

EVALUATION OF AGRICULTURAL RISK MANAGEMENT OPTIONS FOR THE FM AREA DIVERSION PROJECT

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SECTION I. SCOPE OF WORK

Watts and Associates, Inc. (W&A) was engaged by Eric Dodds of Advanced Engineering and Environmental Services, Inc. (AE2S) consulting in December, 2013. W&A was asked to develop a brief summary of available options for mitigating risk or providing specified approaches to compensation for agricultural production within the anticipated footprint of the Fargo Moorhead (FM) Area Diversion Project. The summary was to include a description of the concept, pros and cons, expected timeline, and anticipated budget parameters.

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SECTION II. INTRODUCTION

Balancing agricultural productivity with large scale flood management requires a comprehensive and integrated approach to crop production risk management. Soil type variations, crop rotation systems, weather (rainfall and snow) patterns, timing of field operations, and length of time of land inundation (retention) collectively impact crop enterprise profitability and even viability.

The FM Area Diversion Project was initiated to provide flood protection to the communities of Fargo, North Dakota and Moorhead, Minnesota, and surrounding area. The combined population of Fargo, West Fargo, and Moorhead proper is approximately 170,000 (2010 Census of the United States). In addition to a system of dikes and levees, implementation of a comprehensive flood management plan included a systematic approach to upstream water retention on land that is currently primarily used for agriculture. Retention plans will impact the timing of field operations in crop production, such as delaying or preventing planting, with the severity and extent of attendant damage being a function of the volume of water diverted and duration of inundation. Per plans provided, the FM Area Diversion Project “will establish permanent flood protection measures for the region. The current plan includes a 20,000 cubic feet per second, 35-mile long, 1,500 foot-wide diversion channel with ~32,500 acres of upstream staging.” Implementing appropriate risk management strategies for ~32,500 acres of cropland will require an evaluation of potential crop insurance options, potential alternative risk mitigation strategies, and perhaps even acquisition of rights or easements to the directly affected land.

It must be noted up front that the Federal Crop Insurance program provides a mechanism for producers to insure their crops for a wide variety of perils, including flooding. However, “intentional flooding” of agricultural land is currently not a covered peril; the Billings Regional Office of the USDA Risk Management Agency (RMA) has provided specific guidance to this point.

Objectives

This paper briefly outlines potential solutions for managing agricultural production risk as impacted by upstream staging of floodwaters as part of the FM Area Diversion Project. The solutions presented are designed to stimulate discussion for development of a comprehensive risk management and/or compensation plan for cropland in the ~32,500 acre planned staging area. It is expected that AE2S and FM Area Diversion Authority personnel will review this briefing and provide further guidance with regard to options that appear attractive and may warrant additional detail. The objectives of the review are as follows:

1. Identify solutions for risk management of agricultural land impacted by upstream staging as part of the FM Area Diversion Project.
2. Outline pros and cons of each risk management solution.
3. Outline potential costs of developing and maintaining each risk management solution.
4. Estimate timelines for implementation of each risk management solution.

Background Information

The Federal Crop Insurance program provides subsidized crop insurance to producers of major and minor commodities across the United States. Multi-Peril Crop Insurance (MPCI) is administered through RMA, and delivered by 17 privately held insurance companies and brokers through a vast network of individual licensed crop insurance agents. MPCI covers a wide range

of perils (e. g. drought, excess moisture, disease, etc.) that negatively impact crop yields and subsequently crop revenue. MPCCI offers protection for yield and revenue. The average premium subsidy for producers is 55 percent (i.e. the Federal Crop Insurance Corporation (FCIC) covers 55 percent of a given premium, and the insured (producer) pays the remaining 45 percent). All company operating expenses and agent commissions are paid by the Federal government under the terms of the Standard Reinsurance Agreement. Coverage is offered to nearly all commonly grown crops planted in the expected FM Area Diversion Project “affected area.” North Dakota has the highest Federal Crop Insurance participation rate in the United States, with enrolled net acreage approximately equal to NASS planted acreage estimates (~100 percent participation). Participation in Minnesota is not quite as high as it is in North Dakota. This is principally a function of the lower participation among the typically very small or “hobby” scale farms, in central Minnesota. Commercial scale farms in the Red River Valley participate at roughly the same very high rate on both sides of the river. Federal cover is also available for major crops grown under organic practices, but participation is markedly lower among organic producers, who have historically expressed concern about low relative guarantees and high relative premiums.

The Agricultural Risk Protection Act of 2000 (ARPA) amended the Federal Crop Insurance Act to provide a process for enabling private business participation in developing new Federal crop insurance products. The current Section 508(h) of ARPA provides a mechanism under which FCIC may reimburse approved insurance developers for the development of a new crop insurance product. This process, while generally only used a couple of times each year, provides an opportunity for an interested group of producers to directly petition FCIC for redress of their particular needs, generally in the form of a new Federal Crop Insurance product or optional modifications to existing products that may be elected by individual producers.

RMA also offers prevented planting coverage, which provides protection for producers in the event planting is not possible/practical, generally due to conditions being too wet (although prevented planting also makes provision for drought-based losses). While the Prevented Planting program includes flooding, under current rules it does not apply to land that is intentionally flooded or that is inundated as a result of “man-caused” actions; legal authority defined under the Federal Crop Insurance Act provides USDA with the ability to insure only “natural” perils.

SECTION III. RISK MANAGEMENT CONCEPTS FOR AGRICULTURAL LAND IN FM AREA DIVERSION PROJECT

The following sections outline potential solutions for risk management of agricultural land impacted by upstream staging. Each option is presented in the following format: 1) overview and conceptual discussion; 2) pros and cons; 3) potential costs; 4) timeline for implementation.

III.A. Private Insurance Product

Federal Crop Insurance is delivered to producers through a public/private partnership. FCIC provides the private companies with standardized program materials, premium rates, and underwriting procedures as well as delivering subsidies and reinsuring the private companies against severe losses. All private companies must offer the same selection of Federal Crop Insurance programs under the same rules to any producer who expresses interest in their service area. In addition to delivery of Federal Programs, these private companies may also provide producers with additional products that add coverage or features to the baseline Federal Crop Insurance products. These products are called “Non-Reinsured Supplemental Policies” (NRS) in reference to the fact that they are not subject to subsidies or protection from the FCIC in the case of severe systemic losses.

Conceptual Discussion

Development of a private insurance product would likely result in an NRS product (e.g. a rider policy) that would attach to an MPCFI Federal Crop Insurance product. The product could be designed to include two components. One component would provide indemnification to the producer in the event the producer could not plant a crop due to cropland being inundated by floodwaters as controlled by the FM Area Diversion Project. In this event, a producer could receive a 100 percent coverage guarantee (either yield protection or revenue protection at their option). The second component would provide indemnification in the event the crop was planted, but upstream staging was required during the growing season and thus the crop was inundated for a period of time that would likely result in 100 percent yield loss or a reduction in yield. In this event, the producer would receive 100 percent coverage, less any production to count in the event there was harvestable production. The product would be designed such that the FM Area Diversion Authority would pay for the supplemental insurance product for producers that farm in the staging area.

The NRS coverage would pay the full value of the crop as estimated for Federal Crop Insurance purposes, (the approved yield multiplied by the applicable projected or harvest price or subject to the same factors applicable to Federal Prevented Planting coverage), and would not be subject to a deductible. As the cause of loss (man-made flooding) has been determined to be uninsurable under the terms of the federal policy, no indemnity would be paid by FCIC.

Compensation for the crop loss in the current crop year, however, does not fully capture the value of the damage incurred by the producer. RMA procedures dictate that crop insurance guarantees are determined based on the historical yields for the last ten years in which the field is planted (or intended to be planted) to the applicable crop. In the event of a total production loss as a result of flooding, the producer could expect to endure reduced guarantees and increased federal crop insurance premium rates for many years, particularly when rotations are taken into account. While it is not legal to offer direct compensation for these losses in the guise of an

insurance product (RMA lawyers have formally opined that using a supplemental policy to compensate for future damage to insurance guarantees falls outside the authority of the act), it is possible to “scale up” the private products’ indemnities due in the year of a loss by a factor that roughly equates to the future value of these losses. In the development effort, W&A will specifically consider the potential scale of these future coverage losses and the appetite for the FM Area Diversion Authority to offer compensation in this form (which would directly translate into the premiums that would presumably be paid by the FM Area Diversion Authority).

Pros

Farmers, and particularly Red River Valley farmers, understand crop insurance, and thus education for a supplemental insurance product offering would be easy to implement. The value of losses and process of indemnification would occur under a structured, familiar, and predictable process, minimizing the need for arbitration of potential disputes. Farmers would purchase crop insurance as part of their normal farming operations, and eligible producers in the affected area would be offered the additional supplemental coverage at no cost to them. The insurance premium for the supplemental product would be paid for by the FM Area Diversion Authority, thus providing a mechanism to secure support from farmers. The outlay on the part of the FM Area Diversion Authority would be consistent and predictable year after year.

Cons

The premium rate for the supplemental product would be substantial, commensurate to the increased probability of flooding and subsequent loss of crop in the staging area. The FM Area Diversion Authority would make annual payments for the premium into perpetuity, which would be subject to fluctuations from year to year based on changing crop values. Depending upon participation levels, budgetary constraints, and losses, the subsidies associated with the federal component of the program could be dramatically scaled back, adversely effecting participation and therefore efficacy. Private products are offered through individual private insurance companies at their option. Growers may purchase supplemental coverage only through participating insurance companies and the number of companies that choose to offer this supplemental coverage may vary by year. As each private company has the right to make modifications to private programs each year, the coverage offered may potentially diverge by company and through time, making administration and premiums unwieldy to manage. No Federal subsidies apply to private products.

Potential Costs

Developing a private insurance product would likely cost in the range of \$150,000 to \$200,000 to initially develop. Then, to carry the ongoing costs of annual premiums and transaction costs associated with administration of the program (annual offering negotiations with participating insurance companies, updating rates and pricing based on changes to Federal crop insurance availability identified earlier, etc.), the cost associated with the product maintenance would vary annually.

Timeline for Implementation

A private insurance product could be developed in one to two years based on current diversion development timelines, but could be expedited if necessary. The development of private programs can be very rapid as the regulatory review and requirements on these programs are

much less onerous and it is anticipated that engaging private companies in offering this coverage (with the associated added premium and additional service for their existing customers) would be straight-forward. The private product could be nearly fully developed at any time and then “taken from the shelf” within 18 months of notice prior to the first crop year under which the diversion could be in effect for final revisions and implementation.

III.B. Federal Insurance Product

Section 508(h) of the Federal Crop Insurance Act, as amended, provides a framework for developing new Federal crop insurance products. A crop insurance product could be developed specifically for the areas expected to be impacted in the staging area. This would require the following steps:

- Outlining a concept paper for the insurance product.
- Submitting the concept paper to Federal Crop Insurance Corporation to request development.
- If FCIC approves the concept for development, the crop insurance developer would design the product specifically for the staging area. Components of the project would include developing crop provisions, basic provisions, rating, loss adjustment, and underwriting guidelines.
- Upon completion of the development, the product would be subject to review and approval by FCIC. If approved, the development would be eligible for federal crop insurance subsidies (as provided under the act), federal administration, and substantial reimbursement of costs associated with the development effort (borne both by the developer and the FM Area Diversion Authority).

Conceptual Discussion

Federal Crop Insurance offers highly subsidized coverage for a wide variety of risks for nearly every crop planted in North Dakota. Unfortunately, from the perspective of the FM Area Diversion Authority, any losses resulting from intentional and/or man-caused flooding are specifically excluded from current federal coverage. This means that although a given year’s crop could be completely wiped-out by flooding, if it is determined that the flooding was caused by intentional diversion water onto the insured land no federal crop insurance payments can be made. A product submission could be made to FCIC to include intentional diversion of water during times of regional flooding onto insured land as an insurable peril in this tightly defined area.

There are many approaches that a Federal Crop Insurance product could take to address the issues presented by diversion; the final product design would have to be developed in cooperation with stakeholders and agency staff. In broad terms, the product would identify the acreage that is contained in the diversion water storage area and categorize the land into several sub-classes oriented by the frequency of inundation and the severity of a typical event. Presumably, the lowest lying fields would be inundated most frequently and would be the last to fully drain when water levels drop with rough topographic rings designating sequentially less risky fields. Each of the subclasses would be attributed with its own premium rate.

For farmers who have fields in the affected area, the producer would be offered the option of buying special coverage, with the premium rates determined based on the risk classification

applicable to his/her fields. The coverage would, in effect, add the coverage of intentional flooding to their underlying crop insurance policy, subject to the same deductibles and indemnification policies.

It is worth noting that building an argument for allowing coverage for a peril that has heretofore been deemed to fall outside the legal authority provided by congress for Federal Crop Insurance can be expected to be challenging. While there is room for interpretation under the act, the implications of special rules for a designated area, even if it is clearly in the public interest, will require a formal legal opinion from USDA counsel and perhaps even clarification of the act by congress.

Pros

The benefit to this approach is that the insurance product is designed specifically for the staging area, thus accounting for the unique risks associated with crop production in the staging area as impacted by managed flooding and delivered through the Federal Crop Insurance program. The plan would be available through all insurance companies under identical terms and rates, and all maintenance of the plan would be provided. The product would be eligible for the same Federal subsidies as the existing policies. The program could be structured to allow the FM Area Diversion Authority to reimburse affected farmers for the premiums paid for the additional optional coverage, a substantial savings relative to private product premiums.

Cons

Developing a crop insurance product specific to the staging area would require 3 to 5 years. Due to the small geographic area of the project (e. g. 32,500 acres), the premium rates would be much higher relative to agricultural land that is not impacted by the staging area (due to the increased risk of flooding). The Federal Crop Insurance program limits coverage levels for individual coverage to 85 percent, effectively requiring the producer to endure a 15 percent loss before any compensation is offered. In addition, the producer's future crop insurance guarantees would be reduced as a result of the losses incurred, increasing the un-covered burden borne by the producer.

Potential Costs

The cost of the development would likely be in the range of \$200,000 to \$250,000. If the product is approved for development under Section 508(h), FCIC would reimburse the developer for some of the development costs. The long term costs of maintaining the coverage (e. g. payment of additional premium) would need to be per the account of the FM Area Diversion Authority. The product would follow the insurance (indemnity) guarantee levels within USDA-RMA, and thus producers would not be able to insure more than 85 percent of their yield or revenue, likely necessitating additional compensation in the year of an event, albeit with firm and predictable parameters.

Timeline for Implementation

Approximately 3 to 5 years to develop the crop insurance product, and this would be expected to include extensive interaction with Diversion personnel, local crop stakeholders, RMA staff, and potentially even congressional representation.

III.C. Flowage Lease (Easement)

Flowage easements (leases) are well established in many regions of the United States (Kunzler, 1996). A flowage easement provides a legal mechanism by which landowners are compensated in the event flooding requires staging of water on agricultural land. Flooding depth and the period of time the land will be inundated are two primary factors in determining the compensation levels for a flowage easement. The FM Area Diversion Project website states that “flowage easements will be acquired over all land within the storage/staging areas. A property by property analysis will be conducted to ensure that the specifics of each parcel are taken into account when determine the appropriate mitigation.” The valuation of the flowage lease is a function of the damage caused in the year of inundation as well as the frequency with which a given plot is expected to be flooded, and the reduction in the value of insurance coverage a producer can expect to receive as a result of potentially serial flooding losses. In addition, land that is designated within the water holding area can be expected to be unattractive for commercial development more-or-less permanently. Given its proximity to the growing Fargo-Moorhead metro area, this may eventually sharply reduce future land values in the affected area.

Conceptual Discussion

There are two major classes of value reductions incurred by the landowners as a result of being within the staging area: direct losses and indirect losses. Direct losses refer to the damages incurred in the year of flooding itself, whereas indirect losses refer to more systemic losses to landowner, primarily in the form of lost opportunities and reduced productive land value.

Direct Losses

Farmland in the proposed staging area for the FM Area Diversion Project is very productive. Consequently, landowners are concerned with the frequency and length of time the land may be inundated, and moreover, the expected resulting reduction in productive potential in the year of flooding. Increased time of inundation can result in delayed planting of crops, thus resulting in yield decreases or necessitating shifting to a less valuable shorter-season crop, resulting in a loss of profitability. Inundation may also result in complete prevention of crop planting, thus essentially placing the land into a fallow condition for the crop production season and providing no harvestable crop to market.

Indirect Losses

The uncertainty surrounding any given year’s flooding event diminishes producers ability to forward contract production or engage in available marketing forward pricing opportunities as they face increased uncertainty with regard to their ability to produce and deliver the crop. This can be expected to reduce the potential value of the land both for rental and potentially for sale.

Determining appropriate compensation for landowners via implementation of flowage easements requires consideration of a number of direct and indirect components, including but not limited to the following:

1. The reduction in the value of expected production in the given year in which flooding occurs. This can be established using the same parameters as crop insurance plans; simply multiply the historical average yield by the projected market price to determine an expected revenue per acre. Then determine the volume of any production harvested from

- the land and multiply this by a harvest price. The difference in expected and actual value would be paid under the lease.
2. The reduction in the value of future crop insurance guarantees. This can be estimated by calculating the reduction in a producers' average yield (low yield values from flood years will nearly always reduce averages) and the additional premium rate assessed to the lower average yield. This reduction in guarantee and additional premium would be summed annually and paid under the lease each year.
 3. The reduction in land productive value. While we acknowledge that traditional rules cannot always be applied near cities, theoretical models suggest that the value of a plot of farmland is equal to the net present value of future cash flows. Said differently, land is worth the total value of what it can produce in the long run, less production costs and adjusted for inflation. A cash rent is an estimate of the value of the net productive cash flows in a given year, subject to some adjustments. A stochastic estimate of the change in land value can be made based on actuarial assumptions of the frequency and severity of losses. The loss of the future potential for appreciation of land for development would be incorporated into these calculations as well.
 4. Loss Marketing Opportunities. While admittedly difficult to monetize, the added uncertainty the potential for seasonal discretionary flooding presents have real costs. Producers will likely forego opportunities to secure forward prices, reducing their expected incomes.

Categories 1 and 2 above could be considered direct losses and it would likely be most appropriate to make payments for these losses only in the years in which inundation actually occurs (or in the case of category 2, to decreasing amounts for the years following an inundation event). These are losses that principally affect the individual who is operating the land on the given year of an event (whether he/she is a renter or the land owner themselves). Categories 3 and 4, on the other hand, are indirect losses and represent the annualized costs for more-or-less permanent reductions in landowner value. These principally affect the landowner and should result in roughly equal payments each year. These costs could be summed and be paid as a lump-sum up front at lease signing, with the costs determined under categories 1 and 2 paid only in years when inundation losses are incurred. This mechanism, with a two part payment, would facilitate compensation both for land owners and for individuals who may rent the land in subsequent years by separately and fully accounting for losses incurred under the terms of the lease.

Flowage easement contracts would need to be very specific to clearly communicate to landowners how compensation levels will be determined. Properly constructed, the flowage lease contracts could assist in developing a partnership with affected landowners in the staging area.

Pros

Flowage easements are property specific, and thus a comprehensive financial model can be developed to estimate payments to landowners. Structured appropriately, all management of this approach could be handled within the existing authority of the FM Area Diversion Project and would not require the cooperation of outside government or private (insurance company) participants.

Cons

Farmers are likely to be skeptical of flowage easements due to the uncertainty of loss of productivity from year to year. The cost of maintaining flowage easements would carry on throughout the life of the project, and will vary from year to year. Each flowage easement contract would be parcel and landowner specific, thus potentially resulting in a wide variety of agreements and high upfront legal/negotiation costs.

Potential Costs

Development of models for the valuation of direct and indirect costs specific to the FM Area Diversion Authority will require the relatively straightforward adoption of models already established in the economics literature and the integration of valuation of crop and crop insurance based losses. The initial models could be developed for approximately \$150,000 with an expectation of an annual loss determination expense in years of flooding of approximately \$30,000 (somewhat less in years with no flooding). Legal and negotiation expenses for initial set up of these contracts by the Authority can be expected to be substantial.

Timeline for Implementation

Development and administration of flowage easements would be an ongoing project due to changes in land rental, land ownership, land valuation, and crop enterprise profitability. Models for estimating losses and establishing a framework for compensation under a lease arrangement could be completed in less than one year with extensive stakeholder feedback and input.

III.D. Land Purchase

Purchasing components of the staging area (or even purchase of the entire staging area) provides a high degree of flexibility in allowing the FM Area Diversion Authority to manage the staging area for flood control. In addition to the initial purchase price, the opportunity exists to rent the land back to farmers, thus generating revenue back to the FM Area Diversion Authority. However, for reasons outlined below, this approach may be of minimal feasibility/acceptability.

Conceptual Discussion

Comprehensive control of all 32,500 acres in the staging area can (in theory) be secured via purchase of the entire staging area by the FM Area Diversion Authority. In this discussion, we assume that 100 percent of the staging area can be purchased. The FM Area Diversion Authority would have the flexibility to manage inundation of the staging area as necessary. There are a number of factors to consider in this approach:

1. The farm land could be rented back to area farmers, thus generating revenue back to the FM Area Diversion Authority.
2. Development of a crop insurance program for the staging area could still be appropriate, as farmers that would rent land in the staging area would still desire to insure their crop production each year.
 - a. If insurance for man-caused flood losses could not be secured, rental incomes from diversion land would be expected to face sharp discounts.
3. Each parcel of land in the staging area would likely require an individualized management plan inclusive of surface drainage and/or tiling.
4. Components of a flowage easement agreement would likely need to be part of the farmland rental contracts with the producers.

Current land values for highly productive land in the affected area range between \$4,000 and \$7,000/acre, implying a land value for the affected acreage of between \$130 and \$230 million. That, of course, presumes that all landowners in the affected area would be willing to sell. While Eminent Domain laws present a potential for overcoming potential landowner objections, their use comes at severe political costs and generally result in extended legal challenges and premium ultimate land settlement prices. All these factors imply that out-right purchase of all the land could be impractical. If parcels within the area were available for purchase at prices that were near market rates or if parcels could be identified that were particularly high risk for flooding or particularly valuable for staging operations, their purchase is certainly worthy of consideration.

Pros

Purchase and ownership by the FM Area Diversion Authority of the farmland in the staging area provides a higher degree of flexibility in managing floodwaters during periods of flooding. There are numerous options, from purchasing 100 percent of the land, to purchasing specific parcels (e. g. land in the staging area that would have a higher degree of flooding (e. g. land closer to the river) could be purchased and managed as desired for flood control).

Cons

Landowners in the staging area may not agree to sell their land. The cost of purchasing land in the staging area may be prohibitive, depending upon funding available to the FM Area Diversion Authority and local land prices. Legal and political challenges to eminent domain procedures are daunting and costly for landowners who choose to resist selling.

Potential Costs

Purchase of the land itself, for the entire area, could be expected to range between \$130 and \$230 Million. Legal costs and delays would further exacerbate budgetary issues.

Timeline for Implementation

Purchase of land would require ongoing negotiations and not all landowners will be accepting of this approach. No practical timeline can be provided; all else equal, higher offering prices will reduce non-financial barriers to purchase, but eminent domain cases regularly stretch out for six or more years.

III.E. Subsidized Installation of Tile Drainage Systems

Tiling systems are increasing in popularity in the Red River Valley. While the flat topography and dense soil types provide limited opportunities for surface drainage of cropland, tiling systems provide improved water management with minimal installation disturbance. Tiling systems also improve soil health by helping manage soil salinity. The ability to manage land drainage with tiling systems can result in reductions in yield variability. Crop insurance could be tailored to offer lower premiums on tiled land.

Conceptual Discussion

Tiling systems are a form of subsurface drainage that can be integrated into drainage ditch systems that are generally prevalent in the Red River Valley (and thus in the staging area). Installation of tiling systems has evolved into an easier process due to the development of flexible perforated tile. The subsurface drain tile is in essence a large flexible hose that is buried

underground via utilization of a device (a “stringer machine” or tile plow) attached to a large tractor. The tile plow opens a trench in which the flexible tile is buried. Each trench is only slightly wider than the tile hose (which is generally approximately 3 to 4 inches in diameter), thus resulting in minimal soil disturbance. The flexible tiling is typically buried in a parallel series of lines in a given tract of farmland (although other configurations such as herringbone or double main may be utilized depending upon the layout of the land tract). The distance between the tiles is determined by soil type, discharge output rate, and other factors.

Subsurface tiling provides several benefits to farmers, including but not limited to: 1) increased infiltration; 2) less surface runoff; 3) lowering the water table; 4) reduced delays and improved timing for field operations; 5) less variability in crop yields; and 6) increased land value.

Installation of tiling systems in the staging area provides an additional mechanism to control floodwaters (and thus saturated soils) via a combination of surface and subsurface drainage. The ability for a tract of farmland to dissipate water more quickly via utilization of a tiling system provides greater opportunity for timely planting and harvest, thus providing farmers with a higher probability of generating profit from a crop enterprise (or, said differently, a lower probability of being adversely effected by staging floodwaters on their land). Lower yield variability, coupled with improved timing of field operations (e.g. planting and harvesting), provides potentially lower crop insurance premium rates in the staging area when compared to fields that do not have tiling systems.

One consideration for the FM Area Diversion Authority is to develop a cost share program for installation of tiling in the staging area. The cost share could be graduated depending upon the retention period for a given tract of land within the staging area. The cost share could be simple (e.g. 50/50 with the landowner), or the entire cost of installation of the tiling system could be borne by the FM Area Diversion Authority if a given tract of land (such as a tract closer to the river) required a more sophisticated approach and/or more control by the Authority during a flooding period.

Determination of crop production risk for tiled land vs. non-tiled land in the staging area would need to be developed in order to implement an appropriate crop insurance premium structure. Integration of crop insurance into tiled land would likely be a component of a flowage easement contract (and subsequent compensation) for landowners in the staging area.

Pros

Tiling systems can be installed at a cost that is much lower than purchasing land. Improving soil health via reduction in soil salinity is an additional benefit that increases crop productivity and subsequent profits. It is likely that compensation for water retention would be lower for landowners that have tiling systems installed. In addition, crop insurance premiums could be lower for tiled land than non-tiled land.

Cons

Determination of an “appropriate” cost share with producers will be difficult. A large initial capital investment will be required, albeit the cost of installing tile is much less than purchasing

the land. Environmental concerns (e. g. impact on wildlife habitat, discharge of water from tiled land into the river systems) will also need to be addressed.

Potential Costs

Tiling costs can vary substantially due to soil type, tile spacing, and outlet and lift station requirements. Costs can range from \$400 per acre to \$800 per acre, with an average cost reported at \$575 per acre (source: Hadrich, 2012). Assuming all 32,500 acres could be tiled, the total cost of tiling would be in the area of \$18.7 million dollars. Other costs include development of a crop insurance premium structure for tiled land, development of a computer model for estimation of inundation period and financial impact on tiled land, and implementation of tiled land issues into flowage easement agreements. Some landowners would either have little interest in having drainage installed or hold plots that are not well suited to drainage; alternative compensation would have to be considered for these growers. Alternatively, the Authority could offer growers a redeemable voucher, exercisable as either at a cash surrender value (say 80 percent of the expected tile installation cost) or for installation of tile as a part of a holding-area wide project.

Timeline for Implementation

Tiling would be ongoing with no specific timeline due to negotiations with landowners, securing funding, and scheduling of tile installation. It is expected, if addressed holistically for the entire effected area, all tile could be installed in two or three years, with intensive field efforts scheduled for periods when the fields are fallow (after harvest and prior to planting).

III.F. Self-Insurance

Rather than fashioning coverage through an existing private insurance company or the Federal Crop Insurance system, the FM Area diversion authority could instead choose to offer its own internal insurance coverage to affected growers. This would expose the Authority to the vagaries of risk from season to season, but given the financial depth of the project and the limited scope of potential losses in any given year, may provide an expedient approach to addressing grower compensation issues on the year of a water diversion event.

Conceptual Discussion

At a conceptual level, an insurance company is nothing more than an equity holding entity that aggregates risk across space and time and captures a margin on their reserve equity. Premiums, which are simply actuarial estimates of the cost of future indemnities loaded for administration costs and profit, are collected. Indemnities are paid to policy holders based on covered events. Based on state and federal insurance law, insurance companies are required to meet stringent reporting requirements and meet a variety of reserve requirements; effectively assurances that in the event of a bad loss, policy holder commitments will be honored.

Self-insurance is a semantic device that effectively means the guarantor (in this case the FM Area Diversion Authority) has sufficient capitol depth to meet any given year's loss indemnification commitments without threatening its own current or future operational needs. The FM Area Diversion Authority has estimated that the potential total value of crop losses (liability) in any given year cannot be expected to exceed \$14 million. As the total budgetary

footprint of the project is estimated at several billion dollars, the annual potential liability does indeed appear to be within the scope for potential self-insurance.

Self-insurance is generally approached in one of two ways. The first is a “reserving” process. Under this approach, the FM Area Authority would set aside a “premium” in a reserve account based on the actuarial frequency and severity of an indemnity on any given year. The reserve account would grow in years when there are few claims and be drawn down in years when there are severe events, but the annual budgetary exposure to the Authority would be consistent from year to year; subject to only relatively minor premium adjustments based on new risk considerations or the scope of the existing reserve. This approach is most common in entities where the potential liability constitutes a meaningful share of the liquid assets available at any given time or when a measure of “cost certainty” is important for budgetary or regulatory reasons. The second approach is *ad hoc*. Under this approach, the Authority would simply make loss compensation indemnities out of liquid operational funds whenever a loss event occurred. The *ad hoc* approach requires nearly no reserve administration or annual consideration of changes in risk and is commonly employed where the liability constitutes a small share of liquid assets available and therefore large indemnities (or a total lack of indemnities) will not result in a meaningful disruption in the solvency of the entity.

Pros

Self-insurance has a number of important advantages. A self-insured indemnification program can be expected to have a lower total cost to the authority than partnering with an existing private insurance company for administration and risk sharing because in addition to that actuarial cost of the indemnities, such an arrangement would also have to make provision for the insurance company’s associated costs and profits. In addition, self-insurance is flexible and the design and administration of the compensation program is entirely within the control of the FM Area Diversion Authority. As the Authority would have final and absolute decision making responsibility, the program could readily adapt to changing circumstances without extended negotiations or modifications to external terms.

Cons

Insurance Companies exist for a reason; they add value by bearing risk and administering programs. Under a self-insured program, the Authority would be responsible to compliance with State and Federal regulatory rules (as may or may not apply), setting up the contractual terms for the compensation/indemnification program, adjusting losses, administering payments, and settlement of disputes. Insurance companies are already set up to do all these things, and have the expertise to do so efficiently. In the relatively limited context of the liability for the affected area this is a manageable matter, but will entail both a steep learning curve on the part of the Authority and substantial up-front set up costs. In addition, the Authority would have to contract with skilled loss adjusters to determine individual losses (it would be impractical to maintain adjusters on staff, they can be expected to go several years with no claims, and then a number of claims in a particular year).

Potential Costs

The costs of implementing a program of self-insurance would be concentrated in an upfront compensation/indemnification contract development effort, a relatively straightforward

aggregate actuarial risk exercise, and administrative filing/setup costs. If the program is structured around a reserve, the annual expenditures for maintenance in most years will be very consistent (and somewhat less than they would be if structured through a partner insurance company), with additional loss adjustment and claim adjudication costs in years when water is diverted onto cropland. If an *ad hoc* structure is selected, the maintenance costs can be expected to be marginally lower overall, but the cost in years of loss will be much greater and much more variable than under a reserve self-insurance or any of the other options considered in this exercise.

Timeline for Implementation

The self-insurance program could be set up very quickly, it is simply a matter of designing the indemnification program terms, devising contracts, enrolling affected growers, and meeting all regulatory filing requirements. The process of estimating annual reserve contributions is much easier than devising rates for individual growers, and contracting for loss adjustment support could all be completed in a couple of months.

III.G. Combination of Solutions

A supplemental crop insurance product (rider), a new crop insurance product designed specifically for the staging area, flowage easements, land purchase, and tiling each provide potential solutions for managing crop production risks in the 32,500 acre staging / storage area of the FM Area Diversion Project. No one single solution, however, provides a comprehensive risk management plan. Preliminary analysis contained herein suggests that a combination of solutions should be considered.

There are certain core elements that will be a component of any single or combination solution for the 32,500 acre staging area, namely:

1. Development of computer models and supporting database systems to estimate:
 - a. Frequency of inundation, likely by topographic sub-region within the staging area.
 - b. Typical duration of inundation (retention) on farmland.
 - c. Planting dates.
 - d. Financial impact due to inundation/retention by type of land.
 - i. Tiled land.
 - ii. Non-tiled land.
 - e. Long term financial impact based upon historical flood patterns.
2. Analysis of crop insurance premium impacts on land in the staging area.
3. Communication of strategies and subsequent impacts in landowners.

Development of the core elements for estimation of retention period length and financial impact are primary starting points. Options for integrating crop insurance into the staging area will require a review of the current insurance premium structure for crops produced in the staging area and subsequent impacts to insurance premiums based upon flooding patterns and retention periods.

SECTION IV. DEVELOPING A COMPREHENSIVE RISK MANAGEMENT PLAN

Stabilizing crop production in the 32,500 acre staging area can be achieved via implementation of a comprehensive risk management plan. Broad based information regarding crop yield history, land values, land drainage systems, flooding history, and forecast retention periods can be integrated to provide crop insurance protection that is indicative of the staging area.

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SECTION V. SUMMARY

This document has outlined several options that are available to the FM Area Diversion Authority to assist in managing crop production risk on agricultural land in the 32,500 acre staging area. Very likely, a combination of flowage easements, drainage systems, crop insurance, and even land purchase can be integrated in a comprehensive risk management plan. The needs of the diversion and the political implications on stakeholders, including current landowners will need to be weighed in the execution of any risk management plan.

End Note

While the challenges posed by the scope and ambition of this project are daunting, they are not insurmountable. Many good options exist for coping with the increased risk the project will impose on farmers in the proposed staging area, each with benefits, costs, and risks. It is encouraging that the project has had the foresight to anticipate the impact on their upstream stakeholders and has actively engaged in evaluation of potential mitigation strategies at this early stage in the project. The selection and implementation of any solution option(s) will be an ongoing process and will benefit tremendously from engagement of stakeholders throughout. In an effort to respect the time of the parties involved (and to keep costs for this exploratory gesture at an absolute minimum), this document has been kept very brief and conceptual in nature. If there is further interest in pursuit of any one or several of these options in a more detailed exposition, we stand by to assist.

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SECTION VI. REFERENCES

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