Technical Reviewers' Rating Summary

Proposal Number G-41-03 Application Title Effects of Cropping Se Submitted By NDSU - Williston Rese
Request For $652,640.00 Total Project Costs $1,305,280.00

Section A. Scoring

Statement	Weighting Factor	G-41-03A	G-41-03B	G-41-03C	Average Weighted Score
1. Objectives	9	**4**	**3**	**3**	**27**
2. Achievability	7	**3**	**3**	**4**	**21**
3. Methodology	8	**4**	**3**	**4**	**24**
4. Contribution	8	**3**	**3**	**4**	**24**
5. Awareness / Background	5	**3**	**2**	**4**	**15**
6. Project Management	3	**4**	**3**	**2**	**9**
7. Equipment / Facilities	2	**4**	**4**	**4**	**8**
8. Value / Industry - Budget	4	**4**	**3**	**3**	**12**
9. Financial Match - Budget	4	**4**	**3**	**3**	**12**
Average Weighted Score		**180**	**147**	**177**	**168**
	Total: 50				**250 possible points**

OVERALL RECOMMENDATION

FUND	**X**		**X**
FUNDING TO BE CONSIDERED		**X**	
DO NOT FUND			

Section B. Ratings and Comments

1. The objectives or goals of the proposed project with respect to clarity and consistency with North Dakota Industrial Commission/Oil and Gas Research Council goals are:

   The project is very straight forward and clear.
   - Reviewer: G-41-03A
   - Rating: 4

   This proposal clearly intends to improve Oil and Gas BMPs for pipeline installation.
   - Reviewer: G-41-03B
   - Rating: 3

   The Abstract states "We would like to determine best cropping sequences under dryland no-till conditions that reclaim severely disturbed cropland." The objectives are also stated in the Project Description. 1) define the reclamation success of a long−term control (no action/continued mono−cropping of wheat. 2) evaluate the effects of five annual and two perennial cropping sequences on soil health and crop performance in three disturbance areas (pipeline, road, undisturbed) 3) to determine the effects of ripping with and without manure application across severely compacted areas This study should provide a best management practice document for reclamation of lands impacted by pipeline installation and in return

increase the profitability of the land and improve landowner relations.
- Reviewer: G-41-03C
- Rating: 3

2. With the approach suggested and time and budget available, the objectives are:

I feel the goals and information that can be gained from the study will be really useful. The time frame may not be long enough for full rehab the study areas.
- Reviewer: G-41-03A
- Rating: 3

Alfalfa establishment could be a problem. It commonly takes two to four years for stand establishment.
- Reviewer: G-41-03B
- Rating: 3

The Timetable indicates ripping and manure application in November of 2016. Weather could impact the start time. It also states "Upon the completion of the 4-year sequence, all sequences will be cropped as wheat for 2 years, which will be used as one measurement of reclamation success. If soil health and crop performance has not improved after one 4-year sequence, the study will repeat the sequences a second time." It does indicate that this project could be on-going.
- Reviewer: G-41-03C
- Rating: 4

Reviewer G-41-03A: If significant changes in the measured parameters are not seen by the end of each cropping sequence, we will pursue the opportunity to continue the study for a second sequence. Reviewer G-41-03B: Alfalfa has already been successfully established. Reviewer G-41-03C: November of 2016 was the earliest date possible to perform ripping. The ripping will ultimately occur prior to seeding in the spring of 2017.
- Applicant

3. The quality of the methodology displayed in the proposal is:

No comment
- Reviewer: G-41-03A
- Rating: 4

Ripping and manure application has been a standard surface reclamation practice for many years. I do think the sampling and testing outlined in this proposal takes a more detailed look at soil physical properties. I would like to see more discussion on soil chemistry noted in the proposal.
- Reviewer: G-41-03B
- Rating: 3

The methodology includes collecting data on soil compaction, water infiltration, plant stress, soil sampling for fertility, biological and chemical analysis. It would be helpful if the methodology of the main plots and subplots were supported by drawings or diagrams.
- Reviewer: G-41-03C
- Rating: 4

Reviewer G-41-03B and Reviewer G-41-03C: The Cornell Soil Health Test is a widely accepted set of parameters to assess different aspects of soil health and soil fertility. We will be following their methodology and have requested funds to have these test performed. I will provide a more detailed explanation/descriptions of soil chemistry in an addendum to the

proposal. I will also be including the "Comprehensive Assessment of Soil Health - The Cornell Framework Manual", which explains each test that will be performed along with some diagrams.
- Applicant

4. The scientific and/or technical contribution of the proposed work to specifically address North Dakota Industrial Commission/Oil and Gas Research Council goals will likely be:

   The contribution this project can add to the state would be great since there isn't a lot of information out there on the effects pipelines have on agricultural land.
   - Reviewer: G-41-03A
   - Rating: 3

   While theses reclamation BMPs are not new. The use of a cover crop cocktail with biomass, water infiltration, and bulk density testing would offer new incite into how industry conducts pipeline reclamation. The concern with this proposal is; it fails to account for how the pipeline was installed. Was the excavation compacted during backfill? if so, what was used? Additionally, it does not account for how the top and sub-soil was harvested and stored during pipeline construction. Soil handing is key to reclamation success.
   - Reviewer: G-41-03B
   - Rating: 3

   This project aligns with the NDIC/OGRC goals as stated in the Mission Statement. "Promote efficient, economic, and environmentally sound exploration, development, and use of North Dakota’s oil and gas resources." "Improve the overall suitability of the oil and gas energy industry in North Dakota through the development of new environmental practices that will help to reduce the footprint of oil and gas activities" Pipelines are an integral element to the oil industry. Proper installation and land restoration are vital to safe operations and landowner and public relations.
   - Reviewer: G-41-03C
   - Rating: 4

   Reviewer G-41-03B: I agree, soil handling is key to reclamation success. We have several photos and accounts regarding the installation practices of this pipeline. We will be contacting the engineering consultant and owner of the line to procure a detailed description of the practices used during installation. From the information and photos we currently have, some practices are very clear.
   - Applicant

5. The background of the principal investigator and the awareness of current research activity and published literature as evidenced by literature referenced and its interpretation and by the reference to unpublished research related to the proposal is:

   The principal and co-principal investigators have vast knowledge and credentials for their areas of expertise and will fully benefit this project.
   - Reviewer: G-41-03A
   - Rating: 3

   The proposal failed to provide an account of previous work done in this area of study or other similar surface reclamations best practices in North Dakota (i.e. coal mining).
   - Reviewer: G-41-03B
   - Rating: 2

   The Background/Qualifications for the team are exceptional and impressive. There is no input from industry.

- Reviewer: G-41-03C
- Rating: 4

Reviewer G-41-03B: A detailed description of previous work in this area by all Co-PI's will be included in an addendum to the proposal. It was originally omitted to meet the "# of pages" requirement from the grant proposal.
- Applicant

6. The project management plan, including a well-defined milestone chart, schedule, financial plan, and plan for communications among the investigators and subcontractors, if any, is:

The plan and time table are well defined with a well defined financial plan.
- Reviewer: G-41-03A
- Rating: 4

While I think the costs are elevated, this proposal adequately provides a timeline and an accounting of proposed spending.
- Reviewer: G-41-03B
- Rating: 3

There is a time table but no milestone chart. The financial plan includes wages and administration fees but does does not define any equipment or machinery necessary for planting, ripping or crop removal.
- Reviewer: G-41-03C
- Rating: 2

Reviewer G-41-03C: Equipment costs will be relatively low as this project will take place at the Williston Research Extension Center. The WREC will provide all equipment necessary for carrying out this project.
- Applicant

7. The proposed purchase of equipment and the facilities available is:

Very little equipment purchasing is needed to be bought and only maintenance and repairs so this would be a good value.
- Reviewer: G-41-03A
- Rating: 4

No comment
- Reviewer: G-41-03B
- Rating: 4

Materials and supplies are outlined for soil sampling. The project also includes crop sequences, ripping, ripping w/manure and continuous minimum-tillage. There is no mention of machinery or equipment to perform this work.
- Reviewer: G-41-03C
- Rating: 4

Reviewer G-41-03C: Equipment costs will be relatively low as this project will take place at the Williston Research Extension Center. The WREC will provide all equipment necessary for carrying out this project.
- Applicant

8. The proposed budget “value”1 relative to the outlined work and the commitment from other sources is of:

No comment
- Reviewer: G-41-03A
- Rating: 4

It is my opinion that proposed costs are a little high but are not our of line with similar project expenses.
- Reviewer: G-41-03B
- Rating: 3

There is no financial commitment from industry.
- Reviewer: G-41-03C
- Rating: 3

Reviewer G-41-03C: We have reached out to several oil and/or gas companies for support of this project. While many have expressed that the information generated by this project would be valuable, none have offered financial support.
- Applicant

9. The “financial commitment”2 from other sources in terms of “match funding” have been identified:

No comment
- Reviewer: G-41-03A
- Rating: 4

Much of the matched funds come from staff costs currently in place.
- Reviewer: G-41-03B
- Rating: 3

Matching funds are provided by NDSU. There is no financial commitment from industry.
- Reviewer: G-41-03C
- Rating: 3

1 “value” – The value of the projected work and technical outcome for the budgeted amount of the project, based on your estimate of what the work might cost in research settings with which you are familiar. A commitment of support from industry partners equates to a higher value.

2 “financial commitment” from other sources – A minimum of 50% of the total project must come from other sources to meet the program guidelines. Support less than 50% from Industrial Commission sources should be evaluated as favorable to the application; industry partnerships equates to increased favorability.

General Comments

I would recommend the project and that I feel it has great value for the state with all the new pipelines that are being installed and going to be installed in the future. The tests are being done with normal agricultural products that are easily accessible to be used on projects in the future after after a best practice is found.
- Reviewer: G-41-03A

Current pipeline installation and reclamation practices are lacking and should improve. The proposed study will address these in detail. Metrics such as biomass, water infiltration potential, and soil bulk density are important drivers of reclamation success. I would like to have more information regarding soil chemistry, and how this metric will be utilized. Potential suggestions to impose this study are: Could the study be replicated on three sections of pipeline with known/different installation techniques. Consider using another crop other than alfalfa as a cover crop due to the time it takes to establish. Lastly, make sure to test the manure before use. Fresh manure can reduce plant

establishment due to heat and salinity.
- Reviewer: G-41-03B

The results of this project could result in a BMP for reclamation and restoration of pipeline lands. This project has the potential to improve relations between industry and landowners. It is possible that this is an ongoing project. One key factor and question is why is there no financial sponsorship from industry? I assume this project is located by the city of Williston. Williston is the hub of various oil companies that could benefit from this project. The project states that the reclamation of pipelines and well pads are a serious problem. There is no documentation of how serious it is and what reclamation techniques and procedures are currently in use and their effectiveness.
- Reviewer: G-41-03C