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MILWAUKEE POLICE DEPARTMENT
MEMORANDUM

Date: Wednesday, October 29th 2025

TO: William Wilson
Captain of Police

FR: Sergeant Richard Voden

RE: Electric Livewire Motorcycle Assessment

This memorandum is written by Sergeant Richard Voden, Specialized Patrol Division – Motorcycle Unit.

The purpose of this memorandum is to evaluate the potential addition of an electric motorcycle to the Milwaukee Police Department's Motorcycle Unit fleet. This assessment is organized into three primary categories: Officer Evaluations (Pros and Cons), Training and Safety, and Cost and Maintenance.

Officer Evaluations

Pros

Performance and Handling

- **Acceleration and torque:** The Del Mar's instant power delivery makes it very quick off the line and extremely responsive to throttle input and seamless power delivery.
- **Maneuverability:** The bike is easy to handle at most speeds. Riders highlighted its ability to perform tight U-turns.
- **Smooth ride:** The electric motor provides a vibration-free ride experience.
- **Reverse function:** The reverse function made backing up or parking easier, especially on inclines.
- **Stable and balanced:** Multiple riders noted that the bike felt very balanced, steady at low speeds.

General Ride Enjoyment

- The Del Mar was described as fast, and easy to ride.

Cons

Range and Battery Limitations

- **Limited range for patrol use:** Riders frequently noted that the battery could not last a full shift under moderate use. The bike was tested on a mock short distance escort on the highway, which the Motorcycle Unit performs several times a month. It was noted that highway usage significantly drained the battery to 2% after one full escort.
- **Long recharge time:** A full recharge can take up to 11 hours, making it impractical to charge mid-shift. This limitation is critical for units requiring continuous deployments that often work 12+ hours per shift. The bike was returned to charge prior to the completion of an officer's shift several times. Officers attempted to take the charger with them and charge during their downtime but were not able to do so due to the daily workload of a Motorcycle Officer.

Operational Concerns

- **Not loud enough for traffic:** The bike's quiet operation poses a safety issue. Motorists often failed to notice the bike until it was very close, even with lights activated. A Motorcycle Sergeant was almost struck 3 times on the highway due to vehicles not being able to hear or see the Sergeant.
- **Siren volume too low:** Multiple riders reported that the siren was not audible enough to alert drivers, reducing effectiveness during traffic maneuvers or emergency response which reduced response time to emergency situations. To negate this, we would need to research if a higher powered siren could be added to the Livewire, this would be an additional cost as it would be an aftermarket siren and wiring.
- **Insufficient lighting for emergency use:** Additional emergency lights were requested to improve visibility, Officers conducted several traffic stops and several citizens stated that they did not hear nor see the emergency lights and siren on the Livewire.
- **Deployment ability:** There are several notable deployments where an Officer was not able to assist in normal Motorcycle Unit operations due to the lack of battery range, emergency lights and siren. An example is when a Motorcycle Sergeant serving as the Traffic Supervisor at a recent high profile downtown deployment was unable to use the Motorcycle Officer that was operating the Livewire, both Motorcycle Sergeant and the Officer did not believe the Livewire could a hold a charge for the deployment nor be effective with the lack of emergency lights & low siren. The deployment included multiple time consuming, drawn out movements, amongst 1000s of pedestrians, in which a loud motorcycle is essential. The team was effectively down an officer for the deployment, because of the motorcycle.
- **Size and Weight:** The Livewire S2 Del Mar has a much smaller and narrower footprint compared to the Harley-Davidson Electra Glide motorcycles currently used by the Motorcycle Unit. The Electra Glide weighs over 900 pounds, providing substantial stability and resistance against external interference. During large-scale events such as Harley Fest, demonstrations, and major gatherings in the Entertainment District, there have been incidents where pedestrians have attempted to push over on-duty Motorcycle Officers. The heavier gas-powered motorcycles are far less susceptible to being knocked over in such situations. In contrast, the Livewire weighs approximately 450 pounds—about half the weight of the current model—making it significantly more vulnerable to being pushed or destabilized during crowd-control or high-traffic events

Comfort and Ergonomics

- **Uncomfortable seat:** The seat was repeatedly described as hard and unsuitable for long rides.
- **Poor wind protection:** Riders experienced significant wind buffeting, this was even more prominent on the highways operating at the speed limit. The small windshield was ineffective, and several Officers stated that not having any wind protection or heated handgrips made the ride unbearable, it should be noted that the temperatures during the week of tested ranged from upper 50's to mid-40's
- **Riding position:** Several found the bike forces the rider into more of a sport bike position. This position has the Officer leaning forward more with more pressure on their hands. Officers described the position to be very uncomfortable also citing that the handlebars were too low, with the mirrors and dashboard poorly positioned for visibility.

Storage and Practicality

- **Insufficient cargo capacity:** The soft saddlebags and small rear bag do not accommodate standard patrol gear such as rain gear, first aid kits, or paperwork, lunch, rifle and several other essential police and traffic related equipment. Riders expressed concern that the soft bags would not protect contents in a tip-over. The soft saddlebags does not have a locking mechanism. Anything in the soft saddlebags would not be secured if the Officer parked and left the motorcycle unattended.
- **Emergency Operation Controls:** The position of the Emergency lights and siren controls forces the officer to take their hand off the handlebar to activate & deactivate. This is a safety concern in an emergency operation officers are trained to keep their hands on the handlebars and controls, this ensures a quick response to any evasive maneuvers that the officer may have to conduct.
- **Uniform:** With the Livewire having a dramatic change in style and function it would require additional uniform equipment for every Motorcycle Officer to use the Livewire. A few required items would be a windproof uniform/jacket, full face helmet to protect the Officer at higher speeds, & communication devices for each of those helmets.

*It should be noted that every officer that tested the Livewire stated that it was not practical for the Milwaukee Police Department Motorcycle Unit

Training and Safety

Introducing an electric motorcycle to our current fleet brings safety concerns for our members. As the Motorcycle Unit Training coordinator, we have strived to maintain training standards on our Unit, providing our members with real world training to keep them safe while on patrol. Adding an untested motorcycle into the fleet risks the safety of the rider and all those around him/her on the roadway.

Our current training curriculum, safety protocols, and instructor certifications have been built around the behavior of our current Electra-glide motorcycles. Transitioning to electric motorcycles would require substantial modifications to training exercises and braking techniques prior to allowing Motorcycle Officers to patrol the roadways on an electric motorcycle.

Northwestern University – Center for Public Safety along with Texas A&M Engineering Extension Service are the two standards that the Milwaukee Police Department has used to certify instructors on Basic Motorcycle Operations. Although the Motorcycle Unit has six certified instructors, none of them are certified in teaching the basic operations for an electric motorcycle. These two entities do not currently have a training curriculum for an electric motorcycle added into their instructor certification program. We also don't know if an electric motorcycle operated by a trained rider can even pass our current certification course.

Every spring, the Milwaukee Motorcycle Unit participates in a yearly in-service training. At this training, instructors ensure that all members can safely operate the Police motorcycle. Members participate in slow speed exercises where they are taught the principles of the friction zone. This is a concept that allows an operator to maneuver the police motorcycle at slow speeds, yet under full control. Operators do this by using a combination of the clutch, throttle, and brake. The electric motorcycle does not have a manual transmission, eliminating the need for a clutch. This presents a dramatic difference in how an operator would control the motorcycle in a slow speed situation. No current motorcycle Officer would be certified in the operation of an electric motorcycle, raising liability concerns if an Officer or citizen were to be injured in a crash while operating an electric motorcycle.

Another training exercise that members participate in is emergency braking techniques. Motorcycle Unit members are taught the emergency braking standards every spring to ensure they can safely come to a stop in an emergency situation. Motorcycle Unit members need to show proficiency in these braking techniques so they can safely avoid a collision. The Milwaukee Motorcycle Unit uses the training manual provided by Northwestern University – Center for Public Safety and Texas A&M Engineering Extension Service to teach these braking techniques. In our current training manuals, emergency braking is taught, demonstrated, and practiced on a motorcycle with a manual transmission. As stated earlier, an electric motorcycle does not have a manual transmission which eliminates the clutch. Emergency braking on a standard motorcycle vs. an electric motorcycle have dramatic differences. Officers would not only have to be taught a new technique that we do not have a curriculum for, but would not be able to rely on muscle memory if they are forced to switch between the standard motorcycle and the electric motorcycle.

The electric motorcycle is nearly silent during operation, so the rider must be visually seen by other motorists to be aware of their location. The operator must be completely aware of their surroundings, including the positions of other vehicles, stay out of all blind spots, and be ready to react immediately if another driver doesn't see or hear them. Another concern is the instant torque to the rear wheel that the electric motor provides. Combustion engines need to build torque, unlike electric motors, where torque is instantaneous. The motorcycle is governed to prevent the front wheel from lifting, but the instant torque creates rapid acceleration, making it an extremely fast motorcycle that none of our riders are used to.

Anytime a member from the Motorcycle Unit is involved in a crash it is reviewed to determine if this crash could have been avoided. This practice is in place to make changes at training and identify trends that may be occurring. If an Officer is involved in a crash while operating an electric motorcycle they do not have a standard for training to rely on. This is a liability concern for the instructors, the operator, and the City of Milwaukee.

Cost and Maintenance

Upfitting Cost

The Livewire Del Mar S2 Patrol police motorcycle comes upfitted from the factory with several options pre-installed. These pre-installed options for the Patrol model include a siren system, emergency lighting, saddlebags, and fall over protection.

The Milwaukee Police Motor Unit currently has two different police motorcycles models in our fleet, one of which comes partially outfitted from the factory, that later is completed by both a local dealership and the department, as well as one model that has no police equipment at all from the factory, that is completely upfitted by the Department. There are pros and cons to both of these and we are well versed in outfitting police motorcycles, the requirements for our motor officers and the environments we ride in, and time and cost associated with upfitting a police motorcycle.

The cost of the Livewire Patrol will be higher than a standard, non-patrol model, as departments are paying for pre-installed emergency equipment. Departments that do not have a service dealer nearby to do the upfitting for them or a city garage capable and trained to work on police motorcycles to do in-house upfitting, this factory installed equipment can be worth the extra upfront cost if found adequate. However, in this instance, the factory installed patrol equipment on the Livewire Del Mar S2 Patrol we were lent for testing, the emergency lighting and the siren specifically, were found to be inadequate in our testing. These items will have to be replaced at an additional cost to the department, which is equal to paying twice to outfit the motorcycle, both first in the purchase price, and again upon delivery and setup of the motorcycle to replace the factory equipment in order make it meet our patrol standards. Additionally, to accommodate this extra equipment, as the current accessory circuit on the Livewire Patrol does not provide adequate power, just 10 additional Amps of power, and only at certain times, which also depletes the main battery and adversely affects the range of the motorcycle. We would be required to add a secondary battery system to power additional lighting and a larger, more powerful siren speaker and amplifier.

Beyond just the emergency equipment, the upfitting the Livewire Del Mar Patrol for day to day use by a motor officer would also require the installation of a computer system. The current fleet of motorcycles is equipped with purpose built and already existing equipment we are able to move from one motorcycle to another year to year or as needed when motorcycles are traded in and replaced. The Livewire Del Mar Patrol, uses a soft sided, compact, flexible luggage system, unlike any other motorcycles used in law enforcement. This will require a custom built computer mounting system as well as a slimmer computer dock to allow all the additional required equipment and wiring in compact luggage system.

The estimated cost to upfit the Livewire Del Mar Patrol in addition to the initial purchase price is approximately $5638. This cost is to equip this motorcycle similar to our current patrol motorcycles just to allow officers to do their basic daily duties, before taking into account any further limitations.

Maintenance

Currently, the Milwaukee Police Motor Unit conducts the majority of its motorcycle maintenance in house, which cuts down on both down time and maintenance costs. The Livewire Del Mar Patrol motorcycle is a low maintenance vehicle as far as what is required at service intervals. However, does follow the same service schedule as our standard Harley fleet. At this time, there are no trained personal to conduct a full maintenance on this motorcycle when it approaches these intervals requiring it to be serviced solely at a Livewire certified dealership. Currently, there are four Harley Davidson dealerships within a 30 minute drive of the Milwaukee Police Department Specialized Patrol Division building where if any of our current fleet required maintenance, we are able to easily access parts and service. However, Livewire is separate from Harley Davidson and has its own dealerships. As of now, the nearest dealership available to provide service for the Livewire product line is located in Libertyville, IL, a 60 mile drive. Currently, our preferred dealership offers pickup and drop off services when we are required to have dealer services done, such as replacement tires and recall work. This cuts down on the time an officer is not on patrol. In order to have a Livewire serviced, an officer would have to trailer the motorcycle minimum of an hour into Illinois, requiring both time from patrol and cost to the department.

Conclusion

The Livewire S2 Del Mar is not a practical option for full-duty patrol operations. Its limited battery life and lengthy charging time prevent it from sustaining an entire shift or supporting extended assignments such as Bucks or Brewers games, Summerfest, or other large-scale city events. While the motorcycle could potentially be used for short-duration functions—such as parades or community engagement events—doing so would still require all Motorcycle Officers to complete additional training due to the significant operational differences between the Livewire and traditional gas-powered motorcycles.

Because the Livewire cannot be individually assigned to an officer, it would need to remain at Specialized Patrol Division for occasional use. Moreover, an officer operating the Livewire at a community event could be called at any moment to perform standard motorcycle duties—such as emergency escorts or officer-down responses—but the bike's limited range and lack of rapid charging capability would prevent it from meeting the operational demands of the unit.

Until a comprehensive and standardized training program for electric motorcycles is developed, maintaining the current fleet configuration ensures both operational consistency and officer safety.

The Livewire S2 Del Mar Patrol motorcycle does arrive from the factory equipped with emergency lights, a siren, saddlebags, and fall-over protection. However, testing by the Milwaukee Police Motor Unit determined that the factory-installed siren and lighting are inadequate for patrol use. Replacing and upgrading these components would add significant expense, as the Department would effectively be paying twice for upfitting. In addition, the motorcycle's limited electrical capacity would require the installation of a secondary battery system to power upgraded emergency equipment.

The soft-sided, compact luggage design also presents challenges, as it cannot securely accommodate the Department's existing computer systems or required patrol gear without custom mounting solutions. Maintenance further complicates deployment—Livewire motorcycles can only be serviced by certified technicians, with the nearest facility located approximately 60 miles away in Libertyville, Illinois. This would increase downtime and operational costs compared to the Department's current in-house maintenance capabilities.

In summary, while the Livewire S2 Del Mar demonstrates innovative electric technology and performance, it is not suitable for patrol use in its current configuration. The combined limitations of range, charging time, equipment compatibility, maintenance logistics, and safety concerns outweigh the potential benefits for the Milwaukee Police Department.

INSPECTOR OF POLICE

Received 10/30/25

Referred Fleet Manager / Exec Staff

By Insp. E [illegible]

Respectfully Submitted,

Sergeant Richard Voden
Specialized Patrol Division
Motorcycle Unit