



To: Salisbury AD 1 Project File

Date: December 12, 2018

Memorandum

From: Lydia Lee, PG
Peter Smiar, PE

Project #: 58073.00

Re: Supplemental Materials in Response to Comments of the
Agency of Natural Resources Regarding Salisbury
AD 1, LLC Motion to Transfer and Amend CPG

INTRODUCTION

VHB has prepared this memorandum on behalf of Salisbury AD 1, LLC ("Salisbury AD 1") to provide supplemental material in response to comments provided by the Agency of Natural Resources ("ANR") in its *Comments of the Agency of Natural Resources Salisbury AD 1, LLC Motion to Transfer and Amend CPG*, Docket No. 18-3449-PET, dated October 31, 2018. ANR's comments were filed in response to Salisbury AD 1's Motion to Amend the CPG. This memorandum, originally dated November 19, 2018, has been revised to incorporate updated information based on on-going discussion with ANR and the submittal of two collateral permit applications to the Vermont Department of Environmental Conservation ("DEC"): an Anaerobic Solid Waste Digestion Facility Certification and an Air Pollution Construction and Operating Permit. This memorandum provides responses by VHB and others as indicated herein.

WATER POLLUTION (SOIL HEALTH AND WATER QUALITY)

ANR Information Request

The Amended Project will be located within the Otter Creek watershed. Otter Creek is a tributary to Lake Champlain. Otter Creek, downstream of the Project, is on the 2016 Stressed Waters List (pollutants: turbidity, nutrients, and sediment) and the 2018 Priority Surface Waters List – Part D (impaired with approved TMDL for E. Coli). Lake Champlain (Otter Creek Section) is on the 2018 Priority Surface Waters List – Part D (impaired with approved TMDL for Phosphorus). The pollution budget (TMDL) established for the Lake under the federal Clean Water Act establishes a 40% phosphorus reduction requirement from agricultural loading. Achieving this reduction will require substantial changes in agricultural management, especially those related to manure and nutrient management. The Amended Project has the potential to raise phosphorus levels in soil at the host farm to a level which risks the introduction of excess phosphorus, through erosion, into Otter Creek and the Lake. This would negatively impact water quality and could affect the state's ability to achieve the phosphorus reductions required by the TMDL.

The importation of additional nutrients in the form of food waste as feedstock for the Amended Project appears to result in the host farm exceeding the allowances of its nutrient management plan and would require the Amended Project to export phosphorus that cannot be applied to the fields. This dilemma is corroborated by the information contained in Exhibit SAD1-7. However, the Amended Project has not demonstrated how it will manage and monitor levels of phosphorus at the host farm, not established how it will successfully extract excess phosphorus from the digestate, and has not identified an outlet for managing and exporting the excess phosphorus. The Agency's experience has been that identifying a market and establishing the ability to export extracted phosphorus has proven challenging.



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Salisbury AD 1 Response

The Project team has met with ANR and the Agency of Agriculture, Food and Markets to develop a plan to address these concerns on November 7, 2018 and November 28, 2018. As discussed at the November 28th, 2018 meeting, it is the Project's intention to find a suitable, sustainable market for the excess nutrient cake that the farm cannot use. However, it is not possible to reach an agreement with such facilities until there is certainty as to the timing of Project construction and thus material availability. The Digestate Management Plan thus provides that the nutrient cake will be disposed of at a landfill or disposal facility that is certified to accept such material, until the market to sell nutrient cakes can be secured. A detailed plan is provided in VHB's Digestate Management Plan, dated December 12, 2018.

Response by: Lydia Lee, VHB

AIR POLLUTION

ANR Information Request

The Amended Project includes the addition of a backup diesel generator. Anticipated use and emissions associated with this new component are not sufficiently explained. In order to evaluate the Amended Project and establish that air pollution impacts will not exceed an acceptable level, additional information explaining under what conditions or circumstances the backup generator will need to be utilized, how many hours per year of use are expected, and what Tier of emission levels (40 CFR Part 89 and 1039) it will be certified to meet is needed at this time. In addition, specifications for the gen-set to be utilized for the combined heat and power component of the project would be useful for the same purposes.

While it is understood that the Amended Project will ultimately need to obtain a Construction and Operating Permit from the VT DEC Air Quality and Climate Division, the additional information noted above is needed at this time for the Agency to conclude that the Amended Project does not raise {sic} a significant issue with respect to air pollution with the condition that ultimately the Amended Project will be required to obtain the referenced air permit prior to any site preparation or construction.

Salisbury AD 1 Response

Salisbury AD 1 has filed a DEC Air Pollution Construction and Operating Permit Application for the Project on November 21, 2018, which address these comments. For convenience, the following provides a summary of the requested information:

1. *Under what conditions or circumstances will the backup generator need to be utilized?*

Response: The back-up generator will be utilized as an emergency generator or "standby engine." A generator meets the Environmental Protection Agency's ("EPA") definition of an emergency generator if it is solely operated for routine testing and maintenance ("readiness testing") for up to 100 hours per year and for true emergencies (when there is no power available from the CHP). There is no time limit for emergency generator operations for true emergencies. The Project's generator will meet those requirements.



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2. *How many hours per year of use are expected?*

Response: Aside from true (unanticipated) emergencies (caused by the CHP not operating) and planned maintenance for the CHP, the emergency generator will operate for short periods of time (between approximately 10 and 30 minutes) typically on a weekly basis for readiness testing. For example, this would amount to 13 hours per year if operated for 15 minutes per week, representing 0.15% of the hours in a year.

3. *What Tier of emission levels (40 CFR Part 89 and 1039) will the backup generator be certified to meet?*

Response: The backup generator will be certified for Tier 2 emissions. A Tier 2 emissions certified generator is one which the generator manufacturer certifies will not exceed EPA Tier 2 emission limits. EPA and the Vermont Air Quality & Climate Division ("AQCD") accept generator manufacturer Tier 2 emission certifications in lieu of conducting emission testing to demonstrate compliance with Tier 2 emission limits. Refer to the attached specifications.

4. *Specifications for the gen-set to be utilized for the combined heat and power component of the project would be useful.*

Response: Please see the attached specifications for the backup generator and CHP.

Response by: Lydia Lee, VHB, with information provided by John Hinckley, GeolInsight.

WASTE MANAGEMENT

ANR Information Request

The Amended Project proposes to substantially increase the volume of pre-processed food waste (including high strength wastes) utilized as feedstock for the digester. Volume of food waste feedstock is anticipated to be 65,000 tons per year, a figure which constitutes approximately two-thirds of the overall feedstock.

Food waste will be delivered by trucks. The Amended Project proposal lacks sufficient information to identify and assess appropriate and necessary waste management measures, with regard to both project design and operations. For example, will a tipping floor be needed? A tipping floor would entail the need for leachate collection and the management of leachate. Will food waste arrive in a slurry form or will it need to be processed into a slurry on site? Will de-packaging equipment be needed? In addition, prevention and containment of food waste spills both during and after delivery is not addressed in the Amended Project's proposal. Without identified structural and operational containment measures there is no way for the Agency to determine that risks of releases into sensitive receptors (e.g., wetlands, streams, etc.) are reduced to an acceptable level.

While it is understood that the Amended Project will ultimately need to obtain a Solid Waste Facility Permit from the VT DEC Waste Management and Prevention Division, the additional information noted above is needed at this time for the Agency to conclude that the Amended Project does not raises a significant issue with respect to waste management with the condition that ultimately the



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Amended Project will be required to obtain the referenced solid waste permit prior to any site preparation or construction.

Salisbury AD 1 Response

Salisbury AD 1 filed an application for an Anaerobic Solid Waste Digestion Facility Certification on November 20, 2018, which provides additional information related to this comment. For convenience, the following provides a summary of the requested information:

1. *Will a tipping floor be needed?*

Response: No tipping floor is needed, and therefore no leachate collection system is proposed. Liquid feedstocks will be transferred from the delivery tanker trucks into the Hydrolyzer Tank through a tube and cam-lock with bar-screen and a containment system to prevent any material from contacting soil or surface water. Solid feedstocks will be transferred directly to the Hydrolyzer Tank from delivery trucks through entry of a retractable lid. Refer to Salisbury AD 1's Spill Prevention and Control Plan (Exh. SAD1-12 of the December 12, 2018 supplemental filing to the PUC).

2. *Will food waste arrive in a slurry form or will it need to be processed into a slurry on site?*

Response: Food waste will arrive in a de-packaged, slurry or solid form. There will be no slurrying on-site; however, all food waste will be macerated, homogenized, and hydrolyzed in the hydrolyzer prior to going into the digester. Before material is brought on-site, the material must meet quality standards. All packaging and other non-organic material (glass, cardboard, plastic, etc.) must be removed before delivery to the Facility, and feedstock cannot contain more than 1% of inert material. Haulers must provide a manifest for each delivery truck equipped with hoses for material transfer to confirm the material meets quality standards.

3. *Will de-packaging equipment be needed?*

Response: No de-packaging equipment will be needed, as all food waste will be pre-processed/de-packaged prior to delivery to the site, as described above.

Response by: Sol Ucciani, Vanguard Renewables and Lydia Lee, VHB

PUBLIC HEALTH AND SAFETY

ANR Information Request

The Amended Project proposes to construct a nutrient liquid storage tank designed to hold 5.3 million gallons of digestate at any given time. The storage tank is located less than 100 feet from a wetland and a tributary to Otter Creek. Salisbury's filing does not include design and operation details which address the management of potential releases of digestate from the storage tank. The conceptual site plan (Exhibit SAD1-3) also indicates that the Amended Project proposes to pump the liquid digestate across the referenced wetland and tributary in order to get the digestate to the storage tank. However, no plans or drawings are provided, and no explanation is presented as to the materials or methods of the pipe's construction or operation. It is also noted that the pipe will need to cross an existing culvert



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and will be laid under a road that will be subjected to heavy truck traffic. Similarly, plans, drawings and explanations as to construction techniques and safety assurance are not provided.

It is also necessary to ascertain who will be responsible for responding to and containing releases of digestate should they occur, and to identify measures that will be implemented (including but not limited to physical structures, response plans, designated on- or off-site personnel) to prevent, contain or clean up any releases and prevent them from coming into contact with surface waters.

Salisbury AD 1 Response

We note that Salisbury AD 1 has revised the nutrient storage tank ("NST") design to consist of two smaller tanks that are each below the storage capacity threshold for requiring a Ch. 43 permit. The two NSTs are sized at 2.5 Mgal each and would be in the same location as the previously proposed 5.3 Mgal NST.

1. Potential Digestate Releases: Please refer to Salisbury AD 1's Spill Prevention and Control Plan (Exh. SAD1-12 of the December 12, 2018 supplemental filing) that addresses the prevention and management of potential releases of digestate from the NSTs and incidental releases from Project operations. Salisbury AD 1 will be the entity responsible for identifying measures that will be implemented (including physical structures, response plans, and designated on-site or off-site personnel), and for responding to and containing release of digestate should it occur, as described in the Spill Control Plan.
2. Nutrient Pipeline Construction: Please refer to the Force Main Trench detail and Force Main Crossing at Culvert detail on sheet C-6.02 of Exh. SAD 1-3(Rev.) of the December 12, 2018 supplemental filing), which provide information regarding the proposed materials and construction of the pipeline. The pipeline will consist of a 4" or 6" diameter plastic pressure pipe (High Density Polyethylene (HDPE) SDR17 or equivalent as required). The pipe will be installed via open trenching and laid within an envelope of sand bedding materials and buried at a depth and in a manner that will provide protection against surface structural loads associated with truck traffic. Design, construction, and testing of the pipeline will be performed in accordance with the standards for wastewater force mains as established in Appendix 1-A, Section 1-A-05 of the State of Vermont Environmental Protection Rules Chapter 1, Wastewater System and Water Supply Rules, 2007 (VT DEC WW Rules).
3. Nutrient Pipeline Operation: The pipeline will serve as a force main where liquid nutrient (digestate) will be pumped from the nutrient recovery system to the NSTs. Liquid pumping rates will be variable and dependent upon daily feedstock input. The maximum expected amount of liquid digestate pumped in a single day is approximately 60,000 gallons based upon the mass flow estimate for the proposed facility. A series of sensors throughout the facility, including level sensors in the tanks, will be tied into a Supervisory Control and Data Acquisition System (SCADA) which controls the operations of the plant, including pump operation. Each pump is individually controlled by a programmed logic system which commands the pumps to shut off when the level



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sensors indicate that a tank is full. Manual shutoffs and localized disconnects will be provided for these components for redundancy.

Response by: Sol Ucciani, Vanguard Renewables and Peter Smiar, VHB

WETLANDS

ANR Information Request

[C]omponents of the Amended Project which will receive, transport or contain waste (feedstock or digestate) are located in close proximity to wetlands. However, there are a lack of details concerning prevention of waste from entering wetlands as discussed above. The conceptual site plan (Exhibit SAD1-3) reveals that the Amended Project proposes disturbance within wetlands and / or wetland buffers. However, the amount of disturbance is not quantified and the way in which the wetlands or buffers will be disturbed and otherwise impacted by the construction and operation of the Amended Project's infrastructure (e.g., piping, stormwater structures, etc.) is not described or explained.

While it is understood that the Amended Project will ultimately need to obtain a Wetland Permit from the VT DEC Watershed Management Division, the additional information noted above is needed at this time for the Agency to conclude that the Amended Project does not raises a significant issue with respect to wetlands with the condition that ultimately the Amended Project will be required to obtain the referenced wetland permit prior to any site preparation or construction.

Salisbury AD 1 Response

Grading for the Project's vehicle access area and stormwater infrastructure will require some minimal disturbance to the wetland and wetland buffer. In addition, the culvert under the access road to the NSTs will need to be replaced and the road widened to accommodate tanker trucks, which would result in minor direct permanent impacts to the wetland and intermittent stream. Currently, the channel has no connectivity to up- or downstream channels, as intervening wetlands are not the type that are saturated year-round. The channel segment itself is artificially manipulated and subject to intermittent flows. The Project proposes to replace the existing 18"-diameter corrugated metal culvert with a new 36"-diameter HDPE culvert that will be partially buried and backfilled with streambed substrate to improve hydraulic connectivity between portions of the wetland on either side.

The anticipated impacts to the wetland, buffer, and intermittent stream are depicted on the attached Wetland Impact Plan. In summary, approximately 10,325 sq. ft. of permanent wetland buffer impacts, 5,590 sq. ft. of temporary wetland buffer impacts, and 560 sq. ft. of wetland impacts are anticipated, for which Salisbury AD 1 will seek authorization under the Vermont Wetland General Permit. The direct wetland and stream impacts are expected to be authorized under the Army Corps of Engineers Section 404 General Permit ("404 Permit") via Pre-Construction Notification of the Vermont General Permit. The Project has been designed to first avoid, and then minimize, wetland and Class II buffer impacts to the greatest extent feasible while still achieving the Project's purpose and need. Proposed wetland and buffer impacts would occur in resource areas which already have been previously impacted by activities at the farmstead, invasive



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plants, fill, or excavation (for access road and farm pond), and would not change or eliminate the existing functions of the subject wetlands. VHB anticipates that these impacts will be authorized by both agencies, given the avoidance and minimization measures that have been implemented in Project design, and resultant minimal nature of the impacts proposed.

Response by: Lydia Lee and Carla Fenner, VHB

STREAMS

ANR Information Request

[C]omponents of the Amended Project which will receive, transport or contain waste (feedstock or digestate) are located in close proximity to, including the crossing of, a tributary to Otter Creek. However, there are a lack of details concerning prevention of waste from entering surface waters as discussed above. The conceptual site plan (Exhibit SAD1-3) reveals that the Amended Project will disturb a stream where the digestate pipe crosses stream 2018-SC-2 (also discussed in the public health and safety section above). However, no plans or drawings are provided, and no explanation is presented as to the materials or methods of this pipe's construction or operation.

Salisbury AD 1 Response

The pipeline will be designed, constructed, and tested in accordance with standards and specifications for a wastewater force main as established in Appendix 1-A of the VT DEC WW Rules, which incorporate the necessary environmental and safety requirements that would avoid the risk of a release or leak. Furthermore, the pipeline will be constructed below the intermittent stream channel and new culvert, preventing a direct release of liquid nutrient to the stream or wetland. Please refer to the Force Main Trench detail and Force Main Crossing at Culvert detail on sheet C-6.02 of Exh. SAD1-3(Rev.), which provide information regarding the proposed materials and construction of the pipeline.

A Stream Alteration Permit for the culvert replacement will not be needed because the short stream segment below the existing culvert is intermittent and has less than a 0.5-square-mile watershed. However, the Project will coordinate with the DEC Streams Program to confirm based on VHB's proposed culvert design. As stated above, it is expected that the Project will apply for 404 Permit coverage via a PCN for impacts to the stream and wetland. Construction will be completed in accordance with an EPSC plan and will implement best management practices. As stated above, the final Project will improve the hydraulic connectivity between portions of the wetland on either side of the existing roadway by replacing and improving the culvert. Therefore, the installation of the pipeline along the existing road will require minor temporary disturbance to the stream but will not result in adverse impacts to the stream.

Please also refer to the responses above under Public Safety (for pipeline construction information) and Wetlands (for approximate impacts to the stream). The existing conditions of the stream channel segment are similar to the surrounding wetland area in that there are existing and ongoing disturbances. The channel segment is straight, starts at the outlet of an access road culvert and ends at a farm pond (mapped as a Class II wetland), and appears to have been created, straightened, or excavated previously. There is no woody vegetation cover along the channel or within 50 feet of the stream channel, and invasive plants are



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present throughout the surrounding wetland areas. It is VHB's opinion that the ecological function and aquatic habitat in the short intermittent channel segment is minimal, and the Project's proposed impacts resulting from culvert replacement would not adversely impact the stream or riparian buffer condition.

Response by: Lydia Lee and Carla Fenner, VHB

WATER POLLUTION (STORMWATER)

ANR Information Request

The documents submitted with Salisbury's motion to amend the CPG confirm that the Amended Project will require both a construction stormwater permit and an operational stormwater permit. The filing acknowledges that impervious surfaces will exceed the one-acre threshold. However, the conceptual site plan (Exhibit SAD1-3) lacks the following details which are necessary to evaluate the impacts of the Amended Project: actual extent of soil disturbance, actual grading contours, actual operational stormwater features (such as detention ponds and conveyance channels) including actual size, shape, location and design type (e.g., extended detention basin with forebay, infiltration basin, grass lined swale or channel, rock lined swale or channel, etc.), and the location, extent and types of impervious surfaces.

While it is understood that the Amended Project will ultimately need to obtain both construction and operation stormwater permits from the VT DEC Watershed Management Division, the additional information noted above is needed at this time for the Agency to conclude that the Amended Project does not raise a significant issue with respect to stormwater with the condition that ultimately the Amended Project will be required to obtain the referenced stormwater permits prior to any site preparation or construction..

Salisbury AD 1 Response

Please refer to the attached sheets C-1.01 Final Design Site Plan, C-5.02 Erosion and Sediment Control Plan, C-5.03 Erosion and Sediment Control Details of SAD1-3(Rev.). The sheets are part of the Project Design Plans, and depict the extent of soil disturbance, grading contours, and operational stormwater features.

1. Stormwater Construction Permit. For Project construction, direct earth disturbance is necessary for installation of the digester and supporting building and equipment pads, new truck turnaround areas at the digester and NSTs, as well as disturbance associated with the installation of piping to connect Project components. The Project's construction will result in approximately 8.5 acres of soil disturbance. Because the Project is estimated to have more than one acre of proposed earth disturbance, Salisbury AD 1 will apply for coverage under a Vermont DEC Construction Phase Stormwater Discharge Permit. VHB completed a Project risk assessment and has determined that the Project would require an Individual Permit ("INDC") and would be required to comply with an approved site-specific EPSC plan to manage stormwater runoff from areas of exposed soil during construction. Implementation of such a plan will minimize the potential for sediment-laden runoff to reach the nearby receiving waters, thereby addressing the moderate to high erodibility ratings associated with some of the soils that underlie the Project Site. Examples of EPSC measures to be



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implemented include: limits of disturbance demarcation (e.g., construction fence and barrier tape) along the perimeter of the Project Site, silt fence or other similar perimeter controls between the Project Site and receiving waters, stabilized construction entrances/exits, construction phasing to limit concurrent earth disturbance, and on-going stabilization of exposed soil using seed and mulch, seed and rolled erosion control product ("RECP"), and/or a gravel surface. As a result, the Project will not result in unreasonable soil erosion or reduction in the capacity of the land to hold water so that a dangerous or unhealthy condition results. The Project intends to prepare and file necessary application materials to DEC for the issuance of an INDC and it is anticipated that this permit will be issued.

2. Stormwater Operational Phase Permit. Approximately 1.7 acres of new impervious surface will be constructed, which includes the truck turnaround, roofs of the digesters, utility building, CHP, hydrolyzer, upgrader, lab, backup generator, and the proposed gravel access area around the NSTs. The NSTs are open-topped and will collect precipitation. Therefore, it is not considered as an impervious area. Since new and existing impervious areas will be greater than 1 acre, Salisbury AD 1 will apply for coverage under Vermont DEC Operational Phase Stormwater Discharge General Permit 3-9015 ("GP 3-9015"). The proposed stormwater treatment practices are expected to include a combination of grass channels, deep sump catch basin, disconnection areas, and sediment forebays to achieve pretreatment of runoff prior to routing flows to two gravel wetlands for water quality treatment and peak flow mitigation. Operational stormwater features are depicted on Sheets C-1.01 and C-6.01 of the attached Project Plan Set. It is anticipated that authorization to discharge pursuant to GP 3-9015 will be issued by DEC for the Project.

Response by: Peter Smiar, VHB

ATTACHMENTS:

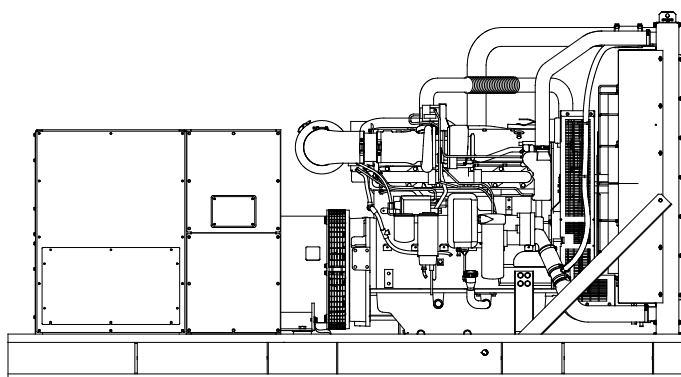
1. Backup Generator Specifications
2. CHP Specifications
3. Plan Depicting Wetland Impacts

KOHLER**Model: 500REOZJB****208–600 V****Diesel**

**Tier 2 EPA-Certified for
Stationary Emergency
Applications**

Ratings Range

		60 Hz
Standby:	kW	400–510
	kVA	500–638



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz emergency generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all generator set systems and components. Two- and five-year extended limited warranties are also available.
- Alternator features:
 - The pilot-excited, permanent magnet (PM) alternator provides superior short-circuit capability.
 - The brushless, rotating-field alternator has broadrange reconnectability.
- Other features:
 - Kohler designed controllers for one-source system integration and remote communication. See Controllers on page 3.
 - The low coolant level shutdown prevents overheating (standard on radiator models only).
 - Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
 - An electronic, isochronous governor delivers precise frequency regulation.
 - Multiple circuit breaker configurations.

Generator Set Ratings

Alternator	Voltage	Ph	Hz	150°C Rise Standby Rating		130°C Rise Standby Rating	
				kW/kVA	Amps	kW/kVA	Amps
5M4024	120/208	3	60	450/563	1561	440/550	1527
	127/220	3	60	465/581	1525	465/581	1525
	139/240	3	60	505/631	1519	475/594	1428
	220/380	3	60	400/500	760	400/500	760
	240/416	3	60	450/563	781	440/550	763
	277/480	3	60	505/631	759	475/594	714
5M4027	120/208	3	60	505/631	1752	475/594	1648
	127/220	3	60	505/631	1657	500/625	1640
	139/240	3	60	505/631	1519	505/631	1519
	220/380	3	60	405/506	769	405/506	769
	240/416	3	60	505/631	876	475/594	824
	277/480	3	60	505/631	759	505/631	759
5M4028	120/208	3	60	510/638	1770	510/638	1770
	127/220	3	60	510/638	1673	510/638	1673
	139/240	3	60	510/638	1534	510/638	1534
	220/380	3	60	470/588	893	470/588	893
	240/416	3	60	510/638	885	510/638	885
	277/480	3	60	510/638	767	510/638	767
5M4270	347/600	3	60	505/631	607	505/631	607
5M4272	347/600	3	60	510/638	613	510/638	613

RATINGS: All three-phase units are rated at 0.8 power factor. *Standby Ratings:* The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. Ratings are in accordance with ISO-8528-1 and ISO-3046-1. Obtain technical information bulletin (TIB-101) for ratings guidelines, complete ratings definitions, and site condition derates. The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

Alternator Specifications

Specifications	Alternator
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Permanent-Magnet, Pilot Exciter
Leads: quantity, type	10/12, Reconnectable 4, 600 V
Voltage regulator	Solid State, Volts/Hz
Insulation:	NEMA MG1
Material	Class H, Synthetic, Nonhygroscopic
Temperature rise	130°C, 150°C Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Rotor balancing	125%
Voltage regulation, no-load to full-load	Controller Dependent
One-step load acceptance	100% of Rating
Unbalanced load capability	100% of Rated Standby Current
Peak motor starting kVA:	(35% dip for voltages below)
480 V 5M4024 (10 lead)	1350
480 V 5M4027 (12 lead)	1550
480 V 5M4028 (10 lead)	1800
600 V 5M4270 (4 lead)	1250
600 V 5M4272 (4 lead)	1750

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
- Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
- Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field.
- Self-ventilated and dripproof construction.
- Superior voltage waveform from a two-thirds pitch stator and skewed rotor.
- Brushless alternator with brushless pilot exciter for excellent load response.

Application Data

Engine

Engine Specifications	
Engine manufacturer	John Deere
Engine model	6135HFG75
Engine type	4-Cycle, Turbocharged, Charge Air-Cooled
Cylinder arrangement	6, Inline
Displacement, L (cu. in.)	13.5 (824)
Bore and stroke, mm (in.)	132 x 165 (5.2 x 6.5)
Compression ratio	16.0:1
Piston speed, m/min. (ft./min.)	594 (1949)
Main bearings: quantity, type	7, Replaceable Insert
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	563 (755)
Crankshaft material	Forged Steel
Valve material	
Intake/Exhaust	Nickel-Chromium Head Chromium-Silicone Stem
Governor: type, make/model	JDEC Electronic L15
Frequency regulation, no-load to full-load	Isochronous
Frequency regulation, steady state	±0.25%
Frequency	Fixed
Air cleaner type, all models	Dry

Exhaust

Exhaust System	
Exhaust manifold type	Dry
Exhaust flow at rated kW, m³/min. (cfm)	97.2 (3433)
Exhaust temperature at rated kW, dry exhaust, °C (°F)	524 (975)
Maximum allowable back pressure, kPa (in. Hg)	Min. 4 (1.2) Max. 10 (3.0)
Engine exhaust outlet size, mm (in.)	See ADV drawing

Engine Electrical

Engine Electrical System	
Battery charging alternator:	
Ground (negative/positive)	Negative
Volts (DC)	24
Ampere rating	60
Starter motor rated voltage (DC)	24
Battery, recommended cold cranking amps (CCA):	
Qty., CCA rating each	Two, 950
Battery voltage (DC)	12

Fuel

Fuel System	
Fuel supply line, min. ID, mm (in.)	13 (0.50)
Fuel return line, min. ID, mm (in.)	10 (0.38)
Max. lift, fuel pump: type, m (ft.)	Electronic 2.1 (6.8)
Max. fuel flow, Lph (gph)	214.8 (56.7)
Max. return line restriction, kPa (in. Hg)	35 (10.3)
Fuel prime pump	Electronic
Fuel filter	
Secondary	2 Microns @ 98% Efficiency
Primary	10 Microns
Water Separator	Yes
Recommended fuel	#2 Diesel

Lubrication

Lubricating System	
Type	Full Pressure
Oil pan capacity, L (qt.) §	40.0 (42.3)
Oil pan capacity with filter, L (qt.) §	42.0 (44.4)
Oil filter: quantity, type §	1, Cartridge
Oil cooler	Water-Cooled
§ Kohler recommends the use of Kohler Genuine oil and filters.	

Application Data

Cooling

Radiator System	
Ambient temperature, °C (°F)*	50 (122)
Engine jacket water capacity, L (gal.)	18 (4.8)
Radiator system capacity, including engine, L (gal.)	67.2 (17.8)
Engine jacket water flow, Lpm (gpm)	400 (106)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	209 (11896)
Heat rejected to air charge cooler at rated kW, dry exhaust, kW (Btu/min.)	116 (6603)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	965 (38)
Fan, kWm (HP)	18 (24)
Max. restriction of cooling air, intake and discharge side of radiator, kPa (in. H ₂ O)	0.125 (0.5)

* Enclosure with internal silencer reduces ambient temperature capability by 5°C (9°F).

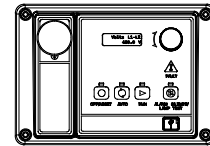
Operation Requirements

Air Requirements	
Radiator-cooled cooling air, m ³ /min. (scfm)†	651 (23000)
Cooling air required for generator set when equipped with city water cooling or remote radiator, based on 14°C (25°F) rise, m ³ /min. (cfm)†	279 (9867)
Combustion air, m ³ /min. (cfm)	38 (1342)
Heat rejected to ambient air:	
Engine, kW (Btu/min.)	38 (2163)
Alternator, kW (Btu/min.)	40 (2277)

† Air density = 1.20 kg/m³ (0.075 lbm/ft³)

Fuel Consumption	
Diesel, Lph (gph) at % load	Standby Rating
100%	134.5 (35.5)
75%	104.6 (27.6)
50%	75.3 (19.9)
25%	38.8 (10.2)

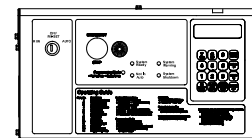
Controllers



APM402 Controller

Provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility.

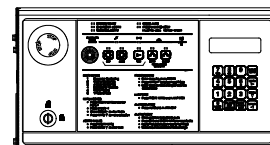
- Digital display and menu control provide easy local data access
 - Measurements are selectable in metric or English units
 - Remote communication thru a PC via network or serial configuration
 - Controller supports Modbus® protocol
 - Integrated hybrid voltage regulator with ±0.5% regulation
 - Built-in alternator thermal overload protection
 - NFPA 110 Level 1 capability
- Refer to G6-161 for additional controller features and accessories.



Decision-Maker® 550 Controller

Provides advanced control, system monitoring, and system diagnostics with remote monitoring capabilities.

- Digital display and keypad provide easy local data access
 - Measurements are selectable in metric or English units
 - Remote communication thru a PC via network or modem configuration
 - Controller supports Modbus® protocol
 - Integrated voltage regulator with ±0.25% regulation
 - Built-in alternator thermal overload protection
 - NFPA 110 Level 1 capability
- Refer to G6-46 for additional controller features and accessories.



Decision-Maker® 6000 Paralleling Controller

Provides advanced control, system monitoring, and system diagnostics with remote monitoring capabilities for paralleling multiple generator sets.

- Paralleling capability with first-on logic, synchronizer, kW and kVAR load sharing, and protective relays
 - Digital display and keypad provide easy local data access
 - Measurements are selectable in metric or English units
 - Remote communication thru a PC via network or modem configuration
 - Controller supports Modbus® protocol
 - Integrated voltage regulator with ±0.25% regulation
 - Built-in alternator thermal overload protection
 - NFPA 110 Level 1 capability
- Refer to G6-107 for additional controller features and accessories.

Modbus® is a registered trademark of Schneider Electric.

Standard Features

- Alternator Protection
- Battery Rack and Cables
- Customer Connection
(standard with Decision-Maker® 6000 controller only)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Available Options

Approvals and Listings

- ☐ California OSHPD Pre-Approval
- ☐ CSA Certified
- ☐ IBC Seismic Certification
- ☐ UL 2200 Listing

Enclosed Unit

- ☐ Sound Enclosure Level 1 and Subbase Fuel Tank Packages
- ☐ Sound Enclosure Level 2 and Subbase Fuel Tank Packages
- ☐ Weather Enclosure and Subbase Fuel Tank Packages

Open Unit

- ☐ Exhaust Silencer, Critical (kit: PA-354880)
- ☐ Flexible Exhaust Connector, Stainless Steel

Fuel System

- ☐ Flexible Fuel Lines (Select rubber or stainless steel)

Controller

- ☐ Common Failure Relay
(Decision-Maker® 550 and 6000 controllers only)
- ☐ Communication Products and PC Software
- ☐ Customer Connection (Decision-Maker® 550 controller only)
- ☐ Decision-Maker® Paralleling System (DPS)
(Decision-Maker® 6000 controller only)
- ☐ Dry Contact (isolated alarm)
(Decision-Maker® 550 and 6000 controllers only)
- ☐ Two Input/Five Output Module (APM402 controller only)
- ☐ Remote Audiovisual Alarm Panel
(Decision-Maker® 550 controller only)
- ☐ Remote Emergency Stop
- ☐ Remote Serial Annunciator Panel
- ☐ Run Relay
- ☐ Manual Speed Adjust
(Decision-Maker® 550 and APM402 controllers only)

Cooling System

- ☐ Block Heater, 2500 W, 90–120 V, 1 Ph
- ☐ Block Heater, 2500 W, 190–208 V, 1 Ph
- ☐ Block Heater, 2500 W, 210–240 V, 1 Ph
- ☐ Block Heater, 2500 W, 380–480 V, 1 Ph
Required for ambient temperatures below 0°C (32°F)
- ☐ Radiator Duct Flange

Electrical System

- ☐ Alternator Strip Heater
- ☐ Battery
- ☐ Battery Charger, Equalize/Float Type
- ☐ Battery Heater
- ☐ Line Circuit Breaker (NEMA type 1 enclosure)
- ☐ Line Circuit Breaker with Shunt Trip (NEMA type 1 enclosure)

Paralleling System

- ☐ Voltage Sensing

Miscellaneous

- ☐ Air Cleaner, Heavy Duty
- ☐ Air Cleaner Restriction Indicator
- ☐ Crankcase Emissions Canister
- ☐ Engine Fluids Added
- ☐ Rated Power Factor Testing

Literature

- ☐ General Maintenance
- ☐ NFPA 110
- ☐ Overhaul
- ☐ Production

Warranty

- ☐ 2-Year Basic Limited Warranty
- ☐ 5-Year Basic Limited Warranty
- ☐ 5-Year Comprehensive Limited Warranty

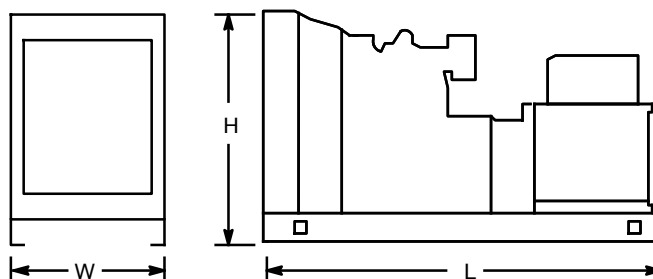
Other Options

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

Dimensions and Weights

Overall Size, L x W x H, max., mm (in.): 3630 x 1425 x 1993
(142.9 x 56.1 x 78.5)
Weight (radiator model), wet, max., kg (lb.): 3883 (8560)

Note: See ADV drawing for specific dimensions based on accessory selections.



NOTE: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

DISTRIBUTED BY:

Project Name Vanguard - Vermont 600K
 Project Location Vermont
 Prepared by Kevin Rohrer

Engine Information		
Siemens Engine ID	IC-G-B-36-233	
Model Number	SGE-36SL	
RPM	1800	
Fuel Type	Natural gas	
Aspiration & NO _x	<i>g/bhp-hr</i> Lean, 1.0	
Supply Fuel Pressure	<i>psi</i> 3-5	

Generator Information		
Marathon Model	574RSL4037	
105°C rise NEMA-F rating	kWe	800
KVA		600
Voltage		480
Frequency	Hz	60
Power Factor		1.0

Engine Performance	Unit	100%	80%	60%	40%
Electrical Power	kWe	600	480	360	240
Mechanical Power	bHP	831	668	507	344
Exhaust Flow	lb/h	7,328	6,030	4,766	3,569
Exhaust Temp	°F	748	764	780	795
Heat to Radiation <i>(Ambient)</i>	BTU/h	102,360	85,320	64,860	44,340
Fuel Consumption <i>(LHV)</i>	BTU/h	5,421,639	4,522,735	3,644,846	2,748,071
Fuel Consumption <i>(LHV)</i>	BTU/bHP-hr	6,527	6,766	7,188	7,998
Fuel Consumption <i>(LHV)</i>	BTU/kWh	9,036	9,422	10,125	11,450

Energy Balance					
Total Primary Heat Recovered	BTU/h	2,823,342	2,437,275	2,063,584	1,713,276
Total Secondary Heat Recovered	BTU/h	0	0	0	0
Total Steam Recovered	BTU/h	0	0	0	0
Total Heat Recovered	BTU/h	2,823,342	2,437,275	2,063,584	1,713,276
Electrical Efficiency <i>(LHV)</i>	%	37.76%	36.21%	33.70%	29.80%
Thermal Efficiency <i>(LHV)</i>	%	52.08%	53.89%	56.62%	62.34%
Total Efficiency <i>(LHV)</i>	%	89.84%	90.10%	90.32%	92.14%

Primary Circuit <i>Water</i>					
Process Water Flow	GPM	307	250	212	176
Process Water Temp Inlet	°F	170	170	170	170
Process Water Temp Outlet	°F	190	190	190	190

Secondary Circuit <i>None</i>					
Secondary Water Flow	GPM	0	0	0	0
Secondary Water Temp Inlet	°F	0	0	0	0
Secondary Water Temp Outlet	°F	0	0	0	0

Steam Production					
Steam Produced	lb/h	N/A	N/A	N/A	N/A

Engine HT Circuit <i>50% Ethylene glycol</i>					
Jacket Water Heat	BTU/h	1,837,505	1,599,289	1,380,054	1,186,728
Exhaust Heat <i>cooled to 248 °F</i>	BTU/h	985,836	837,986	683,530	526,548
Oil Cooler Heat	BTU/h	0	0	0	0
HT Radiator Rejection	BTU/h	0	0	0	0
Jacket Water Temp Inlet	°F	177	181	183	184
Jacket Water Temp Outlet	°F	194	194	194	194
Jacket Water Flowrate	GPM	275	275	275	275

Engine LT Circuit <i>50% Ethylene glycol</i>					
Intercooler Heat	BTU/h	129,517	110,416	83,715	41,754
LT Radiator Rejection	BTU/h	-129,517	-110,416	-83,715	-41,754
Intercooler Water Temp Inlet	°F	128	129	129	130
Intercooler Water Temp Outlet	°F	131	131	131	131
Intercooler Water Flowrate	GPM	110	110	110	110

Radiator Specifications	% Oversize	Capacity BTU/h	Ambient	Altitude	Voltage
HT Radiator	10	2,021,256	105 °F	1,000 ft	480
LT Radiator	25	161,896			

Notes

Energy balance data is stated at ISO 3046-1 conditions

MEGpro v4.1.1.0

Issue Date
7/30/2018

	GROUP	GAS	PRODUCT INFORMATION		INDEX	
	IC		IC-G-B-36-233		B1	
	POWER RATING				DATE	
					15/05/17	
					DEP.	2

GENSET:	SGE-36SL	SPEED:	1800
JACKET WATER TEMPERATURE(°F):	194	FUEL TYPE:	NATURAL GAS
INTERCOOLER WATER TEMP(°F):	131		

SERVICE:	CONTINUOUS	COMPRESSION RATIO:	11,6:1
COOLING SYSTEM:	TWO CIRCUITS	REGULATION:	Electronic
	TWO STAGE IC / Oilcooler in main circuit	IGNITION TIMING:	18°
EXHAUST MANIFOLD TYPE:	WATER COOLED	MAX. BACK PRESSURE:	18 "H2O (450 mmH2O)
EMISSIONS:		AMBIENT CONDITIONS ISO 3046/1:	
	NO _x g/bHPH 1		
	CO g/bHPH <1.8	Atmospheric pressure ("Hg (kPa))=	30 (100)
	NMHC g/bHPH <0.7	Ambient temperature (°F (°C))=	77 (25)
	CH ₄ g/bHPH <3	Relative humidity (%)=	30
	CO ₂ lb/h 804		

POWER RATING (4)		NOMINAL	PARTIAL LOADS			
LOAD		%	100%	80%	60%	40%
MECHANICAL POWER (3, 4, 5)		BHP (KWb)	939 (700)	751 (560)	563 (420)	375 (280)
BMEP		psi (bar)	189 (13.0)	151 (10.4)	113 (7.8)	75 (5.2)
ELECTRICAL POWER (cosφ 1)	(9)	kWe	676	539	402	264
ELECTRICAL POWER (cosφ 0,8)	(9)	kWe	669	534	398	262
FUEL CONSUMPTION	(1)	BTU/bHP-hr (KW)	6527 (1796)	6766 (1489)	7188 (1186)	7998 (879)
MECHANICAL EFFICIENCY		%	39.0	37.6	35.4	31.9
ELECTRICAL EFFICIENCY (cosφ 1)	(9)	%	37.6	36.2	33.9	30.0
HEAT IN MAIN WATER CIRCUIT	(1)	BTU/min (KW)	33380 (587)	28600 (503)	24170 (425)	20240 (356)
HEAT IN SECONDARY WATER CIRCUIT	(1)	BTU/min (KW)	2388 (42)	1990 (35)	1649 (29)	796 (14)
HEAT IN CHARGE COOLER	(1)	BTU/min (KW)	2388 (42)	1990 (35)	1649 (29)	796 (14)
HEAT IN OIL COOLER	(1)	BTU/min (KW)	***	***	***	***
HEAT IN EXHAUST GASES (25 °C)	(1)	BTU/min (KW)	24850 (437)	20810 (366)	16660 (293)	12280 (216)
HEAT IN EXHAUST GASES (120°C)	(1)	BTU/min (KW)	18410 (324)	15550 (273)	12580 (221)	9350 (164)
EXHAUST GAS TEMPERATURE	(1)	°F (°C)	738 (392)	756 (402)	775 (413)	793 (423)
HEAT TO RADIATION	(1)	BTU/min (KW)	1706 (30)	1422 (25)	1081 (19)	739 (13)
CARBURETION SETTINGS (2)						
O ₂ TO EXHAUST(DRY)(ONLY A REFERENCE)		%	9.2	9.0	8.8	8.5

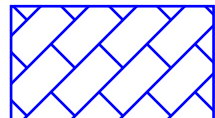
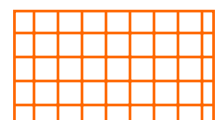
MASS FLOWS						
INTAKE AIR FLOW	(1)	lb/h (Kg/h)	7920 (3590)	6440 (2920)	5010 (2270)	3600 (1630)
EXHAUST GAS FLOW (WET)	(1)	lb/h (Kg/h)	8210 (3720)	6680 (3030)	5200 (2360)	3740 (1700)

NOTES:
1. 100% LOAD TOLERANCES: FUEL CONSUMPTION +5%, COOLING CIRCUIT AND EXHAUST GASES ± 8%, RADIATION ±25% EXHAUST TEMPERATURE ±20°C, MASS FLOWS ± 10% (ALSO FOR CO2 FLOW IN EXHAUST).
2. THE ENGINE PERFORMANCE DATA, TIMING ADVANCE AND CARBURETION SETTINGS ARE VALID FOR A GAS THAT FULFILLS THE REQUIREMENTS DEFINED IN IC-G-D-30-001e AND IC-G-D-30-002e
3. NET POWER, MECHANICAL PUMPS NOT INCLUDED.
4. POWERS ARE VALID FOR AMBIENT TEMP.=77°F (25°C) AND AN ALTITUDE OF =1640 ft (500 m). SEE OTHER CONDITIONS IN PI IC-G-B-00-001
5. OVERLOAD NOT ALLOWED
6. THE SPECIFICATIONS AND MATERIALS ARE SUBJECT TO CHANGE WITHOUT NOTIFICATION
7. A ENGINE WITH INLET OR OUTPUT RESTRICTION OVER PUBLISHED LIMITS, OR WITH INADEQUATE MAINTENANCE OR INSTALLATION CAN MODIFY POWER RATING DATA.
8. EMISSIONS ACCORDING TO D1 CYCLE IS 8178-4.
9. ALTERNATOR VOLTAGE 480 V

CODE3	5/23/2018	Cod.: C-A	Elab:	idsv	Versión: 38/31/01/2018	1/1
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40 IDX Dr
Building 100 Suite 200
South Burlington, VT 05403
802.497.6100

-  Permanent Buffer
10,325 Square Feet
-  Permanent Wetland
560 Square Feet
-  Temporary Buffer
5,590 Square Feet



**Goodrich Farm /
Salisbury AD1**
615 Shard Villa Road
Salisbury, Vermont

No.	Revision	Date	Appr'd.

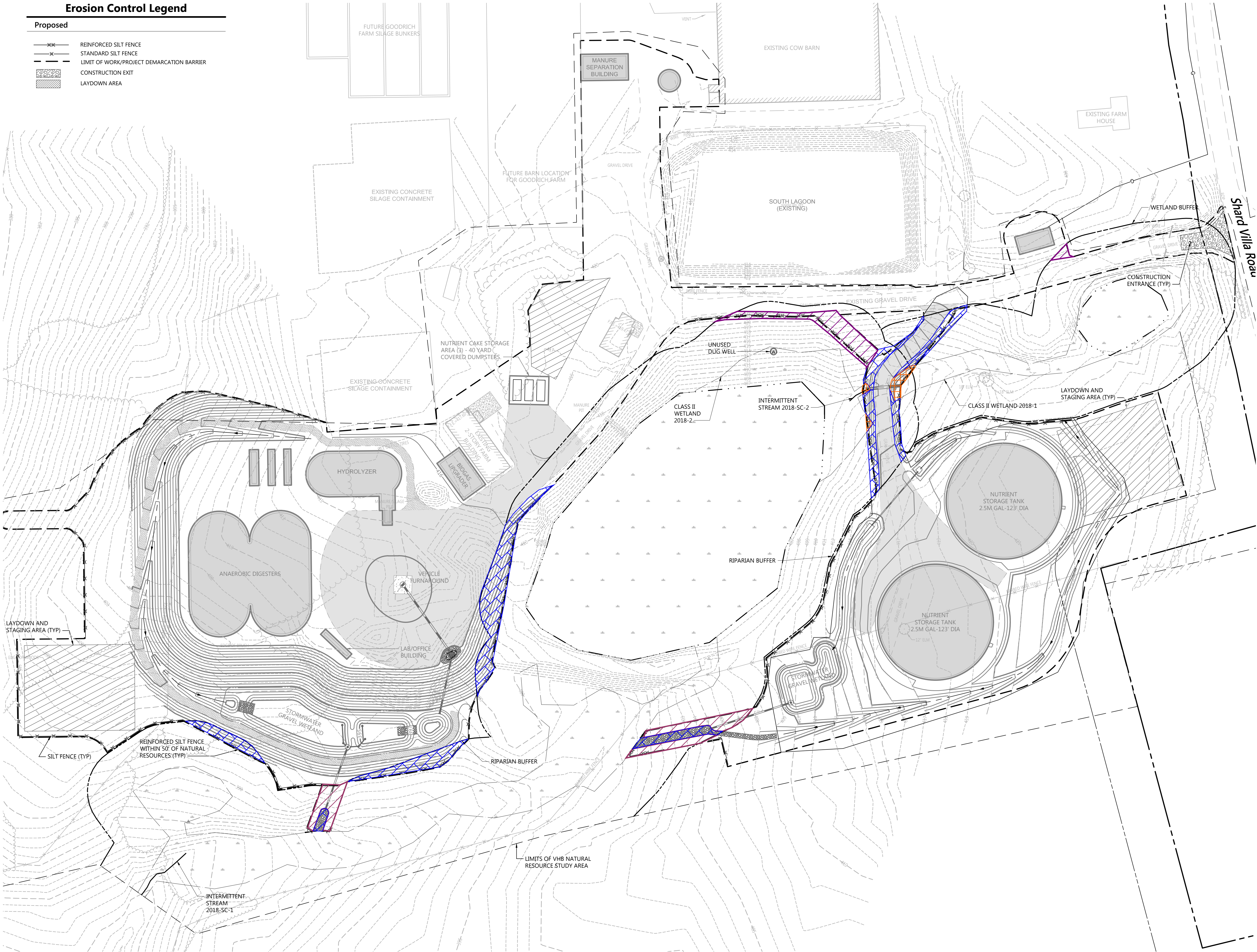
Designed by	Checked by
Issued for	Date
248 Submittal	Dec. 12, 2018

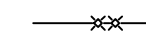
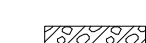
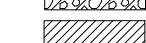
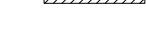
Not Approved for Construction
Drawing Title:
**Wetland and
Wetland Buffer
Impacts Exhibit**

Drawing Number

Sheet of

Project Number
58073.00



- Erosion Control Legend**
- Proposed**
-  REINFORCED SILT FENCE
 -  STANDARD SILT FENCE
 -  LIMIT OF WORK/PROJECT DEMARCATION BARRIER
 -  CONSTRUCTION EXIT
 -  LAYDOWN AREA