MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

INTEROFFICE COMMUNICATION

TO: Permit to Install File No. 14-19

FROM: Annette Switzer, Permit Section Manager

DATE: November 13, 2019

SUBJECT: Public Contact Information for Fiat Chrysler regarding the Proposed Community Benefits Plan

FCA Mack Avenue (FCA) was issued an air use Permit to Install (PTI) on April 26, 2019. The PTI included a permit condition for additional community benefits projects as well as ambient air monitoring.

FCA submitted the Proposed Community Benefits Plan to the Air Quality Division (AQD) on October 31, 2019, which is attached to this memo.

FCA has also provided an email address for the public to submit questions and comments regarding the proposed plan. That email is:

publiccomment@fcagroup.com

Attachment: Additional Projects Plan, FCA

cc w/att: Mary Ann Dolehanty, Director, AQD
Christopher Ethridge, Field Operations Manager, AQD
Wilhemina McLemore, Detroit District Supervisor, AQD

FCA
FIAT CHRYSLER AUTOMOBILES

ADDITIONAL PROJECTS PLAN

FCA US, LLC
Mack Assembly Plant
11570 Warren Avenue East
Detroit, MI

Prepared by FCA US, LLC

October 31, 2019

1.0 Background

FCA US, LLC (FCA) prepared this Additional Projects Plan (Plan) pursuant to the requirements of Permit to Install (PTI) 14-19, issued April 26, 2019 for the Mack Assembly Plant project at 11570 Warren Avenue, Detroit, Michigan. PTI 14-19, Flexible Group AUTOASSEMBLY Section IX Other Requirements, Paragraph IX, states:

> *The permittee shall work with the City of Detroit, through the Community Benefits Ordinance to identify additional projects for the community surrounding the facility. No less than 180 days after beginning construction pursuant to the Permit to Install No. 14-19, the permittee shall submit to the AQD District Supervisor and AQD Permit Section Manager a plan for the additional projects for review and approval.*

FCA initiated construction of the Mack Assembly Plant on June 3, 2019. Therefore, the deadline for submitting this Plan to the AQD is November 30, 2019.

FCA is pleased to submit this Plan which documents: the process that FCA used to engage the local community; the scope of the additional projects that FCA will complete for the benefit of the local community; and the execution plan for those additional projects.

2.0 Process

Prior to issuance of the PTI 14-19 FCA engaged the City of Detroit and local community through Detroit's Community Benefits Ordinance (CBO) process. This process entailed a series of public meetings with the local residents and representatives of various local stakeholder groups. The CBO requires that the local residents elect eleven representatives (Neighborhood Advisory Council or"NAC") to work with the company involved in the development to negotiate the scope of activities, investments, and policies that the company will implement for the benefit of the local community. The NAC representatives were elected by the local residents and stakeholders with the specific purpose of acting on their behalf to protect their interests and obtain commitments from FCA for the most meaningful and impactful community benefits possible. This process resulted in the approval of a lengthy list of commitments made by FCA and approved by the Detroit City Council on May 21, 2019.

During the CBO process, FCA received requests that certain environmentally related projects be implemented to address and minimize perceived negative environmental impacts of the planned Mack Assembly Plant development and operation. These requests tended to receive less attention during the CBO process than the primary concerns related to jobs, training, tax benefits, traffic, investments, etc. Therefore, the CBO agreement only included a reference to

Additional Projects that FCA would implement to address perceived environmental impacts, and a commitment by FCA to work with the NAC in a series of workshops to establish those projects. At the same time commenters requested that that commitment be included in the air emissions PTI which was being written and developed by the State of Michigan Air Quality Division at that time. As a result, FCA requested that the condition quoted above was included in the PTI 14-19.

3.0 Scope of Additional Projects

FCA has committed to the implementation of "Additional Projects", that go beyond what is required by local ordinances or regulations, to enhance the vicinity of the new development and benefit the community and residents. By listening to the needs and concerns of the local community and following guidance from the Community Action to Promote Healthy Environments (CAPHE), the FCA additional projects will follow a sustainable urban environment approach to ensure social, educational and environmental needs are addressed.

FCA developed the scope of the proposed additional projects based on the following:

- Input from the NAC and local stakeholder representatives, including:
  - Eastside Community Network;
  - Coalition for Environmental Justice;
  - Michigan Environmental Law Center; and,
  - Michigan State Senator Stephanie Chang;
- Identification of projects and activities that would provide viable and positive outcomes; and,
- Projects that are sustainable without requiring ongoing maintenance and/or commitment from others.

As a result, FCA is will implement the following additional projects at and around the Mack Assembly Plant site:

1. Establish a robust green buffer on plant property;
2. Plant street trees in key impacted neighborhoods;
3. Establish biodiversity wildlife habitat on plant property;
4. Assist in the restoration of vacant lots with vegetation and tree planting;
5. Partner with the Chandler Park Conservancy to support their current marshland project;
6. Foster partnerships with local schools to provide environmental and sustainability training to students;
7. Provide solar powered bus stop shelters at key locations near the site;

8. Conduct a rain barrel education event and provide rain barrels and equipment as requested by local attendees.

The following sections provide details on the plan and scope for each of these activities.

3.1 Green Buffer/Street Trees

FCA is committed to establishing a robust green buffer of trees around the plant site perimeter. It has been demonstrated that trees provide a considerable benefit for the filtration of airborne contaminants and particulate. Therefore, FCA is committed to the planting of up to 600 additional trees on the Mack Site.

Placed strategically around the plant, trees and vegetation soften the infrastructure buildout and reduce operational noise pollution. Properly chosen plantings improve the aesthetics and performance of sound barrier walls while contributing to human well-being, air quality improvements, storm water reduction, and wildlife habitat.

In addition to the Green Buffer on the Mack Property, we are also committed to the planting of street trees in the immediate area, on Beniteau and Lillibridge streets between East Warren and Kercheval Avenues. These trees will be planted on properties where the owners request a tree, up to a total of two hundred trees.

The planting of street trees will improve the tree canopy for District 4, which is well below the national average for urban canopy, as well as, the high and medium planting priority zones. Green buffers utilizing trees will improve air quality, reduce energy usage, reduce storm water runoff, improve the resale value and aesthetics of the neighborhood.

Benefits of Trees

Trees are constantly working to provide important environmental, social and economic benefits and services, including:

- improving air quality and the public health effects of air pollution.
- removing ozone from the air helping to reduce atmospheric warming.
- storing carbon and reducing the amount returning to the atmosphere as a greenhouse gas.
- shading and cooling streets/buildings mitigating the urban heat island effect.
- intercepting and absorbing stormwater reducing flooding and the amount of water entering the city's stormwater system.
- improving water quality by filtering and removing pollutants.

- providing homes, food and shelter for wildlife.
- beautifying the community.
- increasing real estate values.
- positively impacting the overall health of urban residents and lessening the impacts of urbanization.

To provide an understanding of the benefits and services trees provide, and their value to this project and the residents of the City of Detroit, an i-Tree analysis was performed on four species that are common in Detroit and may be planted as part of this project, Eastern Redbud (*Cercis canadensis),* American Hophornbeam (*Ostrya virginiana),* Swamp White Oak (*Quercus bicolor)* and Tuliptree (*Liriodendron tulipifera).* i-Tree is a suite of peer-reviewed software applications developed by the USDA Forest Service to quantify the ecosystem services and benefits that a community's trees provide.

A summary of the annual benefits that a ***single tree*** of each species provides are listed in Table 1 and is followed by a detailed description of each of the benefits.

ANNUAL BENEFITS*	**Redbud**	**American Hophornbeam**	**Swamp White Oak**	**Tuliptree**
	Cercis canadensis	*Ostrya virginiana*	*Quercus bicolor*	*Liriodendron Tulipifera*
Tree Size Diameter at Breast Height (DBH)	8"	12"	24"	24"
Carbon Dioxide (CO2) Sequestered (Absorbed)	2 pounds / year	2 pounds / year	326 pounds / year	185 pounds / year
Rainfall Intercepted	472 gallons / year	246 gallons / year	2,067 gallons / year	2029 gallons / year
Carbon Monoxide	0.12 oz	0.19 oz	0.53 oz	$0.52
Ozone removed from air	4 oz	7 oz	1.12 pounds	1.56 pounds
Nitrogen Dioxide	0.74 oz	1.38 oz	3.34 oz	5.06 oz
Sulfur Dioxide	0.32 oz	0.57 oz	1.43 oz	1.93 oz
$PM_{2.5}$	0.3 oz	0.63 oz	1.36 oz	2.88 oz
CO_2 stored over lifetime	169 pounds	376 pounds	2,652 pounds	1,842 pounds

Energy Savings (A/C)	13.51 kWh	27.13 kWH	27.13 kWH	27.13 kWH
Fuel Savings (natural gas/oil)	0.6 MMBtu	1.19 MMBTU	1.19 MMBTU	1.19 MMBTU
Energy Savings Value	$7.23	$14.49	$14.49	$14.49
Annual Value of Benefits	$13.61	$26.89	$42.82	$47.43
**Based on an analysis utilizing the USDA Forest Service's i-Tree MyTree benefits tool (www.itreetools.org) for one tree of each species.*				
TABLE 1: Annual benefits of common species in the City of Detroit (single tree)				

Air Quality

Trees serve an important function in improving air quality, reducing air pollutants and helping ameliorate the public health effects of air pollution. Trees intercept and filter particulate matter (PM) from the air, including dust, ash, pollen, and smoke. They absorb harmful gaseous pollutants like ozone (O_3), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2); and reduce O_3 formation by shading surfaces and reducing air temperatures. Scientists have also found that some tree species may absorb more volatile organic compounds (VOCs) than previously known.

Ozone (O_3) is naturally found in the upper atmosphere where it protects Earth from the sun's ultraviolet radiation. While it is beneficial in the upper atmosphere, at ground level O_3 is an air pollutant that causes serious harm to human health. Ground level O_3 is formed by a chemical reaction between nitrogen oxides (NOx)/volatile organic compounds (VOCs) and sunlight; add heat and O_3 formation is exacerbated. VOCs are a class of carbon-based particles emitted from automobile exhaust, lawnmowers, and other human activities. A single 24" DBH Tuliptree can remove over 1.5 pounds of ozone and nearly 3 ounces of particulate matter ($PM_{2.5}$)

Carbon Sequestration and Storage

As sunlight strikes the Earth's surface, it is reflected back into space as infrared radiation (heat). Greenhouse gases (GHG) absorb some of this infrared radiation and trap this heat in the atmosphere, increasing the temperature of the Earth's surface. Many chemical compounds in the Earth's atmosphere act as GHGs, including methane (CH_4), nitrous oxide (N_2O), carbon dioxide (CO_2), water vapor, and human-made

gases/aerosols. As GHGs increase, the amount of energy radiated back into space is reduced, and more heat is trapped in the atmosphere.

Trees absorb atmospheric carbon and reduce GHGs. The carbon-related function of trees is measured in two ways: storage (total stored in tree biomass) and sequestration (the rate of carbon absorbed per year). Urban trees act as a sink of CO2 by storing excess carbon as biomass (e.g. trunk, branches, leaves, roots) during photosynthesis. The amount of CO2 stored is proportional to the biomass of the tree.

Urban trees reduce atmospheric carbon dioxide (CO2) in two ways

- Directly – Through growth and the sequestration of CO2 as wood and foliar biomass.
- Indirectly – By lowering the demand for heating and air conditioning, thereby reducing the emissions associated with electric power generation and natural gas consumption.

A swamp white oak (24" DBH) growing in Detroit can absorb (sequester) 326 pounds of atmospheric CO2 per year and over its lifetime store 2,652 pounds, reducing the amount returning to the atmosphere as a GHG.

Stormwater and Water Quality

During storm events trees intercept rainfall in their canopy acting as a mini reservoir. Intercepted rainfall evaporates from leaf surfaces or slowly soaks into the ground, reducing and slowing stormwater runoff, and lessening the impacts of rainfall on barren soils. While underground, tree root growth and decomposition increases water holding capacity and infiltration rates of soils allowing for greater absorption of rain. Each of these processes greatly reduces the flow and volume of stormwater runoff, reducing flooding and erosion and preventing sediments and pollutants from entering waterways. Infiltrating and treating stormwater runoff on site can reduce runoff and pollutant loads by 20 to 60 percent.

Planting trees in and adjacent to rights-of-way provides a unique opportunity to increase the effectiveness of grey and green stormwater systems. Existing stormwater management systems are not always adequate to accommodate runoff; when a system is overtaxed, peak flows can blow manhole covers off the ground, back up stormwater and cause flooding. Where existing systems are challenged by common stormwater events, planting additional trees is a cost-effective solution to improve functional capacity. A swamp white oak (24" DBH) growing in the City of Detroit can intercept an

estimated 2,067 gallons of rainfall each year, reducing the amount entering the City's combined sewer system reducing flooding and improving water quality in the Detroit River.

Urban Heat Island

An urban heat island occurs, when impervious surfaces, like roads, buildings and sidewalks, in a city trap and retain heat causing air temperatures to be hotter than nearby areas that are less built up. According to the Environmental Protection Agency (EPA), a city with extensive areas of impervious surfaces can be 1-3 degrees Fahrenheit warmer than surrounding areas during the day, and up to 22 degrees Fahrenheit warmer at night. With over 60% of the land area covered by impervious surfaces in Detroit urban heat island impacts can be significant and may include:

- heat stroke, and heat-related mortality.
    - According to the Center of Disease Control and Prevention heat related illnesses across the United States caused more deaths from 1979-2003 than hurricanes, lightning, tornadoes, floods and earthquakes combined.
- increased energy consumption needed for cooling homes and businesses, resulting in higher energy bills;
- elevated air pollution and greenhouse gases from plants supplying power to meet the increased energy demands
- increased ground level ozone created by chemical reactions of atmospheric gases and compounds with sunlight and heat.

Shade from trees reduces the amount of radiant energy absorbed and stored by impervious surfaces, while transpiration releases water vapor from tree canopies cooling the surrounding area. Through shade and transpiration, trees and other vegetation within an urban setting modify the environment and reduce heat island effects.

Benefits to Wildlife

Trees provide critical habit for birds, mammals, reptiles, insects, fish and other aquatic species. Their flowers offer pollinators, like honeybees, a valuable source of pollen and nectar; and their canopies provide food and shelter to a variety of wildlife.

Aesthetic and Social Benefits

The aesthetic and social benefits of trees, while perhaps the most difficult to measure, may provide some of the greatest community contributions. These contributions include:

- beautifying the community
- increasing shade, privacy and creating a sense of place
- providing opportunities for recreation and increasing walkability
- improving mental and physical health
- reducing violence
- increasing property values.

Research has shown that trees promote business by stimulating more frequent and extended shopping, and a willingness to pay more for goods and even parking. They have also been proven to increase private and public property values. A well-landscaped residential yard can increase property values by as much as 10%; and a well-maintained street tree can add 3-15% in value to a home and continue to appreciate in value over time.

While some tree benefits and services are intangible and/or difficult to quantify (e.g. impacts on physical/psychological health, crime and violence), studies have provided empirical evidence of their benefits to residents and the community.

Tree Planting

To ensure that the tree planting initiatives are successful, proper species selection, tree planting and care is critical. Tree species will be selected taking into consideration the current site conditions (i.e. soil type, existence of underground infrastructure/overhead utilities), diversity and the species that can provide the maximum air quality benefits to the site. The project will provide a variety of species, mature heights and types of trees to add biodiversity to the site.

While FCA will strive to maximize the number of trees on the site, in order to ensure adequate space and growth of trees, they will be planted no closer than 15 feet on center. This spacing will reduce competition among the trees and allow for adequate resources and spacing to allow the trees to grow to their maximum mature size.

The following are general guidelines that will be followed during tree planting.

Planting season. Planting should occur during the dormant season, in early spring or late fall before budbreak or after leaf drop. Planting outside the dormant season should only be as required by special circumstances.

Tree stock. All plant material shall conform to *American Standard for Nursery Stock*. Plants shall be true to species and variety specified and nursery grown in accordance with good horticultural practices. They shall be freshly dug during the most favorable harvest season.

Identify root flare. The root flare is where the roots connect to the trunk at the base of the tree (Figure 5). If the flare is not visible, remove soil from the top of the root ball or planting container to find it. The tree must be planted so the tree's root flare is at grade.

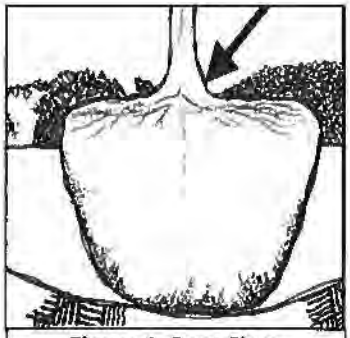

Figure 1. Root Flare

(Source: Tree Manual and Standards of Practice, Racine, WI)

Dig a shallow, broad planting hole. A planting hole should only be as deep as necessary to ensure the tree's trunk flare is planted at grade. The hole should be wide, as much as two to three times the diameter of the root ball.

Prepare tree for planting. Any ties in the tree's canopy should be removed prior to planting. Containerized trees should be removed from the container and roots inspected for any girdling or circling roots and carefully remove them.

Place tree in the hole. Before placing the tree in the hole, check depth to ensure trunk flare will be at final grade. Place tree in hole and check depth of the hole and trunk flare by placing a shovel handle across the hole. The handle should be level with the final grade. If necessary, remove tree from the hole and add/remove soil to ensure the trunk flare is at the correct depth. Always lift the tree by the root ball and not the trunk to prevent damage.

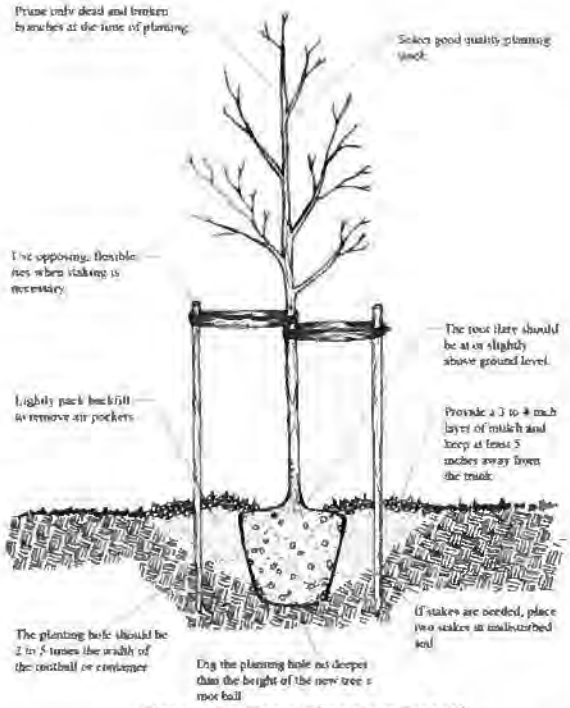

Figure 2: Tree Planting Detail

(Source: Pacific Northwest ISA. 2019. Planting – Prepare the Tree.)

Straighten tree in the hole. Check that the tree is straight and centered

in the hole - looking at it from a variety of angles. Straighten tree by moving or tilting ball – do not pull on trunk.

Fill hole. If the tree is wrapped with burlap, plastic or wire, cut and remove as much of it as possible, remove from hole and dispose of properly. Place soil in hole and gently, but firmly tamp down the soil. Do not stomp or jump, but rather firmly walk or press on the soil. Continue adding and tamping down the soil until the hole is filled to grade. Only soil should be placed in the planting hole, sod, old roots, rocks, concrete, and other debris should be disposed of properly.

Do not fertilize at time of planting, it can damage and burn new tree roots. Broken or damaged branches may be pruned, but no other pruning is needed at time of planting.

Mulch tree. Place 2 - 4 inches of mulch in planting area, leaving a 1 to 3-inch mulch-free area around trunk (Figure 6). Mulch should not be piled up on to trunk (volcano mulch), it can cause the trunk to stay wet, inviting fungus and wood decaying organisms that can damage and kill the tree.

Figure 3: Tree Mulching
(Source: USDA Forest Service – Tree Owner's Manual)

Water tree. When the tree has been planted and mulched, water to moisten the entire planting area and tree root system. Water should be allowed to filter into the soil before adding more water.

Stake tree as necessary. Trees establish more quickly and develop stronger root systems and trunks without stakes. If the site is windy, the tree is large (greater than 3-inch caliper) or vandalism is a concern, stake tree with two wooden stakes placed on opposite sides of the tree. Attach nylon strapping or fabric ties to the stake and around the tree. Stakes and straps should be removed after 1-year or one full growing season, whichever is longer. Damage caused by improper placement or use of stakes/straps may require replacement of the tree.

Provide follow-up care for two growing seasons. Newly planted trees should receive 25 gallons of water per week during the first two growing seasons. Ensure water penetrates deep into the tree's root system and the soil is moist, but not soaked. Watering bags, a hose on a slow trickle, or slowly poured buckets of water will help water penetrate the soil. A sprinkler is not sufficient for watering trees. If it has rained 0.5 inches during the week, watering is not necessary that week.

Species Selection

Tree species for the Green Buffer and Street Tree elements of this project will be primarily chosen from the list provided in Appendix 1. However, species selection will ultimately be determined by nursery availability at time of planting.

The list is separated by mature tree size and includes information on characteristics of the tree, and particular benefits the trees provide. Species that have an "X" in a benefit column (i.e. Pollutant Removal, Stormwater Runoff and CO2 stored) provide the greatest benefit for that particular benefit category; though all species that are planted will provide benefits to the project. Evergreens will not be planted as street trees.

3.3 Biodiversity

FCA will partner with the Wildlife Habitat Council (WHC) to develop onsite projects to support and enhance the natural environment, pollinators populations and educate the employees and community on the importance of environmental awareness and sustainability. The site will seek to obtain certification by the WHC. This partnership will also help with the development of the Neighborhood and Community projects.

Providing suitable wildlife habitat space in urban and industrial landscapes is critical to the success of maintaining biodiversity in the Detroit Area, as many migratory and resident species depend on a patchwork of available habitat to support their lifecycle needs. Since 1988, WHC has partnered with corporations, fellow conservation organizations, government agencies and community members to facilitate wildlife habitat and conservation education efforts both on and off corporate-owned property.

WHC employs a model of research, discussion and planning to identify suitable and feasible biodiversity and community engagement projects a company or its facilities may pursue and provides guidance on the planning and execution of the chosen projects. To date, WHC has aided in the development of such projects at over 1000 locations in the U.S. and abroad.

With the input of dozens of stakeholders, WHC developed a credible, third-party standard, called Conservation Certification®, by which biodiversity and conservation-based education projects can be assessed and recognized.

In order to qualify for certification, a biodiversity-related project must meet certain criteria, including the following:

1. Be voluntary and/or exceed regulatory requirements;
2. Include a clear conservation or conservation education objective;
3. Be locally appropriate by targeting native species for management or utilizing native habitat or species for educational purposes;
4. Provide value by maintaining adequate habitat/life cycle needs for at least one growing or breeding season; and
5. Have documented measurable outcomes (e.g., project monitoring and/or evaluation) to guide project management decisions.

These criteria are in place to ensure the ongoing monitoring, maintenance and management of each biodiversity effort and to increase the likelihood of successful on-the-ground outcomes for wildlife and the surrounding community. Ongoing biodiversity projects also create recurrent opportunities to educate the community and company employees on the importance of such efforts and have been utilized for STEM education.

FCA is a current member of WHC and maintains WHC-certified biodiversity and conservation education programs at six (6) of its facilities with several more programs under development and pursuing Conservation Certification.

3.4 Lot Restoration

As part of the overall project, the City of Detroit desires to remove up to 300 blighted houses from the area. The newly vacant lots will provide areas to improve the green infrastructure, reduce storm water runoff, improve air quality and support pollinators/wildlife. Numerous studies illustrate the profound health benefits of human exposure to green spaces and instill a sense of community pride. FCA is committed to enhancing the restoration of these lots through the planting of vegetated landscaping on each of these lots.

3.5 Chandler Park

Near the new facility, Chandler Park provides another outstanding opportunity for community engagement. An informative nature trail paired with a citizen science phone "app" could engage and educate residents and local students about the natural environment around them. With additional tree planting (arboretum), this area would support further canopy development and the associated benefits that trees provide.

FCA will seek to partner with the Chandler Park Conservancy for future activities at their storm water marsh project which may include support such as: site development, education, and volunteer support.

3.6 Environmental and Sustainability Education

The new campus is located within an urban area with several K-12 schools (i.e., The Barack Obama Leadership Academy, Enterprise Academy, Southeastern High School, etc.). FCA will partner with the schools to support and enhance their existing educational programs and learning centers. Programs such as Salmon in the Classroom, B's in the D, and many other educational topics (eg, importance of pollinators, local habitat and wildlife, recycling benefits, etc.) will help to provide real life experience for the students within our community.

FCA constructed a storm water retention pond to control storm water runoff from portions of the Assembly plant. The storm water pond will be developed into a Storm Water Park for use by the neighborhood. A walking path for nature viewing and recreation will be around the pond and native vegetation, pollinator areas, outdoor classroom and educational information will be provided throughout the park.

3.7 Bus Stop Shelters

Renewable energy sources benefit the local community by reducing the burden on the existing energy grid and save natural resources. FCA will provided and install two

attractive and functional bus stop shelters at locations near the Mack facility that will include lighting from solar power.

3.9 Rain Barrel Initiative

Rain barrels are a great way to collect rain water to be used for watering of outdoor plants, while avoiding the use of city water and reducing loading of storm water on the City infrastructure. FCA will sponsor a rain barrel education event for the impacted area and will supply free rain barrels and equipment for those local residence who would like to implement this at their homes.

4.0 Additional Projects Execution and Timing

FCA is committed to working with the local residents and organizations to implement the spirit of this Additional Projects plan for the benefit of community and City.

Appendix 1 – Tree Species List

SMALL TREES (*mature height less than 30 feet*)									
Acer buergerianum 'Streetwise'	Trident Maple		X		X	X			
Acer griseum	Paperbark maple		X						
Acer pensylvanicum	Striped maple	X	X						
Amelanchier arborea 'Trazam'	Downy Serviceberry	X	X	X					
Amelanchier laevis 'Cumulus'	Allegheny Serviceberry	X	X						
Amelanchier x grandiflora 'Autumn Brilliance'	Autumn Brilliance Serviceberry	X	X						
Cercis canadensis	Eastern Redbud	X	X	X	X				
Chionanthus retusus	Chinese Fringetree		X	X					
Chionanthus virginicus	White Fringetree	X	X	X					
Cornus kousa	Kousa Dogwood		X						
Cornus mas	Cornelian Cherry		X						
Maackia amurensis	Amur maackia		X		X				
Malus sp	Crabapple	Some sp.	X	X	X	Moderate			
Prunus sargentii	Sargent Cherry		X		X	Moderate			
Prunus serrulata 'Accolade'	Accolade Flowr. Cherry		X			Moderate			
Prunus serrulata 'Kwanzan'	Kwanzan Cherry		X	X		Moderate			
Syringa reticulata 'Ivory Silk'	Japanese Tree Lilac		X	X	X	X			

MEDIUM TREES (mature height 25-40 feet)									
Acer miyabei	Miyabei Maple				X		O3, NO2, SO2, PM	X	
Acer truncatum	Shantung Maple		X				O3, NO2, SO2, PM	X	
Betula nigra	River Birch			X			SO2		
Carpinus betulus	European Hornbeam		X		X		SO2		
Carpinus caroliniana	American hornbeam	X	X	X					
Cladrastis kentukea	American Yellowwood	X		X	X				
Halesia carolina	Carolina Silverbell		X	X			SO2, PM	X	
Laburnum x watereri	Goldenchain Tree		X						
Ostrya virginiana	American hophornbeam	X	X		X				
Parrotia persica	Persian parrotia		X		X		SO2		
Quercus robur	English Oak				X	X	SO2, PM		

*CO= Carbon Monoxide; NO2 = Nitrogen Dioxide: O3 = Ozone; SO2 = Sulfur Dioxide; PM = Particulate Matter

LARGE TREES (*mature height greater than 40 feet*)									
Abies concolor	White Fir				X		O3, NO2, SO2, PM		X
Acer x freemanii	Freeman Maple			X	X	X	CO, O3, NO2, SO2, PM	X	X
Acer pseudoplatanus	Sycamore Maple			X	X	X	CO, O3, NO2, SO2, PM	X	X
Acer rubrum	Red Maple	X		X			CO, O3, NO2, SO2, PM	X	X
Acer saccharum	Sugar Maple	X					CO, O3, NO2, SO2, PM	X	X
Aesculus hippocastanum	Horsechestnut					Moderate	CO, O3, NO2, SO2, PM	X	X
Aesculus octandra (flava)	Yellow Buckeye	X				Moderate	CO, O3, NO2, SO2, PM	X	X
Celtis occidentalis	Northern Hackberry	X		X	X	Moderate	O3, NO2, SO2, PM		X
Cercidiphyllum japonicum	Katsura tree				X		CO, O3, NO2, SO2, PM	X	X
Corylus colurna	Turkish Filbert				X		O3, SO2	X	X
Eucommia ulmoides	Hardy Rubber Tree			X	X		CO, O3, NO2, SO2, PM	X	X
Ginkgo biloba	Ginkgo				X	Moderate	CO, O3, NO2, SO2, PM	X	X
Gleditsia triacanthos	Honeylocust	X		X	X	X		X	X
CO= Carbon Monoxide; NO2 = Nitrogen Dioxide: O3 = Ozone; SO2 = Sulfur Dioxide; PM = Particulate Matter									

LARGE TREES (*mature height greater than 40 feet*)									
Gymnocladus dioicus	Kentucky Coffeetree	X			X	X	O3, NO2, SO2, PM	X	X
Liquidambar styraciflua	Sweetgum			X	X	X	CO, O3, NO2, SO2, PM	X	X
Liriodendron tulipifera	Tuliptree	X		X			CO, O3, NO2, SO2, PM	X	X
Magnolia acuminata	Cucumbertree			X	X		O3, NO2, SO2, PM	X	X
Metasequoia glyptostroboides	Dawn Redwood			X	X		SO2		X
Nyssa sylvatica	Blackgum (Sourgum)	X		X	X	Moderate	CO, O3, NO2, SO2, PM	X	X
Picea abies	Norway Spruce			X	X		CO, O3, NO2, SO2, PM	X	X
Pinus strobus	Eastern White Pine	X			X		O3, NO2, SO2, PM	X	X
Platanus occidentalis	American Sycamore	X		X	X	Moderate	CO, O3, NO2, SO2, PM	X	X
Platanus x acerifolia	London Planetree			X	X	Moderate	CO, O3, NO2, SO2, PM	X	X
Pseudotsuga menziesii	Douglas Fir				X		O3, NO2, SO2, PM		
Quercus bicolor	Swamp White Oak	X		X		X	CO, O3, NO2, SO2, PM	X	X
Quercus imbricaria	Shingle Oak	X		X	X	Moderate	CO, O3, NO2, SO2, PM	X	X
CO= Carbon Monoxide; NO2 = Nitrogen Dioxide: O3 = Ozone; SO2 = Sulfur Dioxide; PM = Particulate Matter									

LARGE TREES (*mature height greater than 40 feet*)									
Quercus macrocarpa	Burr Oak	X		X	X	X	CO, O3, NO2, SO2, PM	X	X
Quercus montana (prinus)	Chestnut Oak	X			X		O3, SO2	X	X
Quercus muehlenbergii	Chinkapin Oak	X			X		CO, O3, NO2, SO2, PM	X	X
Quercus rubra	Northern Red Oak	X			X		CO, O3, NO2, SO2, PM	X	X
Quercus shumardii	Shumard Oak	X		X	X		CO, O3, NO2, SO2, PM	X	X
Sophora japonica	Japanese Pagodatree			X	X		SO2	X	X
Taxodium distichum	Bald Cypress			X	X	X	O3, NO2, SO2, PM		X
Tilia americana	American Linden	X					CO, O3, NO2, SO2, PM	X	X
Tilia cordata	Littleleaf Linden						O3, NO2, SO2, PM	X	X
Tilia heterophylla	White Basswood			X			CO, O3, NO2, SO2, PM	X	X
Tilia platyphyllos	Big Leaf Linden			X			CO, O3, NO2, SO2, PM	X	X

CO= Carbon Monoxide; NO2 = Nitrogen Dioxide: O3 = Ozone; SO2 = Sulfur Dioxide; PM = Particulate Matter

LARGE TREES (*mature height greater than 40 feet*)									
Tilia tomentosa	Silver Linden				X		CO, O3, NO2, SO2, PM	X	X
Tilia x euchlora	Crimean Linden						CO, O3, NO2, SO2, PM	X	X
Ulmus americana	American Elm	X		X	X	X	CO, O3, NO2, SO2, PM	X	X
Ulmus japonica x 'wilsoniana' Accolade Morton	Morton Accolade Elm			X	X	X	CO, O3, NO2, SO2, PM	X	X
Zelkova serrata	Japanese Zelkova			X	X		CO, O3, NO2, SO2	X	X

CO= Carbon Monoxide; NO2 = Nitrogen Dioxide: O3 = Ozone; SO2 = Sulfur Dioxide; PM = Particulate Matter