Technical Reviewers' Rating Summary

Proposal Number	**G-40-03**
Application Title	**UAS Aerial Observation to Support Oil & Gas Pipeline Post Construction Restoration Efforts**
Submitted By	**Isight RPV Services**
Request For	**$19,700.00**
Total Project Costs	**$39,400.00**

Section A. Scoring

Statement	**Weight**	**G-40-03A**	**G-40-03C**	**G-40-03C**	**Avg. Score**
1. Objectives	9	3	5	4	36
2. Achievability	7	3	5	4	28
3. Methodology	8	3	5	4	32
4. Contribution	8	3	4	4	29
5. Awareness / Background	5	4	2	5	18
6. Project Management	3	4	4	4	12
7. Equipment / Facilities	2	3	5	5	8
8. Value / Industry - Budget	4	4	5	5	18
9. Financial Match - Budget	4	3	3	4	13
Avg. Weighted Score		**162**	**216**	**211**	**196**
OVERALL					
FUND			**X**	**X**	
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 two OGRP goals aligning with application are: -Promote efficient, economic, and environmentally sound exploration, development, and use of North Dakota’s oil and gas resources. -Encourage, and promote the use of new technologies and ideas that will have a positive economic and environmental impact on oil and gas exploration, development, and production in North Dakota.”

- Reviewer: G-40-03A

- Rating: 3 (Clear)

“”

- Applicant

“The proposed project focuses on the utilization of unmanned aerial systems coupled with enhanced optical technologies to assist in identifying issues related to pipeline reclamation. ”

- Reviewer: G-40-03C

- Rating: 5 (Exceptionally Clear)

“”

- Applicant

“Clear and concise objective of cost reduction while achieving successful reclamation and remediation. ”

- Reviewer: G-40-03C

- Rating: 4 (Very Clear)

“”

- Applicant

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

“Three months should be long enough to verify base data acquired through traditional ground surveying and provide post-construction backfill/cleanup data. However, three months does not seem adequate to verify vegetation restoration efforts. Additional concern is that according to ND PSC records in mid-June, 90% of the right of way has been cleared and 87% of the right of way has been graded. All pre-construction areal data will need to be obtained through traditional flight operations performed by ONEOK. ”

- Reviewer: G-40-03A

- Rating: 3 (Likely Achievable)

“In order to capture extended data to include additional problematic issues related to vegetation restoration efforts, we would propose adding two additional flights in the April-May 2017 timeframe. The cost of the additional flights and data processing will be absorbed into Applicant's in-kind share of the project. Although the cost will be higher, the project will be much more complete with the additional flights in spring 2017.”

- Applicant

“The applicant proposed a 3 month timeframe.”

- Reviewer: G-40-03C

- Rating: 5 (Certainly Achievable)

“In order to capture extended data to include additional problematic issues related to vegetation restoration efforts, we would propose adding two additional flights in the April-May 2017 timeframe. The cost of the additional flights and data processing will be absorbed into Applicant's in-kind share of the project. Although the cost will be higher, the project will be much more complete with the additional flights in spring 2017.”

- Applicant

“While much and many of the problematic issues are viewable during the first three months, ultimately it may be necessary to review the project lands during and over the first year, especially after the first winter season and spring thaw! ”

- Reviewer: G-40-03C

- Rating: 4 (Most Likely Achievable)

“In order to capture extended data to include additional problematic issues related to vegetation restoration efforts, we would propose adding two additional flights in the April-May 2017 timeframe. The cost of the additional flights and data processing will be absorbed into Applicant's in-kind share of the project. Although the cost will be higher, the project will be much more complete with the additional flights in spring 2017.”

- Applicant

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

“Methodology generally appears adequate for the intended results. Few details provided in the application on how the data will be processed for the desired change detection results.”

- Reviewer: G-40-03A

- Rating: 3 (Average)

“Part of the goal of the project is to develop an efficient and effective process for analyzing and reporting the data collected with UAS. ISight has been developing its expertise in stitching various types of imagery throughout 2016. Stitching the imagery is the first level of analysis required to begin making the data actionable. In addition, per the stated goals of the project, ISight will work with Barr and ONEOK to start developing a change-detection algorithm based on historical problems encountered. The development of this algorithm will pave the way for quickly turning data collected from UAS into actionable data in an efficient way.”

- Applicant

“The unmanned aerial systems and imaging systems to be used in this project are innovative ideas that could be applied in other areas of oil and gas exploration, development, and production.”

- Reviewer: G-40-03C

- Rating: 5 (Well Above Average)

“Part of the goal of the project is to develop an efficient and effective process for analyzing and reporting the data collected with UAS. ISight has been developing its expertise in stitching various types of imagery throughout 2016. Stitching the imagery is the first level of analysis required to begin making the data actionable. In addition, per the stated goals of the project, ISight will work with Barr and ONEOK to start developing a change-detection algorithm based on historical problems encountered. The development of this algorithm will pave the way for quickly turning data collected from UAS into actionable data in an efficient way.”

- Applicant

“Utilization of unmanned flights is obviously ever increasing across all walks of life. Coupled with the technology proposed, the results of this method could greatly enhance industry's efforts in their efforts to return pipeline routes to near original condition. ”

- Reviewer: G-40-03C

- Rating: 4 (Above Average)

“Part of the goal of the project is to develop an efficient and effective process for analyzing and reporting the data collected with UAS. ISight has been developing its expertise in stitching various types of imagery throughout 2016. Stitching the imagery is the first level of analysis required to begin making the data actionable. In addition, per the stated goals of the project, ISight will work with Barr and ONEOK to start developing a change-detection algorithm based on historical problems encountered. The development of this algorithm will pave the way for quickly turning data collected from UAS into actionable data in an efficient way.”

- 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:

"Along with the results for this one specific project, the true value of the application is making the results/data available for additional research on the topic of UAS in petroleum operations. I see this application aligning specifically with the following OGRP priority goals and objectives: -Develop baseline information that will lead to other projects, processes, ideas, and activities"

- Reviewer: G-40-03A

- Rating: 3 (Significant)

"While this project will contribute significantly to the framework needed to effectively implement UAS in petroleum operations, there will be specific opportunities for additional projects to refine the process and to expand it to additional applications such as pipeline surveillance and leak detection. The project team is committed to developing a detailed technical report that will explain the methods and the results, providing future projects a framework to begin from."

- Applicant

"The proposed project encourages and promotes the use of new technologies and ideas that, if successful, will have a positive impact on the environment and landowners. "

- Reviewer: G-40-03C

- Rating: 4 (Very Significant)

"While this project will contribute significantly to the framework needed to effectively implement UAS in petroleum operations, there will be specific opportunities for additional projects to refine the process and to expand it to additional applications such as pipeline surveillance and leak detection. The project team is committed to developing a detailed technical report that will explain the methods and the results, providing future projects a framework to begin from."

- Applicant

"The work very well could provide a huge contribution to aide in successful reclamation of lands involved in pipeline activity lending to landowner agreement and approval of the efforts of the North Dakota Industrial Commission and the Oil and Gas Research Council. "

- Reviewer: G-40-03C

- Rating: 4 (Very Significant)

"While this project will contribute significantly to the framework needed to effectively implement UAS in petroleum operations, there will be specific opportunities for additional projects to refine the process and to expand it to additional applications such as pipeline surveillance and leak detection. The project team is committed to developing a detailed technical report that will explain the methods and the results, providing future projects a framework to begin from."

- 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:

“Leadership and supporting team have extensive expertise on UAS operations. The support of Barr Engineering and ONEOK adds expertise to apply the UAS operations to ND's petroleum industry.”

- Reviewer: G-40-03A

- Rating: 4 (Better Than Average)

“While much has been discussed anecdotally regarding the implementation of UAS in petroleum operations, relatively little has been formally published. This may be due in part to the competitive nature of the UAS and the petroleum industries in the US. Through the experience and professional networks of the full team including ISight, UAII, Barr, and ONEOK, we are extremely confident that we have a full understanding of what research has taken place in the region and in the country, and are in a great position to leverage existing knowledge to take the next step forward.”

- Applicant

“This is a proof of concept project. There was no reference to current research activity or published literature.”

- Reviewer: G-40-03C

- Rating: 2 (Limited)

“While much has been discussed anecdotally regarding the implementation of UAS in petroleum operations, relatively little has been formally published. This may be due in part to the competitive nature of the UAS and the petroleum industries in the US. Through the experience and professional networks of the full team including ISight, UAII, Barr, and ONEOK, we are extremely confident that we have a full understanding of what research has taken place in the region and in the country, and are in a great position to leverage existing knowledge to take the next step forward.”

- Applicant

“The credentials, experience and background of Douglas McDonald and others noted appear to be without reproach. ”

- Reviewer: G-40-03C

- Rating: 5 (Exceptional)

“While much has been discussed anecdotally regarding the implementation of UAS in petroleum operations, relatively little has been formally published. This may be due in part to the competitive nature of the UAS and the petroleum industries in the US. Through the experience and professional networks of the full team including ISight, UAII, Barr, and ONEOK, we are extremely confident that we have a full understanding of what research has taken place in the region and in the country, and are in a great position to leverage existing knowledge to take the next step forward.”

- 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:

“Although clearly outlined, the timeline would need to be adjusted if approved by OGRP and NDIC. Communication schedule with OGRP is clearly defined and appropriate. Budget clears defines how funds will be utilized in the project. ”

- Reviewer: G-40-03A

- Rating: 4 (Very Good)

“As described in #2 above, we propose adding two additional flights in spring 2017. It can be planned to communicate initial results of the flights in fall 2016, with a final report after the spring 2017 flights.”

- Applicant

“”

- Reviewer: G-40-03C

- Rating: 4 (Very Good)

“As described in #2 above, we propose adding two additional flights in spring 2017. It can be planned to communicate initial results of the flights in fall 2016, with a final report after the spring 2017 flights.”

- Applicant

“”

- Reviewer: G-40-03C

- Rating: 4 (Very Good)

“As described in #2 above, we propose adding two additional flights in spring 2017. It can be planned to communicate initial results of the flights in fall 2016, with a final report after the spring 2017 flights.”

- Applicant

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

“Budget outline appears to contain justifiable expenses to complete the objective of the application. ”

- Reviewer: G-40-03A

- Rating: 3 (Justified)

“”

- Applicant

“All proposed equipment is necessary for the project.”

- Reviewer: G-40-03C

- Rating: 5 (Extremely Well Justified)

“”

- Applicant

“Most of the cost appears to be related to time and travel and is well defined and very justifiable. ”

- Reviewer: G-40-03C

- Rating: 5 (Extremely Well Justified)

“”

- Applicant

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

“The potential value of the application is in the data and best practices for others in the UAS field. The data and techniques outlined in the application may advance the application of UAS technology in petroleum operations. ”

- Reviewer: G-40-03A

- Rating: 4 (High Value)

“”

- Applicant

“”

- Reviewer: G-40-03C

- Rating: 5 (Very High Value)

“”

- Applicant

“The potential results and future utilization of similar technologies that could build and this project are limitless. OneOk and Barr Engineering's commitments to the project reflect their value in the expected potential and assistance in future reclamation efforts. ”

- Reviewer: G-40-03C

- Rating: 5 (Very High Value)

“”

- Applicant

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

“50/50 matching funds for the application. Value is added by the relationship of Barr Engineering and ONEOK. ”

- Reviewer: G-40-03A

- Rating: 3 (Average Value)

“”

- Applicant

“”

- Reviewer: G-40-03C

- Rating: 3 (Average Value)

“”

- Applicant

“Applicant and Industry's matching funding of the proposed project shows their favor in the expected results. ”

- Reviewer: G-40-03C

- Rating: 4 (High Value)

“”

- Applicant

General Comments

“The value to the OGRP goals and objectives is the potential to place real world UAS data and experiences in the hands of other experts in the UAS field. The proposed process of combining existing areal and ground data with UAS flight data and success in "change detection" will aid in determining the suitability of UAS in petroleum operations.

Due to the short project timeline and some uncertainty around the methodology used for "change detection," additional information by the applicant may be desired by the OGRP before funding is considered. ”

- Reviewer: G-40-03A

“The use of unmanned aerial systems coupled with enhanced optical imaging technologies may be a cost effective solution to identifying issues related to pipeline reclamation. The proposed project encourages and promotes the use of new technologies and ideas that, if successful, will have a positive impact on the environment and North Dakota landowners. The applicant did not reference current research activity or published literature on the subject, but that may be a result of little to no research or literature existing. The use of unmanned aerial systems as a tool to support oil and gas exploration, development, and production in North Dakota has unprecedented potential, beyond the scope of this project. ”

- Reviewer: G-40-03C

“The proposal to utilize unmanned aerial systems to aide in pipeline restoration and remediation is of very high merit, great potential and very favorable anticipated results. Potentially being the least invasive, least costly method with the greatest ability to identify and monitor problem areas within pipeline construction right of ways. I am very much in favor of this and any effort that results in the successful return of agricultural lands to as near original condition after development efforts, therein gaining more satisfied landowners with there lands returned to production. While these efforts, should provide much information as to the problematic issues related to pipeline construction during the very first three months after initial reclamation, which this proposal is specifically attending to, efforts should also be placed in reviewing these and similar lands at other time frames/seasons of the year. Specifically during the spring of the year following construction, when the greatest effects of moisture, water flow, drainage and slumping has occurred. ”

- Reviewer: G-40-03C

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.