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| Proposed CCNY Extension Final Environmental Impact Assessment |
| Solid Waste Management Group |
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CE 372

Environmental Impact Assessment

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# 1.0 Abstract

Survey, research and analysis to determine the impact on NYC solid waste infrastructure of the proposed City College of New York expansion shows no significant impact based on a significance threshold of 50 tons/week additional solid waste generated. The study area is set at the physical boundary of the project build area, from Amsterdam Avenue to Riverside Drive, between 135th and 140th streets. Solid waste is the aggregate of commercial and residential solid waste generated within the project boundary. Residential MSW within the project area is estimated based on a two block sample of building data from the city’s on-line GIS portal. Commercial presence within the project area is determined through in-person survey of businesses within the project area and the commercial component of solid waste is determined through analysis of that data.

The expected MSW generated in the build condition is 43.2 T/wk, which is a 65% reduction from the estimated existing condition of 124.4 T/wk generated. The build condition utilizes less than half the MSW truck fleet of the build condition, 5 trucks as compared to 12 trucks for existing conditions, and will require nearly 1300 fewer collection stops per week compared with existing conditions. Proposed waste generation reduction strategies, recycling and composting will further reduce the project burden on MSW infrastructure in accordance with New York City goals outlined in DSNY’s Comprehensive Solid Waste Management Plan (DSNY, 2006)

# 2.0 Objective

The new development for the City College of New York between Amsterdam Avenue and Riverside drive and between 135th Street and 140th Street may generate more solid waste than the existing residential and commercial infrastructure. This report will model existing and build condition expected solid waste generation for the development and compare it with the standards set out for solid waste management (SWM) in the CEQR Technical Manual to determine if the proposed project will have a significant adverse impact on SWM goals and MSW infrastructure. The character of the project impact, adverse, neutral or beneficial, shall determine the recommendation to reject or approve the proposed project with respect to MSW management.

# 3.0 Introduction

The property for this report is the volume of municipal solid waste disposed of within the development area in existing and build conditions. The City College of New York (CCNY) is a branch of The City University of New York (CUNY), a public institution of The City of New York and, as such, its garbage is publicly managed municipal solid waste. In the existing condition, a mixed use area with residences lining the streets, commercial establishments lining the avenues, a public school and a park, MSW management is divided between the Department of Sanitation for the City of New York, which handles the residential and school MSW, and commercial haulers, which handle the commercial MSW. In the near term, the waste generation of the neighborhood surrounding the project area is expected to remain unchanged. City College has been in its location since 1847 and the character of the surrounding neighborhood is well equilibrated to its presence. As a result, the study area is set at the boundary of the proposed project, which is also the edge of the area in which the MSW generated is expected to change in the build condition.



Figure 1: Map of City College and proposed project area showing existing buildings, non-residential areas and the blocks used to sample residential density. (The City of New York, 2011)

Figure 1 shows the footprint of the proposed project in situ, outlined in orange, with the existing City College of New York campus outlined in green to the southeast. The blocks outlined in blue are used to estimate the residential density of the project area as described in section 5.1.1.

The solid waste assessment procedure presented in this report is the standard method for assessing impact from solid waste generation of all kinds. The assessment is undertaken to comply with the city regulation as set forth in the CEQR Technical Manual and with all environmental concerns. A short list of the reasons for and the necessary steps concerning the aspect of solid waste generation and management assessment of this form is as follows:

* The City has a goal of limiting the MSW generated and mitigating the impact of that MSW on civic infrastructure and the environment in accordance with the state mandated SWMP.
* The city’s municipal management system is primarily concerned with the solid waste generation from any large new developments, therefore a thorough assessment considering the solid waste generation that will affect the existing MSW management system should be undertaken for all large projects.
* Analysis is limited to the solid waste generation during use of the facility. This analysis will be used to complete the EIS for this project and obtain all necessary permit required to proceed with the project.
* Significant adverse impact threshold is set at a net increase of 50 tons MSW/week for the build condition.
* This report will be used to determine whether the proposed project reduces demand relative to the current solid waste generation and, if not, whether the increase is significantly adverse.

3.1 Municipal solid waste

Municipal solid waste is that waste generated by residences, public schools, and city agencies and collected in street bins and from street sweeping operation within the project footprint. It includes neither construction debris nor sewage. Municipal solid waste comprises refuse and recyclables, where *refuse* refers to everyday garbage from which mandated recyclables have been sorted (The City of New York, 2010). Municipal solid waste, both refuse and mandated recyclables, is collected by DSNY trucks and carted to transfer stations for sorting. Recyclables are sorted and sold, and refuse is trucked to landfills outside New York City.

3.2 Commercial Solid Waste

Commercial establishments such as restaurants, retail facilities and offices will be considered for their routine solid waste generation. Solid waste, including refuse, recyclables, and organic waste, is collected by commercial haulers and transported to private transfer facilities by truck. Once there, it is sorted, the recyclables are sold and the remainder is trucked to power generation facilities for incineration or to landfills.

3.3 Designated Recyclable Solid Waste

Designated recyclable materials, all MSW such as plastics, glass bottles, clothing, aluminum foil, metal containers, beverage cartons, newspapers and magazines are sorted on site for pickup by designated DSNY recycling trucks, in the case of residential and institutional sources, or are sorted from the refuse at transfer facilities in the case of commercial sources.

3.4 Special Waste

Special Waste refers to regulated medical waste and hazardous materials such as laboratory waste or radioactive waste, the disposal of which is separate from MSW and restricted to additionally licensed carriers. Regulated medical waste and some laboratory waste are carted for incineration. Radioactive waste is held on site in a designated storage area until such time as radioactive decay has rendered it sufficiently inert, at which time it is carted and landfilled according to regulations by a licensed carrier.

3.5 Mitigation: description of Solid Waste Management

According to SEQR (2010), solid waste management concentrates on “waste prevention first, followed by reuse, recycling, or composting, deriving energy from non-recyclable waste in environmentally acceptable ways, and disposal by landfilling.” CEQR 14.311 states that features that minimize waste, beyond those required by law should be identified. Many of the suggested features are a standard part of modern institutional design and are components of new building within the project area. Such features are identified through survey of existing measures which qualify under CEQR and through examination of new potentials for further mitigation. For waste minimization, several propositions can be made for the project and are outlined in section 5.3.3.

3.6 Regulations and Standards

* New York State Solid Waste Management Act of 1988, codified at article 27, Title 1 of the New York State Environmental Conservation law (ECL). § 27-0101(1), (2), § 27-0103(1), (2a), (2b), (2c), (3a), (3b), §27-0106(1a), § 27-0107(1a), (1b(i)), (1b(ii)), (1b(iii))
* Title 6 of the New York Codes, Rules and Regulations (6 NYCRR) Part 360, Subpart 15, Comprehensive Solid Waste Management Planning. §360-15.9(a), (b), (c), (d), (e), (f), (g),(h)
* City  of  New  York  Comprehensive  Solid  Waste  Management  Plan  (2006).
* New  York  City  Recycling  Law,  Local  Law  19  of  1989,  codified  at Section  16- 301  et  seq.  of  the  Administrative  Code  of  the  City  of  New  York.    § 16-304, § 16-305, §16-316

# 4.0 Methods and Procedures

Data collection for analysis of solid waste generation for the existing and project build conditions follows the three existing types of waste generators: residential, commercial and institutional, and the projects two main types of facilities: dormitories and academic buildings. Data for estimating existing residential units is obtained from the City’s building and tax data at its GIS web portal (City of New York, 2011). A survey of project area commercial establishments provides data for estimating commercial waste generation. Internet research reveals important statistics regarding the public school within the project area. Formulae for estimating MSW generation for each type of generator are created based on Table 1, which gives MSW generation rates by building or unit type.

Table 1: CEQR Table 14-1: Solid Waste Generation Rate*. Table categories are used to classify the surveyed commercial businesses. Solid waste generation rates are used to calculate the total solid waste generation from all sources.*

|  |
| --- |
| CEQR Table 14‐1 Solid Waste Generation Rates  |
| **Use**  | **Rate (pounds per week)**  |
| **Residential**  |
| Individual  | 17 |
| Household  | 41 |
| **Institutional**  |
| Public Elementary School | 3 per pupil |
| Public Intermediate School | 4 per pupil |
| Public High School | 2 per pupil |
| Private School (K‐8) | 1 per pupil |
| Private School (6‐12) | 4 per pupil |
| College  | 1 per pupil |
| Hospital  | 51 per bed |
| Government Office | 0.03 per square foot |
| Correctional Facility | 13 per inmate |
| **Commercial**  |
| Office Buildings  | 13 per employee |
| Single Offices  | 9 per employee |
| Wholesale  | 66 per employee |
| General Retail  | 79 per employee |
| Restaurants  | 251 per employee |
| Fast Food  | 200 per employee |
| Food Stores  | 284 per employee |
| Hotels  | 75 per employee |
| **Industrial**  |
| Apparel and Textile Manufacturing | 125 per employee |
| Printing/Publishing | 240 per employee |
| **Source:** New York City Department of Sanitation  |

## 4.1 Existing Conditions

4.1.1 Residential

The project area under existing conditions comprises, in part, eight residential blocks. Information regarding residential units per building at NYCityMap (NYC, 2011) is used to estimate the number of residential units in the study area with the following formula:

 [1]

*UB* is number of units in a sample block

*B* is the number of residential blocks in the study area

*UT* is total units in study area

For residential units, MSW can be calculated using Table 1 either based on the number of residents or on the number of residential units. For the existing condition, estimated number of residential units in the study area is used to calculate existing MSW load:

 [2]

*MSWER* is Municipal Solid Waste generated in tons per week by existing residential

*RU* is MSW generation rate in pounds per unit per week based on Table 1.

4.1.2 Commercial

A survey was undertaken of all the commercial businesses within the project area. Each individual business was visited to obtain the number of employees per day working in the business. Business types within the project area range from individual offices, medical facilities, public service agencies and sporting goods stores to fish markets, grocery stores and restaurants. Each business type was assessed with respect to table 14-1 of CEQR Technical Manual. Those businesses that could be easily classified into one of the table categories were placed in the category. For the remainder, due consideration was given to the type of business and its daily activities. Based on type and activity, a fair estimate was made of daily solid waste generation based on the business type resemblance to one of the categories found in the table with small rate adjustments made where appropriate. The New York City public school within the project area was included in the commercial survey, although the collection method at the school is by DSNY truck rather than by commercial hauler. Note of this is made in section 5.3.1. Existing commercial MSW generation is:

 [3]

*CSW* is Commercial Solid Waste in tons per week

*Ei* is Number of employees working per day in surveyed businesses by business type *i*

*Ri* is rate of SW generation by business type *i* found in Table 1 in pounds per employee per week

4.1.3 Total Existing Solid Waste Generation

The total solid waste in the existing project area is:

 [4]

*MSWET* is total solid waste generated in the project area under existing conditions.

## 4.2 Build Conditions

4.2.1 Dormitory Buildings

The project includes three new residential dormitories substantially like the existing Towers dormitories at City College. Dormitory capacity was collected from the Towers website and used in conjunction with the per-resident rate from Table 1 to determine MSW generated for this portion of the project (City College of New York, 2011).

 [5]

*MSWBR* is MSW from project residential buildings in tons per week

*BR* is number of residential dormitory buildings

*S* is student residents per building

*RR* is MSW generation rate in pounds per student per week from Table 1

4.2.2 Academic buildings

The project includes three new academic buildings similar in size to the existing Marshak Science Building, a 13-story high, 649,458 square foot building containing lecture halls, laboratories and a gymnasium (The City of New York, 2011). CEQR standard practice for school buildings is to use a rate of MSW generated per pupil, but there is no stated capacity for Marshak Science Building according to CCNY facilities management office. Further, Marshak Hall is a laboratory facility as well as an academic building, so it is possible that the rate per pupil would undercount the MSW Marshak generates. The DEIS for the new science buildings currently under construction on the CCNY campus estimates the MSW generated by Marshak using the rate for government offices, based on square footage (The Louis Berger Group, Inc., 2007). Two methods are examined for estimating MSW for the project’s three academic buildings and the more conservative of the two is chosen for the estimate. The first method, in equation 5, follows the DEIS for the science buildings under construction. The second, in equation 6, uses the per-pupil rate with the total enrollment for CCNY.

 [6]

*MSWBA* is MSW generated in the project academic buildings in tons per week

*BA* is the number of academic buildings

*sf* is the square footage of the buildings

*Rsf* is the rate of MSW generated in pounds per square foot per week from Table 1

 [7]

*RS* is MSW generation rate in pounds per student per week from Table 1

Total MSW for the proposed project is the sum of the MSW from the academic and dormitory buildings.

 [8]

*MSWP* is total MSW for the project in tons per week

## 4.3 Determining Impact Significance

Significance refers to a project’s impact overwhelming the DSNY and commercial hauling infrastructure that serves the project area. Significance is judged relative to the 50 tons per week benchmark, and from dislocation or disruption of municipal solid waste collection and facilities either by development or by regulation. The procedure for determining significance for the new CCNY Development will include measuring the difference between the existing MSW and CSW generation and projected MSW generation from the proposed project and comparing the result to the benchmark:

 [9]

Significance with respect to collection and facilities operation is assessed by identifying collection methods and facilities within the project area. Qualitative differences between MSW collection under build conditions are assessed by comparing collection methods in existing and build conditions. Collection method changes under build conditions that are unprecedented or markedly increase collection time or effort could be considered significant. Significance with respect to MSW facilities shall be closure or dislocation of existing facilities. As the build condition includes demolition of all existing buildings within the project area, any MSW facility within the project area would necessarily be closed, leading to a finding of significant impact. CEQR 14.400 allows for a finding of no significant impact if EIS identifies substitute capacity within the region. Determination of impact with respect to MSW facilities requires identifying building use within the target area. City mapping is analyzed, building by building to identify MSW facilities within the target area.

4.3.1 Assessing impact on MSW collection infrastructure

Where a proposed project is expected to generate substantial new solid waste of at least 50 tons per week, a detailed analysis of required sanitation services is indicated. Said analysis assists in determining secondary impacts to other CEQR attributes, even where it is not itself a significant impact.

Analysis will be of truck trips per week with respect to existing usage and build condition. The change in MSW generated will come from the net change in population living in the project area and the project area shift from commercial/residential to academic/residential.

Truck capacities for DSNY and commercial carriers are detailed in CEQR 14.312. Existing condition impact on MSW collection infrastructure is calculated as follows:

Existing DSNY truck usage:

 [10]

*CapDSNY* is municipal truck capacity in tons

*Trucks* is truck trips per week

The leftmost term in equations 8 through 10 is rounded up with a ceiling function represented by the bar in the formula. This rounding-up accounts for the integer nature of truck counting. MSW collection happens three times per week in New York City, so in equation 8 the area’s residential MSW would be collected in thirds, with the rounding-up happening for each collection day.

Existing truck usage commercial:

 [11]

*CapCT* is Commercial truck capacity in tons

Commercial hauling is on an unknown schedule and so is calculated in this simple form.

Build condition truck usage:

 [12]

In addition to the number of trucks used, the amount of time solid waste hauling trucks are collecting in an area is part of MSW infrastructure expenditure and has secondary effects on traffic, noise and air quality. The amount of time trucks are on the street is related to the number of stops the trucks make in the area. For existing conditions, DSNY refuse trucks make stops at each residential building three times per week. Two types of recycling trucks make one stop per week each. Commercial haulers are on unknown schedules but for this calculation are considered to make three stops per week at each location. For existing conditions, number of stops per week is:

 [13]

*Stops* is truck stops per week

*BR* is number of residential buildings in the project area

*C* is number of businesses in the project area

# 5.0 Results and Discussion:

## 5.1 Existing Conditions

5.1.1 Residential

The project area under existing conditions comprises, in part, eight residential blocks. Seven of those blocks are of uniform height and building type and one, the block between 139th and 140th streets and between Riverside Avenue and Broadway (see Figure 1), includes a tall, high density residential building. Information regarding residential units per building at NYCityMap (The City of New York, 2011) is used to estimate the number of residential units in the study area with the following adjustment of equation 1:

 [1a]

*US* is number of units in standard sample block

*Uhd* is number of units in high density sample block

The high density block had 920 units according to city data, while the standard sample block between Broadway and Riverside Drive and 135th and 136th Streets had 464 units. The standard sample block was chosen because it appeared to be closest to the mean length of the seven city blocks of similar density. Table 1 gives a rate for MSW generation per residential unit as 41 pounds per unit per week.

Residential MSW impact for existing conditions from Eqns. 1a and 2:

 [1a]

 [2]

Estimated existing residential MSW generation of 85.4 T/wk, or about 10 tons per week per city block is reasonable as it is based on the method outlined in CEQR. The same method was used to estimate project impact for the Manhattanville redevelopment FEIS and is therefore considered sound (AKRF, Inc., 2007). Possible sources of error include the estimation of total residential units in eight city blocks from the two block sample, and the error inherent in the estimate of MSW generation per unit from Table 1.

5.1.2 Commercial

Commercial Solid Waste (CSW) generated by the existing businesses in the project area is calculated using the data collected in a door to door survey of businesses operating in the area. Business managers were asked the number of employees. The type of business was also recorded for categorization according to Table 1. The survey was very successful and useful in determining the solid waste generation. However, there were some stores that were closed, employees at some stores could not speak English while some others considered the information requested confidential. Where no information was available the surveyor estimated the total number of employees by comparison with other businesses surveyed. The data collected from the survey estimates the commercial activity and, through analysis, the estimated solid waste generation from the project area quite accurately within those parameters and the error inherent in the Table 1 CSW rates.

Table 2 shows the results of the survey conducted to collect the number of businesses in the project area, the type of business each is in, and the number of employees at each business. Each business was classified according to the categories found in table 1. Further details available in Appendix A.

Table 2: Business Survey Data for project area

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|   |   |   |   |   |   |   |
|   | USE | Businesses Businesses | Employees | Rate (lbs/Emp) | Total MSW |   |
|   | SINGLE OFFICE | 22 | 42 | 9 | 378 |   |
|   | OFFICE BLDG. | 14 | 108 | 13 | 1404 |   |
|   | ELEM. SCHOOL | 1 | 571 | 4 | 2284 |   |
|   | WHOLESALE | 1 | 4 | 66 | 264 |   |
|   | GENERAL RETAIL | 46 | 141 | 79 | 11139 |   |
|   | FOOD STORE | 25 | 146 | 284 | 41464 |   |
|   | FAST FOOD | 7 | 43 | 200 | 8600 |   |
|   | RESTAURANTS | 12 | 53 | 251 | 13303 |   |
|   |  Total |   | 1108 |   | 78836 |   |
|   |  |  |  |  |  |   |
|   |  |  | Total MSW generation |   |  |   |
|   |  |  | 78836 | lbs/wk |  |   |
|   |  |  | 39.418 | Tons/wk |  |   |
|   |  |  | 35.75940811 | MT/wk |  |   |
|   |   |   |   |   |   |   |

The above tabulated data expresses the analysis using equation 3, where the products of the number of employees in each category of business and the rate of CSW generated per employee are summed to give the total estimated CSW generated in the project area.

For example, the total number of employees in general retail establishments in the project area is 141. The solid waste generation rate for general retail in Table 1 is 79 pounds per employee per week, yielding one component of the total estimated CSW:

Category: general retail

Total Employees: 141

Rate of SWG: 79 lb per employee/week

 [3]

The subscript *GR* indicates general retail

This calculation (Table 2, row 5) was carried on for each individual category and the categories were added together to determine the total solid waste generation on a weekly basis in tons. Figure 2 shows CSW distribution in the existing condition for the project area by business type.

Figure 2: Distribution of CSW by business type

5.1.3 Total Existing Solid Waste Generation

The total amount of solid waste generated in the existing condition for the product area from equation 4 is:

 [4]

Given that both the existing residential and the existing commercial solid waste generation rates were deemed reasonable, their sum is also reasonable within the errors described.

## 5.2 Build Conditions

The objective of this section is to quantify the waste that the project will generate and describe the solid waste management for the proposed project.

The first goal is to calculate the number of people living/studying in the area. According to the CCNY Towers website (City College of New York, 2011), the Towers provide accommodations for 589 residents. Individual residential MSW generation rate is used here because the number of residents is known exactly, rather than simply the number of units as in the existing condition. As three new residence halls will be built, the projected solid waste generation will be:

 [5]

The number of people in the buildings similar to the Marshak Hall varies. It depends on the time of year and time of the day. The existing Marshak Science Building is 13-story and 649,458 square feet. The DEIS for the CCNY science buildings currently under construction describes solid waste and special waste generation for Marshak Building, the model for the three new academic buildings within the project area. Marshak Building is a mixed-use laboratory/classroom building. Table 1 estimates solid waste generation per pupil at 1 lb/wk. The facilities management office of CCNY says that there is no stated capacity for Marshak Building, only for the assembly areas within. According to *The Campus,* enrollment for the whole college was 15,402 in 2009 (O’Neal 2009). Using the 1 lb/wk estimate and applying the total school enrollment to Marshak Building to equation 7 gives a weekly regular solid waste generation for the building of 7.7 tons/wk, and total for three new academic buildings:

 [7]

The Science Building DEIS uses the more conservative estimate for government office buildings in Table 1 of 0.03 lbs/sf to estimate waste generation while accounting for the mixed use nature of the facility. According to Citymap the square footage of Marshak building is 620ksf for a standard waste generation rate of 9.3 tons per building per week. The total waste estimate for the Project would therefore be three times the conservative estimate for Marshak building, or 27.9 tons/week.

 [6]

Marshak Building generates special waste in the form of radioactive waste and medical waste from its laboratories and research facilities. CEQR section 14.200 states, “Compliance with applicable requirements [for special waste handling] generally eliminates possible significant adverse impacts” (NYC, 2010). Special waste generation for Marshak science and biology laboratories was not considered significant. The DEIS suggests that special waste generation in Marshak would be partially shared by the new science buildings currently under construction, a major increase in laboratory facilities at CCNY. It is expected that the Project academic buildings will be classroom facilities rather than laboratory buildings and will generate none of the special waste associated with laboratories. The special waste would be limited to exhausted fluorescent tubes and some occasional quantity of electronic waste which can be handled with the existing special waste handling methods employed by CCNY.

It is expected that each new academic building will have some food service area similar to the Marshak Hall Starbucks café, which also serves salads and sandwiches from the main cafeteria. At any given time there is only one person on duty, making the food service related MSW generation as follows, considering a café as a fast food establishment from Table 1:

 [3]

The total expected waste in the project area is given in Table 3, where all types of waste are presented and mirroring the result of Equation 8:

 [8]

Table 3: Estimated MSW generated by proposed project

|  |  |
| --- | --- |
| **Type of Waste** | **Amount (tons per week)**  |
| SW residential | 15 |
| SW college | 27.9 |
| SW cafeteria | 0.3 |
| Total  | 43.2 |

The total number, 43.2 tons/week, is a fraction of the solid waste produced in the area now. As described previously, between 135th and 140th streets and between Amsterdam Ave and 12th Ave, there are currently many residential buildings, varying in size from 5 to 24 floors with between 20 and 770 units; a public school, general retail stores, offices, several grocery stores, and fast food restaurants. This area generates 124.35 tons/week of solid waste, a substantial amount. The project is estimated to generate 43.2 tons/week, which is 34.7% of the existing amount of solid waste per week. Thus, the proposed project is favorable from the point of view of solid waste management. It will significantly reduce the amount of solid waste generated in this area. The expected amount (43.2 vs 124.35 tons/week) is the reduction of solid waste in the area by 65%.

Figure 3 shows the expected solid waste generated by the project per type per week. Solid waste, generated in the academic buildings, would be the largest amount of total waste generated (64%). The least amount of waste would be food waste, with a 0.3 tons/week (1% of total).

Figure 3: Estimated MSW generated by proposed project

For calculating the amount of expected waste in the project area, the conservative approach was implemented. For this, the highest numbers for produced waste were calculated.

The possible sources of error in the calculations are:

* Not knowing the exact capacity of the Marshak and therefore estimating that all the students can be inside one hall at the same time (unrealistically large number of people).
* Calculating the amount of waste in an academic building using its gross footage. This uncertainty is similar to that associated with the use of any rate or threshold in CEQR rather than one tailored to the specific conditions.

## 5.3 Impact Significance

The project is favorable for the City of New York as it decreases the amount of produced solid waste in the area compared to the existing conditions by 65% and reduces the impact of this area on the municipal solid waste infrastructure. Using equation 9 to quantify the impact:

 [9]

Additionally, there are no MSW infrastructure facilities within the project area, nor any regulation component to the project which could impact the city’s SWM, so by these standards also there is no significant adverse impact. The finding of no significant adverse impact authorizes a recommendation to allow the proposed CCNY expansion project from the standpoint of SWM.

5.3.1 Impact on MSW Collection Infrastructure

The new CCNY Development will have a net reduction in solid waste generation due to reduction in residents in the project area and the lesser amounts of MSW generated by the academic buildings of the project when compared with the commercial waste generated within the project area. Still, it is useful to quantify the effect of the action on sanitation infrastructure as the city has laid out long-term goals regarding MSW generation and management in the SWMP.

Analysis of the difference in impact of the existing and build conditions on MSW collection infrastructure is as follows, with this note: Typical capacity for commercial trash trucks is given as 12 to 15 tons per truck. Conservatively estimating the build condition suggests maximizing the relative impact of the build condition. It is therefore reasonable to use the higher capacity of the commercial MSW truck for existing conditions.

 [10]

There are typically three regular trash pick-ups per week and one recycling pick-up of two types of recyclables in New York City, making five the minimum number of truck trips per week. Equation 10 shows the existing condition generates more MSW than five trucks can handle, indicating that four additional trucks service the area to accommodate the load. These 9 truck trips per week from the DSNY fleet would also be responsible for picking up MSW from the elementary school within the project area. The last truck is not at capacity and therefore the additional one ton of MSW per week would not change the calculation. Further, examining the calculation for CSW below, reducing the weight of CSW by one ton does not reduce the required trucks per week.

Commercial MSW impact for existing conditions from Equation 11:

 [11]

Commercial waste is sorted into refuse and recyclables at sorting facilities, obviating the need for multiple truck types and multiple pick-ups at each location. There is no known set schedule for CSW pickup.

Total existing condition MSW collection infrastructure impact is the sum of commercial and DSNY infrastructure demand: twelve trucks per week.

Total build condition MSW collection infrastructure impact from Eqn. 12:

 [12]

With the previously applied minimum of 5 truck trips per week, the build condition impact is 42% of the existing condition impact even as the MSW generated is 35% of the trash generated. Additionally, the survey of existing conditions shows 184 buildings and 130 businesses (The City of New York, 2011). Each residential building receives 3 regular trash pickups per week and one pickup each from two types of recyclables truck, for a total of 5 weekly pickups. Using an estimate of 3 commercial pick-ups per week by commercial haulers, who typically sort recyclables after pickup, equation 13 details estimated truck stops per week for the existing condition as:

 [13]

The build condition includes 6 buildings which are all part of one institution. With the infrastructure consolidation typical of CCNY (where most or all of the campus MSW is put through one facility in the NAC), one could easily imagine one pickup per truck trip, a significant reduction in truck time on the street. Using the conservative estimate of one pick-up per project building per pick-up day results in 30 stops per week. These results are summarized in Table 4, which shows that the build condition will result in seven fewer truck trips per week and a remarkable 1280 fewer MSW pick-ups per week.

Table 4: Existing versus build condition MSW collection infrastructure impact

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CONDITION** | **MSWR** (T/wk) | **CSW or MSWBA** (T/wk) | **MSWt** (T/wk) | **TRUCKS/wk** | **STOPS/wk** |
| Existing | 85.4 | 39 | 124.4 | 12 | 1310 |
| Build | 15 | 28.2 | 43.2 | 5 | 30 |
| % Change | -82.4 | -27.7 | -65.2 | -58.3 | -97.7 |

The procedure followed above has a few possible sources of error. The schedule for commercial waste pick-up is unknown and the estimate could be verified. It may be that commercial waste is picked up nightly for some businesses and weekly for others. The commercial vendors within CCNY facilities may contract their MSW collection separate from the school MSW collection. It is difficult to quantify the error for impact on MSW collection infrastructure, but it is reasonable to suggest that it is of the order of the error in MSW generated. In some sense, however, the error is insignificant as the build condition is less taxing on city infrastructure than the existing condition.

5.3.2 Consistency with the City’s Solid Waste Management Plan

The New CCNY Development does not warrant more detailed analysis as a result of the conclusion of no significant adverse impact and therefore does not require assessment with respect to the City’s SWMP. However, as previously stated, the reduced impact of the build condition comports with the goals of SWMP.

Solid waste management of special waste, described in SEQR (2010) as those wastes that “require special handling to avoid mixing with regular refuse and recycling collections” could be estimated as well. An example of this for the proposed project would be – batteries, fluorescent light tubes, compact fluorescent bulbs, mercury thermostats (from various labs and classes). This material should be collected separately and regularly. Designated areas to store it should be assigned, as DSNY accepts this kind of waste at certain drop-off locations. Its management should be specified, but is not expected to be an excessive burden and will fit within the special waste management of existing CCNY buildings.

Comparing the existing and proposed conditions, the proposed project will result in a decrease in the amount of produced solid waste. There are 124.4 tons of solid waste per week for the existing conditions and 43.2 tons per week for the proposed project shown with distributions in Figure 4.

Figure 4: Distribution of solid waste generated in existing and project conditions

The proposed project decreases the amount of solid waste by 65% from the existing conditions even though it was calculated with the conservative approach.

The results clearly show the advantages with respect to MSW management of building the new extension to the City College west of Amsterdam Avenue, between 135th and 140th streets. The results make sense based on the conservative methods used, which are reasonable for estimating impact; the data used was collected personally using authoritative websites and survey. The solid waste rates are taken from current CEQR. Any assumptions are specified and explained.

5.3.3 Mitigation

In order to reduce solid waste several mitigation measures can be made for the project:

* Extensive recycling, including using recycling bins for paper/bottles in each building and outside as well as recycling in the café and cafeteria areas.
* Using only air-dryers in public lavatories. This is necessary in order to reduce sanitary paper waste in the building (which is not recyclable).
* Using e-mail instead of paper letters.
* Using only printers with double-sided printing option and advising faculty members and students to use it.
* Installation of water-bottle fillers on each floor.

The existing Marshak Science building has this system on the ground floor; however, it is advised that they be installed on each floor to reduce demand on disposable bottles.

* On-site Composting.

In order to reduce food waste, on-site composting is a unique opportunity for the college. The NYC Compost Project was created by the NYC Department of Sanitation in 1993 to provide compost education and outreach to NYC residents, nonprofit organizations, and businesses (The City of New York, 2011). Composting bins can be located behind the buildings. Composted material can be used for lawns or can be sent to the following organizations which require compost (The City of New York, 2011): community gardens, NYC Housing authority, NYC parks, NYC schools, etc.

# 6.0 Conclusion

The proposed City College of New York expansion, covering the project site from 135th Street to 140th Street between Amsterdam Avenue and Riverside Avenue will have a 65% net reduction in solid waste generated, resulting in a reduced load on municipal solid waste collection infrastructure. The consolidation of waste pick-ups from one per small building and business to one pick-up per institutional building reduces impact on the DSNY yet does not directly reduce the waste stream. A significant reduction in DSNY truck time in the project area positively impacts quality of life, noise, traffic, and air pollution. No waste management facilities are displaced by the project. Further, mitigation measures already in place at the college, and further measures proposed herein, will reduce the solid waste generated in the project area from the already low estimates. The initial evaluation dictated a finding of no significant impact for the solid waste management attribute. Detailed analysis was conducted to examine the projected net reduction in solid waste, although not strictly required by CEQR. Secondary benefits to traffic and air quality are projected as a result of reduced sanitation truck activity in the project area. The recommendation is to approve the proposed project with regard to its impact on the municipal solid waste attribute.

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# Appendix A: Commercial solid waste generation data, business survey

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Benjamin Conable |  |  |  |  |  |
| USE | RATE | # of BUSINESSES | EMPLOYEES | TOTAL MSW |  |
| Office Building | 13 | 3 | 35 | 455 | 25 med emp. |
| Single Offices | 9 | 4 | 15 | 135 |  |
| Wholesale | 66 | 1 | 4 | 264 |  |
| General Retail | 79 | 9 | 29 | 2291 |  |
| Restaurants | 251 | 1 | 6 | 1506 |  |
| Fast Food | 200 | 3 | 28 | 5600 |  |
| Food Stores | 284 | 6 | 66 | 18744 |  |
| Total |  | 27 |  | 28995 |  |
|  |  |  |  |  |  |
| JUBAIR UDDIN |  |  |  |  |  |
| Business Classification | Rate | Total Businesses | Employees | Total MSW |  |
| GENERAL REAIL STORE | 79 | 15 | 40 | 3160 |  |
| RESTURAUNTS | 251 | 4 | 15 | 3765 |  |
|  FAST FOOD | 200 | 2 | 5 | 1000 |  |
| FOOD STORE | 284 | 7 | 19 | 5396 |  |
| SINGLE OFFICES | 9 | 4 | 12 | 108 |  |
| OFFICE BUIDLING | 13 | 2 | 13 | 169 | 13 med emp |
| Total |  | 34 |  | 13598 |  |
|  |  |  |  |  |  |
| Sebastian Tinazzi  |  |  |  |  |  |
| USE | RATE | Total Employee | Total MSW |  |  |
|  |  |  |  |  |  |
| Office Building | 13 | 15 | 195 |  | 19 med emp. |
| Single Offices | 9 | 4 | 36 |  |  |
| General Retail | 79 | 49 | 3871 |  |  |
| Restaurants | 251 | 26 | 6526 |  |  |
| Fast Food | 200 | 4 | 800 |  |  |
| Food Stores | 284 | 36 | 10224 |  |  |
| Elem. School | 4 | 571 | 2284 |  |  |
| 48 |  |  | 23936 |  |  |
|  |  |  |  |  |  |
| Ksenia Shikhmacheva |  |  |  |  |
| USE | RATE | Total Employee | Total MSW |  |  |
| Office Building | 13 | 45 | 585 |  | 40 med emp. |
| Single Offices | 9 | 11 | 99 |  |  |
| General Retail | 79 | 23 | 1817 |  |  |
| Restaurants | 251 | 6 | 1506 |  |  |
| Fast Food | 200 | 6 | 1200 |  |  |
| Food Stores | 284 | 25 | 7100 |  |  |
|  |  |  |  |  |  |
|  |  |  | 12307 |  |  |

# Appendix B: Solid Waste Group meeting minutes

First Meeting on 02/09/2011

8.30 AM - 9.15AM

The meeting was called by Sebastian to meet on Wednesday, February 9th, 2011 at 8.30 AM in the classroom. The following persons were present on the meeting: Sebastian Tinazzi, Ksenia Shikhmacheva and Benjamin Conable. Jubair Uddin was absent. The meeting lasted 45 minutes. Minutes were taken and submitted by Ksenia Shikhmacheva.

* At the beginning of the meeting, the roles were defined as

Sebastian Tinazzi – Project Manager;

Benjamin Conable – Time Keeper;

Ksenia Shikhmacheva – Note Taker.

* Exchange of personal information

Sebastian Tinazzi (718)877-4630 satf10@hotmail.com

Benjamin Conable (917)449-0415 benconable@mindspring.com

Ksenia Shikhamcheva (646)334-3399 ks.shik@gmail.com

* Rewiew IW1

Reading printed individual works. Sebastian expressed the difficulty of writing the first assignment. Ben gave him a feedback, pointing on concentrating on the specific topic. Giving feedback to Ben’s and Ksenia’s papers. Discussing Jubair’s work.

• Discussion

1. Defying the object of the project in more specific terms.
2. Deciding to work on the project in “real time” - writing the parts of it during the semester, not leaving to the end.
3. Ben formulated “special waste” issue
4. Sebastian proposed some improvements to reduce solid waste which should be in the paper (for example, more hand dryers in the bathrooms).
5. Ben discussed the food waste from private vendors.
6. Ksenia suggested proposing a composting area in the project.
7. Ben considered solid waste management for Towers.

• Agenda for the second meeting

It was decided the second meeting will take place on Wednesday, February 16th, 2011 at 8.30AM. All members will be reminded personally and via email.

1. Review comments for IW2 of each group member.
2. Discussing final version for Objective and Introduction parts.
3. Discussing the ways of proceeding experiments relative to the project (what is important, which data can be collected, how to analyze it).
4. Preparing questions to ask Professor Wittig in class.

At the next meeting, the roles will be assigned as following:

Benjamin Conable – Facilitator;

Sebastian Tinazzi – Note taker;

Ksenia Shikhmacheva– Project Manager;

Jubair Uddin – Time keeper.

Second Meeting on 03/03/2011

12.30 PM - 1.30 PM

The meeting was called by the whole team to meet on Thursday, March 3rd, 2011 at 12.30 PM in the library of Marshak Science Building. Every member of the team was present and on time. The meeting lasted 60 minutes. Minutes were taken and submitted by Jubair Uddin.

* At the beginning of the meeting, the roles were defined as

Sebastian Tinazzi – Note taker;

Benjamin Conable – Facilitator;

Ksenia Shikhmacheva – Team Leader;

Jubair Uddin – Time keeper.

Agenda

1. Review comments for IW2 of each group member.
2. Discussing final version for Objective and Introduction parts.
3. Discussing the ways of proceeding experiments relative to the project (what is important, which data can be collected, how to analyze it).
4. Preparing questions to ask Professor Wittig in class.
* Rewiew IW2

Reading printed individual works. Benjamin discussed how he thought that the way he layout out his assignment was not as “clean” as the other team members. The team discussed for a few moments that Benjamin’s part was similar to our third individual assignment than our second assignment. Sebastian and Ksenia asked Benjamin about the number of students that was chosen for Marshak building. Benjamin explained that even though that number didn’t resemble the number of occupancy (number used was enrollment of semester) of the building, that number was the “highest” number possible for the building and it didn’t exceed the threshold value of 50 tons/week of solid waste. The different calculations done by each member were checked and Sebastian expressed that he thought that his numbers were too big. Benjamin and Ksenia explained that the squared footage used was the wrong one. Ksenia asked Jubair why did he separated students into different categories (grad, part time, full time), Jubair explained that he didn’t realized that the calculation was already done in the DEIS. Ksenia mentioned that the assumption by Benjamin that net waste from the proposed project will not be zero but it will be much more less for our project since the commercial waste will be gone.

* Discussion
1. Defying the area of the project in more specific zones.
2. Deciding to work divided new area into four sub-zones and assigning one to each team member.
3. Ksenia formulated a table for data collection.
4. Benjamin discussed florescent tubes once more and mentioned that he was about to finished his analysis and was going to provide the data in the next meeting.
5. Sebastian wonder if the swimming pool was going to cause any waste, the team decided that it wasn’t relevant.
6. It was decided that the survey to collect data it’s going to be part of the appendix.

 Agenda for the third meeting

It was decided that the third meeting will take place on Thursday, March 17th, 2011 at 12.30 PM. All members will be reminded personally and via email.

1. Review comments for IW3 of each group member.
2. Discussing data collection collected.
3. Discussing who will do what for the analysis (analysis, assess significance, identify mitigation).
4. Preparing questions to ask Pr Wittig in class.

At the next meeting, the roles will be assigned as following:

Benjamin Conable – Note taker;

Sebastian Tinazzi – Time keeper;

Ksenia Shikhmacheva – Facilitator;

Jubair Uddin – Team leader.

Minutes of Meeting 3 on March 17, 2011

1:15 PM – 2:45 PM

Roles:

* Jubair Uddin – Team leader. Not present.
* Ksenia Shikhmacheva – Facilitator;
* Benjamin Conable – Note taker;
* Sebastian Tinazzi – Time keeper;

Next meeting roles are:

* Benjamin Conable – Team Leader;
* Sebastian Tinazzi – faciliator;
* Jubair Uddin - note taker.
* Ksenia Shikhmacheva – time keeper;

Agenda

* Review comments for IW3 of each group member.
* Discussing data collected.
* Discussing who will do what for the analysis (analysis, assess significance, identify mitigation).
* Discussion delayed until after meeting with professor.
* Prepare questions to ask Professor Wittig
* Set date and time and agenda for Group Meeting 4

For Monday, Jubair, team leader will compile raw data and write memo for submittal.

It was decided that due to Jubair being late, team leader responsibility will be shared by the remaining team for meeting 3.

The team briefly discussed IW3. It was noted that the team members had different interpretations of what the assignment was. It was decided to ask Professor Wittig to comment.

Raw data discussion:

The group discussed estimation of employees for companies who would not provide information. Group members counted visible employees for non-responsive companies. That was determined to be sufficient for the count. The group discussed how to count medical offices, which do not appear in Table 14-1 of CEQR. It was decided to ask Professor Wittig at the meeting with her at 2 PM.

Who will do what for analysis:

Ben, Seb, Jubair

Analysis of existing conditions and analysis of impact on MSW infrastructure.

 Ben: impact on MSW infrastructure and florescent

 Seb: residential

 Jubair: commercial existing

Ksenia: Analysis of build condition - Identify mitigation

Questions and answers from meeting with Professor Wittig:

Our results for assess significance do not activate other parts of the chapter 14. We want to do the sections anyway. Is that a good thing for the project? Specifically…

500. mitigation

400 impact

312. detailed analysis

313. Most of the medical waste comes from the labs, not the clinic. No medical waste

 320. swmp

 - Prof. Wittig says yes do all sections and state that some sections would not be included in an actual DEIS and why.

Clarify the scope of the last two assignments specifically with reference to 14.

Professor Wittig says that IW2 was about identifying needed data and sources for it and IW3 was about formulating exact equations for analyzing data. Our team, especially Ben and Sebastian, made IW3 about MSW infrastructure impact and IW2 about existing conditions and build conditions analysis.

IW2 = what kind of data do we need. What sources of information do we need. Where is the data coming from.

IW3=what specific formulas and analysis is needed for all sections of ceqr.

May we divide report work as we feel is fair? Yes

How do we deal with medical offices which do not appear on Table 14-1?

Professor Wittig says to come up with a method for estimating MSW generation at a medical office, possibly by combining or considering Office Building, Hospital, and Retail rates. Provided the team comes up with reasonable justification, the method will be considered sound.

Wittig says project should really look like a lab report more than the CEQR 14. We can use CEQR 14 subheading in report. The person who writes analysis section for some specific data writes the method section as well, Wittig suggests. We can use our judgment regarding division of writing. Wittig says we should include a table that maps commercial store types to 14-1 table values.

Mitigation sections always end up being qualitative. –Wittig. Mitigation linked to existing usage. Ksenia asked questions about how aspirational our mitigations could be: whether we can include mitigations we would like to see or only mitigations that are existing at the college. Professor Wittig suggested that composting is relevant based on the presence of food service at the college.

Agenda GM4

* Identify roles for final project – elect team leader
* Review IW4
* What still needs to be done – divide up the writing.
* Further questions for Professor Wittig
* Determine whether 5th meeting is necessary
* Date for GM4: Thursday, March 31, 2011 at 12:30 PM.

Group Meeting 4

03/31/2011 1:30 PM – 2:30PM

Roles:

* Benjamin Conable – Team Leader;
* Sebastian Tinazzi – faciliator;
* Jubair Uddin - note taker.
* Ksenia Shikhmacheva – time keeper;

Today’s meeting discussions

* Every group member will write two power point slides
* The back ground picture, a classic photo from 2010 photo album was anonymously selected by everyone in the group
* Everyone has agreed to present their part of the project for the final presentation.
* No further questions for Professor Wittig.
* Next meeting date and time: Thursday April 14, 2011 @ 12:30

Roles for next meeting:

* Team Leader (Final Project Manager) Benjamin Conable
* Sebastian Tinazzi will organize the slides

Agenda for next meeting:

* Discuss the details and specifics of the presentation
* Discuss power point slide for the presentation
* Discuss IW5

April 13, 2011

Professor Beth Wittig

Civil Engineering Department

The City College of New York

140th Street & Convent Avenue

New York, New York 10031

Transmittal Memorandum

Re: Solid Waste Generation Group Final Report

Dear Professor:

Attached please find the Final Solid Waste Management Report for the proposed City College of New York extension project. The goal of this report is to identify the impact of the proposed project on municipal solid waste infrastructure relative to existing waste generation levels and judge the significance of that impact against the standard set forth in the New York City Environmental Quality Review Technical Manual.

This final report comprises analysis of existing residential solid waste generation prepared by Sebastian Tinazzi, existing commercial solid waste generation by Jubair Uddin, build condition waste generation by Ksenia Shikhmacheva, and municipal solid waste collection infrastructure impact for existing and build conditions by Benjamin Conable. Mr. Uddin oversaw collation of the commercial MSW generation survey conducted by all group members. Ms. Shikhmacheva prepared the mitigation analysis and Mr. Tinazzi helped format the report.

Sincerely,

Benjamin Conable

Final Project Manager

Solid Waste Generation Group

Project Checklist

* Transmittal page
* Table of contents
* Abstract
* Objective
* Introduction
* Methods and Materials
* Results and Discussion
* Conclusions
* References (follow Ch2)
* Appendices (include raw data as written in the field, supporting calculations, all

four meeting agendas and minutes)