AGENDA ITEM NO: 9.2

UNIVERSITY COUNCIL

ACADEMIC PROGRAMS COMMITTEE

REQUEST FOR DECISION

PRESENTED BY: Roy Dobson; Chair, Academic Programs Committee

DATE OF MEETING: June 18, 2015

SUBJECT: Master of Water Security

DECISION REQUESTED:

That Council approve the Master of Water Security degree in the School of Environment and Sustainability, effective September 1, 2016.

PURPOSE:

The School of Environment and Sustainability (SENS) sees the Master of Water Security (M.W.S.) as a new and truly innovative graduate program that builds both disciplinary expertise snd awareness of and capability for interdisciplinary work. The schools aims for a 12-month project-based program that will provide an unprecedented depth and breadth of training for industry, government, and research. The proposed program is wholly consistent with the interdisciplinary mandate of SENS, and builds primarily on core Global Institute for Water Security faculty located within SENS.

CONTEXT AND BACKGROUND:

Master of Water Security (M.W.S.) is a professional, project-based Master's program within the School of Environment and Sustainability (SENS). The motivation for this degree program is to further realize the strategic investment in water security made at the University of Saskatchewan (U of S) by the Federal and Provincial Governments and the University, and to capitalize on existing faculty expertise across the many facets of water-related research and research infrastructure present across campus. The U of S has a comparative advantage internationally in this area of research and potential graduate training. Creation of such a program would help advance SENS's strategic priorities and realize some of the early objectives associated with its creation. SENS is fully supportive of this proposed effort.

The M.W.S. would also realize some of the ambitions of the Global Institute of Water Security (GIWS) and map directly to the vision and objectives of the newly created Saskatchewan Water Security Agency. Consultations have already begun with that agency in terms of how such an academic program would be beneficial to the ongoing professional development of its staff.

Most importantly, there is current and future demand for professional graduate programs in water research, management and policy, regionally, nationally and internationally. It is

within the fields of engineering, hydrology, geology, geochemistry, biology, public health and many others that graduates from this proposed program would work in and network with to create, manage and adapt water plans for the future. The Government of Saskatchewan also predicted growth in job opportunities for Natural/Applied Sciences and related skill types, projecting 4,300 new job opportunities due to expansion and attrition.

The Master of Water Security (M.W.S.) is a cross-disciplinary, project-based, professional-style program that can be completed in 12 months of full-time study. Students enrolled in this program will be required to complete 30 cu as follows: 15 cu of core (required) courses, 9 cu of prescribed electives, and a 6 cu research project and ENVS 990. This program is intended to provide prospective and current environmental practitioners with a post-graduate learning opportunity in water security.

IMPLICATIONS:

The M.W.S. faculty will include core SENS faculty and existing faculty involved across the many facets of water-related research across campus. Students in professional, project-based programs are typically self-funded. However, in the budget and TABBS modeling for the program, five scholarships at $1,500 each have been included.

Tuition fees for the M.W.S. will be set at the current MSEM tuition rate ($7,263 for domestic and $10,894.50 for international students as of Sept. 1, 2014, subject to change). The MSEM rates are very competitive with other professional master's degrees with an environmental focus, ranging from $4,467 to $12,655 for domestic students at Universities of Dalhousie and Western Ontario, to $9,089 to $31,400 for international students at the Universities of Toronto and Western Ontario respectively. The competitive mid-range tuition rate will make the program very attractive given the high quality of faculty instructors, excellent student experience, and program focus.

SENS will budget for a full-time Graduate Secretary who will begin in year one of the program so that M.W.S. students have access to a support person. Also in year one, a new half-time Program Manager, who will be supervised by the Program Coordinator, will be hired.

Student office space will be provided by SENS in Kirk Hall. Office space for the Graduate Secretary will be made available in the SENS general office space (Room 323, Kirk Hall). Renovation costs to accommodate this change have been included in the budget. The Program Manager will be housed in the GIWS space at NHRC and again rental and renovations cost have been accounted for in the budget.

No program-level funding is requested, nor is any budgeted for equipment or special needs. All specialized equipment required for project research will be met by faculty participating in the program. The direct costs associated with the new program will be covered by SENS's operating fund.

CONSULTATION:

- Planning and Priorities Committee of Council (February 2013 and March 4, 2015)
- Departments of Geography and Planning, Bioresource Policy, Geological Science, Soil Science, Civil and Geological Engineering, Community Health and Epidemiology, School of Public Policy, School of Public Health, and the College of Law (September/October 2014 regarding specific courses as core classes and electives for the M.W.S.)
- Graduate Programs Committee, College of Graduate Studies and Research) (March 9, 2015)
- Executive Committee of the College of Graduate Studies and Research (March 16, 2015)
- Consultation with the Registrar (March 16, 2015)
- Academic Programs Committee of Council (May 13, 2015)

SUMMARY:

The University currently has faculty from several colleges and schools (the College of Arts and Science, the College of Engineering, the College of Law, the College Agriculture and Bioresources, the School of Environment and Sustainability and the Johnson-Shoyama School of Public Policy) that conduct research and teach undergraduate and graduate courses on water-related topics. There are approximately 27 undergraduate and 15 graduate-level courses that have a water focus. These courses will be pulled together and resources will be networked to capitalize on existing strengths to produce well-rounded, highly-educated practitioners who will have the benefit of an interdisciplinary perspective, with little to no new course or faculty development needed.

Creating the project based master's program will use existing resources to develop graduates who have in-depth disciplinary knowledge and the capacity to link this knowledge using a systems approach to create a holistic understanding of water security. M.W.S. degree holders will thus be proficient in basic science, engineering, and policy analysis to investigate the nature of rapid social and environmental change in complex and uncertain water systems, positioning them to solve problems of regional, national and global scope. The program will thus fill the demand for a new generation of graduates to tackle complex hydrological systems modeling, water vulnerability assessment, integrated watershed planning and management, and decision support. The faculty and courses for this program currently exist, and can be consolidated in a new direction in order to attract world class students.

ATTACHMENTS:

1. Master of Water Security Program Proposal

UNIVERSITY OF SASKATCHEWAN

Proposal for Academic or Curricular Change

Proposal for New Graduate Degree in Water Security

School of Environment and Sustainability

and

Global Institute for Water Security

at the

University of Saskatchewan

Master of Water Security (M.W.S.)

Prepared by Jeffrey McDonnell
and
Submitted by:
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and
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February 25, 2015, version

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1.0 EXECUTIVE SUMMARY

Graduate training in hydrology at the University of Saskatchewan has been ongoing since the early 1960s, when it was led initially by the Division of Hydrology (then based in the Department of Agricultural Engineering). Now, such training is at the Centre for Hydrology based out of the Department of Geography & Planning. This rich training program produced the only Canadian textbook on Hydrology (Gray, 1973), and its graduate students went on to senior positions in federal, provincial, and territorial governments in hydrology/water management, flood forecasting groups, the consulting industry and the faculty of national and international universities. In 2011 the Global Institute for Water Security (GIWS) was developed with support from the Canada Excellence Research Chair (CERC) in Water Security to provide a new campus-wide focus for one of the University's Signature Areas, water security. A key element of the GIWS mission is to create a focus and a platform for interdisciplinary collaboration that recognizes the societal dimensions of water security (complementing the hydrology focus of the successful and ongoing Centre for Hydrology), human impacts on the environment, and the linkages and feedbacks between atmosphere, land, and water systems. These goals require a new integration of the relevant spectrums from the natural sciences, human health, social sciences, public policy, and engineering.

GIWS now has members from fourteen academic units across the University, including the School of Public Health, the Edwards School of Business, and the Johnson–Shoyama School of Public Policy. The institute has promoted both the development of new leading edge disciplinary science as well as exciting new interdisciplinary research, with funding to date for 157 personnel across multiple academic units. The CERC proposal foresaw the need to develop a new graduate program to develop the Highly Qualified Personnel (HQP) needed both to support the research agenda and to provide the expertise required by government and industry to meet the needs of water security within a framework of sustainable development. This need for HQP is illustrated in a recently published report from the Association of Public and Land-grant Universities, which studied the impacts of climate change over sixteen years in countries such as Australia, Canada, and the United States. This report recognized the need to increase the understanding of the impacts of climate change on ecosystems, water supplies, air quality, fire, disease transmission, and species survival. It went on to stress the need to develop technology that allows for real-time monitoring and management of water systems (Association of Public and Land-grant Universities, 2014). These needs require well-trained policy managers, field technicians, and academics to move us forward in this time of change and uncertainty. The Government of Canada also published a report called Impacts to Adaptation: Canada in a Changing Climate (2008) where it recognized that "as Canadians adapt to climate change, they require, as a minimum, access to the best scientific information and expert help and advice" and will depend upon "maintenance and strengthening of the knowledge base, as well as mechanisms for sharing information." With these needs in mind, we believe that the time is now right to move forward with this proposal.

Our proposal is for a new and truly innovative graduate program that builds both disciplinary expertise and awareness of and capability for interdisciplinary work. We aim for a 12-month project-based Master of Water Security (M.W.S.) program that will provide an unprecedented depth and breadth of training for industry, government, and research. It seeks to engage faculty across the University, with an appropriate financial model to recognize contributions to teaching and project supervision. We consider the School of Environment and Sustainability (SENS) as the most appropriate host academic unit, as the proposed program is wholly consistent with the interdisciplinary mandate of SENS, and builds primarily on core GIWS Faculty located within SENS.

The SENS vision is to create and integrate multiple understandings of natural and human environments and to be internationally known for innovative, provocative and wide-ranging approaches to environmental sustainability. Its mission is to enable sustainable communities and environments through col-

laborative research and teaching, and graduate student engagement and community involvement, as well as to broaden understanding and to develop champions of environmental sustainability by creating, exchanging, and translating knowledge using diverse perspectives. The Master of Water Security has been developed with the School's core mission and vision in mind.

Water is an essential resource for all living organisms. Its availability is a limiting factor in many of Earth's ecosystems. Water security is a public health, social, and economic concern where natural and anthropogenic changes challenge how we use, sustain, and manage our water resources. Western Canada is experiencing unprecedented population growth, natural resource development, and economic expansion. With these increases, we rely more heavily on water resources, for uses such as irrigation and resource extraction. All of these changes interact to create challenging scenarios for policy makers and governments to manage our water resources and to ensure quality and quantity for the future. It is the importance of water and the complexity surrounding its proper use and management that creates the need for well trained, motivated, professional water practitioners. The M.W.S. aims to produce graduates that will have an in-depth disciplinary knowledge within an interdisciplinary framework. This will enable them to link their knowledge, using a systems perspective approach, to develop a synthetic and complex understanding of water security.

Student interest in interdisciplinary, problem-oriented, experienced-based learning programs is on the rise (see section 4.1). These programs prepare graduates for real world problems and working environments. Through mentorship and core courses, students will gain the professional development they need to work and lead in team environments, as well as in-depth knowledge that leads to innovation, collaboration, and communication across a spectrum of disciplines and working sectors. Water security for the future depends on innovation, cooperation, and the understanding of how water is used, managed and valued in society. The Master of Water Security will be the only program of its kind in Western Canada, creating a unique opportunity for the University to be a leader in Canada's water future and to increase its national and international presence.

Saskatchewan's Water Security Agency has identified the need for good water management and states that "water is of economic, social and environmental importance and that the challenge is to ensure a sustainable water supply to support business and industry needs, a healthy environment and our quality of life" (Water Security Agency 25 Year Plan, 2012). This plan outlines Saskatchewan's need for professionals who have knowledge in the areas of flood prediction, estimating surface and groundwater water reserves, understanding the relationships between water and living ecosystems, water resource management and who can understand the value, social importance, and use of water in human contexts under anthropogenic control. Saskatchewan's occupational groups with the highest employment growth, due to expansion and demand, are in the natural and applied sciences. Also, over the last year, Saskatchewan has seen the largest and most evident job growth in areas related to the professional scientific and technical services industries with 1,800 jobs added (Hansen, 2012). The new M.W.S. will provide the trained professionals that the province needs to fill these employment gaps and in so doing will help ensure a sustainable water future.

This proposed master's program will utilize the University's already established water-related course resources to develop three specialized track options for students. Students in the program will choose to focus their study in one of the three tracks, each track focuses on one aspect of hydrological knowledge, but all students will come together and take the same core courses that will instill in each student the weight, perspective, and importance that each area (track) has on water security. These core courses will allow students to network and enable them to learn and adapt ideas from each other that will lead to comprehensive knowledge in the broad spectrum of water security issues.

Faculty from SENS will lead in the implementation of the mandatory required core courses (four out of the six core courses). Within the three tracks, the program will draw upon the existing faculty expertise across the many facets of water-related research, which will foster the cross-disciplinary nature of the program and introduce students to networks and resources they can use to increase their understanding of the many areas and complexities of water research and industry.

The Master of Water Security positions itself in complete alignment with the direction and vision of both SENS and the GIWS, where interdisciplinary, problem-oriented, experience-based learning, with focuses on climate change, land management and environmental stewardship are explored through physical, natural, social and health sciences, which come together to create holistic solutions to resource development, decision-making, and quality of life for the future.

The proposed degree program is directly in line with the University's Third Integrated Plan to increase the enrollment of graduate students, by creating a new graduate program that will draw in students who are looking for an alternative to traditional academically focused programs. The degree program will enhance the international presence of the University through water security research on the global scale by attracting and graduating international students. It will also enhance Aboriginal engagement through enrollment of Aboriginal students and research partnerships between Aboriginal communities and the program through the student projects. This graduate program also links to three of the University's signature areas of research (see section 3.4).

2.0 COMMON PROGRAM INFORMATION

2.1 Proposal Identification

Proposal for Curriculum Change to be approved by University Council or by Academic Programs Committee (APC)

Title of proposal: Proposal for New Graduate Degree in Water Security, School of Environment and Sustainability and Global Institute for Water Security at the University of Saskatchewan

Degree(s): M.W.S.

Field(s) of Specialization: Water Security

Level(s) of Concentration: N/A

Option(s): Three Tracks – i) Hydrology; ii) Hydrogeology; iii) Socio-hydrology.

Degree College: College of Graduate Studies and Research

Home College: School of Environment and Sustainability

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Approved by the degree college and/or home college: School of Environment and Sustainability, January 2015

Proposed date of implementation: September 2016

2.2 Type of Change

Requiring approval by University Council

X A new Degree-Level program or template for program.
□ A new Field of Specialization at the Major or Honors Level of Concentration or template for a major or honours program.
□ Conversion of an existing program from regular to special tuition program.
□ A change in the requirements for admission to a program.
□ A change in quota for a college.
□ Program revisions that will use new resources.
□ A replacement program, including program deletion.
□ A program deletion (consult Program Termination Procedures, approved by Council in May 2001).

Requiring approval by Academic Programs Committee

□ Addition of a higher Level of Concentration to an existing Field of Specialization.
□ Addition of a new Field of Specialization at the Minor Level of Concentration.
□ A change in program options.
□ A change in the name of a Degree-level Program or Field of Specialization.
□ A change in the total number of credit units required for an approved degree program.

3.0 INTRODUCTION

3.1 Context

We wish to submit a proposal for a new Master of Water Security (M.W.S.) degree as a professional, project-based Master's program within the School of Environment and Sustainability (SENS). The motivation for this M.W.S. degree program is to further realize the strategic investment in water security made at the University of Saskatchewan (U of S) by the Federal and Provincial Governments and the University, and to capitalize on existing faculty expertise across the many facets of water-related research and research infrastructure present across campus. The U of S has a comparative advantage internationally in this area of research and potential graduate training. Creation of such a program would help advance SENS' strategic priorities and realize some of the early objectives associated with its creation. SENS is fully supportive of this proposed effort.

The M.W.S. would also realize some of the ambitions of the GIWS and map directly to the vision and objectives of the newly created Saskatchewan Water Security Agency. Consultations have already begun with that agency in terms of how such an academic program would be beneficial to the ongoing professional development of its staff.

Most importantly, we wish to develop the M.W.S. because there is current and future demand for professional graduate programs in water research, management and policy, regionally, nationally and internationally. The United States Department of Labor, Bureau of Labor Statistics reports that the job outlook for hydrologists is "projected to grow 10 percent from 2012-2022, about as fast as the average for

all occupations," but that "population growth and environmental concerns are expected to increase demand for hydrologists" (United States Department of Labor, 2014). The Government of Alberta published a Short-Term Employment Forecast for 2014-2016 where the government used short-term employment forecasts to identify occupations that will be in high or low demand in the labour market in the near future. The Government of Alberta identified the following occupations in the High Demand category: Civil Engineers, Civil Engineering Technologists and Technicians, Engineering Managers, Geologists, Geochemists, Geophysicists, Biologists and Related Scientists, Database Analysts and Data Administrators, Geological and Mineral Technologists and Technicians, and Inspectors in Public and Environmental Heath and Occupational Health and Safety. Occupations forecasted as being of medium demand are Natural and Applied Science Policy Researchers and Consultants and Program Officers. It is within these professions that graduates from this proposed program would work and network with to create, manage and adapt water plans for the future (Government of Alberta, 2014). The Government of Saskatchewan also predicted growth in job opportunities for Natural/Applied Sciences and Related skill types, projecting 4,300 new job opportunities due to expansion and attrition between 2009 and 2014 (Saskatchewan Ministry of Advanced Education Employment and Immigration, 2010).

3.2 Background and Historical Information

- Notice of Intent (NOI) submitted to the Planning and Priorities Committee in February 2013
- The NOI precursor to this proposal has been vetted by Toddi Steelman and Howard Wheater and the SENS Academic Programs Committee. The proposal ideas have also been vetted by ~25 water faculty from across the U of S campus, as part of two all-campus water faculty meetings (November 1 and December 11, 2012). An all-campus water graduate student meeting with over 30 graduate students (November 30, 2012) was also used to seek input for this document from the student perspective. Enthusiasm for this proposed degree program by faculty and graduates is very high. In addition, consultation on these ideas has occurred with Trever Crowe, Associate Dean Graduate Studies and Research; Karsten Liber, Director, Toxicology Centre and former Executive Director, SENS; and Karen Chad, Vice-President Research. Each has expressed enthusiasm for the concept and made useful contributions to an implementation strategy that will be followed in the ultimate proposal document.
- Based on discussions in early 2014 with GIWS members from across campus, we have decided to modify the original NOI to focus initially on the development of a project-based Master of Water Security; a proposal regarding a PhD program may be forthcoming in one to three years.
- The NOI was resubmitted to the Planning and Priorities Committee on January 26, 2015 given the above noted changes in program structure.

Water security is a key challenge in Canada (Renzetti et al., 2011) and internationally (Beniston et al., 2011). Simply defined, water security is "availability of an acceptable quantity and quality of water for health, livelihoods, ecosystems and production, coupled with an acceptable level of water-related risks to people, environments and economies" (Grey and Sadoff, 2007). Globally and nationally, water security faces unprecedented pressure from population growth and urbanization, unsustainable water use, and rapid environmental change. More than 80% of the world's population lives in areas where either human water security or biodiversity is threatened (Vörösmarty et al., 2010), which has driven up food prices, threatened governments, and caused political change (Friel et al., 2011) and conflict (Hsiang et al., 2013).

Many of these global issues are exemplified in Western Canada, where the Saskatchewan and Peace-Athabasca River basins are experiencing periodic water shortages, rapid economic development, debilitating floods and droughts, and degraded water quality (Jeffries, 2009; Seitz et al., 2012). These deleterious conditions threaten aquatic ecosystem health and hinder economic development (Sommerfeld,

2012). For example, the two most expensive natural disasters in Canadian history both occurred in Western Canada. The 1999-2004 drought in the Prairies caused a $5.8 billion drop in GDP over two years alone (Stewart et al., 2011). Premier Redford gauged that the June 2013 floods in Alberta will cost well over $5 billion in terms of rebuilding infrastructure (Canadian Press, 2013).

Solutions to these complex and dynamic problems require innovative and well-trained professionals who can bring expertise in a particular area to a cross-disciplinary team. But, Canadian graduate students in the field of water security are rarely trained in this way. Most water graduate training programs operate on either a traditional disciplinary-focused model where independence is emphasized or on an interdisciplinary model where depth of knowledge is underdeveloped (Moslemi et al., 2009). At the M.Sc. level, students in Canada typically engage in thesis research with limited coursework focused on water. As a result, they leave their degree program with strong research skills but in a narrowly focused area with little technical proficiency in the basics of water security.

Canada, and Western Canada in particular, needs a training program where students are equipped with knowledge through professional coursework that gives them the foundation in the areas of water security (Hydrology, Hydrogeology and Socio-Hydrology) necessary for qualified work in the field.

4.0 THE NEED FOR A MASTER OF WATER SECURITY DEGREE PROGRAM

The University currently has faculty from several colleges and schools (the College of Arts and Science, the College of Engineering, the College of Law, the College Agriculture and Bioresources, the School of Environment and Sustainability and the Johnson-Shoyama School of Public Policy) that conduct research and teach undergraduate and graduate courses on water-related topics. There are approximately 27 undergraduate and 15 graduate-level courses that have a water focus. We propose to pull together and network these resources, capitalizing on them to produce well-rounded, highly-educated practitioners who will have the benefit of an interdisciplinary perspective, with little to no new course or faculty development needed.

Creating the project based master's program will use our existing resources to develop graduates who have in-depth disciplinary knowledge and the capacity to link this knowledge using a systems approach to create a holistic understanding of water security. M.W.S. degree holders will thus be proficient in basic science, engineering, and policy analysis to investigate the nature of rapid social and environmental change in complex and uncertain water systems, positioning them to solve problems of regional, national and global scope. We will thus fill the demand for a new generation of graduates to tackle complex hydrological systems modeling, water vulnerability assessment, integrated watershed planning and management, and decision support. The faculty and courses for this program currently exist, and can be consolidated in a new direction in order to attract world class students.

4.1 Relationship between the Proposed Program and the Strategic Directions of the University of Saskatchewan

The M.W.S. relates directly to the strategic directions of the University. This program will support the Third Integrated Plan (2012-2016) by enhancing knowledge creation via increasing the quantity and quality of graduate students on campus. The M.W.S. will result in "innovation in academic programs," a stated goal within the Third Integrated Plan, by leveraging the University's existing water expertise into a new graduate program that will address current water security issues. Finally, the M.W.S., through its ties with the GIWS, will help lead to further internationalization of the U of S campus through water security research world-wide. The M.W.S. will be administered through SENS and will feed back into its sustainability efforts to track, assess and rate the sustainability of water at the local, provincial and national level. Further, it will help SENS realize its stated goals by creating and integrating multiple understandings of natural and human environments. Like SENS, the mission of the M.W.S. will be to enable

sustainable water use in communities and environments through collaborative research (via the M.W.S. 6 cu project), teaching, graduate student engagement and community involvement. These also map directly to the CERC/GIWS vison to undertake world-class research that enables and enhances water security (http://www.usask.ca/water/).

The University has identified, through campus wide consultation, six signature areas of research that will lead the University of Saskatchewan into the future as "among the most distinguished universities in Canada and among the very best in the world" (U of S Vice-President Research, 2014). The M.W.S. connects directly with three of the signature areas.

- ***Agriculture: Food and Bioproducts for a Sustainable Future*** – This signature area focuses on new "science, technology and policies to help feed a hungry world adequately, safely and sustainably" (U of S Vice-President Research, 2014). This statement mirrors the objectives and ambitions for the M.W.S., where the goal is to educate current and future generations of water professionals to make new advances and foster cooperation in water use and management, to ensure sustainability in industries like food production for generations to come. Sustainable water use and management are paramount to the success and future of our nation's, and more specifically to our province's, development of natural resources and therefore links to the next signature area.
- ***Energy and Mineral Resources*** – Energy and mineral resource operations and development are invariable users of water. In both sectors, sustainable management plans are paramount to the satisfaction of all stakeholders. This is one of the key areas where M.W.S graduates would have the opportunity to bring new holistic ideas to an area of ongoing development.
- ***Water Security: Stewardship of the World's Freshwater Resources*** – Water for the future, amongst climate change, pollution and overuse, is the focus of intensive, interdisciplinary research spanning the spheres of sociology, hydrology, geology, chemistry, land management, policy and engineering. This is the primary focus and goal of the M.W.S. program.

The University's commitment to interdisciplinary research in water security will be directly addressed in the three tracks offered in the M.W.S. The Hydrology track will focus on the basic understanding of hydrologic systems at the physical and chemical level, which is paramount to our ability to effectively manage and predict future water scenarios. The Hydrogeology track will train students who will contribute to developing and deploying a sustainable plan for future groundwater use and management during this time of economic growth and resource development. The Socio-Hydrology track will focus on the nexus of interdisciplinary research between human use, control, value, and culture related to water and its place in the global community. All students will take classes in each of these areas, via the core courses, but will choose to specialize in one of the three tracks where additional knowledge depth will be developed.

5.0 RATIONALE

5.1 Student Demand

A student demand survey was conducted for two weeks from September 16 to September 30, 2014. A total of 13,313 University of Saskatchewan undergraduate students were invited to participate in the survey, from the College of Arts and Science, the College of Agriculture and Bioresources, the Edwards School of Business, the College of Education, and the College of Engineering. The survey response rate was 6.83% (909 responses) with a 6.2% (825 complete responses) completion rate. Twenty-nine students responded that they would definitely register for the degree if it was offered, and 137 students responded that they would likely register (Table 1a.). The "definitely" and "likely" responses exceed our first year's registration expectations of 8 students and would also fill subsequent years; registration is projected to increase by eight students each year until the program is capped in Year 4 at 32 students.

Of 416 responses, 44.5% (185 students) felt that the M.W.S. would increase their employability, 63.2% (263 students) would register because they were interested in the program's topic, and another 22 students commented very positively to why they would register for the program (Table 1b and c). Responses regarding interest in the three tracks to be offered by the M.W.S showed considerable interest in each track: 28.2% of respondents were interested in the hydrology track, 26.9% in the hydrogeology track, and 44.9% were interested in the sociohydrology track (Table 1d). Surveyed students largely had no objections to the program and the two most common reasons they gave for not indicating interest in registering in the program were either that the program did not apply to their career goals or they were not interested in the topic (Table 1e).

Another SENS survey was conducted as part of the creation for the Undergraduate Certificate of Proficiency in Sustainability. Strong interest in the certificate was indicated in the survey, and enrollment in the certificate has been above expectations. We are confident that we would have similar results.

Based on experience of SENS faculty members who have worked with other water programs, we expect very strong demand for this degree. The M.W.S. will help produce employable graduates that are ready for successful careers in resource management and development sectors, private consultant industries, as well as public management and policy positions. The U of S's Third Integrated Plan notes that "in Canada, Saskatchewan has the lowest percentage of post-secondary education graduates in its workforce, a statistic that needs to change, and that we can help change, as the province develops" (Promise and Potential: The Third Integrated Plan 2012-2016). The M.W.S. will emphasize interdisciplinary research approaches and provide a strong educated workforce for Saskatchewan, Canada, and internationally.

Table 1a: Responses to demand survey

If this degree is offered, would you register for it?

Response	Chart	Percentage	Count
Definitely		3.3%	29
Likely		15.4%	137
Uncertain		28.7%	256
Unlikely		32.8%	292
Definitely not		19.9%	177
		Total Responses	**891**

Table 1b: Responses to demand survey

For which of the following reasons would you register?

Response	Chart	Percentage	Count
My employability would be increased.		44.5%	185
I am interested in the topic.		63.2%	263
I am interested in learning an additional subject beyond my major.		41.1%	171
Other, please specify		5.3%	22
		Total Responses	**416**

Table 1c: Responses to demand survey

For which of the following reasons would you register? (Other, please specify)

#	Response
1.	I definitely want a career in hydrology after completing my degree
2.	It would really help me to have better understanding of microbe in water and safety
3.	Irrigation has been a passion since the development of Lake Diefenbaker.
4.	Easy masters degree
5.	Very important issue that needs more attention
6.	It's a field that really matters to the world and that's appealing.
7.	Cross Curricular training is essential in promoting ecological sustainability
8.	Looking for a program that is relatively quick so I can go right to work
9.	All of these reasons and I think more and more students are interested in this matter, especially with our changing planet and climate change!
10.	Water plays a important role in earth.
11.	Water issues are an imminent issue, and the most impacted will likely be small communities and First Nations communities
12.	I would like to use my not-yet-done undergraduate degree of Geology, and linking it to the contamination and clean-up of water resources.
13.	This masters program addresses serious current issues and could create a solution that would better humanity
14.	I want to do something good for the world!
15.	I want to make a difference in people's lives by ensuring they have access to clean water
16.	to see the different things this type of career path has to offer
17.	Interested in sustaining the Earth
18.	The fact that it is only 1 year long.
19.	This knowledge is badly needed in the World
20.	the direness of the situation and moral obligation as a capable life on the plant
21.	Important to my world values
22.	It’s a interesting area

Table 1d: Responses to demand survey

In which area of focus are you most likely to register?

Response	Chart	Percentage	Count
Surface Water Hydrology		28.2%	185
Groundwater Hydrology		26.9%	177
Socio-Hydrology		44.9%	295
		Total Responses	**657**

Table 1e: Responses to demand survey

Why would you not register in this program?

The 172 responses to this question are summarized below.

Response	Chart	Percentages	Count
Cost barriers		0%	1
Degree does not apply to my career goals		42%	73
Job uncertainty		2%	4
No interest in graduate school		1%	2
Not interested		53%	92

5.2 Comparable Programs across Canada and the USA

No university in Canada nor in the USA (that we are aware of) offers a project-based master's degree in water (Table 2) making this proposed program the first of its kind in North America. This distinction allows us a unique opportunity to anticipate capitalizing on a large market share of the students who are eligible for this type of a program in the North American and the international communities.

In general, no Canadian universities integrate graduate training in water science, water resources engineering and water policy. Instead, existing courses and degree programs in traditional departments and colleges with traditional research-based M.Sc. and Ph.D. degrees are offered in an ad hoc way across a fragmented list of Canadian campuses. Water resources science or management programs are offered in several geography, environmental, earth science and engineering departments nationwide. A number of engineering-based hydrology programs are also offered, aimed mostly at Master's level students. In the social and policy realm, only the University of British Columbia offers a program focused on water governance. One exception is The University of Waterloo which initiated, in June 2012, a "Collaborative Water Program." This is a new research-based interdisciplinary graduate program in water, linked to a Royal Bank of Canada (RBC) gift of $1.75 million to the university. That program will be our greatest competition (http://water.uwaterloo.ca/CWP_program.aspx). However, we see clear differentiation between our proposed M.W.S. program and the Waterloo M.Sc. and Ph.D. degrees as their program has only two courses that students take in water, as a supplement to their department-focused program. These include WATER 601: Introduction to Integrated Water Management (panel presentations and discussions with faculty members and professionals from different disciplines to introduce students to current water-related issues and concerns) and WATER 602: Integrated Water Project (in-depth analysis of

current issues and challenges in water research and management from a variety of perspectives. The purpose of this course is to provide students with an opportunity to collaborate in a multi-disciplinary team to effectively identify issues, challenges, and opportunities to address current water-related problems). Therefore, while the Waterloo program has a water moniker for its degree program, the degree is, in effect, administered by the student's home department with these two course add-ons providing the supplemental title of Collaborative Water Program.

In the USA, research-based M.Sc. and Ph.D. programs exist at several universities, including Oregon State University, the University of California–Davis, Colorado State University, the University of Nevada Reno, the University of Delaware and 60 others (see https://www.cuahsi.org/Posts/Programs, for a complete list) but none, that we are aware of, are project-based master's degrees. We believe that this differentiation and focus on coursework which gives a larger breadth of knowledge, much like an MBA degree in business, will result in a sought-after program and sought-after graduates upon completion.

In terms of anticipated enrollment, similar programs in the USA (e.g., the thesis-based Water Resources Graduate Program at Oregon State University, see http://oregonstate.edu/gradwater/) have progressed from zero to ~40 full-time graduate students within the first five years of creation (2005-2010) and have sustained that to the present time (McDonnell has adjunct status in that program). We have factored into our TABBS forecasting the following growth trajectory: year one - 8 students; year two - 16 students; year three - 24 students; year four - 32 students; year five - 32 students. The program would then be capped at 32 students going forward. We anticipate that, as is the case with SENS itself, graduate students from around the world would be drawn to such a unique, innovative graduate degree program, where these areas are combined under the umbrella of water security. We will fill a niche in the international arena. This new program has the potential to become the destination point internationally for those looking for integrated, comprehensive training.

Table 2: Canadian programs with a water component

	University	Program/Institute Name	Degree Offerings
Alberta	University of Alberta	Civil and Environmental Engineering	MEng, MSc, PhD in Civil and Environmental Engineering with Area of Research in Water Resources Engineering
	University of Calgary	Civil Engineering	PhD, MSc, MEng degrees; specialization in Water Resource Engineering
		Haskayne School of Business, Shulich School of Engineering, Graduate Studies, Law and Environmental Design	MSc in Sustainable Energy and Development
	University of Lethbridge	Graduate Studies	PhD in Biosystems and Biodiversity with concentration in Water resource policy and management; PhD in Earth, Space, and Physical Science with concentration in Water and environmental science
British Columbia	Simon Fraser University	Water Research Group	Master's in resource and environmental management; i.e., not a water focus"
	Thompson Rivers University	School of Trades and Technology	Water Treatment Technology Certificate, Levels I, II, III, & IV; Diploma; Certificate in Water & Wastewater Utilities
	University of British Columbia	Program on Water Governance and Department of Geography	MA, MSc or PhD in Resource Management and Environmental Studies through the Institute for Resources, Environment and Sustainability or MA, MSC or PhD in Geography
		Institute for Resources, Environment and Sustainability	Watershed Management Certificate Program
		Faculty of Land and Food Systems	Master of Land and Water Systems - Land and water conservation and management
	University of Northern British Columbia	Natural Resources and Environmental Studies (NRES)	MA NRES, MSc NRES, MNRES and PhD NRES; no water program

	University of Victoria	Water and Climate Impacts Research Centre	Similar to U of S/NHRC; Graduate degrees offered through various departments, but no clear water program
Manitoba	Brandon University	Geography	BSc in Geography - Water Science Technology with diploma in Water Quality Technology
		Environmental Science	BSc in Environmental Science - Land and Water Management
	University of Manitoba	Watershed System Research Program	Research Program--no specific grad programs
	University of Winnipeg	Economics	Master of Arts in Environmental, Resource and Development Economics
New Brunswick	University of New Brunswick	NSERC CREATE WATER program. Watershed and Aquatics Training in Environmental Research (WATER);	Undergraduate and graduate student scholarships and training with four main components: Field Techniques Certificate, Professional Science Certificate, Integrated Forum (applied solutions to environmental crises), and Research and Skill Exchange
Newfoundland and Labrador	Memorial University of Newfoundland	Marine Institute	Advanced (post-graduate) diploma in Water Quality
Nova Scotia	Dalhousie University	Centre For Water Resources Studies (Faculty of Engineering); STEWARD – Systems Training and Education in Water Assets Research and Development; collaborative NSERC CREATE graduate training program between Dalhousie University and Queen's University	Undergraduate, masters and doctoral student degrees and stipends
	Saint Francis Xavier University	Environmental Science	BSc Advanced Major or Honours in Environmental Sciences - Climate & Water
Ontario	Lakehead University	Water Resource Science	BSc and Honours BSc in Water Resource Science
	McMaster University	Water Without Borders	Collaborative graduate program in water, environment and health between McMaster University and the United Nations University – International Network on Water, Environment and Health (UNU-INWEH) This program is designed to be undertaken alongside a graduate degree program at McMaster University
	Trent University	Water Quality Centre; Institute for Watershed Science	MSc or PhD in Environmental and Life Sciences (formerly known as Watershed Ecosystems)
	University of Waterloo	The Water Institute	15 schools and departments offer M.Sc., M.A., and PhD degrees for graduate research in water science, engineering, and policy
	University of Windsor	Great Lakes Institute for Environmental Research	MSc and PhD degrees in Environmental Science concentrate on studies of large lakes and their watersheds
	Wilfrid Laurier University	Centre for Cold Regions and Water Science	Inter-faculty undergraduate program in water sciences, training BSc students in Biology, Chemistry and Geography in water quantity and quality in the Canadian landscape. No graduate program
Quebec	McGill University	Agricultural and Environmental Sciences; McGill School of Environment	MSc and Graduate Certificate in Bioresource Engineering - integrated water resources management; BSc major in Environment - Water Environments and Ecosystems
	Université du Quebéc - Institut national de la researche scientifique	Eau Terre Environnement Research Centre	MSc In Water Science - Thesis based program (French only)

Saskatchewan	University of Saskatchewan	SENS and Geography and Planning (Centre for Hydrology)	Bachelor's degree with Water Science Minor

5.3 Distinctiveness of the Proposed Program

The M.W.S. does not duplicate nor does it overlap directly with any current program at the U of S campus. As a result, no existing program would need to be deleted as a result of this offering. The M.W.S. proposal intends to create a new innovative program that does not yet exist on campus. The Centre for Hydrology, directed by John Pomeroy in the Department of Geography and Planning, helps facilitate research in the hydrological sciences on campus by offering academic M.Sc. and Ph.D. degrees with a water focus. However, these programs, due to their research focus, limit students to 12 and 6 cu of graduate coursework for a M.Sc. and Ph.D. respectively, while our proposed program requires 24 cu (plus a 6 cu project) of coursework, clearly setting the two programs apart and offering more programing selection to prospective students.

6.0 IMPLEMENTATION

6.1 Expertise of the School

Five out of the seven core courses required for the M.W.S. will be taught or lead by SENS faculty (the other 2 core courses are taught by GEOG and JSGS). The various courses that comprise the three tracks will draw on the expertise of faculty from across campus. This degree program will engage and link faculty and graduate students in an academically rigorous program where students will gain in-depth, disciplinary knowledge and the capacity to link this knowledge to real world problems.

6.2 Environment for Learning

The learning environment for the program will be interdisciplinary with a focus on collaboration and integration of ideas, solutions, and communication between physical, ecological, social and engineering scientists. The program will strive to provide a broad perspective on a large range of water security issues, yet also allow students to hone in on one area and gain an enhanced knowledge base in that field thereby allowing for the development of expertise. The short-term nature of the program (12 months) should allow students an atmosphere of immersion whereby they can focus on the program. Both SENS and the GIWS have stimulating and engaged research groups that are interdisciplinary, innovative, original and collaborative in nature; this will provide an excellent and exciting environment for students to learn and grow professionally.

6.3 Impact and Outcomes of Implementation

The impacts and outcomes from the implementation of this program will work to address the pressing issues for water security faced by Western Canada and other parts of the world where main river basins are experiencing periodic water shortage, rapid economic development, expensive floods/droughts, a rapidly changing climate, rapid population growth, and degraded water quality. To ensure continued aquatic ecosystem health and sustainable economic development of Western Canada, solutions to these complex problems are required. The next generation of leaders must be able to create a community for effective scholar-practitioner relationships across the spectrum of expertise levels that characterize the diverse audiences for water resources information. These leaders also need to be able to effectively work in teams to coproduce knowledge. Through the combination of core courses and the electives

available in the three track options, graduates from the M.W.S. program will possess integrated knowledge, and will be ready to fill the demand for a technically qualified workforce.

6.4 Program Governance and Departmental Co-operation

The program will be run as a stand-alone degree program through SENS and will be managed by a Program Coordinator. Initially, this post will be filled by Dr. Andrew Ireson. The Program Coordinator will be given an annual 3 cu course release to lead this program. One sixth of the Program Coordinator's salary will be covered by the incremental revenue generated by the program. Dr. Ireson is committed to the Program Coordinator position until 2017/18 when he will be eligible for sabbatical leave.

Given the proposed university-wide faculty involvement in course content and delivery, we will embed within the terms of reference of the program the ability for non-SENS faculty taking part in the M.W.S. to vote for changes and updates in the program. Consequently, the M.W.S. Management Team, consisting of the Program Coordinator, Program Manager and Graduate Secretary will be chaired by the Program Coordinator and be advised by a Program Committee, comprised of three SENS faculty members teaching in the program and three faculty members (one each from Geography and Planning and Civil and Geological Engineering, and one annually rotating position from other participating departments as part of their regular assignment of duties).

Program Governance Structure

The M.W.S. will have a core management team comprised of the Program Coordinator, Program Manager, Graduate Secretary, and be advised by the Program Committee.

The Program Coordinator position will be filled by a SENS faculty member. This position will be responsible for promoting, championing, and directing the academic aspects of the program, assuring balance and relevance between current academic and practical research. The Program Coordinator will be the team lead for the core management team, and will work closely with the Program Manager regarding the day to day operations of the program. The Program Coordinator will also serve as the Program Committee's Chair, organizing, scheduling and participating in the Program Committee meetings.

The Program Manager position will be an ASPA Managerial Phase 2 position. This position will be responsible for day to day administration of the program; coordinating and assisting with student/project matches; coordinating student space; leading domestic, international and Aboriginal student recruitment; liaising with participating faculty and units that will have courses included in the program. This position will assist the Program Coordinator with the vetting of student applications for appropriate background and fit. The Program Manager will also be the liaison between program operations and administration and the Program Committee, ensuring the Committee's academic directions are being implemented. The overall intent of this position is to run the program, with oversight from the Program Coordinator.

The Graduate Secretary position will be a CUPE 1975, Operational Services (Research Clerical Assistant) Phase 4 position. This person will report to both the Program Coordinator and the SENS Administrative Officer for day to day concerns and coaching that may be needed. Typical duties for this position will include general reception, responding to requests for information, processing mail, and preparing forms; arranging meetings for the Program Committee; taking minutes; assisting with the organization of special events and guest speakers; assisting prospective students with applications and enrollment questions and subsequently processing forms and maintaining student records; class builds and the submission of grades; preparing materials for different stages of student graduate programs, including registration, progress reports, leaves of absence, and final defence and convocation; and other related duties as assigned.

The Program Committee will be comprised of 6 faculty members, 3 SENS faculty members teaching in the program and three faculty members from other participating units. The Program Committee will be chaired by the Program Coordinator. The Program Committee will guide the academic direction of the program and ensure the overall success of the program and that all participating units have their voices heard. The M.W.S. Program Committee will recommend prospective students directly to the SENS Admissions and Awards Committee.

Program Coordinator/Program Manager

- Student selection – vetting student applications to ensure appropriate prerequisites and requirements.
- Student advising – helping students to select appropriate courses for their track of choice and assuring that students meet all course-related criteria for the degree.
- Faculty supervising – assign faculty advisors to oversee each student for their 6 cu final projects.
- Evaluation of projects – coordinating the evaluation process for all projects, including coordination between the faculty advisor, project constituent and the Program Coordinator.
- Student performance – ensuring students are succeeding in the program, troubleshooting where necessary to keep students on track.
- Report to the Graduate Chair/SENS Equity Advisor –reporting annually on the number of Aboriginal students, visible minorities and women in the graduate program.
- Program reports – reporting monthly to the SENS faculty council on the status of the program.
- Program Committee Chair – Chairing, organizing and scheduling regular Program Committee meetings.
- Program evaluation – providing reports and overall program evaluation to meet SENS reporting needs.

Program Committee

- Program assessment – ensuring the overall success of the program by facilitating the realization of the vision and goals of the program.
- Student admissions – approving student admissions annually.
- Program completion – approving student program completion and graduation.
- Student grievance – the Program Committee will be the first place to evaluate student grievances that are beyond the Program Coordinator's ability to resolve alone.
- Course selection –voting on core course replacement and having an equitable say in the selection of pre-prescribed electives for each track that will then go before the Academic Planning Committee for approval.
- Program growth –actively overseeing the growth and evolution of the M.W.S program (assessing the appropriateness of student numbers, additional tracks, administration needs, etc.).

6.5 Commitment to Equity

The M.W.S. will follow the SENS commitment to access and equity including:

To provide moral and social support to M.W.S. students and to enhance the feeling of belonging and participation in the activities in the M.W.S. program, various initiatives will be undertaken on an ongoing basis. These initiatives include, but are not limited to, an orientation process for new students

(this may be participation in the current SENS orientation); the nurturing of a graduate student association for the M.W.S.; annual meeting of all graduate students with the Graduate Chair on issues of interest; inclusion of a graduate representative on the Graduate Affairs Committee; and inclusion of graduate students in all departmental activities.

The M.W.S. Program Coordinator will report to the SENS Equity Advisor on annual basis the number of Aboriginal students, visible minorities and women in the graduate program. The SENS Equity Advisor will then pass that information on to the CGSR Employment and Education Equity Committee.

The M.W.S. program will endeavor to meet any special needs of persons in designated groups, including those regarding alternate scheduling of classes, part-time or full-time status, time limits for program completion and residency requirements; and, the M.W.S Program Coordinator will facilitate the accommodation of any special needs that students with disabilities who apply and are accepted into the M.W.S. program may need.

6.6 Program Resources: New Courses and Faculty Resource Requirements

We envision leveraging incremental revenues from the TABBS model that are generated by the increase in student numbers and credit hours to provide the necessary funding structure to cover required administrative support for program delivery as it evolves. We will require an up-front "investment" or "loan" to launch the program with the intention of paying this investment off over time as the program grows. We will use the current SENS faculty structure to launch the program. Additional administrative resources will be needed to handle the increase in student applications. Resources for marketing and communication will be needed, as will staff time to develop and implement materials for outreach (website, brochures, etc.). Costs will be incurred to accommodate the creation of new office space in Kirk Hall for new students. New students will be physically housed in Kirk Hall with SENS Master of Sustainable Environmental management students.

6.7 Faculty

The M.W.S. faculty will include core SENS faculty and existing faculty involved across the many facets of water-related research across campus.

6.8 Student Funding

Students in professional, project-based programs are typically self-funded. However, in the budget and TABBS modeling for the program, five scholarships at $1,500 each have been included.

6.9 Administrative and Support Staff

We will budget for a full-time Graduate Secretary who will begin in year one and will be located in Kirk Hall so that M.W.S. students have access to this support person. Also in year one, a new half-time Program Manager will begin and this position will be located in the GIWS at the National Hydrology Research Centre (NHRC). The Program Manager will be directly supervised and managed by the Program Coordinator. The Graduate Secretary will be supervised by the Program Coordinator (NHRC) and the SENS Administrative Officer (Kirk Hall).

6.10 Space and Equipment

Student office space will be provided by SENS in Kirk Hall. Each student will be provided a desk and small space where they can keep personal items and work outside of class hours. Student space is an important aspect of building community and enables students to interact in a cooperative and interdisciplinary way. This sense of belonging and collaboration is an important goal of the M.W.S. program in terms of learning environment. We will need to have sufficient space available to accommodate the estimated increase in student numbers, based on the above noted growth trajectory up to year 5 when we expect to reach our carrying capacity. Office space for the Graduate Secretary (beginning in year 1) will

be made available in the SENS general office space (Room 323, Kirk Hall). Renovation costs to accommodate this change have been included in the budget. The Program Manager (beginning in year 1) will be housed in the GIWS space at NHRC and again rental and renovations cost have been accounted for in the budget.

No program-level funding is requested, nor is any budgeted for equipment or special needs. All specialized equipment required for project research will be met by faculty participating in the program.

6.11 Other Resources

There are no anticipated additional expenses for library resources, with the exception of individual requests made by participating faculty.

Funds for launching the program will be budgeted into the TABBS model. Funds will be needed for student recruitment, website development and execution of an advertising campaign. There may also be need for extra personnel resources with regards to program launch.

6.12 Budget for the M.W.S.

Salary and Benefits

It is anticipated that a full-time graduate secretary, at $55,000 per year, and a half-time Program Manager ($45,000), will be hired in Year 1. One sixth of the Faculty Coordinators' salary (~$20,000) will be paid by program starting in Year 1. In addition, $27,000 per year has been budgeted to cover general program support costs (printing, administrative support, etc.) to the Global Institute for Water Security.

Non-Salary Expenditures

Annual general operating costs in Year 1 are projected to be $10,000, which will largely be used for promotional purposes. The anticipated increase to general operating costs is $5,000 per year. New office space will be required for staff and students, which will cost $8,180 (Yr. 1), $8,314 (Yr. 2), $4,752 (Yr. 3) and $4,895 (Yr. 4). Five scholarships of $1,500 per scholarship are included in the budget.

Incremental Projected Impact on TABBS Model:

Assumptions of the TABBS modeling include: Instruction by SENS – 54.5%; home of the supervisor is half SENS and enrollment of students is 100% SENS. The anticipated student count is outlined in the table below:

Table 3: Anticipated student count

Year	# of Students	International	Domestic
1	8	3	5
2	16	5	11
3	24	8	16
4	32	11	21
5	32	11	21

Based on the above budget and assumptions, the TABBS model incremental surpluses for Years 1- 5 are $178,367, $373,200, $573,825, $773,522 and $772,665, respectively. Reducing these amounts by the direct budgeted costs, the projected net incremental surpluses in Years 1-5 are $5,187, $149,886, $348,847, $5535,902 and $529,665, respectively.

It is important to note that the Instruction Operating Grant is a notional reallocation of grant revenue based on the assumption that all else remains equal. Therefore, any changes in activity from other units

and/or in the annual operating allocation received from the Province will cause variances in the projections presented.

In addition to the tuition revenue shown on the SENS' TABBS modeling, other units will also realize the benefits of this additional tuition. This will be in Years 1 to 5, approximately, $18,560, $36,140, $54,700, $73,260 and $73,260, respectively.

Table 4: Incremental projected impact on TABBS model

School of Environment and Sustainability

Incremental Projected Impact on TABBS Model: New Graduate Water Security Degree

	2015/16	2016/17	2017/18	2018/19	2019/20	Total
Operating Grant						
Instruction	189,283	378,188	566,716	754,869	754,869	2,643,925
Research						0
Targeted Funding						0
Directed Funding						0
Tuition						
Undergraduate - Enrolment						0
Undergraduate - Instruction						0
Graduate - Enrolment	25,517	49,691	75,208	100,724	100,724	351,864
Graduate - Instruction	6,959	13,552	20,511	27,470	27,470	95,962
Graduate - Supervision	12,758	24,845	37,604	50,362	50,362	175,931
						0
Total Incremental Revenues *	**234,517**	**466,276**	**700,039**	**933,425**	**933,425**	**3,267,682**
Research Support				0	0	0
General Student Support	18,003	35,994	53,975	71,943	71,943	251,858
Graduate Support	9,306	18,572	27,798	36,982	36,982	129,640
Faculty/Staff Support	9,567	9,567	9,567	9,566	9,566	47,833
General Occupancy	3,209	6,417	9,625	12,832	12,832	44,915
Utilities	1,127	2,253	3,380	4,507	4,507	15,774
Caretaking	1,160	2,320	3,481	4,641	4,641	16,243
Leases						0
Health Sciences						0
General Support	13,778	17,953	18,388	19,432	20,289	89,840
						0
Total Incremental Expenses	**56,150**	**93,076**	**126,214**	**159,903**	**160,760**	**596,103**
TABBS Model Incremental (Deficit)/Surplus	**178,367**	**373,200**	**573,825**	**773,522**	**772,665**	**2,671,579**
Projected Incremental Direct Operating Expenses						
Projected Additional Direct Expenses						0
1/6th faculty - co-ordinator - estimate only	20,000	20,000	20,000	20,000	20,000	100,000
Program manager	45,000	90,000	90,000	90,000	95,000	410,000
Graduate secretary	55,000	55,000	55,000	60,000	60,000	285,000
Annual operating costs	10,000	15,000	20,000	25,000	30,000	100,000
GIWS office support	27,500	27,500	27,500	30,000	30,000	142,500
Scholarship	7,500	7,500	7,725	7,725	8,000	38,450
Office renovations	8,180	8,314	4,753	4,895	0	26,143
Total Incremental Direct Operating Expenses	**173,180**	**223,314**	**224,978**	**237,620**	**243,000**	**1,102,093**
Net Incremental Projected Surplus/(Deficit)	**5,187**	**149,886**	**348,847**	**535,902**	**529,665**	**1,569,486**

If only realize 50% of operating grant allocation	(89,455)	(39,208)	65,489	158,467	152,231	247,524

15-Jan-15

Table 5: TABBS modelled output

School of Environment and Sustainability
New Graduate Water Security Degree
(modelled similar to MSEM)

	# students	Intern'l	Domestic	Annual costs	stipends	Scholarship	GIWS office support	operating total	# of offices	sq.m.	$60 $380/student Office Renovations		Faculty		CUPE Grad. Secretary		ASPA Program manager	
Yr. 1	8	3.0	5.0	10,000	15,000	7500	27500	60,000	2	32	8,188		16.67%	20,000	1	55,000	0	0
Yr. 2	16	5.0	11.0	18,000	15,000	7500	27500	66,000	4	64	8,314	3%	16.67%	20,800	1	55,000	1	60000
Yr. 3	24	8.0	16.0	20,000	15,000	7725	27580	70,225	6	96	4,751	8%	16.67%	20,800	1	55,000	1	60000
Yr. 4	32	11.0	21.0	25,000	15,000	7725	96000	77,725	8	128	6,895	3%	16.67%	20,800	1	60,000	1	65000
Yr. 5	32	11.0	21.0	90,000	15,000	8000	36000	85,000	8	126	0		16.67%	20,000	1	60,000	1	65000
											26,143							

Tuition		
Domestic		7,236
International		10,896

Yr 1	68,868
Yr. 2	134,076
Yr. 3	202,944
Yr. 4	271,812
Yr 5	271,812

Instruction SENS 54.5%
Instruction Other 45.5%

Home of supervisors 1/2 SENS; 1/2 by other Units

Enrolment of Students - 100% SENS

Kirk Hall Renovations		
desk	90	
chairs	390	
cabinet	30	(1 cabinet for 4 students $120/4)
phone installa	50	
	560	
GIWS renos	3,510	per student
Plus YR. 1	3,700	main office renos.
Plus Yr 2	3700	Program manager's office

Oct 27, 2014

6.13 Calendar Entry

Degree Offered: M.W.S. (Master of Water Security)

The Master of Water Security (M.W.S) is a cross-disciplinary project-based program that focuses on a holistic approach to water security. The program requires 24 credit units of course work and a 6 credit unit project.

7.0 DESCRIPTION OF THE MASTER OF WATER SECURITY (M.W.S.)

7.1 Goal and Learning Objectives

The mission of the University of Saskatchewan's M.W.S. degree program will be to train the next generation of water scientists, engineers, managers and policy-makers to tackle the complex and multidisciplinary water problems of the future. Our vision is to be the best program of its kind in Canada, with strong course content and high expectations for scholarship. We expect that graduates from the M.W.S. program will be job-ready for positions in consulting and government sectors and will also be able to go on to PhD programs, at the U of S or elsewhere.

In line with Graduate Studies and Research Policies on degree-level Learning Outcomes, the M.W.S will be configured as follows:

- The degree will be at least one full year in length (12 months).
- Within the scope of a professional-oriented Master's degree, graduates will have a good understanding of current issues and methods in their chosen discipline, and will be capable of applying this understanding in practical or professional contexts.
- As a project-based Master's degree, the program will provide graduates with a broader background in the field of study, with a much greater dependence on coursework. Aside from research activities embedded within the coursework there will be less focus on preparing students to conduct independent study and research.
- A project-based Master's program includes at least 30 credit units of course work with at least 24 credit units completed at the graduate level.

7.2 Application and Admission Requirements

The program is designed to allow students to complete all requirements within 12 months of full-time intensive study.

Applications will be vetted by the Program Coordinator and selected by the Program Committee on the basis of academic potential, as demonstrated by academic credentials, letters of reference and past experience and scholarly contributions. Intake into the program will be in September and will align with the U of S academic calendar. The deadline for consideration of applicants for admission will be January 15 each year.

Applicants will be required to:

Complete the online application and send the following to the M.W.S. Program Coordinator in the School of Environment and Sustainability:

- Two official copies of academic transcript(s): photocopies are fine at the time of initial application.
- Three letters of recommendation, with at least one from a professor familiar with your scholarly work.
- A curriculum vitae or resume.
- A brief synopsis (approximately 1-3 pages in length) outlining the reason for undertaking advanced study, relevant research interests, academic preparations to date and career goals. This synopsis must include a statement about the broad area in which the project may be conducted

and should also describe how the student's interests are congruent with the aims of the School and the program.

- Applicants from a university where English is not the primary language of instruction must provide proof of proficiency in oral and written English. They must comply with the regulations of the College of Graduate Studies and Research.

All forms for the application process are available from the College of Graduate Studies and Research Office, Room 180 College Building, or the College of Graduate Studies and Research website at: www.usask.ca/cgsr. All applications are subject to a $90 non-refundable application fee and applications will not be considered complete until the fee is paid.

Application documents are to be directed to:

M.W.S. Program Coordinator
School of Environment and Sustainability
University of Saskatchewan
Room 323, Kirk Hall
117 Science Place
Saskatoon SK Canada S7N 5C8

To be admitted as a fully qualified M.W.S. student, a student must have the equivalent of a University of Saskatchewan four-year Bachelor's degree, with a grade point average of at least 70% over the last 60 credit units (or equivalent) completed. In some cases, students with less than these minimum requirements may be admitted on a conditional or probationary basis. Students from a wide variety of disciplines – e.g., ranging from the arts and social sciences to the life and physical sciences, pure and applied – will be eligible. Prospective students should be aware that their ability to succeed in the program is based upon a good match between their background education and their current track of interest. Students with a backgrounds in geology, physical geography, ecological biology, toxicology, physics or environmental/earth science, agricultural science or civil engineering would be eligible to apply for the Hydrology or Hydrogeology tracks, while students who possess a background in human geography, law, policy, sociology, psychology, native studies, economics, philosophy or political science would be best suited for the Socio-Hydrology track.

Students may be admitted on a conditional basis if they require additional courses to correct specific deficiencies in their background training, but otherwise meet the requirements for admission. These courses will not be credited toward the graduate degree requirements, but may be taken concurrently with graduate courses taken toward those requirements. Once the specified courses have been successfully completed, the student will be recommended for fully-qualified status.

Students may be admitted on a probationary basis if their academic qualifications are difficult to assess or do not meet standards for admission. Students in this category will be assigned courses as specified by the Program Coordinator, which will form the basis for assessment of ability to continue as fully-qualified.

7.3 Aboriginal Student Recruitment

The M.W.S program strives to work with Aboriginal students and their communities. After reaching out to the University's Aboriginal Initiatives group, we were put in contact with the International Centre for Northern Governance and Development. This group was able to recommend that the program be promoted amongst First Nations peoples in Saskatchewan by contacting the postsecondary directors or coordinators for each First Nation in the province. It is also our intention to promote the program with the Education Directors for the Federation of Saskatchewan Indian Nations and the Tribal Councils through the process of program launch and as a part of the program recruitment efforts.

In addition to promoting the program to Aboriginal students, the M.W.S. program would like to incorporate Aboriginal community research questions into the 6 cu final projects. This goal could be facilitated through collaboration with initiatives such as the Canadian Water Network project called "Nipiy Network: A Community Driven Process for Water and Wastewater Management," which is working with students at James Smith Cree Nation to examine community needs related to water and developing strategies for creating change through student-driven projects. SENS is also currently working on a Memorandum of Understanding with the Beardys-Okemaskis First Nation on water issues in their community and this would represent an excellent opportunity to address Aboriginal issues and collaboration with the community. Our project goals could also be realized through collaboration with other groups such as the forthcoming Indigenous Peoples Initiatives with the College of Engineering and the Indigenous Peoples Resource Management Program within the College of Agriculture and Bioresources; both groups have expressed interest in working together once the program is initiated.

7.4 Tuition Fee Structure

Tuition fees for the M.W.S. will be set at the current MSEM tuition rate ($7,263 for domestic and $10,894.50 for international students as of Sept. 1, 2014, subject to change). The MSEM rates are very competitive with other professional master's degrees with an environmental focus, ranging from $4,467 to $12,655 for domestic students at Universities of Dalhousie and Western Ontario, to $9,089 to $31,400 for international students at the Universities of Toronto and Western Ontario respectively. Our competitive mid-range tuition rate makes our program very attractive given the high quality of our faculty, excellent student experience, and program focus.

7.5 Curriculum and Modes of Delivery

As per the College of Graduate Studies and Research guidelines, graduate students will be required to take 24 credit units of coursework and complete a research project (6 credit units) for a total of 30 credit units to complete their degree program.

The program will have three degree tracks: Hydrology, Hydrogeology and Socio-Hydrology. Each student must choose one track within which to specialize.

7.6 Course Structure

The Master of Water Security (M.W.S.) is a cross-disciplinary, project-based, professional-style program that can be completed in 12 months of full-time study. Students enrolled in this program will be required to complete 30 cu as follows: 15 cu of core (required) courses, 9 cu of prescribed electives, and a 6 cu research project and ENVS 990. This program is intended to provide prospective and current environmental practitioners with a post-graduate learning opportunity in water security.

Core Courses and Restricted Electives

All students will be required to take six core courses (15 cu):

1. **ENVS 806.3:** Field Skills in Environment and Sustainability, to be offered annually
2. **ENVS 827.3**: Breakthroughs in Water Security Seminar, which will be offered each year
3. **ENVS 821.3:** Sustainable Water Resources
4. **ENVS 990.0**: Seminar in Environment and Sustainability offered annually
5. **JSGS 870.3:** Water Policy in an Age of Uncertainty.
6. **GEOG 427:** Advanced Hydrology that is offered every year. This course's content will be modified to accommodate accessibility to both science and non-science students.

The remaining credit units will be made up of the 6 cu project and 9 cu of course work from the restricted electives for each track (Table 3). The restricted electives are subject to change as courses are added,

removed or as students interests warrant. Also, not all elective courses may be offered every year. The Program Coordinator will advise students with respect to elective selection, to ensure that students possess the required pre-requisite knowledge to enable them to be successful. Students will be required to select elective courses from those offered in their track of choice (9 cu). Students will be allowed to choose up to one elective (3 cu out of the 9 cu) from another track with consultation and approval from the Program Coordinator. The Program Coordinator will also liaise with all academic units contributing courses to the M.W.S. to ensure that courses have adequate capacity to accommodate students in the M.W.S. program. Four of the six core courses are guaranteed to be offered annually. SENS will work to create redundancy in the needed teaching areas. In the event that core courses from an outside unit are not available due to leave/sabbatical, the replacement for those classes will be chosen by the Program Coordinator and approved by the Program Committee from either the restricted electives or from new courses that are considered suitable. All changes to the core course structure will be submitted CGSR for approval.

Table 6: The M.W.S. proposed degree course structure

Term	Term 1	Term 2	Spring & Sumer Term 1	Total credit units (CU)
Credit Units	**12 CU**	**12 CU**	**6 CU**	**30 CU**
	***ENVS 990.0:** Seminar in Environment and Sustainability [not for credit]	***ENVS 990.0:** Seminar in Environment and Sustainability [not for credit]	***ENVS 992.6: Research Project** [May-Aug]	
	***ENVS 806.3:** Field Skills in Environment and Sustainability [Morrissey, Jardine & Kricsfalusy]	***ENVS 821.3**: Sustainable Water Resources [Baulch]		
	***ENVS 827.3**: Breakthroughs in Water Security Research/ Seminar [McDonnell]	***JSGS 870.3**: Water Policy in an Age of Uncertainty [Gober]		
	***GEOG 427.3** Advanced Hydrology [Kinar]	**2x Track specific courses**		
	1x Track specific course			

***Core courses required by all students**

Table 7: Restricted track specific electives

Electives Term 1		
Hydrology Track	**Hydrogeology Track**	**Socio-Hydrology Track**
ENVS 824.3: River Science and Management [Lindenschmidt & Jardine]	**GEOE 412.3:** Reservoir Mechanics [Hawkes]	**JSGS 807.3:** Statistics for Public Managers [Gober]
ENVS 898: Climate Change [Li]	**ENVS 898:** Climate Change [Li]	**JSGS 863.3:** Aboriginal Peoples and Public Policy [Coates]
CE 464.3: Water Resources Engineering [Elshorbagy]	**CE 898.3:** Water Resources Development [Elshorbagy]	**ENVS 807.3:** Sustainability in Theory and Practice [Baulch & Loring]
CE 898.3: Water Resources Development [Elshorbagy]	**SLSC 821.3:** Soil Physics [TBA]	**ENVS 811.3:** Multiple Ways of Knowing in Environmental Decision-Making [Barrett-on Sabbatical]
		CHEP 802.3: Community and Population Health Research Methods [Engler-Stringer]
		BPBE 430.3: Natural Resource Economics [Belcher]

Electives Term 2		
Hydrology Track	**Hydrogeology Track**	**Socio-Hydrology Track**
ENVS 805.3: Data Analysis and Management [Ireson & TBD]	**ENVS 805.3:** Data Analysis and Management [Ireson & TBD]	**ENVS 805.3:** Data Analysis and Management [Ireson & TBD]
ENVS 823.3: Chemicals in the Environment [Jones]	**GEOE 475.3:** Advanced Hydrogeology [Ferguson]	**ENVS 823.3:** Chemicals in the Environment [Jones]
ENVS 825.3: Water Resource Management in Cold Regions [Lindenschmidt]	**GEOG 328.3:** Groundwater Hydrology [Westbrook]	**ENVS 825.3:** Water Resource Management in Cold Regions [Lindenschmidt]
CE 840.3: Surface Hydrology Prediction and Simulation [Elshorbagy]	**GEOL 413.3:** Aqueous Geochemistry [Hendry]	**PUBH 815.3:** Water and Health [Bharadwaj]
CE 415.3: Structures for Water Management [TBA]	**ENVS 813.3:** Numerical Modeling [Ireson]	**RRM 312.3:** Natural Resource Management and Indigenous Peoples [TBA]
GEOG 827.3: Principles of Hydrology [TBA]	**CE 850.3:** Geoenvironmental Engineering Fundamentals [Barbour]	**ENVS 832.3:** Risk Assessment and Negotiation of Environmental Issues [Hecker] Compressed Course Nov. Start
ENVS 813.3: Numerical Modeling [Ireson]		
TOX 843.3: Environmental Chemodynamics [Jones]		

7.7 Residency Requirements

Residency in the program is considered fulfilled when all requirements are met.

7.8 Supervisory Responsibilities

The Program Coordinator will serve as the advisor for the M.W.S. program. Each student will be assigned a Faculty Advisor at the beginning of the program who will mentor the student, ensure that the student completes the necessary program forms, and assists the student in establishing and completing a suitable research project.

7.9 Program of Studies

At the beginning of the program, the student's Faculty Advisor will be assigned by the Program Coordinator to work with the student to develop a program of studies. This program will indicate the type of study to be undertaken, courses, and other requirements. The program of studies must be approved by the Program Coordinator within the first four months of the program. Any changes made to the program of studies must be approved by the Faculty Advisor and the Program Coordinator and must be recorded in writing.

Students in the M.W.S. program must achieve a grade of at least 60% in all graduate courses required for the degree and maintain an overall weighted average of at least 70% in those courses. If the student fails to meet this standard, the Program Coordinator and Program Committee will assess the student's performance and determine an appropriate course of action. The student may be permitted to re-take a course or undertake other remedial work if, in the opinion of the Program Coordinator, the overall performance of the student was otherwise satisfactory. If this is not the assessment of the Program Coordinator, the Program Committee will recommend that the student discontinue.

7.10 Project

The project provides 6 credit units toward the required 30 credit units. Students must prepare a short, two-page statement about their research project which must be approved by the Faculty Advisor and Program Coordinator. This statement must be submitted at least one month prior to the beginning of project work. Students are also responsible to ensure that any ethics requirements for the project are met prior to beginning work on the project and must indicate the status of the ethics review in their project statement. Any changes to the project must be approved by the Program Coordinator prior to being undertaken.

Projects will be undertaken in the first Term of the Spring and Summer Session and may take a variety of forms including a modeling exercise, a case study or evaluation of a management practice or system. Students will present written and oral reports on their project to their peers and faculty members. The final written presentation includes an abstract and introduction with background and rationale for the project, a literature review, some original analysis or assessment and conclusions. Project reports are limited to 50 pages exclusive of references, appendices and front matter.

The Faculty Advisor will review the project report and give feedback to the student. Normally, the advisor will not review the project report more than once before it is submitted for grading. Once submitted, the project report is graded by the advisor and a second reader selected by the Program Coordinator or the Faculty Advisor. The grade for the final report is arrived at by consensus of the two markers. If the two cannot come to consensus, the grade of the two markers is the average of their assessments.

A bound copy of the final report is required to be submitted to SENS. M.W.S. students will participate in the SENS symposium day, held annually with posters as per the MSEM students.

7.11 Ethical Approval to Conduct Research

The University of Saskatchewan follows the national standards outlined by the *Tri-Council Policy Statement - Second Edition: Ethical Conduct for Research Involving Humans* and the *University Policy for Research Involving Human Participants* and the *University Research Integrity Policy*. Additional guidance is also provided by the Agreement on the Administration of Agency Grants and Awards by Research Institutions.

All research that involves living human subjects or the use of human tissue from subjects, living or not, requires review and approval by the REB according to the guidelines set out therein. This includes coursework in undergraduate or graduate studies.

The official website of the U of S Ethics Office (http://www.usask.ca/research/ethics_review/) has complete and current information.

Students may also require research permits before research or field work can commence. Obtaining and meeting the requirements of these permits is the responsibility of the graduate student. Students who work with animal research with potential environmental impacts, and/or in parks or protected areas are also responsible for obtaining the necessary permits or permissions before undertaking their research.

8.0 ACKNOWLEDGEMENTS

The School of Environment and Sustainability and the Global Institute for Water Security would like to acknowledge the expertise and support of many faculty members and administrative personnel who have helped develop the ideas contained in this proposal. We would also like to thank the many schools, departments and units who have allowed us to incorporate their courses in to this new and exciting program. Special thanks go to Cherie Westbrook for the use of the table of Canadian universities with programs in water, Kate Wilson for early drafts of the proposal and final editing and to Kim Janzen for the composition and management of the proposal, as well as the creation and deployment of the student demand survey.

School Statement

Please provide here or attach to the online portal, a statement from the School which contains the following:

- □ Recommendation from the School regarding the program
- □ Description of the School process used to arrive at that recommendation
- □ Summary of issues that the School discussed and how they were resolved

Related Documentation

At the online portal, attach any related documentation which is relevant to this proposal to the online portal, such as:

- □ Excerpts from the College Plan and Planning Parameters
- □ SPR recommendations
- □ Relevant sections of the College plan
- □ Accreditation review recommendations
- □ Letters of support
- □ Memos of consultation

It is particularly important for Council committees to know if a curriculum changes are being made in response to College Plans and Planning Parameters, review recommendations or accreditation recommendations.

Consultation Forms At the online portal, attach the following forms, as required

Required for all submissions:	□ Consultation with the Registrar form
Required for all new courses:	□ Course proposal forms
	□ OR Calendar-draft list of new and revised courses
Required if resources needed:	□ Information Technology Requirements form
	□ Library Requirements form
	□ Physical Resource Requirements form
	□ Budget Consultation form

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APPENDICES

A. Letters of Support

From: Brown, Bill
Sent: Thursday, September 18, 2014 1:52 PM
To: McDonnell, Jeffrey
Subject: RE: Graduate Program Proposal

Hi Dr. McDonnell:

I circulated your email and attachment to the Department faculty and got several responses. The answer to your first 2 questions: (1) to see if there are any implications for enrollments of which I am not aware; 2) to see if there are any tacit prerequisites of which I should be aware;) were negative. The support for the program from the faculty was not unanimous. Concern was raised that there is no economics in the program. Economics is the social science concerned with allocating scarce resources and water is and will be a very scarce resource. Secondly, there was concern about including a 300 level undergraduate course in the program and University rules state that only two 400 level courses are allowed without special permission.

However, in general, the faculty of the Bioresource Policy, Business and Economics Department supports the School of Environment and Sustainability's course based master's degree in water security.

Bill Brown Professor and Head

Bioresource Policy, Business and Economics

From: de Boer, Dirk
Sent: Monday, September 22, 2014 1:59 PM
To: McDonnell, Jeffrey
Subject: RE: Graduate Program Proposal

Dear Jeff,

This looks to be a wonderful program. As a one-year professional program, I think this will draw a new group of graduate students to the U of S that otherwise would not consider enrolling into a graduate program.

Regarding your questions:

1) We do not foresee any problems with enrollment in the courses indicated below. We will have to work out some of the details of teaching GEOG 427.3 and GEOG 827.3, but we will work with you to ensure that students who need these courses will be able to take them.
2) The prerequisites for the courses are as follows:
    a. GEOG 328.3 - GEOG 225; or 12 credit units of GEOL.
    b. GEOG 427.3 - One of MATH 110 or MATH 112 or MATH 125 or MATH 123; one of PHYS 115 or GE 124; GEOG 225
    c. GEOG 827.3 – Nothing indicated in the calendar

    In all likelihood, anyone with a four year B.Sc. in the geosciences probably would have those prerequisites. We can also waive prerequisites if there is a good case to be made based on education and work experience, so that is always an option.
3) I have conferred with my colleagues in the Department in Geography and Planning who have research and teaching interests in hydrology, and we wholeheartedly support this program proposal. Our view is that it is complementary to our research-based M.Sc. and Ph.D. programs, and that having both a course-based Master's and research-based M.Sc. and Ph.D. programs will make the University of Saskatchewan the place to go to for graduate studies in hydrology. We look forward to helping this program thrive.

Best wishes,

Dirk de Boer

Professor and Head

Department of Geography and Planning

From: Merriam, James
Sent: Friday, September 19, 2014 4:43 PM
To: McDonnell, Jeffrey
Subject: RE: Graduate Program Proposal

Dear Jeff,

I have had a chance to talk to both Jim Hendry and Matt Lindsay regarding GEOL 413.3 Aqueous geochemistry as a component in the proposed Masters in Water Security. The reason for including Matt in the discussion is that he would be the likely successor to Jim Hendry when Jim retires.

Currently Jim offers the course every second year, Matt might think about doing it every year when he takes over. Adding your students to the mix would probably encourage an every year delivery. Enrollment in that class is currently variable and manageable, so I see no difficulty in adding a contingent from water security.

I hope your proposal is successful and I look forward to working with you.

Best wishes

Jim Merriam

From: Van Rees, Ken
Sent: Monday, September 15, 2014 7:58 AM
To: McDonnell, Jeffrey
Subject: Re: Graduate Program Proposal in Water Security

Hi Jeff

I have talked with Bing Si and he looks forward to having students from your program taking his class. There are no enrolment restrictions or prerequisites for the soil physics course in the Department of Soil Science. Thus our Department is very supportive of your proposal for the master's degree in water security and we look forward to hearing about its approval.

Cheers,
Ken

Ken Van Rees, RPF

Acting Head, Department of Soil Science

Director, Centre for Northern Agroforestry and Afforestation 51 Campus Drive

University of Saskatchewan
Saskatoon, Saskatchewan Canada S7N 5A8

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www.kenvanrees.com

From: Wegner, Leon
Sent: Monday, September 15, 2014 4:54 PM
To: McDonnell, Jeffrey
Subject: RE: Graduate Program Proposal

Jeff:

I received input from all the instructors and our undergraduate chair. Our department is certainly supportive of the proposed program and we are willing to have our courses listed as electives for the program. I should note, though, that a number of our undergraduate courses are near capacity, and this could become an issue in some years. The graduate courses, however, are open to students from outside the department, and your students would only require the approval of the instructor to register. Our faculty also expressed the importance of having SENS courses open to graduate students in our programs.

With regard the undergraduate courses identified [CE 415, CE 464 (note correction from 463), GEOE 412 and GEOE 475 (note corrections from GEOGE)] and your first two questions [1) implications of enrollments and 2) prerequisites]:

- As I mentioned, enrollment capacity in some courses might be an issue in some years. This year, some of these courses are at or near their limit with our own students. In previous years we could have easily accommodated 5 additional students.
- There are no tacit prerequisites, but the prerequisites and corequisites listed for these courses must be met (or the prior learning they represent).

Some course specific comments:

CE 415: Structures for Water Management

Prereq CE 315 Fluid Mechanics and Hydraulics (taken) Enrollment limits have been met in some years

CE 464: Water Resources Engineering

Preq CE 315 (Taken) or BLE 431 (taken, no longer offered) and GE 348 (taken); CE 319 This course is at capacity this year, but had room in previous years.

A graduate version of this course (with shared lectures) is currently being offered as a CE 898. It will soon have a regular number.

GEOE 412: Reservoir Mechanics (note that this course focuses on fluid flow in hydrocarbon reservoirs)

Preq or coreq: (CE 328 or CHE 324 or ME 335) and GEOL 245

This course generally has some space. At present, we could likely handle an additional 5 students,

but the number of GEOE students admitted to the program was recently increased, so the course could be full in future years.

GEOE 475: Advanced Hydrogeology

Preq or coreq: (BLE 432 or CE 328 or CHE 324 or ME 335) or (CHEM 112 and MATH 110 and 30 cu

from GEOL 200-499)

This course generally has some space, and there is not a concern with some additional students. However, increasing student numbers are expected in future years as mentioned above.

I trust that this provides the information you were looking for. All the best as you take the proposal forward.

Leon

Leon D. Wegner, Ph.D., P.Eng. Professor and Head

Department of Civil and Geological Engineering University of Saskatchewan

57 Campus Drive Saskatoon, SK S7N 5A9 CANADA

Tel: (306) 966-5349

Fax: (306) 966-5205

From: Muhajarine, Nazeem
To: McDonnell, Jeffrey
Cc: Janzen, Kimberely; Bharadwaj, Lalita; Bonner, Cat
Subject: RE: Graduate Program Proposal in Water Security
Date: Wednesday, September 10, 2014 3:08:58 PM

Hello professor McDonnell,

Thank you for getting in touch with us in the School of Public Health, where the PUBH 898.3 Water and Health course is taught by professor Lalita Bharadwaj.

I have consulted with professor Bharadwaj and I am pleased to offer our support for your proposal for graduate program in Water Security. You had asked us two specific questions in relation to this specific course and I will address each of them here. First, in terms of enrollment limits of students in the Water and Health course, we anticipate being able to accommodate 20-25 students per term and therefore we do not see any issues arising with student enrollment in the first instance. Second, the prerequisite we will have is registered in a graduate program.

Again, thank you for consulting with us, and all the best in getting your program proposal through. Nazeem Muhajarine

Interim Executive Director, School of Public Health

From: Anand, Sanjeev
Sent: Thursday, September 11, 2014 9:33 AM
To: McDonnell, Jeffrey
Cc: von Tigerstrom, Barbara; Surtees, Doug
Subject: Re: Graduate Program Proposal in Water Security

Dear Professor McDonnell,

Thank you for your recent email message. Although I am happy for you to include the Water Law course in your list of electives, I must tell you that the course is a new one developed by a term faculty member whose appointment ends on June 30, 2015. At this stage, there is considerable uncertainty as to whether this course would be offered by any of our other faculty members (however we are currently in the midst of a joint CRC search with SENS and the successful candidate for this position may end up being competent to teach this course). Having said this, the course has previously had SENS students enrolled in it. Consequently, there are no prerequisite concerns.

Finally, I happy to support this new degree program. It seems academically rigorous with important learning objectives and I would foresee significant demand for such a graduate degree.

I am ccing the College's Associate Dean Academic and Associate Dean Research and Graduate Studies, in case they have further comments they would like to share with you pertaining to these matters.

Should you have any further questions or concerns, please let me know. Sin-

cerely,

Sanj

Sanjeev Anand, JD, LLM, PhD, QC
Dean of Law

University of Saskatchewan

From: Leis, Anne
To: McDonnell, Jeffrey; Engler-Stringer, Rachel
Cc: Janzen, Kimberely; Janzen, Bonnie
Subject: RE: feedback on a new MSc program where we would like to use one of your courses: Reminder
Date: Thursday, November 06, 2014 12:17:35 PM

Hi Jeff and Kim

Thank you for meeting with us this morning about your proposed project-based master's degree in water security. We give you permission to list Dr. Engler Stringer's course (CH&EP 802) as an elective. Both of us are supportive of this endeavour and can also see potential for future collaborations. Please keep us informed of the advancement of this file.

Sincerely

Anne

Anne LEIS, PhD

Professor and Head

Dept of Community Health & Epidemiology College of Medicine

University of Saskatchewan

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104 Clinic Place
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Country code: 01

From: Atkinson, Michael
To: McDonnell, Jeffrey
Cc: Janzen, Kimberely
Subject: Re: Graduate Program Proposal: Reminder
Date: Friday, October 24, 2014 6:10:28 PM

Hi Jeff,

Sorry, I missed this email altogether. I have no objections to including these courses as electives, but I would note that we do have 25 person limits on most courses. As for a general endorsement, I'd have to see the rest of the program, but I am encouraged that you are developing a program that builds on our research expertise: I can say at least that much.

Again, sorry for the delay Mi-

chael

B. M.W.S. Demand Survey Results

Demand Analysis

If this degree is offered, would you register for it?

Response	Chart	Percentage	Count
Definitely		3.3%	29
Likely		15.4%	137
Uncertain		28.7%	256
Unlikely		32.8%	292
Definitely not		19.9%	177
		Total Responses	**891**

For which of the following reasons would you register?

Response	Chart	Percentage	Count
My employability would be increased.		**44.5%**	**185**
I am intereseted in the topic.		**63.2%**	**263**
I am interested in learning an additional subject beyond my major.		**41.1%**	**171**
Other, please specify		**5.3%**	**22**
	Total Responses		**416**

For which of the following reasons would you register? (Other, please specify)

#	Response
1.	I definitely want a career in hydrology after completing my degree
2.	It would really help me to have better understanding of microbe in water and safety
3.	Irrigation has been a passion since the development of Lake Diefenbaker.
4.	Easy masters degree
5.	Very important issue that needs more attention
6.	It's a field that really matters to the world and that's appealing.
7.	Cross Curricular training is essential in promoting ecological sustainability
8.	Looking for a program that is relatively quick so I can go right to work
9.	All of these reasons and I think more and more students are interested in this matter, especially with our changing planet and climate change!
10.	Water plays a important role in earth.
11.	Water issues are an imminent issue, and the most impacted will likely be small communities and First Nations communities
12.	I would like to use my not-yet-done undergraduate degree of Geology, and linking it to the contamination and clean-up of water resources.
13.	This masters program addresses serious current issues and could create a solution that would better humanity
14.	I want to do something good for the world!
15.	I want to make a difference in people's lives by ensuring they have access to clean water
16.	to see the different things this type of career path has to offer

17.	Interested in sustaining the Earth
18.	The fact that it is only 1 year long.
19.	This knowledge is badly needed in the World
20.	the direness of the situation and moral obligation as a capable life on the plant
21.	Important to my world values
22.	It`s a interessting area

What barriers might prevent you from registering for the degree, even if you are interested?
The 620 response(s) to this question can be viewed by request, but are summarized below.

Response	Chart	Percentages	Count
Cost barriers		20%	130
Interest in a different program		31%	195
Job availability		15%	98
Need more information		2%	13
Not able to meet prerequisits		13%	85
Not interested in graduate training		5%	32
Time commitment		9%	57

What is your level of interest in the following areas of focus for the degree?

	No Interest	Low	Neither interested nor disinterested	Moderate	High	Total Responses
Surface Water Hydrology	38 (5.8%)	90 (13.7%)	125 (19.0%)	295 (44.8%)	111 (16.8%)	659
Groundwater Hydrology	38 (5.8%)	97 (14.7%)	132 (20.0%)	276 (41.8%)	117 (17.7%)	660
Socio-Hydrology	49 (7.4%)	110 (16.6%)	95 (14.4%)	237 (35.9%)	170 (25.7%)	661

In which area of focus are you most likely to register?

Response	Chart	Percentage	Count
Surface Water Hydrology		28.2%	185
Groundwater Hydrology		26.9%	177
Socio-Hydrology		44.9%	295
		Total Responses	**657**

Why would you not register in this program?
The 173 response(s) to this question can be viewed by request, but are summarized below.

Response	Chart	Percentages	Count
Cost barriers		0%	1
Degree does not apply to my career goals		42%	73
Job uncertainty		2%	4
No interest in graduate school		1%	2
Not interested		53%	92

What is your current year of study?

Response	Chart	Percentage	Count
First		23.8%	197
Second		23.2%	192
Third		22.8%	189
Fourth		19.6%	162
Fifth		6.6%	55
>Fifth		4.0%	33
		Total Responses	**828**

What is your current college?

Response	Chart	Percentage	Count
Arts and Science		57.5%	476
Agriculture and Bioresources		12.3%	102
Edwards School of Business		12.9%	107
Education		3.6%	30
Engineering		13.6%	113
		Total Responses	**828**

What is your current major? Please state "not declared" if you have not yet declared a major.
The 801 response(s) to this question can be viewed by request, but are summarized below.

Response	Chart	Percentages	Count
Aboriginal Justice and Criminology		0%	2
Accounting		2%	20
Aerospace Engineering		0%	1
Agricultural biology		0%	1
Agronomy and Agribusiness		3%	32
Anatomy and Cell Biology		0%	7
Animal Bioscience		2%	17
Anthropology		0%	2
Archaeology		0%	6

Art History	0%	1
Biochemical Engineering	0%	1
Biochemistry	0%	7
Biochemistry and Microbiology	0%	1
Biology	3%	29
Biotechnology	0%	3
Business Economics	0%	6
Chemical Engineering	2%	18
Chemistry	1%	13
Civil Engineering	3%	26
Computer Engineering	0%	2
Computer Science	2%	19
Crop Science	0%	5
Drama	0%	2
Economics	0%	2
Education	2%	20
Electrical Engineering	0%	7
Engineering Physics	0%	3
English	1%	15
Environment and Society	0%	7
Environmental Biology	1%	12
Environmental Earth Sciences	1%	15
Environmental Engineering	1%	11
Finance	1%	10
Food Science	0%	5
Geography	0%	1
Geological Engineering	0%	4
Geology	2%	23
Geophysics	0%	2
Health Studies	0%	1
History	0%	3
Horticulture	0%	1
Human Resources	1%	9
Interactive Systems Design	0%	1
International Cooperation and Conflict	0%	1
International Studies	1%	10
Kinesiology	0%	1
Linguistics	0%	3
Management	1%	10
Marketing	0%	6
Mathematical Physics	0%	2
Mathematics	0%	6
Mechanical Engineering	0%	8

Microbiology/Immunology	0%	7
Music	0%	4
Native Studies	0%	4
Not declared	27%	223
Nursing	0%	7
Operations Management	0%	3
Pharmacy	1%	15
Philosophy	0%	1
Physical Geograph	0%	5
Physics	0%	1
Physiology	1%	14
Plant Ecology	0%	3
Political Studies	1%	10
Psychology	4%	35
Public Administration	0%	2
Regional and Urban Planning	2%	19
Religion and Culture	0%	1
Renewable Resource Management	0%	8
Resource Economics and Policy	0%	3
Resource Science	0%	5
Social Work	0%	2
Sociology	1%	10
Statistics	0%	1
Studio Art	0%	3
Toxicology	0%	7

Do you have additional comments about the proposed master's degree in water security?
The 368 response(s) to this question can be viewed by request.