Town+Gown Request for Proposals

I. General Items

A. Invitation to Submit Proposals in Response. The NYC Department of Environmental Protection (DEP), with the Mayor's Office of Recovery and Resiliency (ORR), invites the Consultants under the Town+Gown Master Academic Consortium Contract (the Master Contract), to submit Proposals in Response for the Citywide Stormwater Resiliency Study, pursuant to the terms and provisions of the Master Contract and this Town+Gown Request for Proposals (T+G RFP), see Attachment 1.

B. Due Date for Receipt of Proposals in Response.
Consultants shall submit their Proposals in Response ONLY via email, no later than 5 P.M., February 8, 2018, to Joseph Vaicels, Deputy Agency Chief Contracting Officer at DEP, at JVaicels@dep.nyc.gov. **Please note that there is a 5 MB file size limit**. If a Consultant chooses not to submit a Proposal in Response, such Consultant shall submit a No Bid Response form, which is attached to this document as Attachment 5 for the purpose of convenience), no later than 5 P.M., February 8, 2018, to Joseph Vaicels, Deputy Agency Chief Contracting Officer at DEP, at JVaicels@dep.nyc.gov.

C. Inquiries and Requests from Consultants for Clarification or Explanation. If a Consultant wishes to make an inquiry or request a clarification or explanation with respect to this T+G RFP, such Consultant must make such inquiry or request in writing sent via email ONLY to Joseph Vaicels, Deputy Agency Chief Contracting Officer at DEP, at JVaicels@dep.nyc.gov, no later than 5 P.M., January 26, 2018. In the event DEP, in consultation with ORR, determines that it is necessary to respond to such inquiry or request in writing, such response will be furnished as an addendum to this T+G RFP and will be sent to all Consultants as described below. If deemed necessary, a meeting or conference call with all interested parties prior to the submission date may be arranged to address questions or concerns.

D. Addenda to Town+Gown RFP. If DEP determines that it is necessary to respond to an inquiry or request for clarification or explanation from a single or several Consultants in writing, such writing will be in the form of an addendum to the Town+Gown RFP issued, which will become part of the requirements for such Town+Gown RFP, and sent to all Consultants to which the Town+Gown RFP was issued. In addition, it will be necessary for such Consultants to acknowledge receipt of an addendum to a Town+Gown RFP by attaching an original signed copy of the addendum to its Proposal in Response.

E. The Name and Contact Information of the City Agency Procurement Process Contact. All Proposals in Response, Inquiries or Requests for Clarification or Explanation, and receipts of any Addenda, shall be sent ONLY to via email:

Joseph Vaicels
Deputy Agency Chief Contracting Officer, New York City Department of Environmental Protection
JVaicels@dep.nyc.gov

II. Scope of Work

A. General Research Project Description.

Rainfall poses a set of interwoven challenges to New York City that require coordinated solutions, and the City of New York is working to improve water quality and address urban flooding. Improving water quality benefits communities, protects ecosystems, and reduces EPA penalties; control of urban flooding increases safety and limits damage to public and private property, and must be integrated with preparation for coastal surge events like Hurricane Sandy. Integrated stormwater management can address both concerns simultaneously. Significant work in this area is underway, but a better understanding of the Hydraulic and Hydrologic (H&H) systems is needed to coordinate and strengthen initiatives, across agencies, between the public and private sectors, and between resiliency and sustainability initiatives. A combined H&H model will support integrated stormwater management planning city wide.

DEP and ORR are also addressing how existing hazards may be aggravated by climate change, including increases in the intensity of extreme precipitation, coastal flooding, and sea level rise. Hurricane Sandy demonstrated the vulnerability of the city to coastal flooding, and further study is required to understand how coastal flooding will interact with and potentially be worsened by urban flooding from rainfall. Also, drainage is projected to worsen in low-lying coastal areas as sea level rise increasingly blocks outfalls in tidal cycles and during surge events. Sea level rise maps have been developed by NYC Department of City Planning showing tidal inundation during mean high-high water events for the 2020s, 2050s, 2080s, and 2100. Many of these areas have been prioritized for coastal protection projects or drainage improvements, but even with implementation of these projects the inland areas will experience flooding through outfalls and inability to drain during high tides. Similarly, inland areas may experience more urban flooding increasing damage to public and private property.

The goals of the study are to develop a full, citywide H&H model that can be used to identify priority at-risk areas in the city. The model will be used to test multiple rainfall scenarios, including extreme and moderate events, with varied spatial distribution, intensity, frequency, and durations. The model will also be used to investigate the impact of changing climate conditions on flood conditions and stormwater management practices, based on climate projections from the New York City Panel on Climate Change (NPCC). These impacts include changes in sea level, groundwater, storm frequency and intensity, and the intensity, duration, and frequency and duration of precipitation events. The study will also look at flooding from coincident surge and precipitation, and investigate geographically-specific stormwater conditions where flooding may be influenced by sea level rise, tidal inundation, and/or elevated groundwater. Results from these analyses will be used to inform the City's current and future stormwater management practices and prioritize interventions.

TASKS

1: Project Management and Workshop Facilitation

The Consultant shall perform project management work throughout the entire period of the H+H modeling study. The Consultant shall coordinate with and provide assistance to DEP and ORR in whatever actions are necessary to advance the overall work and its individual tasks. The Consultant shall also prepare a project management plan and schedule that includes progress meetings/calls, preparation of associated monthly progress reports, and the facilitation of internal meetings.

The Consultant shall develop materials for a minimum of three (3) agency workshops to present initial results and solicit additional ideas and feedback to be reflected in the final report. The Consultant shall also prepare meeting agendas, materials, presentations and summaries for monthly status calls or meetings.

Deliverables: project workplan and schedule 2 weeks after NTP; project and meeting reporting documentation as described above.

2: Develop Hydrologic and Hydraulic Model

2a: **Collect H&H Model Inputs**. Collect and clean relevant datasets as available, including but not limited to:

- Topography using high-resolution LIDAR data (existing 2010 data set, and review ground- and air-captured LIDAR datasets in development for NYC and determine if preliminary outputs can inform the H&H model) (NYC Open Data)
- Map of existing water bodies (various sources)
- Existing DEP Sewer System InfoWorks Models to use as a baseline (DEP)
- Existing and planned sewer network, including locations of CSOs, other outfalls, tide gates, where available (DEP)
- Pump stations and wastewater treatment plants locations and capacity (DEP)
- Land use, building footprints, and impervious cover (NYC Open Data)
- Groundwater levels (various sources)
- Gauge Adjusted Radar Rainfall (NOAA)
- Flow metering data (DEP)
- DEP BWSO GIS sewer network (DEP)
- CSO/MS4 models and maps (DEP)
- Tidal impacts to the combined storm sewer system, including assessment of potential sources of tidal flooding with sea level rise (NYC Open Data and DEP)
- Tide prediction algorithm results (DEP)
- NYC capital project plan (including resiliency projects[1]) (ORR)
- Current and future SLR-adjusted coastal flood maps and SLR-adjusted tidal maps (ORR and Department of City Planning (DCP))[2]
- Climate projections (NPCC)[3]

Relevant City Agencies shall provide all data, pursuant to the confidentiality terms described in section II.C, as available. Additional data collection may be required in priority areas (see Task 5 below), particularly to determine characteristics of smaller sewer networks, groundwater levels, flow metering, and tidal impacts to the storm sewers only where necessary and schedule allows. Other inputs identified by the Consultant as necessary may also have to be developed.

2b: **Review Existing Reports, Models, and other Resources**. Review existing coastal protection projects (responses to Hurricane Sandy), stormwater studies, stormwater maps, and H&H models to identify potential further data inputs and establish opportunities for vetting modeled results. These include but not limited to:

- Hurricane Harvey flood analyses in NYC (DEP)
- Gowanus flood analysis (DEP)
- Red Hook IFPS analysis (DEP)
- East Side Coastal Resiliency drainage analysis (DEP)
- Lower Manhattan Coastal Resiliency drainage analysis (DEP)
- Cloudburst Resiliency Planning Study (DEP)

[1] NYC's resiliency projects are mapped at: https://maps.nyc.gov/resiliency/

[2] DCP's Flood Hazard Mapper is available at: http://dcp.maps.arcgis.com/apps/webappviewer/index.html?id=1c37d271fba14163bbb520517153d6d5

[3] The most recent NPCC projections are available at: http://onlinelibrary.wiley.com/doi/10.1111/nyas.2015.1336.issue-1/issuetoc

- Maps of historic waterways (ORR)
- 311 flooding complaints (NYC Emergency Management (NYCEM))
- NYC Flash Flood Emergency Plan – Reoccurring Flood Locations (NYCEM)
- Other maps that indicate flood risk

2c: **Build Comprehensive H&H Model of New York City** using models and data collected, the Consultant will develop 2-Dimensional H&H Models (InfoWorks ICM, MIKE DHI, or other approved 2-D H&H Models). These 2-D H&H models will include topographical information from the LIDAR to appropriately route runoff to appropriate sewer nodes and any surcharging to adjacent low-lying areas. While there is no expectation that sewer models be built out down to the level of street-level pipes on a citywide basis, certain sub-catchment areas that may be prone to flooding, such as those described in 5, may need to include smaller sewers (18" or larger). For these areas, the catchment delineation and hydraulic/hydrodynamic will also need to be refined to coincide with refined sewer grid.

2d: **Test and Validate H&H Model.** Through sensitivity analysis, the Consultant shall quantify and report on the uncertainty of results. One key parameter that may need to be adjusted is the runoff coefficients; the current model was calibrated based on smaller storm events in which the pervious surface can capture a portion of the runoff. However, for these extreme events, the pervious surfaces will likely be saturated and more runoff will be conveyed from the surface into the sewer system or adjacent low-lying areas.

> ***Deliverables:*** Citywide H&H model. Workshop with City Agency stakeholders demonstrating the functionality, validation, and limitations of the model. Consistent with the Master Contract and Appendix A, as discussed below in sub section 6, upon completion of the project, the H&H model and any associated data collected in its development should be transferred back to the City. Through sensitivity analysis, the Consultant shall quantify and report on the uncertainty of results.

3: Conduct Model Runs Based on Current and Future Scenarios

3a: **Establish 20 Scenarios for Model Runs**. In consultation with DEP and ORR, the Consultant will develop a minimum of twenty (20) scenarios that account for both current and future climate conditions. The scenarios will demonstrate varied conditions for rainfall intensity (based on historic, hypothetical, and climate-projected events); rainfall duration (based on historic, hypothetical, and climate-projected events); sea level rise (based on different scenarios utilizing NPCC data); occurrence of coincident flooding (from rainfall and surge or tidal inundation); a moderate event (1"/hour or 2"+ total); and spatially distributed rainfall (at a catchment or sub-catchment level). Changes in groundwater levels due to sea level rise must also be addressed and accounted for. The characteristics of the 20 scenarios will be selected and refined in consultation with the City.

3b: **Run 20 Scenarios**. The Consultant will run the citywide H&H model based on input from the 20 scenarios defined in Task 3a.

3c: **Prepare Maps and Outputs.** The Consultant shall prepare outputs from the model runs that effectively demonstrate how scenarios vary and how risk is distributed across the city. Through sensitivity analysis, the Consultant shall quantify and report on the uncertainty of results.

> ***Deliverables:***
> - Flood depth maps: high resolution maps for each scenario with hourly time-steps (PDF and GIS layers, and either animated GIF or video files) as well as graphs showing time and duration of flooding and drainage.

- Ensemble maps and statistics: high resolution maps and analysis that assess citywide or borough-wide flood risk across different scenarios. These outputs will be used for spatial prioritization or planning, including maps that show difference in current flood risk and future flood risk; a map combining multiple existing scenarios; a map combining multiple future scenarios; a map of the city with frequent high flood depths across scenarios; areas at risk for high velocity overland flow; areas likely to require dewatering; quantification of evolving risk from sea level rise in terms of sewer backups, tidal inundation, coincident flooding, etc.
- Workshop with City Agency stakeholders demonstrating the results, validation, and limitations of the scenarios.

4: Assessment of Stormwater Interventions Citywide

4a: **Identify Stormwater Interventions**. In consultation with DEP and ORR, the Consultant shall identify interventions and assess their service levels, costs, co-benefits, and other relevant factors and use that information to reduce the modeled impacts to meet an appropriate level of drainage service and flood mitigation. Interventions shall include, but are not limited to:

- Tide gates on outfalls
- Cloudburst management best practices
- Green infrastructure (e.g. bioswales)
- Retention tanks and tunnels
- Bluebelt best management practices
- Re-routing overland flow through streets/pipes
- Daylighting water bodies
- Pumping
- Site stormwater retention
- Land use policies (e.g. standards for new construction, stormwater retrofits)
- Regrading
- High-level storm sewers
- Parallel conveyance

4b: **Assess Impact of Citywide Stormwater Interventions.** The effectiveness of interventions will vary according to location and climate scenario. The Consultant shall determine how, when, and where, on a watershed basis, the strategies in 4a might have greatest benefits. The Consultant shall assess the impact of interventions on H&H across the city at a high-level by rerunning five (5) scenarios identified as most problematic with different sets of stormwater interventions embedded to determine most effective mitigation strategies, benefits, and costs. Attention shall be given to how changing groundwater levels may impact the effectiveness of green infrastructure. This exercise shall focus on identifying and proposing high-level mitigation strategies for the worst cases and determine how infrastructure and operational costs to the City change over time based on climate scenarios.

4c: **Prepare Maps and Outputs.** The Consultant shall prepare outputs from the model runs that effectively demonstrate how scenarios vary and how risk is distributed across the city given stormwater interventions . Through sensitivity analysis, the Consultant shall quantify and report on the uncertainty of results.

Deliverables:

- Flood depth maps: high resolution maps for each scenario with hourly time-steps (PDF and GIS layers, and either animated GIF or video files) as well as graphs showing time and duration of flooding as well as location of interventions.

- Ensemble maps and statistics: high resolution maps and analysis that assess citywide or borough-wide flood risk across different scenarios. These outputs will be used for spatial prioritization or planning, including maps that show the differences in current flood risk and future flood risk, and the impact of stormwater interventions ; a map combining multiple existing scenarios; a map combining multiple future scenarios; a map of the city with frequent high flood depths across scenarios; areas at risk for high velocity overland flow; areas likely to require dewatering; quantification of evolving risk from sea level rise in terms of sewer backups, tidal inundation, coincident flooding, etc..
- Workshop with City Agency stakeholders demonstrating the results, validation, and limitations of the scenarios.

5: **Assess Impact of Neighborhood Stormwater Interventions.** Building off the citywide assessment in Task 4, the Consultant shall assess the impact of interventions on H&H at a detailed level in five (5) neighborhoods with varying characteristics, including presence of MS4 or combined sewers, population density, dense infrastructure, existing landscape, data availability, etc. The goal of Task 5 is to make neighborhood-level recommendations for investments in integrated stormwater management, to collect and include local data as needed and identify where more data is required, and to conduct cost-benefit analyses of recommended interventions. Some of these recommendations shall be presented in the context of time thresholds as climate conditions change. The neighborhoods shall be proposed by the Consultant based on results from Task 2, 3, and 4, and in consultation with DEP, ORR, and the New York City Department of City Planning, but there shall be one in each borough in tidally influenced areas also at risk of precipitation-based flooding. An additional goal of Task 5 is to derive a methodology from these five pilots for similar analyses in other neighborhoods and sewer sheds.

Deliverables:

- Report with maps and hydrographs demonstrating the benefits of proposed stormwater interventions for each of the neighborhoods in Task 5.
- Methodology for conducting stormwater intervention analysis using the H&H model.

6: Final Report

The Consultant shall use all results from previous tasks to prepare a summary report of findings, lessons learned, limitations of the results, and next steps. The report shall also recommend changes to DEP standard operating procedures. The report shall also provide a methodology, based on Task 5, for conducting neighborhood-level modeling analyses, using the model created in this project to identify and justify (through cost-benefit analysis) siting and capacity of stormwater interventions. The final report shall provide a consolidation and set of “best practices” from the Consultants efforts and past efforts by the City. To this end, the Consultant shall synthesize results from this project and from the analysis of other projects in Task 2b to determine best practices and identify how those studies and analyses can be applied effectively in future studies.

Deliverables:

- The Consultant shall submit the report, or segments of the report, as completed, to DEP, ORR, and relevant agencies, as directed by DEP and ORR, for periodic review and comment. All comments shall be resolved and incorporated into the final report.
- The H&H model and all outputs shall be provided to DEP and ORR in electronic formats, with 3 hard copies each for DEP and ORR, pursuant to the confidentiality terms described in section II.C.
- All work must be completed by November 30, 2018.

B. Research Project Objectives.

- Model and map hydraulic and hydrologic (H&H) flow citywide.
- Assess impact of projected sea level rise and precipitation on drainage and urban flooding citywide.
- Assess impact and benefits of stormwater management interventions and identify necessary investments to provide an adequate level of service.

C. Data Sets Confidentiality

DEP has determined that the following data sets, referenced above in section II.2(a) ("Confidential Data"), are sensitive and that disclosure could endanger life or safety:

- Existing DEP Sewer System InfoWorks Models (DEP)
- Existing and planned sewer network, including locations of CSOs, other outfalls, tide gates, where available (DEP)
- Pump stations and wastewater treatment plants locations and capacity (DEP)
- Flow metering data (DEP)
- DEP BWSO GIS sewer network (DEP)
- CSO/MS4 models and maps (DEP)
- Tide prediction algorithm results (DEP)

The Consultant shall indicate in its Proposal in Response how it will keep the Confidential Data contributing to and contained within the H+H model and all output deliverables from being released to the public. In addition, the Consultant shall indicate how it shall protect such Confidential Data in any published work pursuant to the provisions of Section 6.01 of Appendix A to the Master Contract and Section C (12)(f) of the Uniform Federal Contract Provisions Rider for Federally Funded Procurement Contract, attached here to as Attachment 2 . DEP reserves the ability to further negotiate the proposed response with respect to Confidential Data in the final Task Order and may require Confidentiality MOUs prior to granting access to the Confidential Data.

III. Format and Contents of the Proposal in Response

The Proposal in Response must be in a form that conforms to Appendix C to the Master Contract, which template form will be transmitted simultaneously with this T+G RFP for the purpose of convenience. That template form is also available from Town+Gown and is downloadable from the Town+Gown website at http://www1.nyc.gov/site/ddc/about/town-gown-components.page#funded.

The Consultants shall not make changes to the Proposal in Response template form since Appendix C anticipates the accepted Proposal in Response will become the awarded Task Order, which template form is also available from the Town+Gown website. This study is being funded by a CDBG-DR grant. The Proposal in Response must include the CDBG-DR Rider, the Uniform Federal Contract Provisions Rider for Federally Funded Procurement Contracts, and HUD Form 4010 – Federal Labor Standards Provisions. The text of these riders is appended to this T+G RFP. (See Attachments 2, 3, and 4.)

IV. Evaluation Criteria and Evaluation Procedures

A. Criteria. The Proposals in Response will be evaluated on the basis of criteria set forth below:

Criteria	*Weight*	*Explanation*
Experience	30%	Background and experience with respect to the disciplines and issues covered in the Research Project.

Organizational Capability	20%	Organizational capability and the clear definition of roles and duties of the members of the Academic Team, as well as clear lines of communication among them, particularly with regard to interdisciplinary and practitioner input.
Approach and Methodology	30%	Approach to the Research Project and methodologies proposed.
Cost	20%	Cost proposals will be evaluated competitively and are expected to be in the range of $1,000,000 and $1,800,000.

B. Other Considerations. The proposed project team shall bring together expertise in hydraulic engineering, stormwater modeling, green and grey infrastructure, and climate change. It is essential that the team possess specific knowledge of drainage conditions in New York City and have the capacity to perform hydraulic and hydrologic modeling. The proposed project team shall have engineers with experience and practical understanding of the existing NYC drainage systems. It is expected that, depending on the task, the study will be accomplished by modeling hydrologic and hydraulic flow under a variety of precipitation, tidal, and surge conditions including but not limited to past events like Hurricanes Sandy and Irene.

The proposed project team shall adhere to the requirements of the Task Order resulting from this T+G RFP, including the requirements contained in the CDBG-DR Rider (Attachment 2), the Uniform Federal Contract Provisions Rider for Federally Funded Procurement Contracts (Attachment 3), and HUD Form 4010 – Federal Labor Standards Provisions (Attachment 4) (collectively, the "federal requirements").

The Master Contract, under which this T+G RFP has been issued, permits Consultants (as defined in the Master Contract) to join with one or more other Consultants to prepare a Proposal in Response (see Section 3.3 (b)) as well as to utilize Subcontractors (as defined in the Master Contract) as part of a Proposal in Response (see Sections 3.3(b) and 3.3(e)(8)). Please note that Consultants wishing to subcontract with a Subcontractor as part of its Proposal in Response must disclose its intention to use the services of a Subcontractor in its Proposal in Response as provided in Section 3.3 (e) (8) of the Master Contract and Appendix C to the Master Contract. Finally, to the extent a Consultant proposes the use of Subcontractors in its Proposal in Response, as permitted by the Master Contract, all provisions of the federal requirements shall apply to the subcontracts.

C. Basis of Award. DEP will award the project to the responsive and responsible Consultant whose Proposal in Response is determined to be the most advantageous to and in the best interest of the City, taking into consideration all the criteria and considerations which are set forth above in this T+G RFP. Award of the resulting Task Order is subject to successful negotiation of terms of the Task Order as provided in the Master Contract.