

# Queens College StRIPES Initiative

## Stormwater Reduction Integrated with a Photovoltaic Energy System

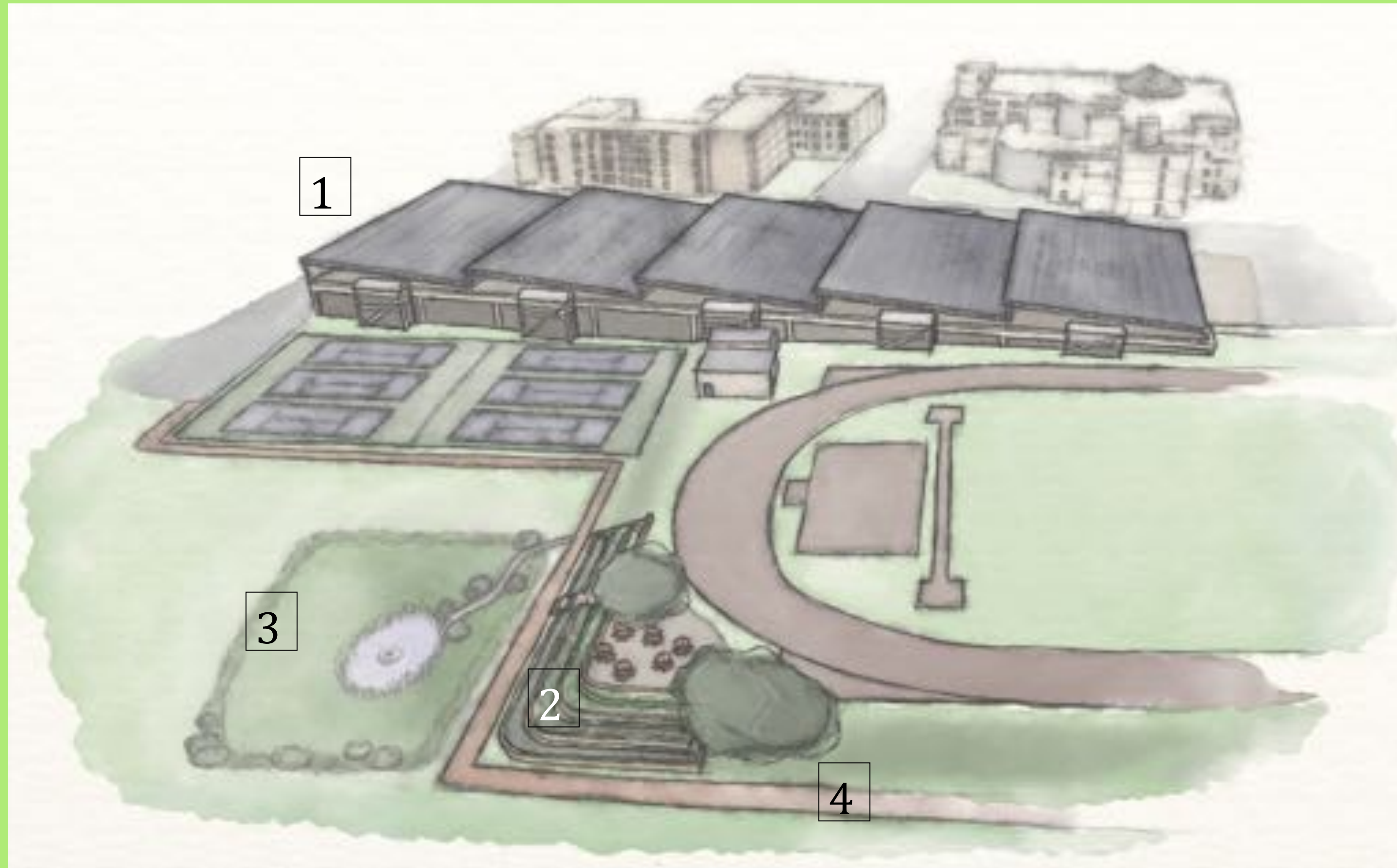


Fig. 1. Future Site Plan. Stormwater Reduction Integrated with a Photovoltaic Energy System (StRIPES): (1) PV cover over the parking garage from which runoff water is harvested. The PV system will provide power for pumping irrigation water; (2) vegetated terraces and patio are infiltration areas for runoff water; (3) retention and infiltration area capable of holding runoff from a 10-year rain event; and (4) permeable walkway.

### Project Objectives

- Construction of a photovoltaic (PV) canopy with collection of runoff water, redirecting it into a groundwater recharge/infiltration area.
- The PV system increase Public Safety of the area and provides the campus and Fitzgerald Gym (an evacuation center) with power backup from renewable solar energy
- Benefits included reduced stormwater runoff and the terraces overlooking the retention pond will create an outdoor educational study area for students
- A new permiable path providing 5,400ft<sup>2</sup> of infiltration area and reducing walking distance across campus by half a mile



Fig. 2 Current Site Plan: Aerial View from West Side of Campus

### Campus Precipitation

- QC receives average monthly precipitation of 4.37 inches per ft<sup>2</sup>.

#### Campus flooding

- Large portion of campus consists of impermeable surfaces
- Street drains back up during heavy rain near the garage, causing flooding. Much of that runoff comes from the garage deck

#### Combined sewer overflows (CSOs)

- Queens College has a combined sewer system
- CSOs discharge mixture of untreated sewage and stormwater runoff into regional water bodies
- Queens College is within a Tier 1 CSO outfall area
- NYC Green Infrastructure Plan calls for 40% reduction in city-wide CSO volume

### Parking Lot Concerns

#### Snowfall Issues:

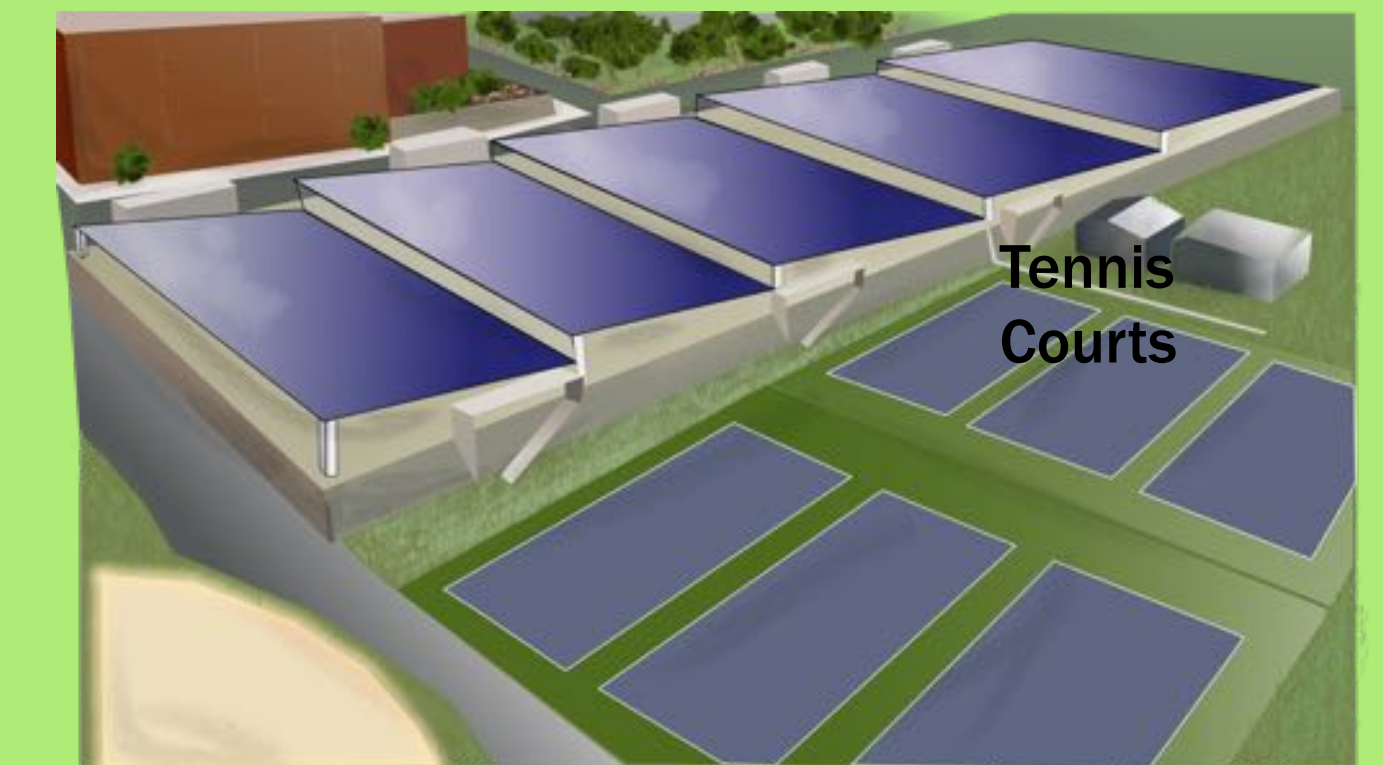
- Parking Deck live-load limit: 30psf
- Weight of snowfall plowing exceeds live-load limit, leads to Public Safety and Facilities Concerns
- 40% of parking spaces on parking deck 14 closed 7-12 days out of year due to snowfall



Fig. 3 Stalactite formation underneath parking deck caused by lime weeping; The PV canopy will greatly reduce water on the parking deck and eliminate need for salt.

### StRIPES Design:

- Water harvested off of a solar canopy system spanning 97,100ft<sup>2</sup>
- PV units produce 1.4 MWh/yr
- Gutters along the lower, long edge collect runoff
- Runoff ducted to infiltration site



### PV Canopy on Parking Deck

#### Solar Canopy will:

- Prevent snowfall directly on Deck
- Eliminate need for road salts
- Provide backup power for evacuation shelter
- Maintenance of the PV subsystem is estimated at 2.5% of project costs.

#### Collection system will:

- Redirect 8,008 ft<sup>3</sup> of runoff water for every inch of rain
- Capture approximately 3.75 million gallons of runoff on average per year
- During 10-year storm event will accrue 342,000 gal./24hr
- During 100-year storm event, will accrue 484,000 gal/24hr



Fig. 4 Gallons (x 1000) of Runoff accrued from PV canopy in 24 hr for storms recurring at various intervals.