



# CITY FOREST CREDITS

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## Tree Planting Protocol

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## List of Attachments and Appendices and Additional Resource

Attachment 1 to this Protocol: Processes for Retirement of ACR or Verra Performance Guarantee Credits with Issuance of City Forest Carbon+ Credits

Appendix A: Project Documentation, Reporting, and Record-keeping for Tree Planting Projects

Appendix B: Quantification Science and Methods for Tree Planting Projects

Appendix C: Verification for Tree Planting Projects

Appendix D: Additionality and Permanence

Additional Resource: McMichael, C., McPherson, M., and Nordman, A., *City Forests – Functions, Scale, and Values of Climate and other Benefits*, City Forest Credits White Paper. April 2019

## Abbreviations and Acronyms

C	Carbon
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
Credit	A unit representing one metric ton of CO <sub>2</sub> e
DBH	Diameter at Breast Height
GHG	Greenhouse gas
ICROA	International Carbon Reduction Offset Alliance
ISO	International Organization for Standardization
PIA	Project Implementation Agreement
PO	Project Operator
Registry	City Forest Credits/Urban Forest Carbon Registry

## Introduction

This City Forest or Urban Forest Carbon Protocol sets forth the requirements for Tree Planting projects in urban areas in the U.S. to quantify carbon dioxide sequestration from woody biomass. That woody biomass is referred to herein by the broader terms “city forests” or “urban forests.”

This protocol provides eligibility rules, methods for quantifying biomass and CO<sub>2</sub> storage, and reporting, monitoring, issuance of credits, reversal, and verification requirements. We have been guided in our drafting by one of the foundational documents for carbon protocols, the World Resources Institute/World Business Council for Sustainable Development Greenhouse Gas Protocol for Project Accounting, which describes greenhouse gas (“GHG”) project accounting principles. We refer to this document as the WRI GHG Protocol.

Our goal in this protocol is to provide for accounting of net GHG reductions in a consistent, transparent, and accurate manner, consistent with the principles and policies set forth in the WRI GHG Protocol document. This process will form the basis for GHG reductions that are real, additional, permanent, verifiable, and enforceable, which can then result in the issuance of city forest carbon offset credits, called City Forest Carbon+ Credits™.

## Contributions of City Forests to Carbon Storage, Energy Savings, Storm Water Reduction, Air Quality, and Climate Mitigation

City forests in the U.S. are estimated to store over 770 million metric tons of CO<sub>2</sub>.<sup>1</sup> The co-benefits of urban forests include air quality improvements, energy savings from reduction of the urban heat island effect in hot weather and reduction of heating costs due to wind mitigation in cold weather, slope stability, bird and wildlife habitat, sound and visual buffering, public health improvements, crime reduction, safety, livability, social cohesiveness, economic improvements, and more.<sup>2</sup> Urban trees clearly influence air temperatures and energy and affect local climate, carbon cycles, and climate change.<sup>3</sup>

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<sup>1</sup> Nowak, D.J. and E.J. Greenfield. 2018. U.S. Urban Forest Statistics, Values, and Projections. *J. For.* 116, 164-177.

<sup>2</sup> See Alliance for Community Trees, Benefits of Urban Forests: a Research List at [http://www.actrees.org/files/Research/benefits\\_of\\_trees.pdf](http://www.actrees.org/files/Research/benefits_of_trees.pdf)

<sup>3</sup> Nowak, 229

Recently updated research has documented the magnitude of the contributions of city forests to climate mitigation. Annually, these trees produce a total of \$18.3 billion in value related to 1) air pollution removal (\$5.4 billion), 2) reduced building energy use (\$5.4 billion), 3) carbon sequestration (\$4.8 billion), and 4) avoided pollutant emissions (\$2.7 billion).<sup>4</sup> See also McMichael, C., McPherson, M., and Nordman, A., *City Forests – Functions, Scale, and Values of Climate and other Benefits*, City Forest Credits White Paper. December 2018.

## Loss of Tree Cover in Urban and Community Areas in the United States

The City Forest Credits White Paper also cites peer-reviewed research published in 2018 showing the significant decline in urban tree cover in the United States. Data for all states in the U.S. show a national loss of urban and community tree cover of 175,000 acres per year during the study years of 2009-2014. Urban and community areas in the U.S. lose an estimated 36,000,000 trees each year.<sup>5</sup>

The total land area of lost urban and community tree cover during the study period of five years amounts to 1,367 square miles – a land area equal to the combined land area of New York City, Atlanta, Philadelphia, Miami, Boston, Cleveland, Pittsburgh, St. Louis, Portland, OR, San Francisco, Seattle, and Boise.

Public funding of urban forests remains minimal.<sup>6</sup> Trees are a maintenance and liability expense for cities, and despite the nature of urban forests as public resources, city trees are not “booked” as an asset on cities’ balance sheets. Financial managers in cities see only the expense. And when those managers weigh the expense of trees that have no asset value against dire needs for human services, utility services, public safety, transit, homelessness, and refugee communities, the trees move to the bottom of the budget.

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<sup>4</sup> Nowak, David J. et al. 2018. U.S. Urban Forest Statistics, Values, and Projections, *Journal of Forestry* 116(2), 164-177

<sup>5</sup> Nowak, D.J. and E.J. Greenfield. 2018. Declining urban and community tree cover in the United States. *Urban For. Urban Green.* 32, 32-55.

<sup>6</sup> McDonald, R., L. Aljabar, C. Aubuchon, H.G. Birnbaum, C. Chandler, B. Toomey, J. Daley, W. Jimenez, E. Trieschman, J. Paque, and M. Zeiper. Funding Trees for Health: An Analysis of Finance and Policy Actions to Enable Tree Planting for Public Health. *Global Solutions White Paper*. The Nature Conservancy, 19 September, 2017. See [https://www.nature.org/content/dam/tnc/nature/en/documents/Trees4Health\\_FINAL.pdf](https://www.nature.org/content/dam/tnc/nature/en/documents/Trees4Health_FINAL.pdf)

The work of this Drafting Group and of City Forest Credits is focused on the United States. But tree canopy loss in urban areas and shortage of public funding are common to cities around the world. These needs are becoming apparent to international organizations and are partly responsible for new initiatives like [Cities4Forests](#) at the World Resources Institute.<sup>7</sup> City Forest Credits has received inquiries from urban forest stakeholders in Uganda, Peru, Australia, the United Kingdom, Belgium, West Africa, Canada, and others, expressing the same concerns of increasing temperatures, rain fall and storm events, loss of trees, and shortage of public funding. These stakeholders ask if carbon protocols could help them to recruit new funding from the sale of credits to support this public resource of city forests.

Adding context to both the value of urban forests around the world and their decline is the recent report from the Intergovernmental Panel on Climate Change.<sup>8</sup> Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate. In the words of the Panel:

*Pathways limiting global warming to 1.5°C with no or limited overshoot would require rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems (high confidence). These systems transitions are unprecedented in terms of scale, but not necessarily in terms of speed, and imply deep emissions reductions in all sectors, a wide portfolio of mitigation options and a significant upscaling of investments in those options.<sup>9</sup>*

One element of mitigation cited by the IPCC is Carbon Dioxide Removal (CDR). City Forests can contribute significantly to CDR, in addition to delivering other climate benefits, as cited above and in the City Forest Credits White Paper.

Also recently released is the National Climate Assessment from the U.S. Global Change Research Program, a program that includes the work of ten governmental

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<sup>7</sup> See WRI's Letter of Support dated September 4, 2018 for request of City Forest Credits to ICROA to review City Forest Credits' protocols.

<sup>8</sup> IPCC, 2018: Summary for Policymakers. In: Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [V. Masson-Delmotte, P. Zhai, H. O. Pörtner, D. Roberts, J. Skea, P. R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, T. Waterfield (eds.)]. World Meteorological Organization, Geneva, Switzerland, 32 pp

<sup>9</sup> Ibid at 17

agencies.<sup>10</sup> The Assessment documents many aspects of climate change and its consequences. It discusses some types of mitigation and adaptation, stating:

*While these adaptation and mitigation measures can help reduce damages in a number of sectors, this assessment shows that more immediate and substantial global greenhouse gas emissions reductions, as well as regional adaptation efforts, would be needed to avoid the most severe consequences in the long term. Mitigation and adaptation actions also present opportunities for additional benefits that are often more immediate and localized, such as improving local air quality and economies through investments in infrastructure.*<sup>11</sup>

The Drafting Group understood that city forests uniquely serve as a bridge connecting the global atmospheric benefit of carbon storage with co-benefits that deliver local resilience and climate mitigation to the large populations in our cities and towns. The Drafting Group was mindful of the strong policy reasons, based on the facts and research cited above and in the White Paper, in favor of developing carbon protocols for this valuable public resource of city forests, a resource that delivers multiple benefits relating directly to climate. The Drafting Group worked diligently to develop a planting protocol that would meet standards of bodies like the International Climate Reduction & Offset Alliance and also be feasible in the real world of urban forestry.

## Prior Efforts at Urban Forest Carbon Protocols

In 2011, the State of California's Air Resources Board (ARB) adopted an urban forest carbon protocol.<sup>12</sup> Despite the efforts of that drafting group, the protocol was acknowledged to contain some flaws and also to be too costly and burdensome to be implemented. It has had no applicants.

In 2013, the State of California awarded a grant to the Climate Action Reserve to develop a more streamlined and feasible urban forest protocol. The Reserve did adopt a planting protocol and a canopy-related management protocol.<sup>13</sup> But those protocols also were complicated and too burdensome to be implemented, a concern expressed

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<sup>10</sup> Jay, A., D.R. Reidmiller, C.W. Avery, D. Barrie, B.J. DeAngelo, A. Dave, M. Dzaugis, M. Kolian, K.L.M. Lewis, K. Reeves, and D. Winner, 2018: Overview. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA. doi: 10.7930/NCA4.2018.CH1

<sup>11</sup> Ibid in Summary of Findings, Actions to Reduce Risks

<sup>12</sup> <https://www.arb.ca.gov/regact/2010/capandtrade10/copurbanforestfin.pdf>

<sup>13</sup> <http://www.climateactionreserve.org/how/protocols/urban-forest/>

by some members of that work group. Those CAR protocols have had no applicants. The State of California ARB did not begin a review process for those CAR protocols for adoption.

Four members of our Drafting Group served on the work group for those urban forest protocols at the Climate Action Reserve in 2013-2014.<sup>14</sup> The lead scientist on our Drafting Group also led the science work for the 2013 CAR protocols and for the 2011 ARB protocol. Our Drafting Group had little desire to develop more protocols that no one would use.

Our Drafting Group was also aware of the perception that city forests lacked the scale of carbon storage to make those projects worth including in carbon crediting. The field of urban forestry in general has not done a good job of educating the larger national and international science and forestry communities on the climate values and the quantifiable ecosystem benefits of urban forests. A significant part of that failure is due to the persistent and pervasive lack of public or private funding for city forests.

But, as noted above and in the City Forest Credits White Paper, stakeholders in urban forestry have a much broader lens than carbon alone. Urban forest scientists and professionals have documented the many climate and other benefits of city forests, even if they have not disseminated that documentation as broadly as it could have been.<sup>15</sup>

Urban forest professionals are also acutely aware that almost 80% of the population worldwide lives in metropolitan areas or in cities and towns, and that urbanization is a significant demographic trend of the 21<sup>st</sup> century.<sup>16</sup> The climate, ecosystem, and social benefits of urban forests flow directly to the people and communities who live in cities and towns.

The City Forest Credits White Paper also describes some of the programs that are beginning under City Forest Credit's existing protocols. A program in Austin, TX has the potential to conduct riparian re-forestation along 900 miles of rivers and stream, almost 10,000 acres. An urban forest preservation program in King County (metropolitan Seattle) could generate credits on 1,500 acres of enormously valuable

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<sup>14</sup> <http://www.climateactionreserve.org/how/protocols/urban-forest/>

<sup>15</sup> See a recent article in Scientific American reporting on research on loss of tree cover in U.S. cities at <https://www.scientificamerican.com/article/u-s-cities-lose-tree-cover-just-when-they-need-it-most/>

<sup>16</sup> Nowak, D.J. and E.J. Greenfield. 2018. U.S. urban forest statistics, values, and projections. *J. For.* 116, 164-177.

urban forest, with quantified storm water, air quality, and energy savings benefits in the tens of millions of dollars.

Single projects in city forests will not generate the carbon storage of large forestry projects, particularly those in developing countries. But as the White Paper shows, city forest projects bring together carbon storage with the resilience and climate mitigation benefits of quantified energy savings, air quality improvements, and rainfall interception, together with many other as-yet-not-quantified benefits, such as bird and wildlife habitat, crime reduction, slope stability, and public health benefits. And these all flow directly to the communities living in cities and towns.

## Documents and Standards for Protocol Development

No single authoritative body regulates carbon protocols or determines final standards. The Stockholm Environment Institute's Carbon Offset Research and Education resource lists the various institutions and programs that have set out formulations of basic principles that every carbon offset protocol should contain.<sup>17</sup>

CORE lists twenty-five different programs or institutions that have either developed standards for protocols or issued standards and rules for their own programs. These institutions range from international bodies such as the Kyoto Protocol, the World Resources Institute, and the International Organization for Standardization, to U.S. carbon programs such as the Regional Greenhouse Gas Initiative and Midwest Greenhouse Gas Reduction Accord, to registries such as the American Carbon Registry, the Climate Action Reserve, and the Verified Carbon Standard.

The standards issued by these bodies vary, and the specific rules formulated to give content to these different standards vary even more. For example, the Clean Development Mechanism under the UN Framework stemming from the Kyoto Protocol lists 115 different approved baseline and monitoring methodologies for large-scale offset projects.

To complicate matters, the environmental and carbon community have tolerated a de facto different standard between compliance protocols and voluntary protocols. Compliance protocols exist in cap and trade jurisdictions like California. Because these compliance protocols establish the rules for credits that will offset actual regulated GHG emissions from monitored sources, greater rigor is expected than in

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<sup>17</sup> See CORE at <http://www.co2offsetresearch.org/policy/ComparisonTableAdditionality.html>

voluntary protocols, where purchasers are buying credits voluntarily to reduce their carbon footprint, not to offset regulated emissions.

There is, nonetheless, a general consensus that all carbon offset protocols must contain the following:

- Accounting Rules: offsets must be “real, additional, and permanent.” These rules cover eligibility requirements and usually include baselines for additionality, quantification methodologies, and permanence standards.
- Monitoring, Reporting, Verification Rules: monitoring, reporting, and verification rules ensure that credits are real, enforceable, and verifiable.

Certification, enforceability, and tracking of credits and reversals are performed by specific programs or registries, guided by language in the protocol where relevant.

Over the last fifteen years, several documents setting forth standard and principles for protocols have emerged as consensus leaders for programs attempting to develop their own offset protocols for specific project types. We will follow and refer most often to:

- WRI GHG Protocol;
- Clean Development Mechanism, Kyoto Protocol, now part of the UN Framework Convention on Climate Change (“CDM”).

## Recognition of Distinct Urban Forest Issues in Protocol Development

The task for the City Forest Drafting Group was to take the principles and standards set forth in these foundational documents and adapt them to urban forestry. Urban forestry and its potential carbon projects are different than virtually all other types of carbon projects:

- Urban forests are essentially public goods, producing benefits far beyond the specific piece of land upon which individual trees are planted.
- New tree planting in urban areas is almost universally done by non-profit entities, cities or towns, quasi-governmental bodies like utilities, and private property owners.

- Except for a small number of wood utilization projects, urban trees are not merchantable, are not harvested, and generate no revenue or profit.
- With the exception of recent plantings in California using funds from its Greenhouse Gas Reduction Fund, almost no one currently plants urban trees with carbon as a decisive reason for doing the planting.
- Because urban tree planting and maintenance are expensive relative to carbon revenues, urban forestry has not attracted established for-profit carbon developers.
- Because urban forest projects will take place in urban areas, they will be highly visible to the public and easily visited by carbon buyers. This contrasts with most carbon projects that are designed to generate tradeable credits purchased in volume by distant and “blind” buyers.

During the drafting process, we remained mindful at all times that the above unique factors of urban forestry distill down to three central attributes:

- Urban trees deliver a broad array of documented environmental benefits,
- Urban trees are essentially a public good delivering their array of environmental benefits to the people and communities living in cities and towns – almost 80% of the population, and
- There are virtually no harvests, revenues, or profits for those who preserve and grow the urban forest.

These three key attributes lead to the conclusion that city forest projects are highly desirable, bringing multiple benefits to 80% of the population in a public good that is unlikely to be gamed or exploited.

Our task then was to draft city forest protocols that encouraged participation in city forest projects through highly-credible protocols that addressed not just catch-phrase principles of carbon protocols, but the policies underlying those principles. Where the needs of urban forest practicality required a variance from accepted principles of carbon protocols, we developed solutions to those variances to maintain a high level of stringency.

## I. Eligibility Requirements

### I.1 Project Operators and Projects

A Project requires at least one Project Operator (“PO”), an individual or an entity, who undertakes a Project, registers it with the registry of City Forest Credits (the “Registry”), and is ultimately responsible for all aspects of the project and its reporting.

### 1.2 Project Implementation Agreement

A Project Operator must sign a Project Implementation Agreement (PIA) with the Registry setting forth the Project Operator’s obligation to comply with this Protocol.

### 1.3 Project Location

Project Areas must be located in parcels within or along the boundary of at least one of the following:

- A. The Urban Area boundary (“Urban Area”), defined by the most recent publication of the United States Census Bureau (<https://www.census.gov/geographies/reference-maps/2010/geo/2010-census-urban-areas.html>);
- B. The boundary of any incorporated city or town created under the law of its state;
- C. The boundary of any unincorporated city, town, or unincorporated urban area created or designated under the law of its state;
- D. The boundary of land owned, designated, and used by a municipal or quasi-municipal entity such as a utility for source water or water shed protection;
- E. A transportation, power transmission, or utility right of way, provided the right of way begins, ends, or passes through some portion of A through D above.

In recognition of the urban-rural gradient and the strong public policy interest in preserving open space and forest land within and along that gradient, the Project Area may lie outside the boundary of one of A through E above. But any Project Area outside the boundary of A through E above must lie within or across parcels that constitute a sequence, chain, or progression of contiguously connected parcels. In addition, some part of the property line of one of those contiguously connected parcels must be coterminous with the boundary of one of A through E above.

## 2. Ownership and Eligibility to Receive Potential Credits

The Project Operator must demonstrate ownership of potential credits and eligibility to receive potential credits by meeting at least one of the following:

- A. Own the land, the trees, and potential credits upon which the Project trees are located; or
- B. Own an easement or equivalent property interest for a public right of way within which Project trees are located, own the Project trees and credits within that easement, and accept ownership of those Project trees by assuming responsibility for maintenance and liability for them; or
- C. Have a written and signed agreement from the landowner granting ownership to the Project Operator of any credits for carbon storage or other benefits delivered by Project trees on that landowner's land. If Project trees are on private property, this agreement must be recorded in the property records of the county in which the land containing Project trees is located.

### 3. City Forest Carbon+ Credits with Ex Post Performance Guarantee

Each credit issued under this Planting Protocol includes:

- CO<sub>2</sub>e by city forest project trees over a 25-year period, based on tree survival, quantification, and verification at survival milestones, as set forth below and in Appendix B on Quantification;
- Quantified co-benefits from city forest project trees of rainfall interception, air quality improvements, energy savings, and avoided CO<sub>2</sub>e, all expressed in Resource Units and dollar values;
- Other benefits from project trees that can include slope and soil stability, flood control, wildlife habitat (including birds and pollinators), human health, and, where relevant, social and environmental justice;
- An ACR or Verra credit as a performance guarantee, retired in the name of the Buyer upon issuance of any City Forest Carbon+ Credit.

The ACR or Verra credits will guarantee the performance of the City Forest Carbon+ Credit. Each ACR or Verra credit meets the required criteria of carbon reduction offsets as stated by ICROA:<sup>18</sup>

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<sup>18</sup> See ICROA Offset Standard Review Criteria, Essential Criteria, Section 5 (2017) and ICROA's Code of Best Practice for Carbon Management Services, Technical Specification v.2.1 at Section 2.

- Unique
- Real
- Measurable
- Permanent
- Additional

The ACR or Verra credit retired with each City Forest Carbon+ Credit represents one ton of CO<sub>2</sub>e removed from the atmosphere under accepted principles, including those promulgated by ICROA. The Buyer receives that offset as part of the City Forest Carbon+ Credit, which also represents one ton of CO<sub>2</sub>e that will be removed from the atmosphere over the 25-year project duration, as well as quantified co-benefits representing quantified Resource Units and avoided costs. ICROA has approved ACR and Verra standards, so offsets from those standards will supply the Performance Guarantee.<sup>19</sup>

The precise processes for retiring ACR or Verra credits in the name of the Buyer upon issuance of City Forest Carbon+ Credits is set forth in Attachment 1.<sup>20</sup>

#### 4. Additionality

The Registry ensures additionality through the following three requirements:

- A. The Performance Guarantee consisting of an ACR or Verra credit retired for each City Forest Carbon+ Credit. The ACR or Verra credit has already met the additionality standard, represents one ton of CO<sub>2</sub>e already removed from the atmosphere, and is retired under Section 3 above;
- B. A Legal Requirements Test that declares city trees planted due to an enacted law or ordinance not eligible (Section 4.1); and

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<sup>19</sup> If ICROA disapproves of any specific methodologies on ACR or Verra, City Forest Credits will not use credits issued under those methodologies.

<sup>20</sup> Further discussion of the facts, policies, and rationale for Drafting Group's development of this Performance Guarantee as related to permanence, timing of credit issuance, and additionality, can be found in Appendix D.

- C. A performance standard baseline developed in adherence with the WRI GHG Protocol (see Appendix D).

#### 4.I Legal Requirements Test

Trees planted because they are required by an ordinance or law are not eligible.

### 5. Project Duration

Projects must submit Project Reports and annual reports to the Registry and must commit to a Project Duration of 25 years from commencement (“Project Duration”). Projects may earn credits after the 25-year Project Duration as provided in Section 11. The Registry ensures permanence through the Performance Guarantee of the ACR or Verra credit retired as part of each City Forest Carbon+ Credit.

### 6. Project Documentation, Reporting, and Record-keeping

Documentation, reporting, and record-keeping requirements are contained in Appendix A. All projects must quantify carbon stored and submit a Project Report at the end of the 25-year Project Duration.

### 7. Project Commencement

Projects commence upon approval of their application by the Registry. Appendix A sets forth documentation and reporting requirements and deadlines. Per Appendix A, initial project documentation is due within 6 months of commencement (i.e., within 6 months of approval of the application by the Registry).

Plantings prior to May 1, 2017 are not eligible, unless a project requests Early Action status and provides written documentation to the Registry that it conducted planting projects prior to May 1, 2017 with explicit reference to or under the guidance of a carbon protocol and with CO<sub>2</sub> storage as a significant part of the reason for the project. The Registry retains sole discretion to determine Early Action status.

### 8. Aggregation of Properties under a Project

A Project Operator may aggregate multiple properties under one project as follows:

- A. The Project Operator may aggregate multiple properties in the same city or in multiple cities

- B. The Project Operator may aggregate properties under public or private ownership under the same project
- C. All aggregated properties must be within one county or be part of a program whose Project Operator is a state-authorized agency, planning authority, or other similar entity
- D. The initial planting of trees for all aggregated properties must occur within the same 12-month period
- E. The Project Operator must demonstrate compliance with all Protocol requirements for each property within an aggregated project
- F. The Project Design Document must include all properties
- G. The Project Operator must obtain written pre-approval from the Registry for aggregation before submitting an application for a project that aggregates multiple properties.

## 9. Issuance of Credits for Tree Planting Projects

The Registry will issue City Forest Carbon+ Credits™, representing a metric ton of carbon dioxide equivalent (CO<sub>2</sub>e), bundled with the quantified co-benefits of rainfall interception, energy savings, and air quality.

The Registry will issue Credits to projects that comply with the requirements of this protocol, as follows (the ACR or Verra offset credit retired with each City Forest Carbon+ Credit provides ex post crediting standards in addition to the City Forest Carbon+ Credit):

- A. After planting of project trees: 10% of projected total CO<sub>2</sub>e stored by Year 26, minus a 20% mortality deduction, subject to quantification conducted under the Registry's quantification methodology and verified by an approved third-party verifier;
- B. After Year 3: 40% of projected total CO<sub>2</sub>e stored by Year 26, subject to data collection, sampling, deductions for tree mortality determined by sampled data, and quantification conducted under the Registry's quantification methodology and verified by an approved third-party verifier;

- C. After year 5: 30% of projected total CO<sub>2</sub>e stored by Year 26, subject to data collection, sampling, deductions for tree mortality determined by sampled data, and quantification conducted under the Registry’s quantification methodology and verified by an approved third-party verifier;
- D. At the end of the 25-year Project Duration, credits are calculated and issued as follows. The Registry has withheld 20% of projected credits (after mortality deductions) until the end of the project at Year 26. At that time, the Project Operator will conduct a Final Quantification of CO<sub>2</sub>e and co-benefits. A third-party verifier must then approve the Project Operator’s final GHG removal assertions. At that time, the Registry will issue “true-up” credits equaling the difference between credits already issued (which were based on projected CO<sub>2</sub>e stored) and credits earned based on Final Quantification and verification of CO<sub>2</sub>e stored;
- E. 5% of total credits earned will be retained by the Registry for a Registry-wide Reversal Pool.

Projects can continue after Year 25, and earn credits, as provided in Section 11.

## 10. Reversals in Tree Planting Projects

Reversals can occur if there is a loss of stored carbon serving as the basis for credits for GHG emission mitigation after credits have been received by projects but before the end of the Project Duration commitment. (References in this section to “carbon” shall mean carbon serving as the basis for credits for GHG emission mitigation). A “Reversal” is loss of stored carbon such that the remaining stored carbon within the Project Area is less than the amount of stored carbon for which Registry credits have been issued. If the Project Operator or the Registry become aware of a potential Reversal, the Project Operator must estimate the amount of remaining carbon and report this estimate within 60 days of becoming aware of the loss.

The Registry shall determine, at its own discretion, whether a reversal was the result of intentional action or gross negligence by the Project Operator or property owner. If a Reversal was not the result of intentional action or gross negligence, the Registry will replace offsets invalidated by the Reversal with credits from the Registry’s Reversal or Insurance Pool.

If the Registry determines that the Reversal was the result of an intentional action or gross negligence by the Project Operator, the Registry shall estimate the number of remaining creditable tonnes CO<sub>2</sub>e using the quantification methods contained in this Protocol. The Registry shall notify the Project Operator of this count. If the Registry determines that more credits have been issued to the Project (counting both credits issued to the Project Operator and credits transferred to the Registry's offset insurance account), the Registry shall notify the Project Operator of this shortfall. The Project Operator shall be responsible for replacing the number of credits that have been issued but that are no longer supported by carbon storage within the Project Area. Within 60 days of being notified of the number of credits that it is obligated to replace, the Project Operator shall submit to the Registry a sufficient number of City Forest Carbon+ Credits to cover the shortfall. If the Project Operator is unable to obtain sufficient City Forest Carbon+ Credits, the Project Operator may pay the Registry \$20 per tonne CO<sub>2</sub>e of shortfall to satisfy the Project Operator's reversal obligation.

Quantifications of carbon stocks determined by the Registry shall be considered to be verified amounts under this section.

If the Project Operator disputes the Registry's reversal calculation, the Project Operator may, at its own expense, measure the remaining carbon stocks within the Project Area that may be more accurate than estimates made by the Registry. The Registry shall consider carbon stock counts submitted to it by the Project Operator, and if the Registry finds that the Project Operator's count is likely to be more accurate than the Registry's estimate, the Registry shall use the Project Operator's count of carbon stocks to determine the Project Operator's liability for replacing credits that are no longer supported by carbon storage within the Project Area.

If a Project has had its carbon stock go below the carbon stock necessary to support credits issued by the Registry, no further credits will be issued to the Project until the carbon stocks are above the amounts needed to support issued credits, including credits allocated to the Registry's Reversal account.

If a Project Operator fails to compensate for a reversal, that Operator may be barred, at the sole discretion of the Registry, from submitting applications to the Registry.

## II. Continuation of Tree Planting Projects after 25-Year Project Duration

After the minimum 25-year Project Duration, projects may continue their activities, submit Project Reports under Appendix A, and seek issuance of credits. Projects must comply with all applicable requirements of this Protocol.

If a project chooses to continue into a second 25-year Project Duration, the Project Operator can conduct at any time a quantification of CO<sub>2</sub> stored in project trees. If that quantification yields more credits than were issued during the project's 25-year project duration (due to additional growth after 25 years or the planting of replacement trees), the Project Operator can request issuance of those additional credits.

### 12. Quantification of Carbon and Co-Benefits for Credits

The Registry will issue City Forest Carbon+ Credits™ to a Project upon request by a Project Operator and verification of compliance with this Protocol. Project Operators must follow the Quantification methods set forth in Appendix B.

Appendix B sets out methods for quantification. Each method requires certain steps, data samples from the Project Operator, data from imaging, data from look-up tables that are or will be provided, and calculations.

Appendix B also provides methods for calculating co-benefits, such as rainfall interception (one element of storm water run-off reduction), energy savings, and air quality. Appendix B contains a description of the quantification methods and the science used to develop those methods.

### 13. Verification

The Registry will issue credits only after a Project Operator submits a Project Report Requesting Verification and undergoes third-party verification by a verifier accredited by the Registry. Credits issued prior to completion of the 25-year project period will be subject to the Reversal Requirements set forth in Section 10.

The approved third-party verifier will verify compliance with this Protocol per ISO 14064-3 as set forth below and in App. C, "Verification for Tree Planting Projects." Appendix C sets out verification methods and standards. Here is a summary.

- App. C sets out standards for verification for project eligibility, quantification methods, and for the issuance of City Forest Carbon+ Credits. App. C also

contains requirements for geocoded photographs, imaging, data, or similar landmarking that provides verification of the Project Operator’s data on quantification.

- Project Operators may use data from management or maintenance activities regularly conducted if the data was collected within 12 months of the project’s request for credits.

## Attachment I – Processes for Retirement of ACR or Verra Performance Guarantee Credits with Issuance of City Forest Carbon+ Credits

### When and How Performance Guarantee Credits Are Retired in the Name of a Buyer

- If Buyer is buying credits in Spot Purchases:
  - After the City Forest Credits Registry (the “Registry”) has approved a Verification Report and been notified by a Project Operator that the Buyer has funded the City Forest Carbon+ Credits, the Registry will retire a Performance Guarantee Credit in the name of the Buyer for every City Forest Carbon+ Credit issued.
  - This obligation is contained in the Project Implementation Agreement between the Registry and the Project Operator
  - The Registry will give the Buyer view-only access to the Registry’s Performance Guarantee ACR account so Buyer can confirm the supply of credits
- If the Buyer is making a Forward Purchase before Credits are issued:
  - Whenever the Project Operator notifies the Registry that the Buyer has funded the forward purchase of credits, the Registry retires Performance Guarantee Credits in the name of the Buyer. I.e., because Buyer has funded up-front, Buyer gets Performance Guarantee Credits retired up-front.
  - In these cases of forward purchases, the Registry will retire the same number of Performance Guarantee Credits as City Forest Carbon+ Credits that the Project Operator estimates it will earn, minus deductions

for the buffer pool and 20% mortality in a Credit Estimation Spreadsheet approved by the Registry.

- This obligation is contained in the Project Implementation Agreement between the Registry and the Project Operator
- The Registry issues City Forest Carbon+ Credits on its issuance schedule per Protocol. (Buyer has received retirement of ACR/Performance Guarantee Credits up-front.)
- The Registry will give Buyer access to its Performance Guarantee ACR account, so Buyer can confirm the Registry's supply of credits