ROADS ARE ASSUMED TO BE 14 FEET WIDE AND 10' CLEARING ON BOTH SIDES
- UPGRADED ROADS ARE ASSUMED TO BE INCREASED FROM 12 TO 14 FEET WIDE AND NO ADDITIONAL CLEARING
- TOTALS DO NOT INCLUDE 10,800 LF OF FORESTRY ROADS TO BE ABANDONED AND REVEGETATED (APPROXIMATELY 5.21 LB OF EXISTING EXPORT)
- ADJUSTMENT MADE FOR RUNOFF FROM LINEAR ROADS IMPERVIOUS (0.75) AND CLEARED AREA (0.50) PER CHAPTER 10.25.3.d

ATTACHMENT 6

Potential House Lot Locations (TJD&A) April 10, 2018

Non-Concept Plan Activities: House Lots

In addition to the possible new logging roads and upgrades to existing logging roads, the Stantec phosphorus report assumed that a certain number of additional house lots could be developed after the Concept Plan expires. The Petitioners are in the forest management business, and has resisted most of the requests by individuals for house lots within their active forestland. While the Petitioners have no plans to sell parcels of land outside of the designated residential development areas, TJD&A identified several locations on existing roads that are either within 0.5 mile of the lake, on the thoroughfare, or in other desirable locations, and thus are a reasonable prediction of future development potential.

Site characteristics used in the location of potentially suitable house lots include:

- Land within the Cross Lake watershed
- Land currently owned by the Petitioners and outside of designated development areas
- Within half a mile of the Cross Lake shoreline on a Petitioners-maintained road or adjacent to a state-maintained road (Routes 161 and 162)
- Soils that are described as Generally Suitable on the USDA NRCS Soil Survey for Aroostook County
- Avoid areas that are shown as Unsuitable due to wetness
- Avoid areas adjacent to transmission lines
- Avoid areas that have been recently replanted
- Preference given to locations where the house site may be part of an existing pattern of development

Three areas were identified that meet these criteria and are shown on the accompanying map with a red hexagon:

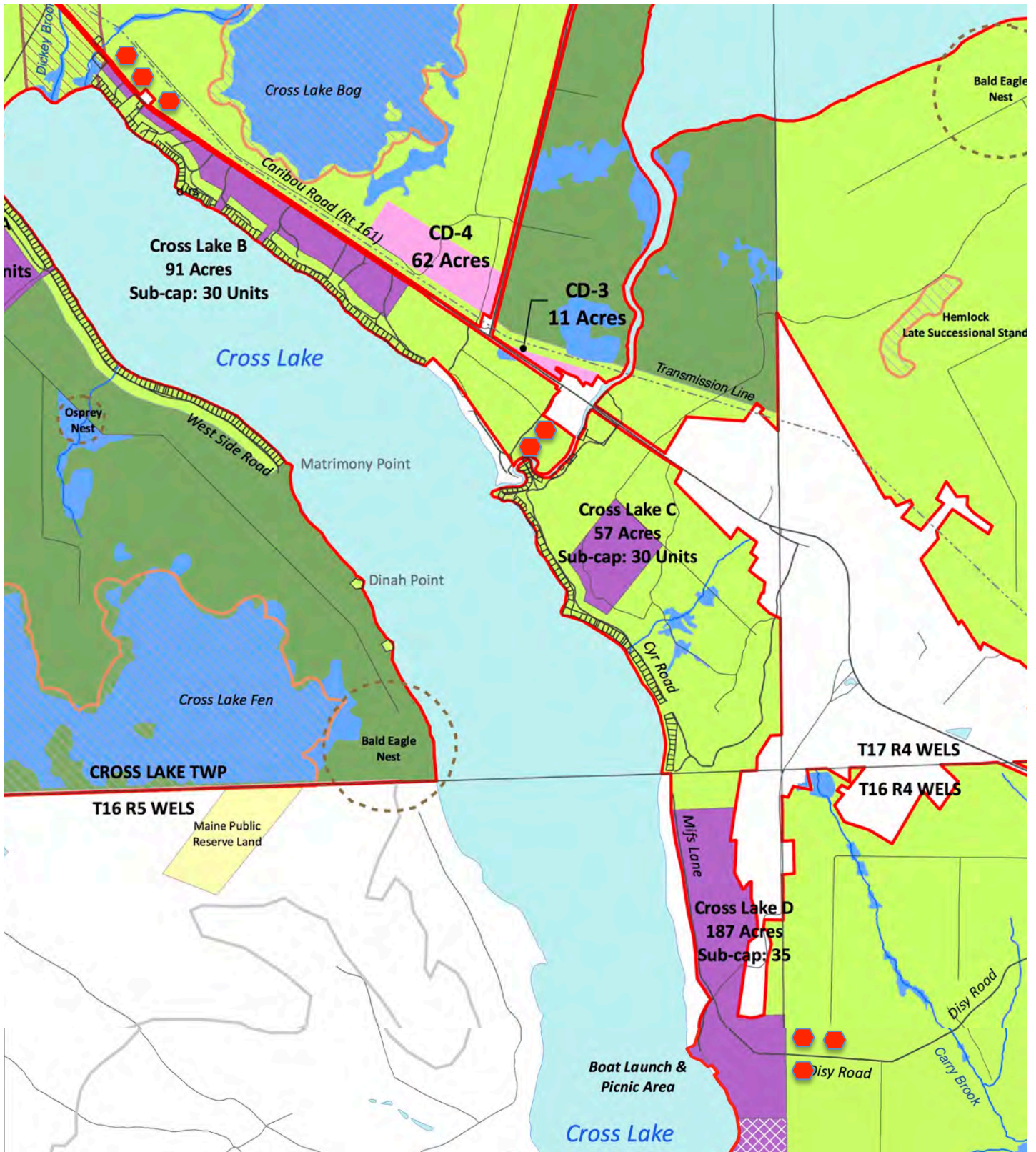


- On Route 161, adjacent to the existing Senior Center: several possible sites
- On the east side of an unnamed woods road on the north side of the Mud/Cross Lake Thoroughfare: one or two possible sites
- On the Disy Road lading to Cross Lake D: several possible sites.

For purposes of determining potential phosphorus export, the calculations used a total of eight lots and applied a factor of 0.29 lbs/lot/year. This assumed that the lots would have the following characteristics:

- No restrictions on the area that would be cleared
- No restrictions on the area of driveways or parking areas
- Driveways would be a maximum of 150 feet in length
- No buffer vegetation around the home or paved areas
- Soils would be in Hydrologic Soil Group C.

This is a very conservative approach to determining potential P export from future house lots, beyond the expiration of the Concept Plan. If the Petitioners did decide to offer land for sale past the date of the Concept Plan, they would have a record of how much of the phosphorus budget was available, following the development any residential or community/economic development areas.



CROSS LAKE POTENTIAL HOUSE LOT LOCATIONS



EVALUATION OF PHOSPHORUS EXPORT AND ALLOCATIONS

FOR

FISH RIVER CHAIN OF LAKES CONCEPT PLAN

April 12, 2018

Prepared for:

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Executive Summary

In May 2017, Irving Woodlands LLC and its related corporate entities, Aroostook Timberlands, Allagash Timberlands, and Maine Woodlands Realty (collectively referred to as “Irving”) issued The Fish River Chain of Lakes Concept Plan and filed a petition with The Land Use Regulation Commission (LURC) for rezoning of the Plan area that encompasses approximately 51,015 acres, currently included in the P-RP Subdistrict. The Concept Plan includes land within 6 unorganized townships: T17 R3, T17 R4, T17 R5 (Cross Lake Township), T16 R4 (Madawaska Lake Township), T16 R5, and T15 R5. The Plan area also includes approximately 34.5 miles of frontage on Long Lake, Mud Lake, Cross Lake, and Square Lake, and along the thoroughfares that connect the lakes. The current use of the lands in the Plan area is primarily forest management and recreational uses. There is limited existing development in the Plan area, including approximately 425 existing camp lots and the Village of Sinclair is located adjacent to the Plan area.

The Land Use Regulation Commission (LURC) established Concept Plans in 1990 as part of the Comprehensive Land Use Plan to encourage meaningful long-range planning based on resource characteristics and site suitability, and to prevent random or unplanned incremental development in the Unorganized Territories. The process for developing the Concept Plan by Irving has taken more than 5 years and includes a comprehensive planning approach to ensure that development pursuant to the Concept Plan will not have any undue adverse impact on the Plan area or natural resources including the Chain of Lakes. The Concept Plan proposes rezoning a few small areas or parcels that specifically include limited development potential within the watershed of Long Lake, Mud Lake, Cross Lake, and Square Lake.

Forestry is an important economic and cultural resource in the region and for Maine’s Unorganized Territories. The Concept Plan will enable Irving to make long-term decisions for forest management activities, allow for continued recreational use and encourage limited residential and community and economic growth, with a high degree of predictability, by identifying those areas to be designated for future development. The Concept Plan seeks to preserve the working forest and sustainability of the forest products industries in the region and to conserve the natural resources, and recreational opportunities enjoyed by those who live, work, and recreate in the region. Important elements of the Plan include placing over 14,600 acres of land in permanent conservation and adopting existing protection subdistricts throughout the Plan area to ensure that significant habitats will be preserved and also limiting the potential for development to a sustainable level at locations throughout the Plan area that will prevent adverse impacts to the water quality of the lakes.

The adoption of the Concept Plan is subject to the requirements and standards provided in the *Land Use Districts and Standards, for Areas Within the Jurisdiction of the Maine Land Use Planning Commission* manual, as revised in May 2017, and as included in proposed amendments within the Concept Plan. Specifically the plan must meet the standards for Surface Water Quality (Chapter 10.25.K) and Phosphorus Control (Chapter 10.25.L). These standards require all development to cause no undue adverse impact to the surface water quality of the affected lakes and to limit the export of phosphorus from the development sites following completion of any development or subdivision.

In December, 2017, The Maine Department of Environmental Protection (DEP) issued a memo to assess the feasibility of being able to develop the numbers of all commercial lots and residential units within the development areas identified in the Fish River Concept Plan, without exceeding the phosphorus budget determined for each lake. The DEP memo addressed potential phosphorus (P) export from each of the proposed development areas in the Concept Plan and concluded that the development areas that may be allowed within the Concept Plan are feasible without long term impacts to the lakes, but identified some concerns specifically within the Cross Lake watershed due to its existing status and greater vulnerability to development pressure, limited lake phosphorus budget, and contributing land areas where unregulated activities such as agriculture and forestry management practices also continue to contribute to the water quality status.

Terrence DeWan & Associates (TJD&A), The Musson Group, Irving, and Stantec have worked with the Land Use Planning Commission (LUPC) and DEP staff to revise the Concept Plan for the development areas to be rezoned within the Cross Lake watershed in order to balance the phosphorus budget to include potential influence from unregulated non-Concept Plan activities. A portion of the lake phosphorus budget for Cross Lake will be reserved for future timber harvesting activity and for other potential uncontrolled future sources. Detailed export calculations of the Cross Lake developments are included in Appendix A.

The export of phosphorus from all potential development sites within the Concept Plan was calculated using methodology approved by DEP and LUPC. The total export from all allowable residential and community development areas in the Concept Plan, will not exceed the lake phosphorus budgets (PB) for the lakes, after considering any residential unit caps, while still allowing some reserve budget capacity for off-site and unregulated activities not associated with the development areas. As a result, the Fish River Chain of Lakes will be protected and will meet Maine water quality standards for non-point stormwater discharge and phosphorus export to receiving waterbodies that must maintain a stable or decreasing trophic state.

Abbreviations

| | |
|--------------|--|
| DEP | Maine Department of Environmental Protection |
| P | Phosphorus |
| PB | Overall Lake Phosphorus Budget |
| PPB | Project Phosphorus Budget (per development area) |
| Concept Plan | Fish River Chain of Lakes Concept Plan |
| LUPC | Land Use Planning Commission |
| TJD&A | Terrence DeWan & Associates |
| Irving | Irving Woodlands, LLC |
| TWP | Township |
| BMPs | Best Management Practices |
| Manual | DEP Phosphorus Control Manual |
| NRCS | Natural Resources Conservation Service |
| SF | Square Feet (area) |
| LF | Linear Feet (distance) |
| ac | Acre (area) |

1.0 INTRODUCTION

Among the many imminent threats to Maine lakes, near the top of the list, and perhaps the most pervasive, is the potential for lakes to become nutrient enriched and more biologically productive, usually as a result of increasing development pressure occurring in lake watersheds. This condition is characterized by declining water clarity or transparency, resulting from an increase in the production and growth of algae. Excess algae in lake water can cause a disturbance to the normal equilibrium of the aquatic ecosystem. In most lake systems, there is typically a limiting nutrient that restricts the amount of plant growth that can occur. Phosphorus is a common nutrient typically associated with soil particles and organic matter and ultimately controls the level of algae production that may occur in lakes.

The Maine DEP determines a lake's vulnerability or current status and the potential for additional phosphorus loading in a lake watershed, and evaluates and distributes the potential for export amongst anticipated new development sources in the lake's watershed, usually on a per acre basis according to the size of the area(s) draining to the lake. Phosphorus export from any development project cannot exceed the predetermined phosphorus budget allocated for the parcel to be developed. The goal of the DEP phosphorus methodology is to provide for a level of development and protection sufficient to avoid any increase in each lake's trophic state, and to distribute the burden of this protection over the entire watershed, and over time, thus allowing for the maximum development potential within any watershed that may occur, without exceeding the phosphorus budgets allocated for each development area or overall lake phosphorus budgets.

Phosphorus usually reaches a lake in stormwater runoff from within the lake's watershed, and tends to be attached to small, lightweight soil particles that may be flushed from the land area draining to the lake during rain events. The amount of phosphorus reaching the lake depends on what the stormwater flows over on its way to the lake that is generally defined by the levels of development surrounding the lake. Natural vegetated and forested areas do not readily release phosphorus to stormwater runoff due to the organic debris or duff layer on the ground, natural vegetation cover, and tree canopy coverage that block or absorb rainfall and limits phosphorus export. The sources of phosphorus are mostly from natural occurrences in an undeveloped environment and from atmospheric deposition. Phosphorus loading contributed by runoff from pastures and croplands is likely the largest source of nonpoint phosphorus on a regional or statewide basis. In undisturbed natural environments, phosphorus is mostly fixed and remains available locally as a nutrient that may be consumed by the trees and vegetation, and results generally in a state of natural equilibrium. However, developed areas, such as residential, commercial or industrial areas, and especially urban areas, contain much higher levels of phosphorus available to be transported to the lake through drainage channels, pipes or flushed from paved or impervious surfaces. The absence of the natural filters and vegetation in developed areas disrupts the equilibrium and allows the phosphorus to be freely transported to shallow channels and streams discharging to the lake waters. Generally speaking, the more developed a lake's watershed is, the greater the transport of phosphorus and the higher the phosphorus concentration of the lake water. This process of transferring phosphorus from developed areas to the lake is referred to herein as phosphorus export or export.

The watersheds draining to lakes also vary greatly in overall characteristics. They can be large or small relative to the lake size and can contribute a wide range of volumes of stormwater and groundwater to the lake. A watershed may be entirely vegetated as upland or it may contain a number of streams and wetlands. It may contain steep slopes or be relatively flat. Soils may range from loose sands or gravels to tight clays or shallow tills. Watershed characteristics can range from forested, pastoral, agricultural, or developed, and the lake watershed may be subject to rapid growth and development pressure. These factors, along with the physical characteristics of the lake itself, such as size, volume, depth, flushing rate and recreational use may determine the potential for increased phosphorus export, which could result in algae blooms in the lake over time. Lakes are individuals, each one differing from the others with specific lake characteristics that affect the way a lake may respond to additions of phosphorus.

2.0 PHOSPHORUS ASSESSMENT

Irving owns or controls extremely large landholding parcels within 6 unorganized townships, totaling over 51,000 acres of land around four of the lakes that comprise the Fish River Chain of Lakes in northern Aroostook County, that include large parts of the watersheds within the TWPs of the lakes involved. For the four lakes, Irving owns between 40% to 90% of all land within the Townships and within the direct watersheds of Cross Lake, Mud Lake, Long Lake and Square Lake. The Concept Plan rezones the Plan area to a P-RP Subdistrict with four types of development zones around the Fish River Chain of Lakes: Residential Development (D-FRL-RS); Recreation Facility Development (D-FRL-RF); General Development (D-FRL-GN); and Commercial Industrial Development (D-FRL-CI). Each of these zones has one or more development areas where proposed zoning regulations to allow new development will be implemented. The Concept Plan includes 11 residential and 4 community/ economical development parcels representing only about 4% of Irving's total land in the Plan.

Accordingly, a very small portion of the overall lake watersheds will be subject to development. The remaining land areas of the Plan are zoned as General Management (M-FRL-GN) or in a Protection subdistrict and will be managed to promote traditional forestry and recreational activities where no development activities will occur other than construction or maintenance of forestry management roads. These unregulated uses are not included in the portions of the Concept Plan to be rezoned for development, and therefore are not considered in the phosphorus export as calculated for the potential development sites. There is a maximum number of new residential development units that may be approved in the new development areas located around each of Long Lake (75), Cross Lake (125) and Square Lake (130), known as the development area cap, and an overall Concept Plan unit cap of no more than 330 new development units that may be approved in the new development areas. Even though each lake may have a total of more units allowed by zoning than the area cap will permit, the actual number of units that can be constructed within each lake watershed will be limited to the area cap for that lake.

The water quality standards for Maine lakes require that they have a stable or decreasing trophic state, subject only to natural fluctuations, and must be free of culturally induced algal blooms that impair their use and enjoyment. Of the four lakes included in the proposed plan only Cross Lake fails to meet these

standards. Cross Lake has, for many years, supported mid-summer blue green algal blooms that reduce measured secchi disc transparency to 2.0 m or less. Long Lake is a productive lake that, in past years has supported algal blooms, but is currently exhibiting a promising trend of decreasing trophic state. Mud Lake is a productive lake with an apparent stable trophic state, though little water quality data has been collected on the lake in recent years. Square Lake is a moderately productive lake with a stable trophic state. While the principle reason for impairment of Cross Lake is from inputs of phosphorus from agricultural activities located primarily in the Dickey Brook watershed, runoff from forestry roads and harvesting operations also contribute to the problem.

Except for the possible construction of a hand carry launch on Mud Lake, the Concept Plan does not actually propose any specific development, but rather is a rezoning plan to allow for future development and long term conservation in specified areas. Each lake subject to residential development will also have a unit cap. All of the development sites in the Concept Plan will be subject to the LURC Land Use District Standards for Surface Water Quality (10.25.K) and Phosphorus Control (10.25.L). However, the vast majority of the land in the Concept Plan will be unregulated with regards to these standards and are not subject to phosphorus export calculations or standards.

Each lake has an overall allocated Lake Phosphorus Budget (PB) as determined by the DEP. According to the DEP, the Concept Plan PB allocations (lb P/yr) for each lake are 208.55 (Long Lake), 103.75 (Mud Lake), 82.19 (Cross Lake), and 458.14 (Square Lake). These were developed based on the total land areas within each township draining to a lake, according to how much the lake's phosphorus concentration can be increased without risking a perceivable increase in its algal production or a decline in its healthy, natural fish community. This value, representing the acceptable increase in lake phosphorus concentration (C), is a function of two variables: Water Quality Category of the lake; and the Level of Protection appropriate for the lake and specific to each lake. These PB allocations are available and will apply to all of the development areas draining to each lake. It will be up to Irving, with the oversight and approval of LUPC, to manage these lake phosphorous budgets and assign an individual Project Phosphorus Budget (PPB) to each development area to allow for possible levels of development.

Since Irving will not be acting as a developer and may sell the designated development areas to developers or other entities in the future, the DEP recommended that Irving should decide up front how much of the Concept Plan's lake phosphorus budgets should be allocated or assigned to each development area within each lake's watershed. Each development parcel will have an assigned Project Phosphorus Budget (PPB) to offset the Project Phosphorus Export (PPE) calculated for each of these sites as determined by the DEP methodology for calculating phosphorus export. Refer to Appendix A for detailed results of phosphorus calculations. These project phosphorus budget numbers will be included in the zoning, sales agreement and/or any deed restrictions so the future buyers would know the potential for development in the area they are purchasing, and the DEP and LUPC would know what the allocated phosphorus budget is for each development parcel.

Each lake was assessed according to combined export totals from the PPE calculated for each residential and community/ economic development area within the direct watershed, and may also be subject to area caps for residential units. The phosphorus export from all areas must meet the allocated PPB for the development site and the cumulative export will not exceed the overall lake PB for each lake watershed.

The PPB for each project will be tracked, as development occurs within the Plan area, along with the total unit count, to assure that each lake PB and/or residential unit cap will not be exceeded.

3.0 METHODOLOGY

Every lake is uniquely situated and the watersheds draining to lakes involve many distinguishing factors relating to vegetative cover, topography, soils, rainfall, existing levels of development or disturbance, and rate of population growth or development pressure. The Maine Department of Environmental Protection (DEP) has considered all of these factors, as well as the physical characteristics of each lake in developing a methodology for determining phosphorus budgets for the watershed of each lake. Each lake is given a per acre allocation factor (P) depending on these unique watershed and lake characteristics. These factors are found in Appendix C of the DEP Manual for most Maine lakes that have been evaluated by the DEP Division of Watershed Management. This Appendix C also presents the information and assumptions used to derive the value of P for the lake watershed of concern.

The DEP methodology is provided in the Maine Stormwater Design Manual, Phosphorus Control Manual, or DEP Manual as referred to herein. The DEP Manual addresses long-term phosphorus loading to lakes by setting standards to limit phosphorus contributions from new developments, and outlines guidelines to meet these standards with the focus on limiting, but not preventing, phosphorus contributions from new developments to lake watersheds. Each lake's phosphorus budget, or per acre allocation factor, is based on how much additional phosphorus loading the lake could accept without resulting in a perceivable change in the lake's water quality. The methodology distributes this additional phosphorus load amongst anticipated new development sources in the lake's watershed on a per acre basis. The per acre phosphorus allocation for a development parcel is used to determine a project phosphorus budget and defines how much phosphorus can be allowed to discharge to a lake, in stormwater runoff from a development project, from each acre of land that may become developed or disturbed. The total phosphorus budget for the project (PPB) is thereby defined by the size (acres) of a development for a project within the watershed based upon the per acre allocation factor.

Phosphorus export from any development project cannot exceed the phosphorus budget allocated for the parcel to be developed. Most projects will generate more phosphorus than the project's phosphorus budget (PPB) will allow. In order to meet the budget, the excess phosphorus export must be reduced by redesigning the project so that initial phosphorus export is minimized or by reducing a project's export from developed areas by incorporating stormwater best management practices (BMPs) to remove and reduce phosphorus from the stormwater before it leaves the site. Some examples of treatment BMPs are vegetated buffer areas, wet ponds, soil filters and infiltration beds. Comparison of the pre-treatment PPE with the PPB will determine how much potential export will need to be reduced onsite.

While per acre phosphorus allocation is the standard method for determining the PPB when assessing impacts to Maine lakes for development projects, the DEP recommended using an overall combined phosphorus budget (PB) for each lake to evaluate the Concept Plan. Rather than evaluating each development area in the Concept Plan based on the PPB determined from the per acre phosphorus

allocation factors associated with the actual project areas, the DEP determined that it is reasonable and more practical to establish an overall combined phosphorus budget for each lake. The DEP provided the PB for each of the lakes in the Concept Plan. The total amount of each PB is proportional to the percentage of each total direct lake watershed occupied by the Concept Plan and owned or controlled by Irving. Because of the unique character of this Concept Plan, which involves extremely large landholding parcels and widely distributed development areas, this approach will allow Irving to manage how these overall lake phosphorus budgets should be applied or distributed for each lake and associated development areas.

Based on this approach of providing a total combined phosphorus budget for each lake, the individual project PPB allocations for all development areas within each lake watershed can be determined. The PPB for each area is assigned so that the aggregate sum of all phosphorus budgets given to each development area will not exceed the overall PB for each lake. The PPE for each site cannot exceed the assigned PPB. This PPE/PPB comparison is made after considering any development limitations based on residential unit caps within each lake watershed. The PPB for each site is assigned with a maximum value to include all potential export, such that each development area can be fully developed based on the "full-build" potential and maximum number of allowable lots. The assigned PPB need not be fully used up at a site, but will be applied for all proposed development up until the proposed level of development is implemented, or the unit cap is reached, after which, no further residential development can occur within the lake watershed, unless other measures are taken to reduce P export from other activities in the watershed. Any excess phosphorus budget not used at a development site may be transferred to other developments, upon review and approval by LURC, within the same lake watershed, providing that the overall PB for the lake is not exceeded for all sites. No portion of any lakes PB can be transferred to a different lake.

Each of the residential and community/economic development areas within each Lake watershed were evaluated to assess the P export associated with the levels of development that would be possible according to assumptions made regarding typical development densities and road access requirements, based on sketches and descriptions provided by TJD&A for each area. These assumptions include estimated areas of typical lot coverage from roofs, driveways, septic systems and lawns, individual house lots, new access roads, upgrades to existing roads, common areas, number of potential lots, soils, and limitations due to maximum potential development based on an overall residential unit cap for each lake. The community/economic development areas included conservative assumptions for the maximum developed coverage that would likely occur on each lot.

4.0 PHOSPHORUS CALCULATIONS

Although not anticipated, or necessary to meet the assigned full-build PPB, some of the development areas could have lots with treatment measures and/or restrictions, and some with none, or any combination thereof at the time of a future development proposal. The many potential issues associated with such restrictions, treatment BMPs, or stormwater management structures that may be proposed need to be considered as well as potential related problems of design, construction, long-term

maintenance, and the responsibility for that maintenance would need to be worked out. Monitoring, inspecting, policing, and lot clearing maximums or BMP maintenance requirements have caused problems in the past, especially in the Unorganized Territories, and are usually difficult to correct or mitigate once the lot has been cleared or site construction completed. Such restrictive and specific requirements to establish predetermined or prescribed limitations for future and unknown development proposals is beyond the scope and intent of the Concept Plan, which is to provide adequate zoning to accommodate future economic growth and development in the area without adversely impacting water quality.

Export values were determined from Table 3.1 and 3.2 from the DEP manual based on the assumed lot coverages for each lot. Although it is reasonable to assume that residential lots in this part of Maine would most likely be described as smaller “camp lots,” rather than the much larger development footprints of a typical “single family” house lot that may occur elsewhere in the state, it was agreed that the use of Table 3.2 would be used to conservatively calculate the export from the residential lots. The P export associated with potential lot development for each residential area has been evaluated for full build-out without any restrictions, covenants, BMPs or mitigation requirements. This has been done to fit strictly within the assigned PPB for each of these development areas to assure that the levels of development anticipated in the Concept Plan can be achieved. All other export values were determined from Table 3.1. Community/economic development areas are evaluated based on values provided in Table 3.1 for Commercial Development with no restrictions on fertilizer use, no buffers, and no restrictions on impervious surfaces or ditch design, and using the High Export Option.

Refer to Appendix A for summary of results of phosphorus calculations.

| Table 3.1 | | | |
|--|-----------------------|--|---|
| Algal Available Phosphorus Export (pre-treatment) for Commercial Development and Subdivisions | | | |
| | | Low Export Option | High Export Option |
| Land Use | Hydrologic Soil Group | P Fertilizers restricted, roads and drives paved and constructed with stable swales (lb/acre/yr) | No restrictions on fertilizer use, road surface or ditch design and construction (lb/acre/yr) |
| Landscaped Areas, Lawns & Ditches | A | 0.1 | 0.2 |
| | B | 0.2 | 0.4 |
| | C | 0.3 | 0.6 |
| | D | 0.4 | 0.8 |

| | | | |
|----------------------------|-----|------|------|
| Roads/Driveways | N/A | 1.25 | 1.75 |
| Parking | N/A | 1.25 | 1.25 |
| Roofs/Other | N/A | 0.5 | 0.5 |
| Riprap/crushed rock | N/A | 0.3 | 0.6 |

| Table 3.2 Algal Available Phosphorus Export from Single Family Residential Lots (pre-treatment) | | | | |
|---|---|---|---|--------------------------------------|
| Hydrologic Soil Group | With Area Restrictions | | Without Area Restrictions | |
| | Cleared Area < 12,000 sq ft Driveway/Park < 1,750 sq ft (lb/lot/year) | | No Restriction on cleared area or driveway/parking area (lb/lot/year) | |
| | w/ 75% drive/park area to buffer | w/o 75% drive/park area to buffer | w/ 75% drive/park area to buffer | w/o 75% drive/park area to buffer |
| A | 0.09 | 0.14 | 0.12 | 0.18 |
| B | 0.12 | 0.17 | 0.17 | 0.24 |
| C | 0.15 | 0.20 | 0.22 | 0.29 |
| D | 1.08 | 0.23 | 0.27 | 0.34 |
| <p>Note: Driveways and parking are considered to be draining directly to a buffer if the flow path to the buffer is 50 feet or less and if the runoff reaches the buffer in well distributed overland flow.</p> <p>Note: phosphorus export values in this table assume a driveway of 150 feet in length, or less. If driveways will likely exceed 150 feet, the excess driveway length should be considered a road and its export calculated using Worksheet 2 and Table 3.1.</p> | | | | |

The DEP memo asserts that the goal of the phosphorus methodology is to provide protection sufficient to avoid an increase in the lake's trophic state, and to distribute the burden of this protection over the watershed and over time, thus allowing a sustainable level of development potential within any watershed. This works well in typical lake watersheds where most of the new sources of phosphorus are associated with development activities that are subject to regulations and required to meet some version of the lake water quality standard. But in watersheds with other existing and future phosphorus sources generated from off-site activities that may account for a portion of the threat to the lake's water quality, the Phosphorus Standard is not likely to provide sufficient protection, unless some of the allowable increase in phosphorus load (PB) is reserved for these unregulated or under-regulated sources. With the recognition that there is potential for future P sources not associated with development activities within the Concept Plan area, but with unregulated timber harvesting road construction, a portion of the PB for

each lake will be reserved for future harvesting activity and for other potential uncontrolled non-Concept Plan sources.

Previous findings from Maine DEP generally concluded that future development within the Plan Area could reasonably occur without long term impacts to the lakes due to the fairly large lake phosphorus budgets and proposed limited levels of development and associated P export, except for on Cross Lake where existing elevated phosphorus related impacts are an area of concern. In fact, the DEP memo stated that the principal source of P export to Cross Lake is from non-Irving agricultural activities located primarily in the Dickey Brook watershed, and that runoff from roads and harvesting operations also contributes to the potential degradation of the Cross Lake water quality status. Additional phosphorus load to Cross Lake, beyond acceptable levels of export exceeding the PB for the lake has the potential to increase the duration and intensity of the algal blooms, so any new phosphorus sources or expansion of existing phosphorus sources should be treated with particular care. Because the overall Cross Lake PB is relatively small and Cross Lake watershed includes a substantial portion of the Concept Plans development areas, a separate analysis, submitted to DEP, focused on the Cross Lake watershed to ensure that future permitted development can be achieved without the need for more complicated treatment measures, BMPs, lot restrictions, off-site mitigation or long term maintenance requirements, which may not be practical in a rural development setting. The results of that assessment are provided herein.

4.1 CROSS LAKE PHOSPHORUS EXPORT

Assumptions

Cross Lake watershed has a Phosphorus Budget (PB) of 82.19 lb P/yr for all land owned by Irving.

The Concept Plan includes 2 community/economic development areas and 5 residential development areas within the watershed of Cross Lake

All lots are forested under existing conditions.

Soils are as shown on the lot sketches per Natural Resources Conservation Service (NRCS) soils mapping. Soils are assumed to have drainage characteristics according to the NRCS Hydrologic Soils Groups (HSG), which may affect the export of phosphorus from vegetated areas.

Phosphorus export values were taken from Tables 3.1 and 3.2. of the MDEP Manual.

Refer to Pre-treatment and Post-treatment Phosphorus Export Calculations worksheets in Appendix A for detailed calculations

P Export for Lots

Residential lot export is **0.29** for HSG C soils and **0.24** for HSG B soils according to Table 3.2 for Single Family Lots with no restrictions on cleared areas or driveway/parking area, and without any buffers.

Community/economic development areas are evaluated based on values provided in Table 3.1 for Commercial Development with no restrictions on fertilizer use, no buffers, and no restrictions on impervious surfaces or ditch design, and using the High Export Option.

P Export for Roads

Export from roads is evaluated based on values provided in Table 3.1 with no restrictions on impervious surfaces or ditch design, and using the High Export Option and assuming (HSG C soils), as follows:

Three types of roads are assumed:

1. New roads will be 20' in width, in a 40' wide clearing (**0.108 lb/100 LF**)
2. Upgraded roads from 12' in width to 20', with a clearing that goes from 24' to 40' in width (**0.054 lb/100LF**)
3. Existing roads suitable for residential development in terms of their current width and condition (**0 lb**)

Common areas are separate from residential lots and generally near the water (HSG C soils assumed). These areas are evaluated based on assumed lot coverages and on values provided in Table 3.1 for Commercial Development with no restrictions on fertilizer use, no buffers, and no restrictions on impervious surfaces or ditch design, and using the High Export Option.

Areas A, B, C and D

| | | | |
|---------------------|-----------|---------------------|-----------------|
| Buildings | 400 SF | (0.0092ac) x (.5) | 0.005 lb |
| Parking/Drive/Paths | 5,000 SF | (0.1148ac) x (1.75) | 0.201 lb |
| Lawn/grass Area | 7,000 SF | (0.1607ac) x (.6) | 0.096 lb |
| Canopy Clearing | 12,400 SF | (0.2847ac) | 0.302 lb |

Area E

| | | | |
|---------------------|-----------|---------------------|-----------------|
| Buildings | 800 SF | (0.0184ac) x (.5) | 0.009 lb |
| Parking/Drive/Paths | 8,000 SF | (0.1837ac) x (1.75) | 0.322 lb |
| Lawn Area | 14,000 SF | (0.321ac) x (.6) | 0.193 lb |
| Canopy Clearing | 22,800 SF | (0.2847ac) | 0.524 lb |

Residential Areas

Cross Lake A (Option 1) 110 acres

| | | |
|-------------------------------------|----------------------------|------------------|
| 30 lots x 0.29 lb/lot | | 8.70 lb |
| 1000 ft new roads | 1000/100 x 0.108 lb/100 LF | 1.08 lb |
| 1400 ft upgraded roads | 1400/100 x 0.054lb/100 LF | 0.76 lb |
| Common area | | <u>0.30 lb</u> |
| Total export-Cross Lake A(1) | | 10.84 lb* |

(*Cross Lake A-Option 1 is not included in totals)

| | | |
|--|----------------------------|-----------------|
| <u>Cross Lake A (Option 2) 110 acres</u> | | |
| 30 lots x 0.29 lb/lot | | 8.70 lb |
| 2000 ft new roads | 2000/100 x 0.108 lb/100 LF | 2.16 lb |
| 1400 ft upgraded roads | 1400/100 x 0.054lb/100 LF | 0.76 lb |
| Common area | | <u>0.30 lb</u> |
| Total export-Cross Lake A(2) | | 11.92 lb |

| | | |
|--|--|----------------|
| <u>Cross Lake B (HSG B soils) 91 acres</u> | | |
| 30 lots x 0.24 lb/lot | | 7.20 lb |
| Existing roads | | 0.00 lb |
| Common area | | <u>0.30 lb</u> |
| Total export-Cross Lake B | | 7.50 lb |

| | | |
|----------------------------------|----------------------------|-----------------|
| <u>Cross Lake C 57 acres</u> | | |
| 30 lots x 0.29 lb/lot | | 8.70 lb |
| 3550 ft new roads | 3550/100 x 0.108 lb/100 LF | 3.83 lb |
| 2150 ft upgraded roads | 2150/100 x 0.054lb/100 LF | 1.16 lb |
| Common area | | <u>0.30 lb</u> |
| Total export-Cross Lake C | | 13.99 lb |

| | | |
|----------------------------------|----------------------------|-----------------|
| <u>Cross Lake D 187 acres</u> | | |
| 35 lots x 0.29 lb/lot | | 10.15 lb |
| 1300 ft new roads | 1300/100 x 0.108 lb/100 LF | 1.40 lb |
| Common area | | <u>0.30 lb</u> |
| Total export-Cross Lake D | | 11.85 lb |

| | | |
|----------------------------------|-----------------------------|-----------------|
| <u>Cross Lake E 163 acres</u> | | |
| 60 lots x 0.29 lb/lot | | 17.40 lb |
| 10,000 ft new roads | 10000/100 x 0.108 lb/100 LF | 10.79 lb |
| 1400 ft upgraded roads | 1400/100 x 0.054lb/100 LF | 0.76 lb |
| Common area | | <u>0.52 lb</u> |
| Total export-Cross Lake E | | 29.47 lb |

Total export: Residential House Lots only, Full-Build (185 units): **52.15 lb**

Total export: Full-Build: Residential Lots, Common Areas, Roads (185 units): **74.73 lb**

Community/Economic Development areas

Cross Lake CD-3

Total area: 11 acres

Maximum number of lots: Assume 2 (eliminated development areas CD-3b and CD-3c and reduced CD-3a [now CD-3] to 2 lots - a reduction from initial proposal of 12 lots total).

Proposed zoning for M-FRL-GN district allows 2,500 SF buildings, with ability to go higher as a special exception (Existing St. Peters Store [not in Concept Plan area] occupies approximately 4,700 SF).

For purposed of this exercise assume:

| | | |
|-------------------|---------------------|--------------------|
| Roof: 5,000 SF | (0.1148ac) x (.5) | 0.06 lb |
| Parking: 5,000 SF | (0.1148ac) x (1.75) | 0.20 lb |
| Lawn: 7,000 SF | (0.1607ac) x (.6) | 0.10 lb |
| | | 0.36 lb/lot |

2 lots x 0.36 lb/lot

| | |
|--|----------------|
| No additional roads; buildings front on Route 161. | 0.00 lb |
| Total export-Cross Lake CD-3 | 0.72 lb |

Cross Lake CD-4

Total area: Approximately 62 acres

Maximum number of lots: Assume 6 lots (a reduction from initial proposal of 30 lots)

Concept Plan limits development to half of available acreage (31 acres)

Proposed zoning for GN district allows 2,500 SF buildings with greater footprint allowed by Special Exception; for purposes of this exercise, assume 5,000 SF buildings.

New road from Route 161: 1,400 LF: 24' width, HSC B soils, 50' clearing (road is wider, since it will be for commercial use).

Roads

33,600 sf (0.7713ac) x (1.75) = **1.35 lb** + 36,400 sf (0.8356ac) x (.4) = **0.334 lb** = **1.684 lb**

Lots

Soils: 4 lots HSG B, 2 lots HSG C

For purposed of this exercise assume:

| | | | |
|----------|----------|----------------------|------------------------------------|
| Roof: | 5,000 SF | (0.1148 ac) x (.5) | 0.057 lb |
| Parking: | 5,000 SF | (0.1148 ac) x (1.75) | 0.201 lb |
| Lawn: | 7,000 SF | (0.1607 ac) x (.6) | 0.096 lb |
| | | | 0.354 lb/lot* (HSG C soils) |

*0.322 lb/lot adjusted for HSG B soils

4 lots x 0.322 lb/lot 1.290 lb

2 lots x 0.354 lb/lot 0.708 lb

Roads 1.684 lb

Total export-Cross Lake CD-4 **3.682 lb**

The overall Cross Lake PB for Irving's land allocated to these combined activities is 82.19 lb/year. Approximately 55.5 lb/year export has been allocated by DEP to be distributed to all of the Cross Lake development areas for residential and community/economic development areas. By limiting the combined PPB available for Concept Plan developments to the maximum PPE calculated for the developed areas, a reserve PB of 26.7 lb/year is set aside for any unregulated activities for long term protection of the Cross Lake watershed for all potential sources of P export anticipated for the life of the Concept plan and beyond. The potential unregulated non-Concept Plan sources of P export have been estimated to be 26.4 lb/year, which is less than the reserve PB. The total combined export from all sources is 81.9 lb/year, which meets the overall PB for Cross Lake.

| | |
|---|----------------------|
| Cross Lake P Budget for Irving Land (PPB): | 82.19 lb/year |
| – <u>P Export from Residential / Community Development:</u> | <u>55.50 lb/year</u> |
| Reserved PB for unregulated activities: | 26.70 lb/year |
| Anticipated P export from roads / houselots: | 26.40 lb/year |

4.2 LONG LAKE PHOSPHORUS EXPORT

Long Lake A residential development is divided into two distinctly different areas. A cluster of up to 26 homes would be located on a sloping site above the Van Buren Cove Beach. An existing logging road in a very wide clearing located above the East Van Buren Cove Road would provide access to an area with less density due to steeper topography (24 lots).

New Roads: 2,600 LF
Upgraded Roads: 4,800 LF

| | |
|--|-----------------|
| <u>Long Lake A</u> 129 acres | |
| 50 lots x 0.29 lb/lot | 14.50 lb |
| 2,600 ft new roads 2600/100 x 0.108 lb/100 LF | 2.81 lb |
| 4,800 ft upgraded roads 4800/100 x 0.054lb/100 LF | 2.60 lb |
| Common area | <u>0.30 lb</u> |
| Total export-Long Lake A | 20.21 lb |

Long Lake B includes 75 acres, including 19 acres restricted as open space, 15 units maximum

The majority of the development (12 lots) would occur at the southern end of Long Lake B, in an area of moderate slopes overlooking the beach at Van Buren Cove. There are also opportunities for a few homesites accessed by individual or shared driveways on the west side of the back lots on the west side of West Van Buren Cove Road.

New Roads: 2,500 LF (includes two driveways to access individual lots)

Common Area. A hand-carry boat launch and related infrastructure could be developed on the Long Lake shoreline, accessed by walking path from Long Lake B.

| | |
|--|----------------|
| <u>Long Lake B</u> 75 acres | |
| 15 lots x 0.29 lb/lot | 4.35 lb |
| 2,500 ft new roads 2500/100 x 0.108 lb/100 LF | 2.70 lb |
| Common area | <u>0.30 lb</u> |
| Total export-Long Lake B | 7.35 lb |

Long Lake C includes 120± acres, 25 units maximum

There are two potential development areas on Long Lake C: an area of gentle to moderate slopes on the western end closest to Sinclair Village and Barn Brook Road, and the sloping hillside on the east side of a small stream that bisects the land. Primary access would be from Barn Brook Road (to be acquired by a developer). Secondary access could be developed from the south over Irving's Knockout Hill Road. There would likely be no common area associated with Long Lake C, since there is no waterfront owned by Irving.

New Roads: 4,150 LF (off Barn Brook Road)

| | | |
|---------------------------------|----------------------------|-----------------|
| <u>Long Lake C</u> 75 acres | | |
| 25 lots x 0.29 lb/lot | | 7.25 lb |
| 4,200 ft new roads | 4200/100 x 0.108 lb/100 LF | 4.53 lb |
| Common area | | <u>0.30 lb</u> |
| Total export-Long Lake C | | 12.08 lb |

The overall Long Lake PB for Irving's land allocated to these combined activities is 208.55 lb/year. Approximately 39.64 lb/year export has been allocated to be distributed to all of the Long Lake development areas for residential and community/economic development areas. A 10% contingency is added to this PB to allow some flexibility of future development to avoid restrictions or BMPs. This allocates a PB to Long Lake of 44 lb/year. By limiting the combined PPB available for Concept Plan developments to the maximum PPE calculated for the developed areas, a reserve PB of 165 lb/year is set aside for any unregulated activities for long term protection of the Long Lake watershed for all potential sources of P export anticipated for the life of the Concept Plan and beyond. The potential unregulated non-Concept Plan sources of P export have not been estimated due to the substantial reserve PB.

The total phosphorus budget available for all development is 44 lb/year, which is well below the overall PB for Long Lake of 209 lb/year.

4.3 MUD LAKE PHOSPHORUS EXPORT

CD-1 includes 281 acres; 30 lots maximum for commercial and industrial use; 50% maximum land utilization

The CD-1 Community/Economic Development area has 2,500 feet of frontage on State Route 162 and has an established road network (6,400 LF) that could provide access to much of the land. Due to soil limitations, the majority of the development would probably occur at the northern end of the property. The land is adjacent to the Maine Public Reserve Land and the Sinclair Sanitary District treatment facility.

New Roads: 5,000 LF, all within the Mud Lake watershed.

Community/Economic Development areas

Mud Lake CD-1

Total area: 281 acres

Maximum number of lots: 30 lots total. Assume 10 lots developed on HSG C soils and 20 lots developed on HSG D soils

Proposed zoning for M-FRL-GN district allows 2,500 SF buildings, with ability to go higher as a special exception (Existing St. Peters Store [not in Concept Plan area] occupies approximately 4,700 SF). For purposed of this exercise assume:

| | | |
|--------------------|----------------------------|----------|
| <u>HSG C soils</u> | | |
| Roof: | 7,500 SF (0.1722ac) x (.5) | 0.086 lb |

| | | |
|-------------------|-------------------------------|---------------------|
| Roads/ driveways: | 3,500 SF (0.0803ac) x (1.75) | 0.141 lb |
| Parking: | 10,000 SF (0.2296ac) x (1.25) | 0.287 lb |
| Lawn: | 15,000 SF(0.3444ac) x (.6) | 0.207 lb |
| | | 0.720 lb/lot |

10 lots x 0.720 lb/lot = **7.20**

1,500 ft new roads **1.983 lb**

CD-1 (HSG D soils)

| | | |
|-------------------|-------------------------------|---------------------|
| Roof: | 7,500 SF (0.1722ac) x (.5) | 0.086 lb |
| Roads/ driveways: | 3,500 SF (0.0803ac) x (1.75) | 0.141 lb |
| Parking: | 10,000 SF (0.2296ac) x (1.25) | 0.287 lb |
| Lawn: | 15,000 SF(0.3444ac) x (.8) | 0.275 lb |
| | | 0.789 lb/lot |

20 lots x 0.789 lb/lot = **15.78**

3,500 ft new roads **5.046 lb**

Total export-Mud Lake CD-1 **30.01 lb**

Mud Lake CD-2

73 acres; 5 commercial lots maximum; 50% maximum land utilization

The CD-2 Community/Economic Development has 900 feet of frontage on Thibodeau Drive, the paved access road into the Sinclair Sanitary District treatment facility, and 1,600 LF of frontage on State Route 162. Due to soil limitations, the majority of the development would probably occur on relatively small lots at the southwestern portion of the property, between Thibodeau Drive and Route 162, with some larger lots to the north. The land is adjacent to the Maine Public Reserve Land and the Sinclair Sanitary District treatment facility.

New Roads: 1,000 LF, all within the Mud Lake watershed.

CD-2 (HSG D soils)

| | | |
|-------------------|-------------------------------|---------------------|
| Roof: | 7,500 SF (0.1722ac) x (.5) | 0.086 lb |
| Roads/ driveways: | 3,500 SF (0.0803ac) x (1.75) | 0.141 lb |
| Parking: | 10,000 SF (0.2296ac) x (1.25) | 0.287 lb |
| Lawn: | 15,000 SF(0.3444ac) x (.8) | 0.275 lb |
| | | 0.789 lb/lot |

5 lots x 0.789 lb/lot = **3.95**

1,000 ft new roads= **1.442 lb**

Total export-Mud Lake CD-2 **5.39 lb**

The overall Mud Lake PB for Irving's land allocated to these combined activities is 103.75 lb/year. Approximately 35.40 lb/year export has been allocated to be distributed to all of the Mud Lake development areas for residential and community/economic development areas. A 10% contingency is added to this PB to allow some flexibility of future development to avoid restrictions or BMPs. This

allocates a PB to Mud Lake of 39 lb/year. By limiting the combined PPB available for Concept Plan developments to the maximum PPE calculated for the developed areas, a reserve PB of 65 lb/year is set aside for any unregulated activities for long term protection of the Mud Lake watershed for all potential sources of P export anticipated for the life of the Concept Plan and beyond. The potential unregulated non-Concept Plan sources of P export have not been estimated due to the substantial reserve PB.

The total phosphorus budget available for all development is 39 lb/year, which is well below the overall PB for Mud Lake of 104 lb/year.

4.4 SQUARE LAKE PHOSPHORUS EXPORT

Square Lake W

Square Lake W; residential; 169± acres, including 48± acres restricted as open space; 30 units maximum

Half of the lots in this off-the-grid area would be developed off an existing logging road that parallels the shoreline of Square Lake. The other half would be developed on a new road that extended down a slope, which would also provide access to a common area on the water.

New Roads: 2,200 LF (includes 700 LF to gain access to water)

Upgraded Roads: 2,600 LF

Common Area. A private boat launch, dock, and related infrastructure could be developed on the Square Lake shoreline, accessed by walking path

Square Lake W 169 acres

| | | |
|-----------------------------------|----------------------------|-----------------|
| 30 lots x 0.29 lb/lot | | 8.70 lb |
| 2,200 ft new roads | 2200/100 x 0.108 lb/100 LF | 2.37lb |
| 2,600 ft upgraded roads | 2600/100 x 0.054lb/100 LF | 1.40 lb |
| Common area | | <u>0.30 lb</u> |
| Total export-Square Lake W | | 12.77 lb |

Square Lake E

Square Lake E; 278± acres; 85 units maximum

Square Lake E is divided into two distinct areas on either side of Square Lake Yexas. The northern portion, with 50 lots shown on the sketch, would utilize an existing logging road, with clusters of additional lots on new loop roads on either side. The other lots (35 shown on the sketch) would be built on the southern portion of the property, primarily on a new lower road that parallels the shoreline and an upper road built into the hillside.

New Roads: 4,250 LF (use 6500 for diversity)

Upgraded Roads: 2,150 LF (use 9000 to include existing road to site)

Common Area. Two common areas focused on the waterfront are shown on the sketch. One could have a trailered ramp with a dock and associated facilities. Square Lake E may also include a parking area to serve residents of Square Lake W who choose to boat across the lake to access their lots.

| | |
|--|-----------------|
| <u>Square Lake E 278 acres</u> | |
| 85 lots x 0.29 lb/lot | 24.65 lb |
| 6,500 ft new roads 6500/100 x 0.108 lb/100 LF | 7.02 lb |
| 9,000 ft upgraded roads 9000/100 x 0.054 lb/100 LF | 4.86 lb |
| Common areas (2 x 0.503) | 1.01 lb |
| Total export-Square Lake E | 37.54 lb |

Square Lake Yexas

Square Lake Yexas; 51± acres; 67 units maximum

Square Lake Yexas is being proposed as a general development area, with the potential for recreational lodging facility (50 units maximum) and the potential for additional lots, a marina, public boat launch, complementary small-scale commercial development, and recreational facilities. Access would be provided over roads developed or upgraded as part of Square Lake E.

(assume 67 single family lots for worse case and include 40,000 sf for parking for lodge option)

New Roads: 1,000 LF

| | |
|---|-----------------|
| <u>Square Lake Yexas 51 acres</u> | |
| 67 lots x 0.29 lb/lot | 19.43 lb |
| 1,000 ft new roads 1000/100 x 0.108 lb/100 LF | 1.08 lb |
| 40,000 sf upgraded roads 0.9183 ac x 1.25 | 1.15 lb |
| Common area | 0.30 lb |
| Total export-Square Lake E | 21.96 lb |

The overall Square Lake PB for Irving's land allocated to these combined activities is 458.14 lb/year. Approximately 72.29 lb/year export has been allocated to be distributed to all of the Square Lake development. A 10% contingency is added to this PB to allow some flexibility of future development to avoid restrictions or BMPs. This allocates a PB to Square Lake of 80 lb/year. By limiting the combined PPB available for Concept Plan developments to the maximum PPE calculated for the developed areas, a reserve PB of 378 lb/year is set aside for any unregulated activities for long term protection of the Square Lake watershed for all potential sources of P export anticipated for the life of the Concept Plan and beyond. The potential unregulated non-Concept Plan sources of P export have not been estimated due to the substantial reserve PB.

The total phosphorus budget available for all development is 80 lb/year, which is well below the overall PB for Square Lake of 458 lb/year.

5.0 CONCLUSION

For this assessment we have evaluated the maximum phosphorus export that could be generated from all anticipated development that may be allowed within the Concept Plan.

The overall lake budgets for all of the four lakes can be met with at least one third of the total lake PB reserved for potential unregulated non-Concept Plan sources.

For acceptable site development(s), the Post-PPE needs to be smaller than the PPB for the parcel(s). Based upon the calculations presented in this report, it appears that the level of development envisioned in the Concept Plan is feasible and will be protective of water quality in all of the Fish River Chain of Lakes.

The Concept Plan meets the goal of the phosphorus methodology to provide protection from degradation of the lake water quality by limiting all potential development in the watershed sufficient to avoid increase in the lake's trophic state, with no visible effects, and distribute the burden of this protection over the watershed and over time.

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