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Bill 46 as currently drafted responds to the scientific evidence that large reductions in nutrient loading will be necessary to save Lake Winnipeg. The amendment to the Water Protection Act is particularly significant – it requires that the City of Winnipeg not only remove but recycle phosphorus. The legislation recognizes that phosphorus is simultaneously a noxious pollutant and a scarce, strategic resource.

Manitoba will be the first jurisdiction in the world to legislate phosphorus recovery. In my professional opinion this provision demonstrates a significant commitment to global food security and fundamental sustainable development principles. Phosphorus, Nitrogen, and Potassium are the fundamental constituents of agricultural fertilizers. Phosphorus fuels the process of photosynthesis that drives plant growth; every DNA molecule of every living plant and animal incorporates elemental phosphorus – all biological life on earth depends on phosphorus.

The mineral origin of almost all phosphorus used in agricultural fertilizers is rock phosphate, which is mined out of the ground from concentrated deposits much like potash is mined to extract potassium. The International Fertilizer Development Corporation – the fertilizer industry’s R&D agency - estimates that we have several hundred years of rock phosphate reserves. Scientific studies published in prestigious journals such as Nature and Scientific American suggest that global phosphorus reserves may be much less – as little as several decades. Whether global rock phosphate reserves are 50 years or 500 years the implications of exhausting supplies of phosphorus for global food security are catastrophic. Phosphorus is much scarcer than potash, which has an estimated 4,000 year reserve life. Canadians will recall that potash was declared a strategic national asset by federal government when it rebuffed the hostile takeover attempt of the Potash Corporation of Saskatchewan by BHP Billiton, a multi-national mining conglomerate based in Australia – the same long-term strategic thinking should be applied to phosphorus.

Bill 46 is a critical first step towards re-defining phosphorus as a strategic asset by legislating its long-term stewardship. In principle a molecule of

phosphorus can be infinitely recycled – always returned to agricultural land to grow food. We ignore our reliance on phosphorus when we allow it to flow unmanaged into lakes and rivers fouling our ecosystems and imperilling the food security of future generations. This phosphorus is effectively lost to global nutrient cycles - a one-time geologic endowment of concentrated mineral supply squandered in a few generations.

Wastewater Treatment Plants are important sources of phosphorus supply. Wastewater Treatment Plants in the 21st century must play a much more important role in phosphorus recycling and the emerging bioeconomy than they did in the 20th century. Wastewater treatment plants should be understood as biorefineries, where strategic resources can be extracted using biological processes and recycled, benefitting the downstream aquatic environment, Manitoba's economy by displacing imported fertilizers, and ensuring long-term food security. Extracting phosphorus using chemical methods and disposing of it in landfills is environmentally, economically, and ethically short-sighted and unacceptable.

Bill 46 is an important initial step towards building the Manitoba bioeconomy by requiring leadership from the City of Winnipeg and it sets the stage for a constructive engagement with Manitoba's agricultural sector, which also has an important part to play. Based on analysis conducted by IISD, we believe that as a whole, Manitoba farmers are very efficient users of agricultural nutrients, specifically phosphorus and nitrogen. We estimate that the fraction of applied phosphorus that leaves agricultural land destined for Lake Winnipeg is very low compared to other jurisdictions in North America. Nonetheless, because of our enormous land base and accumulated surpluses in some localized areas, the total mass of phosphorus that reaches Lake Winnipeg from agricultural sources is significant.

We believe that the key principle introduced by Bill 46 – that phosphorus is a strategic resource that should be recycled – should also be extended to the agricultural sector in a manner that promotes innovation and new economic opportunities for Manitoba's farmers. Manitoba farmers, Manitoba communities and the entrepreneurs that will build the Manitoba bioeconomy should be encouraged to realize these opportunities. An important example of such opportunity is the nutrient-bioenergy project IISD has demonstrated at Netley-Libau marsh, where marsh biomass is used intercept and recycle phosphorus when the biomass is used to produce energy and displace fossil fuels. The nutrient-bioenergy concept could be widely applied across Manitoba's agricultural landscape, creating nutrient management, flood

protection and economic co-benefits.

In summary, Bill 46 is an important legislative precedent as it recognizes phosphorus as a strategic resource. Future legislation consistent with the principles introduced in Bill 46 should take an integrated systems view of the agricultural landscape and encourage innovative agricultural nutrient management that builds Manitoba's bioeconomy and fosters global sustainable development.

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