Ronnie Williams, P.E. of Williams Engineering Services, LLC (WES) has developed this Design Summary for the proposed emergency repair to the Emerald Sky Dairy, LLC facility located in St. Croix County, Wisconsin. This emergency repair plan is intended to protect the recently remediated wetland after the manure spill that occurred in December, 2016, and to replace a waste storage facility (WSF) that was permanently damaged and only temporarily repaired. This document discusses design improvements to the waste transfer and storage system and no significant expansion is being proposed at this time. The former expansion proposal that was received by St. Croix County on October 24, 2016 has been suspended. The purpose of this document is to provide information on individual aspects and components of the project.

The Emerald Sky Dairy, LLC site has a current WPDES permit (WI-0059315-04-0) and is located south of County Highway G and bordered by 250th to the east in the Town of Emerald, St. Croix County, Wisconsin. The dairy is more specifically located in NE ¼ of NE ¼ of T30N, R16W of Section 22. The sites physical address is 2487 County Road G Emerald, WI 54013. Currently, the Emerald Sky Dairy, LLC facility consists of three freestall barns bedded with recycled manure solids, a parlor, feed pad with inadequate first flush only leachate collection, one heavily damaged and temporarily repaired 60 mil high density polyethylene (HDPE) WSF with partially removed cover, Virginia style open front heifer shed with failed and poorly performing runoff collection, calf hutch area without runoff collection and one stormwater runoff pond. The dairy also consists of remaining components of a mostly removed digester system, abandoned ECO Fuel methane collection system and a sand recovery system that are no longer in use. Only the tanks from the sand recovery system and parts of the digester system are being used at this time and much of the original systems are abandoned or have been removed.

The current site is permitted for 3,400 dairy cows per St. Croix County permit. The current site has 1,500 milking cows, 200 dry cows, 250 heifers and 350 calves. 180 milk cows are located in the most northern barn/parlor. The connecting barn contains 1,095 milking cows. The most southern (TMF) barn contains 225 milk and 200 dry maternity cows. There are 250 heifers located in the heifer shed and 350 calves located directly to the south of the heifer shed in calf hutches on dirt. The existing barns will continue to be bedded with recycled manure solids. Currently, manure in the northern barn is scraped into one of three concrete troughs below the barn floor that are connected to pipes that transfer the waste via gravity to a collection tank. This collection tank and the existing HDPE pond are connected by a pipe that allows the waste to be transferred via gravity to the HDPE pond as a backup option. Currently, the manure is pumped from the collection tank to a different collection tank located at the solid separator building. The solids are taken out of the manure stream and temporarily stored under a roof and used for bedding and the remaining liquid waste is transferred by gravity/pump to the existing WSF, depending on the liquid level of the WSF. The manure from the TMF barn is scraped into one concrete trough that drains to the collection

tank of the former sand recovery system that is located in the small building connected to the TMF barn. The manure is pumped from this collection tank to the collection tank at the solid separator building and mixed with manure from the main barns. The liquids are eventually pumped to the existing WSF after the solids are taken out by a solid separator. The piping from the TMF building to the existing solids separation area will be removed and a replacement transfer system will be rerouted to the proposed WSF. It was this original plumbing that was the cause of the December 2016 manure spill. The leachate and runoff from the existing feed pad currently flows to a manhole connected to a transfer system lift station that pumps the leachate and runoff to the collection tank at the solid separation facility and is then pumped to the existing WSF. Currently, stormwater runoff from the site flows to an existing stormwater runoff pond located in the most southern part of the facility via swales and constructed embankments. The stormwater pond currently receives contaminated runoff from the feed pad and calf hutch areas which is in conflict with NR243 goals. Existing DNR permits for the Bio digester and ECO Fuels project shall be maintained, although they are not intended to be used at this time.

Williams Engineering Services, LLC has designed the improvements to Emerald Sky Dairy, LLC. Two waste storage facilities are proposed to be constructed. One of the two WSF's will be a 3.3 million gallon liquid tight reinforced concrete pond with waterstop with an additional 12 inches of clay subliner soil material. The second WSF will be a 60 mil HDPE pond with 36 inches of clay subliner soil material. The existing HDPE pond will be abandoned in accordance with WI NRCS 360 – *Waste Facility Closure*. The northern barns will use the existing waste transfer system to transfer waste to the collection tank at the solid separation building. After solid separation, liquid waste will be pumped through a transfer pipe to the proposed concrete WSF. Additionally, a secondary emergency overflow pipe system will be constructed at the existing solid separation building to transfer liquid waste, if necessary, to a proposed feed pad leachate collection tank. The leachate and runoff collection tank will gravity flow to the concrete lined WSF. The concrete lined WSF is intended to contain residual fine organic manure solids that have not been otherwise separated out of the manure stream by the solid separation system. There will be a concrete manure solids and contaminated bedding stacking pad with waterstop north of the concrete lined WSF that will drain by gravity to the proposed concrete WSF. The two proposed ponds will be connected together by an overflow pipe and concrete channel crossover to allow for the liquid fraction of the manure to flow from the concrete pond to the HDPE lined pond. A perimeter drain tile, observation manholes, and a vent tile network will be installed.

The existing calf hutch lot located southeast of the TMF will be abandoned. The calf hutch area will be moved to a proposed liquid tight concrete lined area north of the TMF barn. A second feed pad will be constructed east of the calf hutch lot area and west of the HDPE lined WSF. The proposed calf hutch and feed pad area runoff and leachate shall flow by gravity to the TMF collection tank. Runoff and leachate will be collected in the existing collection tank north of the TMF barn and

transferred via pump to the proposed HDPE lined WSF via a new 12 inch polyethylene (PE) ASTM F714 transfer pipe.

The existing heifer barn located southeast of the TMF barn with have a wedge pit constructed on the west site that will collect runoff and allow liquid waste to be pumped to the HDPE lined WSF.

The items listed below are some of the major proposed components of the project detailed in this report:

- Concrete Lined Waste Storage Facility (WSF #1)
- HDPE Lined Waste Storage Facilities (WSF #2)
- Waste Transfer System and Pipes
    - TMF Collection Tank to WSF #1
    - Heifer Lot Collection Tank to WSF #1
    - Feed Pad Collection Tank to WSF #1
    - Solid Separator Collection Tank to WSF #1
- Proposed and Existing Feed Storage Complexes With Leachate & Runoff Collection
- Proposed Calf Hutch Area Lot with Runoff Collection
- Proposed Heifer Lot Runoff Collection
- Sand & Solids Stacking Area
- Erosion & Sediment Control Plan
- Access Roads and Heavy Use Areas
- Load Out Spill Contaminant Area