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July 14, 2010

Mr. Robert M. Confer, Chief
Bureau of Solid and Hazardous Waste Permitting South
New Jersey Department of Environmental Protection
P.O. Box 414
401 East State Street
Trenton, New Jersey 08625-0414

Re: Stafford Township Landfill – Facility ID 79077
Amendment to the Closure Plan
Project Number 90160

Dear Mr. Confer:

This Amendment to the Closure Plan is being submitted to the New Jersey Department of Environmental Protection (NJDEP) on behalf of Stafford Township by Walters Homes, Inc (Walters). This application has been prepared in order to modify the end-use of the closed Stafford Township Landfill. Walters intends to install an array of solar panels on the unused portion of the closed Stafford Township Landfill to beneficially use the landfill area to generate renewable solar energy. The existing landfill end-use by the Ocean County Yard Waste Compost Facility in the northwest corner of the Stafford Township Landfill is not impacted by this proposed amendment.

This report modifies the Landfill Closure Report for the Stafford Township Landfill, previously submitted to and approved by NJDEP. This submittal describes the proposed changes to the post closure end-use and maintenance plan for the facility.

## 1.0 SITE HISTORY

The Stafford Township Landfill is located on the west side of the Stafford Township Business Park and based on the available test pit and boring information, it occupies an approximate area of 54 acres. The landfill operated from August 1970, when it registered with NJDEP, until December 31, 1983, when it ceased accepting waste. The landfill is unlined and generally accepted municipal waste from Stafford Township, Long Beach Township, the Borough of Beach Haven, the Borough of Ship Bottom and Surf City Borough. Municipal wastes that were accepted include household, commercial, institutional and vegetative solid waste; bulky items, tires, sewage treatment sludge and septic clean out waste.

A Landfill Closure Report for the closure of the Stafford Township Landfill was prepared by EMCON/OWT, Inc (Shaw Environmental, Inc.) on January 19, 2005 and submitted to NJDEP for approval. The Landfill Closure Report was initially approved on October 26, 2006. As part of the landfill closure, the waste excavated from the Old Stafford Township Landfill was relocated to the landfill for beneficial reuse to grade the landfill surface and a final cover system consisting of a 6-inch bedding layer/gas venting layer, 40 mil LLDPE geomembrane, 12-inch drainage layer, 6-inch fill, and 6-inch topsoil was installed at the site. A passive landfill gas venting system and ancillary drainage features were also completed during the closure construction to ensure proper drainage and stormwater management. Closure activities for the landfill have been completed and the as-built certification for the landfill closure was approved by NJDEP on June 18, 2009.

## 2.0 INTRODUCTION

Walters is proposing to beneficially utilize the unused portion of the closed Stafford Township Landfill to develop a renewable energy project to generate approximately 6 Megawatts of solar power to provide energy to commercial and residential elements of the Stafford Park Redevelopment Project as well as Ocean County's facilities located at Stafford Park. The solar project will consist of solar modules mounted on approximately 1,026 racking systems (arrays). Each array consists of a prefabricated aluminum superstructure and is designed to withstand winds up to 120 mph and a minimum 20 psf of snow loading. The solar arrays are to be installed on pre-cast concrete footers, which will rest on top of the existing final cover system. No excavation will be required for the installation of the solar arrays. A diagram of a typical solar array structure is attached along with a diagram showing the layout of the full solar array system. Electrical conduits, wiring, and grounding are proposed to be run above the landfill cap. There will be 19 inverters on top of the cap with precast pads as well as 6 electric poles with precast ballasts. Grounding will be performed outside of the limits of the landfill cap. Electrical transformers will be pad mounted outside of the limit of the landfill.

### 2.1 CONSTRUCTION PROCESS

The construction work on the landfill will consist primarily of unloading and moving the equipment that will be installed on the property. Medium to light-duty construction vehicles will be used to transport the equipment onto the landfill and off-road capable forklifts will offload and place the equipment in their respective locations. Portable cement mixers will be required to pour concrete pads for the inverters situated at various locations on the landfill.

The installation process will commence with the pouring of the concrete pads. Once the pads have cured, the inverters will be brought to the landfill and placed on the pads. This will be followed by the layout of the concrete ballast across the property. Once the ballast is set in place, the racking structure will be erected and then the solar modules will be attached to the racking system. In concert with module attachment, electrical wiring and conduits will be placed to connect the modules to the inverters. The electrical connections will be completed

with the installation of the final runs of AC power lines from the inverters off of the landfill to the distribution transformers that will be situated near the existing water tower.

## 3.0 REVIEW AND EVALUATION OF LANDFILL CLOSURE REQUIREMENTS

Based on the modified end-use proposed for this site the Landfill Closure Requirements, listed in Section 4of the January 2005 Landfill Closure Report have been reviewed to determine whether or not modification of the facility end-use will affect any aspect of the landfill closure design or the requirements for post-closure maintenance or monitoring. Based upon this review, the following sections address the elements of the closure plan that will be modified to incorporate the proposed end-use.

### 3.1 SOIL EROSION AND SEDIMENT CONTROL PLAN

A soil erosion and sediment control plan (SESC) prepared in accordance with the Standards for Erosion and Sediment Control in New Jersey (Revised September 1999) and New Jersey Stormwater Best Management Practices Manual (April 2004) is included in the approved Landfill Closure Report. No excavation of the existing final cover is proposed therefore no modification to the erosion and sediment control plan is required.

The approved stormwater management plan included in the Landfill Closure Report was based upon a 25-year design storm and a conservative curve number of 98 to calculate runoff from the landfill areas. The four recharge basins were designed to fully contain the runoff from a 100-year design storm. The existing surface water control structures consisting of grass lined channels and perimeter channels installed during the closure operations are designed to ensure that stormwater runoff from the landfill and off-site upgradient areas flow into one of the four infiltration basins.

Installation of the solar arrays will not change the tributary area to each of the stormwater basins. Since there is no change in tributary area and because the basins are designed to contain all of the stormwater run-off, no changes to the existing Soil Erosion and Sediment Control Plan or the existing Stormwater Management Plan are required.

The solar arrays contain rain channels to drain precipitation and minimize sheet flow over the arrays. It is proposed that erosion inspections will be performed monthly during the first year after installation of solar arrays. If during the inspections, surface erosion or rilling is noticed due to stormwater flows over the arrays, rip-rap crash pads on an alternate erosion attenuation method will be constructed to attenuate rainfall impact.

### 3.2 MAINTENANCE OF FINAL COVER AND FINAL COVER VEGETATION

The final cover installation occurred between June 2007 and March 2009. Per the original closure Report, it was anticipated that a self-sustaining vegetative cover could be established

within 3 years of the installation of final cover. The need for final cover maintenance would be necessary for approximately 5 years after the closure construction was completed, after which time, repairs and replacements of topsoil and cover would be completed during the following 2 years. The condition of the landfill final cover is observed during the regular quarterly environmental monitoring events. Engineers from Cornerstone conducted an inspection of the landfill site on June 16, 2010 specifically for the purpose of observing the condition of the landfill in anticipation of implementing the referenced solar project. During the inspection the final cover appeared to be adequately vegetated and in general, the final cover appeared to stable.

As discussed previously, the solar arrays are to be installed on pre-cast concrete footers, which will rest on top of the final cover system. It is anticipated that no excavation will be required for the installation of the solar arrays. The concrete footers are designed to transfer the load of the superstructure to the soil below and the design load of 200 psf is not expected to compromise the integrity of the final cover system.

Per the approved Landfill Closure Report, the grade and thickness of the final cover on all surfaces shall be maintained on a regular basis; including inspection for and repair of any cracks, erosion swales, rills or uneven areas; to prevent ponding of water on the site which in turn will minimize infiltration into the landfill.

The maintenance of final cover and final cover vegetation includes the following:

- Repair and replacement of topsoil and cover soil due to erosion. This condition can occur prior to the establishment of self-sustaining vegetation.

- Application of seed, lime, fertilizer and mulch on areas in which self-sustaining vegetation has not been fully established. This would include areas which have received final cover maintenance activities, or areas in which prior seeding has been ineffective.

- Application of fertilizer and lime to facilitate the establishment of a self-sustaining vegetative cover. Areas will be fertilized for the first 3 years after placement of final cover. It is anticipated that after 3 years the vegetation will be self sustaining and fertilization will no longer be necessary.

Final cover maintenance will include placement of cover soil within the area to be repaired. This material will be spread and fine-graded to a minimum thickness of 12 inches. Drainage pipe which needs to be repaired will be installed to the original design configuration. Topsoil will then be spread over the area to minimum depth of 6 inches and re-vegetated.

The only ground contact by the solar arrays will be the concrete footer. As a result it is expected that vegetation will continue to be the primary means of stabilizing the final cover

soils. Even though the arrays do not cover the ground, it is possible that the shade produced could inhibit the growth of the final cover vegetation. If necessary, prior to solar array installation, the vegetation will be enhanced through the broadcasting of a mixture of shade tolerant grasses. Additionally, areas disturbed during solar array installation will be re-vegetated as necessary with an approved seed mixture including a combination of shade tolerant and direct sunlight tolerant grasses. Grasses will be selected in consultation with the Pinelands Commission.

The inspection frequency for areas which have received new final cover vegetation will be increased to quarterly inspections for the first year to identify potential erosion or areas with sparse vegetation growth. The inspection frequency will revert back to the annual inspection routine specified in the Landfill Closure Report after the first year.

### 3.2.1 STORMWATER FEATURES

The proposed installation of solar arrays will avoid existing stormwater features. Existing stormwater features such as drainage channels, perimeter channels and sedimentation basins will continue to function as originally designed. The only ground contact of the solar array will be the concrete footers. These footers are limited in ground contact and will not disrupt overland flow of surface water. As a result of the avoidance of interference of existing stormwater features and the limited ground contact of the solar arrays no modifications to the final cover stormwater water features are required or proposed.

### 3.2.2 MOWING

Landfill areas will be mowed on a regular basis to prevent the overgrowth of shrubs, trees, and other deep rooted vegetation as well as for aesthetic purposes. The original closure plan assumed that mowing would be required three times per year and would continue through the 30 year post-closure period.

The modification of the Closure Plan end-use to include the installation of solar arrays will require a modification in the approach to mowing operations. The original plan assumed that open areas would be mowed with large, farm type, mowing equipment. However, with the installation of the solar arrays, mowing operations will require the use of smaller pieces of equipment and possibly manual mowing and string trimming, as necessary. The frequency of mowing will be adjusted to respond to the growing patterns of the vegetation at the site. At a minimum, vegetation will be mown once every year.

### 3.2.3 SETTLEMENT REPAIR

During the site inspection conducted on June 16, 2010, no areas of differential settlement were observed. As part of the closure activities, a large volume of previously deposited solid waste was relocated from the Old Stafford Landfill and deposited within the new limits of waste for the Stafford Township Landfill, per the Major Landfill Disruption Approval from

NJDEP dated October 26, 2006, as amended. However, due to the age and type of waste identified, settlement and differential settlement should be significantly less than what would be anticipated from newly placed un-decomposed waste materials.

It is important to note that in the process of re-locating the waste material the existing landfill was re-compacted. Further, the re-located waste was also compacted. With all the additional compaction of the already aged and decomposed waste, the potential for differential settlement will be greatly reduced. Therefore, as indicated by the June 16, 2010 inspection, it is reasonable to expect that the effects of settlement and differential settlement will be minimal.

Ocean County operates a yard waste composting facility on the top of a portion of the closed landfill. During the June 16, 2010 inspection it was observed that this facility is intact and in good condition showing no effect of settlement or differential settlement. The traffic on this portion of the facility imparts loadings which are significantly greater than the loading that will result from the solar array. This comparison further supports the opinion that the effect of settlement and differential settlement will be negligible.

As set forth in the Landfill Closure Report, settlement repair will be required if in the future settlement occurs that creates depressions in the final cover which cause ponding of the surface water or unstable slope conditions. Should such a condition occur, it is assumed that settlement repair will include the dismantling of the solar arrays in the affected area, replacement of the entire final cover section, including subbase material, FML, cover soil and topsoil and reinstallation of the solar arrays in the affected area. It is assumed that settlement within the landfill, that will require repair, will have occurred within the first 6 years after the placement of the final cover so the need for settlement repair should be expected to be limited and/or non-existent after that time period. During this time period, the approved closure plan assumed that settlement repair would be required twice. However, no evidence of differential settlement has been observed and the actual conditions will dictate which components of the final cover need to be addressed in any future settled areas.

Inspections of areas which have received final cover will be conducted on an annual basis as outlined in Section 12.4.8 of the Landfill Closure Report.

## 3.3 FACILITY ACCESS CONTROL AND MAINTENANCE

Site access within the facility is provided by gravel covered perimeter access roads. These roads provide a means for accessing all portions of the landfill to perform necessary monitoring and maintenance activities. The proposed installation of solar arrays will be configured in fashion that will enable continued access to all portions of the landfill to perform necessary monitoring and maintenance activities. Access to the facility will continue to be controlled by the use of gates at the access roads shown on the attached drawing.

Space between the solar arrays will provide the ability for continued access to every area of the final cover. The space between the arrays is presented on the attached drawing.

## 4.0 REVIEW AND ASSESSMENT OF LANDFILL CLOSURE DESIGN

Based on the modified end-use proposed for this site the Landfill Closure Design presented in Section 5 of the Landfill Closure Report has been reviewed to determine whether or not modification of the facility end-use will affect any aspect of the landfill closure design. Based upon this review, the following sections describe how the proposed end-use is compatible with the existing landfill closure design.

### 4.1 Structural Considerations

The solar arrays will rest on concrete footers located on the front and back of each individual array structure (see attachment). . The concrete footers will be 14 feet long by 2 feet wide and are designed to transfer the load of the superstructure to the soil below. The concrete footers are expected to exert a pressure of 200 psf (1.4 psi) on the final cover system.

The existing final cover system consists of 24 inches of cover soil. Assuming a conservative moist unit weight of 150 pounds per cubic foot of soil, the loading on the geomembrane resulting from the cover soil is approximately 2.1 psi. Combining the pressure of the footer to the pressure of the soil indicates that the worst-case pressure on the geomembrane is only 3.5 psi. 3.5 psi represents the equivalent loading of less than 3.5 feet of soil. Geomembranes have proven performance with superimposed loadings of over 100 feet of soil and are commonly used as baseliner in landfills with waste fill heights well in excess of 100 feet. As such, the additional loading of the solar array does not represent a structural impediment to the geomembrane.

The final cover contains a network of corrugated polyethylene sub-surface drainage pipes. The drainage pipes have been evaluated for their ability to sustain additional soil loading. 4 inch diameter corrugated polyethylene pipe has the strength to support 24 psi of loading with only nominal deflection. Based upon the pipe strength, the drainage pipe is capable of supporting more than 7 times the proposed pressure before its structural integrity would be called into question.

Beneath the geomembrane is a 6-inch diameter corrugated polyethylene piping network installed to vent accumulated landfill gas. These pipes are covered by 3 feet of soil. Assuming a conservative wet unit weight of 150 psf, this soil cover equates to a loading of 3.1 psi. Coupled with the proposed loading from the solar array, the combined loading will be 4.5 psi. 6-inch diameter corrugated polyethylene pipe has the strength to support 24 psi of loading with only nominal deflection. Based upon the pipe strength, the landfill gas pipe is capable of supporting more than 5 times the proposed pressure before its structural integrity would be called into question.

## 4.2 SLOPE STABILITY OF THE FINAL COVER

The final cover configuration for the Stafford Township Landfill is relatively flat and most of the final cover has been designed with the minimum 3% slope required to ensure proper drainage. A global slope stability analysis of the landfill and slope stability of the final cover system conducted as part of the Landfill Closure Report indicated more than adequate factors of safety under both static and seismic conditions.

The solar arrays, as can be seen from the attached drawings, are proposed to be constructed on the plateau of the landfill. No arrays are proposed for the exterior landfill sideslopes. As a result, the installation of the solar arrays will have no impact on the stability of the landfill final cover.

## 4.3 LANDFILL GAS MANAGEMENT DESIGN

A passive gas venting system consisting of perforated gas collection laterals and a series of gas vents along the ridge of the landfill were installed during closure operations. The modification of the Closure Plan to include the installation of solar arrays is not expected to interfere in the operation of the installed passive gas venting system. In order to allow access for post-closure environmental monitoring activities, the solar arrays will be installed to provide a minimum of 12 feet clearance between each row. The passive gas venting system is currently configured so that it could, if necessary at some future date be converted into an active collection system. The placement of the solar arrays accounts for this possibility and will not affect this feature of the landfill gas management system.

Additionally, as previously discussed, beneath the geomembrane is a 6-inch diameter corrugated polyethylene piping network installed to vent accumulated landfill gas. These pipes are covered by 3 feet of soil. Assuming a conservative wet unit weight of 150 psf, this soil cover equates to a loading of 3.1 psi. Coupled with the proposed loading from the solar array, the combined loading will be 4.5 psi. 6-inch diameter corrugated polyethylene pipe has the strength to support 24 psi of loading with only nominal deflection. Based upon the pipe strength, the landfill gas pipe is capable of supporting more than 5 times the proposed pressure before its structural integrity would be called into question.

The solar generating system includes a number of measures to prevent the interaction of landfill gas and electricity. The solar generating system will be designed by a licensed electrical engineer and will include proper grounding and bonding to safely discharge stray system charges to the ground outside of the landfill footprint. As an additional precaution, solar arrays will be restricted to no closer than 15 feet to a landfill gas vent. A minimum air-gap distance of 15 feet will be adequate to prevent the potential for static electricity discharge in the vicinity of a landfill gas vent. The landfill gas vents are constructed of non-conductive PVC to further reduce the potential for the landfill gas vents to function as a discharge point for static electricity.

Electrical conduits and wiring will be constructed completely above the landfill final cover. As a precaution, the conduits and wiring will conform to appropriate design requirements for environments where combustible gas may be present. Transformers will be pad mounted outside of the limits of the landfill.

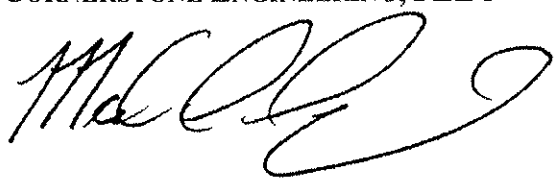
## 5.0 ENVIRONMENTAL SUMMARY

The landfill closure includes the environmental controls of final cover, landfill gas management and stormwater management. As demonstrated in the foregoing discussion, the established environmental controls will not be affected by the proposed end-use modification. Further, the beneficial use of the landfill area to generate renewable solar energy is an environmental enhancement to the originally submitted closure plan.

We trust the enclosed information regarding the planned change in landfill site end-use is acceptable to the Department. Please contact me at 845-695-0208 if you have any questions or comments on this planned Amendment to the Closure Plan.

Sincerely,

**CORNERSTONE ENGINEERING, PLLC**



Mark A. Swyka, P.E.
Project Manager

Enclosure: Site Plan Showing Layout of Solar Array
Details of Solar Array Construction Including Footer

cc: Joseph DelDuca
Bruce Katcher
Ernie Kuhlwein
Jim Moran
Ernie Peters