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NCRE
Additional Materials

September 17, 2018

Chris,

As requested, enclosed please find additional materials which address questions and requests from the Planning Board in relation to the NCRE SEQR review. Since we have three municipalities reviewing at once, in cases where a question was asked by another municipality and the answer has already been shared to all, I did not duplicate it here. Included in this package you will find:

1. Transportation
    a. Additional information about how many students buy parking permits
    b. Additional explanation about how background growth is calculated for traffic
    c. A legend for the bus route map on page 3 of the traffic report
    d. Additional information about the funding of TCAT and future bus routing on North Campus
2. Stormwater
    a. Additional information regarding bioretention and expected infiltration
3. Information about the re-use of 10 Sisson Place (formerly SAM)
4. Information about the size trees that will be planted
5. Information about site recreation
6. Energy

If you need anything else, please do not hesitate to ask. As always, thank you for your advice and assistance.

Kimberly Michaels
Principal

Cc: Brent Cross, Village of Cayuga Heights
Lisa Nicholas, City of Ithaca

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Transportation (pages 155-166)

*Additional information about how many students buy parking permits*

Below is a chart which lists the actual number of parking permits purchased by students broken out by year and totaled for undergraduates.

| Student Year | 2018-2019 Academic Year | 2017-2018 Academic Year | Percentage of 2017 Student Population |
|---|---|---|---|
| First-Year | 112 | 105 | 3% |
| Sophomore | 270 | 271 | 7% |
| Junior | 187 | 186 | 5% |
| Senior | 194 | 166 | 4% |
| ***Total*** | ***763*** | ***728*** | ***5%*** |

*Additional explanation about how background growth is calculated for traffic*

Background growth is based upon consideration of historical growth in daily traffic volumes on study area roadways, known future developments and potential unknown future developments. The traffic engineer notes "we typically use a slightly higher growth rate to cover potential future developments that have not yet been made known to the Town/Village."

*Additional information about the funding of TCAT and future bus routing on North Campus*

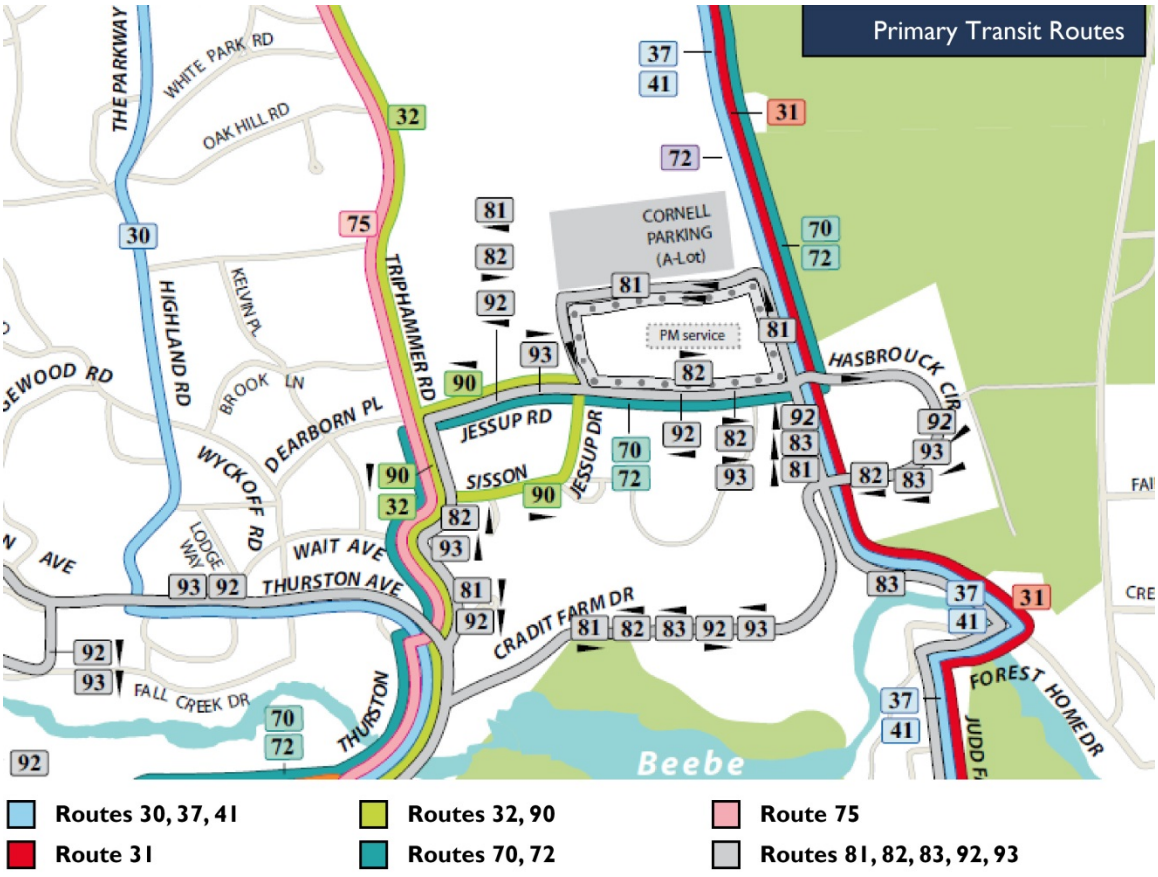
TCAT is a partnership between Cornell University, Tompkins County and the City of Ithaca. Each provides equal funding to the organization. Cornell also contributes scheduled fare payments to cover expenses associated with Cornell ridership.

TCAT has been involved in the NCRE project planning. The exact changes to bus routes are not yet finalized. However, preliminary review by TCAT indicates that Route 82 could use two additional buses during its morning peak-time runs on weekdays and routes 90 and 92 would each need an additional bus on weekday evenings.

Traffic Study (appendix, page 3)

*A legend for the bus route map on page 3 of the traffic report*

The image shown on page 3 of the traffic study is taken directly from the TCAT bus route diagrams. Each colored line on the drawing represents a different route. Below is an image of the diagram with a key included. For further information on existing bus routes, an interactive system map can be found here: https://www.tcatbus.com/learn/system-map/




Stormwater (pages 74-77)

*Additional information regarding bioretention and expected infiltration – particularly in reference to 10% poor drainage soils noted in the LEAF.*

The soils on the site are based on Natural Resources Conservation Service (NRCS) mapping for neighboring lands to the east with similar geologic formulations. The actual site is located on 'unsurveyed' lands as mapped by the NRCS. The surveyed lands to the east are generally 90% Hudson Silty clay loam and 10% Rhinebeck silt loam. NRCS describes Hudson soils as "moderately well drained" and Rhinebeck soils as "somewhat poorly drained," which is where the 10% figure came from.

The soils reports for the adjacent lands would be representative of the original natural soils on the site. These are described as silt loam and silty clay loam which have since been disturbed and mixed with some imported more granular materials in the recent past. The soils reports from Stopen indicate the top layer of soils as 'fill' meaning it has been disturbed from its natural state. This layer is anywhere from a couple feet thick to over 10 feet thick. The material is predominately described as silt which likely originated from the original soils, but they do note encountering sands and gravels at certain locations, generally closer to the surface, which were likely imported to the site and mixed in with the silty soils at some time. The next layer below the disturbed soils are termed 'silt' which are the natural soils which have not been recently disturbed. Below the 'silt' layer is 'glacial till' which is generally well over 10' feet below grade. Glacial till is loamy material that is highly compacted and generally impervious. The depth of the 'till' is such that it generally will not be disturbed and will not affect site drainage.

The bioretention areas are filter practices equipped with underdrains. They will be constructed with imported, well-draining soil. Some, but not a significant amount, of water will infiltrate into the underlying soils at subgrade. When sized per the normal minimum standard sizing criteria for the catchment area, the DEC gives us credit for Runoff Reduction Volume (RRv) equal to 40% of the Water Quality Volume (WQv). This is volume that either evaporates, transpirates or is infiltrated at subgrade. Oversizing the filter practices, which we have at some locations, increases the RRv credit commensurately. These oversized practices will increase the amount of infiltration.

### Construction (pages 231-233)

*Information about the re-use of 10 Sisson Place (formerly SAM)*

Lighting, kitchen equipment, furniture and other minor items have already been salvaged out of the building and reused on campus. Prior to demolition, existing fire alarm equipment and telecommunications equipment will be salvaged for reuse or parts. The hot water tank and grease trap were installed as recently as 24 months ago and can be salvaged for reuse on campus. In addition to salvaging items for use in other places on campus, Cornell will invite Ithaca Re-Use and Significant Elements to salvage from the building. During demolition, materials that can be recycled will be. Opportunities to recycle building components are likely small, given that the building is mainly built of concrete block and not steel.

### Plants, Animals and Agriculture (page 89)

*Information about the size trees that will be planted*

Attached please find a chart which represents the current design intent for tree plantings. The chart lists species, size at planting and the quantity proposed. Size at planting was chosen based on increasing transplant success and future growth rates. Certain trees, like oaks, planted at a smaller caliper size, have higher rates of survival. Based on our experience and research, other species in general transplanted at a smaller caliper benefit from diminished transplant shock and greater adaptability. As a result, these trees eventually outperform the same tree planted as a larger specimen.

# NCRE PLANT SCHEDULE: TREES

| KEY | QTY | TAXONOMICAL | COMMON | ROOT | SIZE | NOTE |
|---|---|---|---|---|---|---|
| | | | MAJOR BROAD LEAF DECIDUOUS TREE | | | |
| ACab | 17 | Acer × freemanii 'Jeffersred' | Autumn Blaze Maple | B&B | 2" | MULTI STEM, 3 |
| ACce | 24 | Acer x freemanii 'Celzam' | Celebration Maple | B&B | 3" | |
| ACsi | 13 | Acer x freemanii 'Sienna' | Sienna Glen Maple | B&B | 2" | |
| BEdh | 8 | Betula nigra 'BNMTF' | Dura-heat River Birch | B&B | 10' | MULTI STEM, 2, 3,4 |
| CEch | 6 | Celtis occidentalis 'Chicagoland' | Hackberry | B&B | 3" | |
| CEja | 5 | Cercidiphyllum japonicum | Katsura, provide 50/50 male and female plants | B&B | 2" | SPECIMEN |
| LItu | 5 | Liriodendron tulipifera 'JFS-Oz' | Emerald City Tulip Tree | B&B | 2" | |
| NYwf | 10 | Nyssa sylvatica 'Wildfire' | Wildfire Black Tupelo | B&B | 1-1/2" | |
| PLxa | 14 | Platanus x acerifolia 'Morton Circle' | Excalamation! London Planetree | B&B | 3" | |
| QUup | 8 | Quercus macrocarpa 'JFS-KW3' | Urban Pinnacle Burr Oak | B&B | 2" | |
| QUhe | 5 | Quercus x macdanielli 'Clemons' | Heritage Oak | B&B | 2" | |
| ULac | 12 | Ulmus 'Morton' | Accolade Elm | B&B | 2" | |
| ULmg | 10 | Ulmus 'Morton Glossy' | Triumph Elm | B&B | 3" | |
| ULfr | 32 | Ulmus 'New Horizon' | Frontier Elm | B&B | 2" | |
| | 169 | | | | | |
| | | | MAJOR DECIDUOUS TREES PLANTED IN SOIL CELL | | | |
| GLms | 7 | Gleditsia triacanthos 'Christie' | Halka Honey Locust | B&B | 2-1/2" | MULTI STEM, 3 |
| GLst | 17 | Gleditsia triacanthos 'Christie' | Halka Honey Locust | B&B | 2-1/2" | STANDARD, BRANCHED TO 8' |
| | 24 | | | | | |
| | | | MINOR BROAD LEAF DECIDUOUS TREE | | | |
| AMab | 20 | Amelanchier × grandiflora 'Autumn Brilliance' | Apple Serviceberry | B&B | 6' | |
| CEca | 20 | Cercis canadensis | Eastern Redbud, species | B&B | 10' | MULTI STEM |
| COma | 6 | Cornus mas 'JFS PN4Legacy' | Saffron Sentinel Cornelian Cherry | B&B | 10' | |
| HAvi | 25 | Hamamelis virginiana 'Harvest Moon' | Harvest Moon Witch-hazel | B&B | 10' | MULTI STEM |
| MAsg | 3 | Malus sargentii 'Sargent' | Sargent Crabapple | B&B | 6' | |
| MAdy | 3 | Malus sp. 'Donald Wyman' | Donald Wyman Crabapple | B&B | 8' | |
| MAwe | 3 | Malus sp. 'Manbeck Weeper' (syn. Anne E) | Anne E Crabapple | B&B | 8' | |
| MAgo | 4 | Malus sp. 'Schmidtcutleaf' | Golden Raindrops Crabapple | B&B | 6' | |
| MAst | 4 | Malus sp. 'Sugar Tyme' | Sugar Tyme Crabapple | B&B | 8' | |
| MAzu | 6 | Malus x zumi var. calocarpa | Zumi Crabapple | B&B | 8' | |
| MGbu | 3 | Magnolia x 'Butterflies' | Butterflies Magnolia | B&B | 8' | |
| MGel | 5 | Magnolia x 'Elizabeth' | Elizabeth Magnolia | B&B | 6' | |
| MGme | 11 | Magnolia × loebneri 'Merrill' | Loebner Magnolia | B&B | 8' | |
| | 113 | | | | | |
| | | | MAJOR CONIFEROUS TREE | | | |
| GMlg | 15 | Glyptostroboides metasequoia | Dawn Redwood | B&B | 10' .. 12' | |
| GMsm | 21 | Glyptostroboides metasequoia | Dawn Redwood | B&B | 6' .. 7' | |
| THlg | 16 | Thuja plicata | Green Giant Western Redcedar | B&B | 10' .. 12' | |
| THsm | 11 | Thuja plicata | Green Giant Western Redcedar | B&B | 6' .. 7' | |
| PIfa | 17 | Pinus strobus 'Fastigiata' | Columnar White Pine | B&B | | |
| PIvp | 12 | Pinus flexilis 'Vanderwolf's Pyramid' | Vanderwolf's Pyramid' Limber Pine | B&B | | |
| | 92 | | | | | |

## Open Space and Recreation (page 149)

*Information about site recreation*

The new artificial turf field will be a higher-quality and more reliable option for students than the current lawn space. This will expand the proposed field's availability for recreation. In addition, the detailed site design in the quads will include outdoor ping-pong, hammock groves, gathering spaces and open lawns for play. Other recreation opportunities available on North Campus are described on page 149.

## Energy (pages 169-211)

*This information is provided in response to public statements on the subject of energy use and impacts made via letters addressed to Town of Ithaca Planning Board representatives just prior to the September 4, 2018 Planning Board meeting and to public comments provided at that September 4 meeting.*

Many of the comments have elevated the discussion of energy use far beyond the intent or norm of the SEQR review process. Public statements include the following:

- A claim that greenhouse gas (GHG) emissions estimates were not correctly assessed per the SEQR standard, since they did not include "upstream methane leakage".
- A claim that the GHG assessment was inaccurate (i.e., that the numbers were not credible)
- A claim that more information or expertise is needed to correctly assess the environmental impact due to energy
- A claim that Cornell is insisting on "rapid-fire environmental review".

### Claim #1: GHG emissions are required to include "upstream methane leakage"

There were several statements that stated or implied that the energy impacts assessment should be considered inadequate under SEQRA because it did not include "upstream methane leakage" in its computation of GHG emissions. This claim is false.

Cornell agrees that upstream methane leakage is a problem in the gas industry that contributes to climate change. Indeed, upstream leakage is a well-recognized element of the carbon footprint of the energy company, which has the ability to control and manage that impact. However, our independent energy consultant, Taitem Engineers, did not err in assessing the total emissions impact by excluding upstream impacts. Specifically, Taitem followed both the intent and the specific instructions of the NY State Department of Environmental Conservation (NYSDEC) "SEQR Handbook"[1] as well as the more detailed NYSDEC policy document "Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements"[2] in documenting their assessment.

In following established rules and protocols, Taitem allows a fair and standardized assessment of this project against any others that may be before the Board(s). Including additional impacts from upstream emissions on this project, or from any other similar source (whether drill rig energy for wells in Pennsylvania

[1] http://www.dec.ny.gov/docs/permits_ej_operations_pdf/seqrhandbook.pdf

[2] https://www.dec.ny.gov/docs/administration_pdf/eisghgpolicy.pdf

or embedded energy for the manufacture of solar panels) while other projects follow existing rules which do not include such upstream impacts would likely confuse anyone trying to make comparison.

Perhaps just as importantly, including upstream impacts, while it may highlight an important aspect of natural gas usage more generally in the State, would not materially impact our assessment of alternatives. As clearly noted in the Taitem assessment, the alternatives for providing heat and chilled water to the campus would result in larger regional GHG emissions – all essentially related to gas usage either on campus or as part of statewide electrical generation. These differences are proportionally amplified if upstream emissions are added.

Members of the public noted that Cornell has performed its own internal and voluntary assessment of the degree to which upstream methane emissions, if uncontained, could affect the overall campus's environmental footprint. That assessment was performed at the behest of members of Cornell faculty and was not related to the NCRE project. The study lacked a framework of well-established protocols, because consensus protocols do not exist for quantifying upstream methane. Rather, it represents Cornell's honest attempt to understand impacts and focus University actions in regards to climate change mitigation. It also highlights Cornell's attempt to explain the complex impacts of increased regional natural gas use.

Finally, the State recently (May 2017) released new guidance on upstream methane emissions[3]. This document provides a strong, holistic approach by the State to reduce methane emissions from landfills, agriculture and gas infrastructure. However, it does not recommend or require any changes to SEQR in terms of assessing those impacts or linking them directly to sites that use natural gas as fuel.

In summary, our SEQR submittal contains a complete and appropriate GHG assessment performed by a third party using the methodology and assumptions specified under State law and policy. Including upstream emissions would set a new precedent and would not alter the results of the analysis in regards to energy supply options.

### Claim #2: Greenhouse gas (GHG) assessments in the report are inaccurate (i.e., the numbers were not credible)

Several unsubstantiated claims were made regarding the GHG assessment. Many of these comments overlapped with the assessment that upstream emissions were not included. However, some members also reacted to a statement by Steve Beyers, representing Cornell, that "there are a lot of ways to calculate this".

Mr. Beyers' statement acknowledges the imperfect nature of modeling, estimating emissions, and comparing options. This imperfection is anticipated by the NYS DEC guidance document on greenhouse gas emissions previously referenced, which states:

> *"The Department recognizes that accurate estimates of energy use and resulting GHG emissions may be complicated by the limitations of energy modeling tools, the variety of project-specific and site-specific characteristics, and the preliminary nature of project design at the point when an EIS is filed. Even within these limitations, an EIS must include consideration of potentially significant environmental impacts. Furthermore, as long as the*

[3] https://www.governor.ny.gov/news/governor-cuomo-releases-plan-cut-methane-emissions

*relative levels of energy use and GHG emissions are compared with respect to project alternatives, and the outcome of the comparison is used in the decision-making process, an important goal will have been achieved even if the quantification of total annual GHG emissions is not precise."*

For Cornell's specific case, the "complicated" pieces include the following:

- Assuming heat pump efficiencies is inexact. Heat pump efficiencies change with temperature on a near-continual basis for air-source heat pumps and seasonably with ground source heat pumps. Reliable estimates for seasonal efficiency are a well-recognized complication in the energy analysis community.
- Calculating the exact efficiency of Lake Source Cooling. Although we measure energy use and building usage precisely, values do slightly change year-to-year, as documented in our Energy Fast Facts.
- Calculating exact central plant efficiencies. We use comprehensive data to make precise calculations, but every year the mix of electric and heat usage is slightly different, so we rely on the last year of data with the understanding that subsequent years will be similar but not precisely the same value.
- Estimating the exact carbon emission for grid electricity (both for import and for export). Carbon emission factors change sub-hourly as different energy generation units are added and removed from service to balance the demand in the regional electric grid. The overall average value changes each year.
- Some estimate the impact of electric use using "average grid emissions". Cornell appropriately used "marginal grid emissions" since this more accurately estimates the impact of project options. The US EPA's eGrid database provides estimates of marginal grid emissions for our region based on actual electric grid operations. Those estimates were used to assess the impact of each option studied.

These nuances, and others that are even more subtle, require resolution and careful documentation to provide a credible estimate.

To ensure that Taitem had the best available information to make their assessment, Cornell shared their raw data for plant inputs and outputs (gas use, electrical production, heat use, system losses, chilled water delivered, etc.) and the project design engineers provided modeling results for their building in cooperation with Taitem engineers. Taitem then used their own expertise and understanding to estimate heat pump efficiencies and operation for a comparison to estimate total emissions. In the end, their report is technically thorough and well-documented.

Although not part of the formal application, Cornell did complete their own internal calculations to weigh the options for energy systems. At least one member of Planning Board requested that we share Cornell's results. Cornell's internal calculations are included below.

Cornell Internal Calculations (not by Taitem)

| Heat & Cooling Supply Option | Equivalent Source Gas (mmBtu annually) | Equivalent Emissions (MT CO2e, annual) | Notes |
|---|---|---|---|
| Project Proposal: Cornell CHP & LSC | 40,200 | 2,100 | 1,2,3,4,5 |
| Boiler and Chiller with Grid Gas and Electric | 49,500 | 2,600 | 1,2,3,4,5 |
| GSHP with grid electric | 46,700 | 2,500 | 1,2,3,5 |
| ASHP with grid electric | 49,300 | 2,600 | 1,2,3,5 |
| GSHP w/CHP elect (no heat use) | 56,400 | 3,000 | 1,2,3,4,5 |
| ASHP w/CHP elect (no heat use) | 59,500 | 3,200 | 1,2,3,4,5 |
| GSHP for heat, LSC for cooling, Grid Elect | 43,500 | 2,300 | 1,2,3,5 |
| GSHP for heat, LSC for cooling, CHP elect | 50,100 | 2,700 | 1,2,3,4,5 |

*Notes:*

*1. Abbreviations: CHP = Central Heating Plant; LSC = Lake Source Cooling: mmBtu = Millions of British Thermal Units; MT = metric tons (1000 kg); CO2e – carbon dioxide equivalent; GSHP = Ground Source Heat Pumps; ASHP = Air Source Heat Pumps*

*2. All numbers rounded to nearest 100*

*3. Source gas impacts for grid estimated using nonbaseline (marginal) emissions with eGrid (UpNY) value of 1022 lb/MMBTU CO2e and accounting for eGrid estimated 4.5% transmission losses from source to site*

*4. Cornell plant estimates use plant output versus building metered use data to calculate distribution and transmission losses; losses are included in results*

*5. Based on 53.07 kg CO2e/MMBtu per EIA (https://www.eia.gov/environment/emissions/co2_vol_mass.php)*

As the table above shows, Cornell considered a host of options for providing energy to the new facilities. The option that resulted in the lowest source energy use and associated emissions (based on gas as the source) is the option confirmed by the Taitem study and chosen for the proposed NCRE project, namely, the connection to the district energy system anchored by Lake Source Cooling and the Combined Heat and Power Plant.

The materials provided to date clearly meet DEC SEQRA expectations, direction, and goals. The assessment is comprehensive and includes a rigorous and appropriate review of alternatives. While Cornell's independent calculations result in slightly different numeric values, Cornell stands behind the Taitem analysis as reasonable and credible within the context of reviewing this project. More importantly, **both analyses result in the same conclusion: that the project as presented (connected to Cornell's infrastructure) represents the lowest overall energy and associated climate impact of the connection options, including heat pumps.**

Claim #3: More information or expertise is needed to assess the environmental impact due to energy

The information provided as an attachment to the SEQR forms is beyond the norm or requirement of assessment for this type of project. Furthermore, any suggestion that the information is not transparent is misplaced. All of the analysis is clearly stated in the Taitem document, including extensive assumptions and footnotes to clarify parts of the analysis. The effort already undertaken exceeds the reasonable expectation for SEQR review of a residential project that is a model of energy efficiency and requires no significant community infrastructure (pipelines, boilers, new generation equipment, etc.). The project is responsive to the community (including the Cornell community) desire for safe and healthy residences that do not create excessive energy impacts. Extensive energy-related information has been provided to support the environmental review.

Claim #4: Cornell is insisting on "rapid-fire environmental review"

In various public meetings, the Cornell team has provided a list of proposed future public meetings. We believe this information is helpful to the community to understand the sequence and pathway of meetings that are part of the SEQR and Site Plan Approval process. Cornell is not dictating any actions or schedules related to the Board actions, although certain sequences and timing requirements are part of SEQR law.

Overall Energy Impacts

Reiterating the main points contained in our application package and restated in additional materials already submitted, the following summarizes the energy impacts of the NCRE project:

- The project will require no new gas infrastructure for building heat, hot water, power, or cooling

- Modeled energy use is ~30% better than the latest State Energy Code standards. As a result of this exceptional energy performance, these buildings will require the equivalent of only about 1.4% of today's total campus district energy (in the form of chilled water, hot water, and electricity) despite representing over 4% of Cornell's utility-connected campus in terms of net square feet of building space. With continued campus-wide energy conservation and good energy stewardship supported by full-time staff, Cornell forecasts a continuation of their decades-long trend: overall reduction in total campus energy use by the time this project is completed and operating.

- NCRE will connect to Cornell's unique district energy systems (underground electric, chilled water, and steam/hot water piping systems that serve most of the Ithaca campus). These systems are anchored by Lake Source Cooling and Cornell's Combined Heat and Power Plant. Using Cornell's district systems further reduces the impact on the environment, as further documented in this letter.

- NCRE facilities are designed for low-temperature hydronic heat and tied into district heating and cooling systems. The facilities will be connected to current Cornell renewable energy systems (hydropower, free lake cooling, and on-campus solar facilities) and can accommodate future renewable or low-carbon energy opportunities like Earth Source Heat, waste heat, biomass, solar thermal, renewable electric, or heat pump technologies. The low-temperature design and hot-water conversion at the district level are new campus standards and represent investments in a lower-carbon future.

In summary, the incremental energy impact of energy for this project is, by design and campus-wide planning, mitigated. The common-sense conclusion is that these facilities reduce energy impacts (compared in other housing options in the County), rather than represent significant new energy impacts.