

From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Thursday, January 02, 2014 9:46:53 AM
To: Clemm, Hallie (DPW)
Cc:
Subject: Happy New Year and All
Attachments: Draft Technical MemoDCDPW Scenario Design10214.doc

Good Morning and Happy New Year: Hope you passed a peaceful new year holiday. I know I did. Take a look at the latest and greatest version of the memo. I did most of what we talked about. Better said, I reworded some things beyond what we discussed. I am home today, I have too much work to be hocked in the office, so give me a call or email or whatever. Regards, Biff

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From: The Arcadis Team
To: Sybil Hammond/Hallie Clemm (DCDPW)
Re: Technical Memo - DC DPW Strategic Roadmap Scenario Design
Date: January 2, 2014

I. Background

Sustainability goals for the DC Department of Public Works (DCDPW) are part of a broader plan for *Sustainable DC* established by Mayor Gray. The plan includes a series of integrated goals encompassing job growth, economic development; city-wide health improvements from clean air and water along with healthier food supplies and lifestyles; diversity and improved social access to needed services; and protection of local environmental assets for citizens, wildlife, and future generations. DC agencies, including the DCDPW, will require investment and continuous process improvements to its governance and service capabilities to make the District the healthiest, greenest, most livable city in the nation over the next 20 years.

Among the goals directed at current waste management operations by Mayor Gray's *Sustainable DC* Plan is zero waste in 2032 that includes an 80% diversion rate of the collected materials from disposal options. For success, the District must develop an integrated solid waste management system that redefines solid waste from a burden that needs to disappear to a resource with economic, environmental and social value. Reductions in waste generated, and value capture through reuse, recycling, and composting along with refined energy production, are both considered integral to achieving this goal.

The inherent definition of sustainability is the wise and efficient use of natural and financial assets by current generations to assure viability for those in the future. The DC Department of Public Works (DCDPW) Strategy Roadmap is a planning tool to achieve that sustainability. It will provide identification and assessment of natural and financial capital investments relative to technology and process options that, in turn, provides an evidence-based guide for implementing future policies and programs to develop and sustain critical systems, as well as optimize outcomes that will meet the planned sustainability goals.

The Strategy Roadmap (SR) is evaluating alternative integrated solid waste management scenarios (including the current state) that can maximize the embedded value of DPW assets and management processes to meet *Sustainable DC* goals; develop an evaluation strategy and framework to quantitatively compare the investments necessary for each of these alternatives; and to evaluate the results. By quantifying and comparing investments needed to optimize baseline waste management operations for the future, the District will be in a better position to identify programming alternatives that contribute to a *Sustainable DC* while making informed management choices regarding its future operations.

The SR study will map strategic and process options needed to achieve the spectrum of goals established in the *Sustainable DC* plan by more specifically evaluating whether and how to:

- Increase the District's recycling diversion rate
- Recapture the embedded energy and economic value of its waste (or residual material assets)
- Optimize the value of the waste (residual) stream while providing economic sustainability over the long term
- Interact with jurisdictional partners in operating a solid waste (residual material) management system
- Make the most efficient use of constrained air, land, and water assets within DC and in the surrounding jurisdictions to enable both conservation and future growth.

II. Study Design and Structure

The design basis of this strategic evaluation study includes depiction of the current system for use as a baseline, and comparison of future operational scenarios that meet *Sustainable DC* goals, improve operational efficiency, and optimize services. To develop these scenarios, the Arcadis Team met in workshops with DCDPW representatives and experts to:

- a) Confirm and map the component elements of the DCDPW system to be addressed in the SR study
- b) Correlate the Sustainable DC goals achievable or affected by best practice alternatives applied to DCDPW modularized process components, and
- c) Identify scenario designs that compare best practice structural and technical process alternatives to meet Sustainable DC goals.

This technical memo incorporates findings and direction developed in these workshops. Additional design and scenario development will occur as part of a public scoping process scheduled in 2014.

A. DPW Operational System Components

1. Locations and Participants

Solid residual material treated as “trash” or “garbage” in DC is a dual public/private system with both local and extra-territorial natural capital parameters to the system. Both DPW and private hauling companies carry out collection and storage processes within the DC geographic/natural capital scope, but full-cycle handling of residual material assets include natural capital of other jurisdictions. A simplified matrix of Arcadis' current understanding of the system would be:

	Intra-borders	Regional
DPW/DC Government	Collection; Diversion (Water, Reuse), Sorting, Transfer	Sorting; Recycling, Fuel, Landfill
Private Haulers	Collection; Diversion (Reuse), Sorting, Transfer	Sorting, Recycling, Fuel, Landfill

2. Overview Data of System Loads

- 900,000 tons Residual Material managed in the District, 500,000 tons through its two transfer stations, 100,000 additional tons are reported as recycled by commercial haulers, and 300,000 tons of municipal solid wastes (MSW) are processed through private sector transfer stations
- 135,000 tons per year DC DPW collected
25,000 tons of recyclables and 8,000 tons of leaves from residential properties. DPW collects an additional 50,000 tons of materials through its street and alley cleaning program and citizen drop-off services;
42,000 tons from District government agencies and contractors servicing government building at the transfer stations
- 225,000 tons of solid waste exported to the Fairfax County Energy Resource Recovery Facility in Lorton
- Recyclables and organics (tonnage TBD) go to Maryland and Virginia facilities for processing.

3. Volume/Flow Throughput Process Phases

The DPW system for material processing is comprised of four main operational activity phases:

- **Generation** - Residual material discarded by DC homes, businesses, and government entities; litter and street accumulation
- **Collection** - Vehicles and processes used to accumulate, transport, and deposit discarded materials for further management
- **Diversion** - Sorting, separation, and transfer of materials for a variety of follow-on options that can include, reuse, bio-reuse (compost), recycling, refining (energy production), or other options
- **Disposition** - final disposal of discarded material with no further use intended

4. Opportunity Linkages between Sustainable DC Goals and DPW Operational Phases

The following chart depicts the foundational mapping of the phases of the DPW processes to the Sustainable DC goals, thereby identifying the potential gains and contributions that process improvements in those phases could contribute to the Plan, and the Air, land, and water assets potentially affected (A/L/W).

Sustainable DC/DPW Goal Map

DPW Phase	DC Sustainability Goal	Best or Available Practice Options	Natural Capital Capacity Affected (DC and Regional)
Phase I: Residual Material Generation	<ol style="list-style-type: none"> 1. 15% Reduction in Residual Material (RM) Generation 2. Recast Materials as Reusable 3. 20% reuse of Construction/Demolition Material 4. Styrofoam Elimination 	<ol style="list-style-type: none"> a. Bans b. Content Regulations c. FAR 	DC A/L/W Regional A/L/W Banked Capacity/ Credits
Phase II: Collection	<ol style="list-style-type: none"> 1. Reduce Greenhouse Gases by 50% (truck fuel) 	<ol style="list-style-type: none"> a. Combined Collections b. Fuel Switch c. Shrink distances 	DC A/L/W Regional A/L/W Banked Capacity/ Credits
Phase III: Diversion	<ol style="list-style-type: none"> 1. 80% Diversion of RM from landfills 2. 50% reduction in GHG (methane leakage) 3. 50% increase in renewable energy 4. Ensure Capacity/Capability for Population Growth 5. Grow DC Economy 	<ol style="list-style-type: none"> a. DC-based Energy Refining b. Increased regional Energy Refining b. DC-based increased recycling c. Increased Regional recycling 	DC A/L/W Regional A/L/W Banked Capacity/ Credits
Phase IV: Final Disposition	<ol style="list-style-type: none"> 1. Zero RM to Landfill 	See Phase III	DC A/L/W Regional A/L/W Banked Capacity/Credits

B. Scenario Development Parameters

Project workshop meetings held with DCDPW client representatives confirmed the strategic directions of the DCDPW, the linkages to the Sustainable DC goals, and preliminary scope of the comparative scenario structure:

1. Overarching Strategic Goals/Direction

The combination of future growth planning and sustainability planning/goals provides opportunities and economies of scale to the District to:

- Restructure and green its flow and management of solid materials
- Design and operate the system to bring greater value and return to the DC economy and its citizens in the form of jobs, renewable energy, local control, energy resiliency, natural capital capacity, and technological advancement

Key aspects of the analysis will be informed by *Sustainable DC* goals for economic development as applicable to waste management through the following precepts:

- Residual solid materials should be viewed as usable, recoverable, or refinable economic assets, and
- Geographically internalized management can be a potential positive economic and environmental activity for a municipality (this concept has already informed successful solid material management programs in Seattle, San Francisco, Chicago, New York and San Jose)

2. Goal and Future Practice Elements

As previously identified, the DCDPW solid materials management system consists of four phases (Generation, Collection, Diversion, and Disposition) each with possible location, technology, and process options that can optimize operations in conjunction with DC economic and sustainability goals. As a result of the mapping correlation between goals and process phases, the Generation and Diversion Phases provided the widest field of opportunity for meeting sustainability goals, and will be a primary focus of the scenarios. Using research, workshop discussions and reviews, and subject matter expert input, planned scenarios will be based on the following core concepts:

- A. A “Baseline” Scenario comprised of air, land, water and cost elements of the current system (including both internal/DC and regional system elements such as landfills, transfer stations, collection processes), and “throw” rates.
- B. A source reduction in “throw rate” equal to the planned Sustainable DC goal of 15% will be included in the Generation phase of each alternative scenario

- C. “Alternative” scenarios will use a matrix format to assess location, technology, and process options that best implement the overarching strategic goals for economic and sustainability optimization aligned with Sustainable DC goals and will include:
- An 80% total diversion rate to optimized recycling and recovery practices using assets in the DC tax base
 - An 80% total diversion rate to optimized recycling and recovery practices using assets in the metropolitan area
 - An 80% total diversion rate to optimized energy refining and/or production with assets in the DC tax base
 - An 80% total diversion rate to optimized energy refining and/or production with assets in the metropolitan area
- D. The scenarios will also take into account District sustainability/economic goals including (but not limited to) job creation, renewable energy, water savings, greenhouse gas reductions, density, and population increase
- E. Scenario revisions or additions, including composite options that recombine one or more goal-structured capabilities among the modular process phases, will respond to scoping inputs received through public and stakeholder meetings

As a result of the system analysis and workshop activities, a scenario design has been developed as depicted in the following chart:

Alternative Scenarios Matrix

Scenario/Process Activity	Phase 1 Load Production	Phase 2 Load Collection	Phase 3 Load Diversion	Phase 4 Load Disposition
Baseline	Baseline	Baseline	Baseline	Baseline
Optimization A1	15% Source Reduction	TBD	80% Diversion through Recycling with DC Built and Natural Infrastructure	Landfill Minimization/Elimination
Optimization A2	15% Source Reduction	TBD	80% Diversion through Recycling with Regional Built and Natural Infrastructure	Landfill Minimization/Elimination
Optimization B1	15% Source Reduction	TBD	80% Diversion through Refining with DC Built and Natural Infrastructure	Landfill Minimization/Elimination
Optimization B2	15% Source Reduction	TBD	80% Diversion through Refining with Regional Built and Natural Infrastructure	Landfill Minimization/Elimination

C. Scenario Comparison Parameters

To meet the Mayor's *Sustainable DC* plan goals, the District of Columbia's material management system must be capable of achieving an economical increase in the District's waste diversion rate, capturing embedded waste stream economic value, and optimizing system component choices among jurisdictional entities while assuring sustainable economic growth over the long term. To do so, DCDPW will assess solid residual management process options that can achieve sustainability goals, and develop factual, quantity-based, empirical data, information, and knowledge to inform residual handling decisions with evidence-based alternatives analysis.

To structure a materials management system with these capabilities, DCDPW must develop program, process, and technology options to sustainably use natural and financial asset capacity. For purposes of this study, actual levels of air, land, and water consumption or other permanent use of natural infrastructure asset capacity available and accessible under regulatory and supply restrictions are considered primary sustainability criteria to evaluate system operation and future management strategy.

1. Capacity to Capability Analysis

Arcadis is providing the requested project evaluation using a *Capacity to Capability* analytic method. *Capacity to Capability* analysis enables client decision-makers to build capability-based, sustainable system design strategies by first identifying and measuring capital asset capacity needed to meet capability goals. It then develops scenario options that efficiently reduce or minimize capacity needed to generate the highest levels of system performance at the lowest capital use rates. The *Capacity to Capability* analysis also captures reduced asset capacity use as equity value that can be made available to other system capability needs, economic development, or recorded as credits for future use.

The goals established in the *Sustainable DC* plan constitute the intended governance and service capabilities sought for a future sustainable District of Columbia. DCDPW intends to optimize its capabilities through practice improvements so as to contribute to meeting these capability-based goals. The SR's capability-based scenarios as further refined in public scoping meetings will include various technology and process elements whose natural, physical, and financial infrastructure capacity is sustainably available, accessible, and affordable to meet sustainability/capability goals.

Each scenario element will be inventoried for its use levels of natural, physical, and financial capital assets, whether available to the system or necessary to acquire. The evaluation process will address overall governance requirements, including siting, regulatory, legal, institutional and other requirements applicable or contingent to each scenario alternative. In addition, project analytics will include jurisdictional and operational partnering opportunities within the residual asset management system

region-wide. Facilitated public participation activities will be included at key steps to provide review and input on the project progress and deliverables.

2. Natural Capital Asset Management (NCAM)

By focusing on the measurable volumes of natural, physical, and financial capital that are, or might be used to avoid, reduce, or handle materials managed by the residuals/waste system, this evaluation quantitatively identifies needed technology and processes capable of providing system-wide capability for handling residual materials at the lowest asset capacity use levels. As part of its analysis, Arcadis will use Natural Capital Asset Management (NCAM) to provide the framework for completing this work. NCAM is a relational database tool that has been developed to allow for the comparison of alternative solutions to complex problems and give decision-makers information they need to select solutions which uses the lowest or most efficient volumes of capital assets to achieve the greatest system capability performance, as well as consider other key capital factors.

An NCAM measures deeds, leases, permits, and other natural element access rights as natural infrastructure—an essential category of working capital to physical, financial, and workforce assets—whose usable and affordable capacity generally define the upper limits of operational capability for enterprise activities. NCAM records inventory levels, utilization rates, and cost/value elements for natural assets using analytic modalities comparable to these other enterprise capital elements. Operational alternatives under consideration by an enterprise system are measured and compared for the total amount of capital assets used in key categories indexed against the units of productivity achieved. Project and operational activities are thus evaluated for their sustainability, allowing decision-makers to optimize enterprise capability and output by selecting alternatives with the lowest capital use for greatest output.

The data elements are based on direct, or algorithmically or arithmetically derived, units of affected air, land, and water elements and sub elements thereof or thereupon, that are used or conserved by the client enterprise for economic or social goals both internal and external to its operations. Standard and client-specific configuration protocols are developed and used during analysis phases to evaluate data source, availability, consistency, time and spatial factors, units of measure, and other data parameters needed for quality control and assurance in both design and operation phases. The NCAM activities in this Strategy/Roadmap project will use primary data correlations between the actual use rate of natural infrastructure assets (as informed by financial costs) and the amounts of residual materials avoided or managed to map a strategy for investment in environmentally preferable technologies and procedures that meet Sustainability DC goals.

3. Affected DC Natural Capital Assets

DPW process phases use Natural Infrastructure Asset capacity in both Operational (OPS) and Residual Material Management (RMM) activities. Each DCDPW Process Phase uses a definable volume of air,

land, and water that can be determined through actual measurement or formulaic calculation. The likely affected asset capacity is charted below.

Anticipated Natural Capital Asset Use Categories in DPW Systems

Air Asset Capacity (RMM)	Land Asset Capacity (OPS, RMM)	Water Asset Capacity (OPS, RMM)
○ Criteria Pollutants	○ Built Infrastructure (Stationary, Transport)	○ Process
○ Greenhouse Gases	○ Storage	○ NPDES
○ Hazardous Pollutants	○ Safety/Setback	○ Sanitary/Sewer
	○ Fill/Burial	

III. Implementation Activities

Tasks are underway as part of the project plan to collect data on the baseline activity phases and operational processes available for implementation under the scenarios developed.

In particular, the proposed scenarios will be made available for review, comment, and revision in public meetings planned in the early part of 2014.

From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Monday, January 06, 2014 12:34:39 PM
To: Clemm, Hallie (DPW)
Cc:
Subject: Draft Technical Memo
Attachments: Draft Technical Memo_DCDPW Scenario DesignRev1614.doc

Good Morning Hallie: Hope all is going well in your corner of the earth today. So here is the latest and greatest version of the TM. Once approved, I will start on the briefing page. Also, I have made an executive decision that we will address data in a separate TM. I felt like it was getting too complex to address both in the same memo. These TMs will be an important part of our final report, so while I am not suggesting they are cast in concrete once approved, we will use them as reference as we move forward and document our decisions, etc. Capish? Regards, Biff

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From: The Arcadis Team
To: Sybil Hammond/Hallie Clemm (DCDPW)
Re: Technical Memo - DC DPW Strategic Roadmap Scenario Design
Date: January 6, 2014

I. Background

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Among the goals directed at current waste management operations by Mayor Gray's *Sustainable DC* Plan is zero waste in 2032 that includes an 80% diversion rate of the collected materials from disposal options. For success, the District must develop an integrated solid waste management system that redefines solid waste from a burden that needs to disappear to a resource with economic, environmental and social value. Reductions in waste generated, and value capture through reuse, recycling, and composting along with refined energy production, are both considered integral to achieving this goal.

The inherent definition of sustainability is the wise and efficient use of natural and financial assets by current generations to assure viability for those in the future. The DC Department of Public Works (DCDPW) Strategy Roadmap is a planning tool to achieve that sustainability. It will provide identification and assessment of natural and financial capital investments relative to technology and process options that, in turn, provides an evidence-based guide for implementing future policies and programs to develop and sustain critical systems, as well as optimize outcomes that will meet the planned sustainability goals.

The Strategy Roadmap (SR) is evaluating alternative integrated solid waste management scenarios (including the current state) that can maximize the embedded value of DPW assets and management processes to meet *Sustainable DC* goals; develop an evaluation strategy and framework to quantitatively compare the investments necessary for each of these alternatives; and to evaluate the results. By quantifying and comparing investments needed to optimize baseline waste management operations for the future, the District will be in a better position to identify programming alternatives that contribute to a *Sustainable DC* while making informed management choices regarding its future operations.

The SR study will map strategic and process options needed to achieve the spectrum of goals established in the *Sustainable DC* plan by more specifically evaluating whether and how to:

- Increase the District’s recycling diversion rate
- Recapture the embedded energy and economic value of its waste (or residual material assets)
- Optimize the value of the waste (residual) stream while providing economic sustainability over the long term
- Interact with jurisdictional partners in operating a solid waste (residual material) management system
- Make the most efficient use of constrained air, land, and water assets within DC and in the surrounding jurisdictions to enable both conservation and future growth.

II. Study Design and Structure

The design basis of this strategic evaluation study includes depiction of the current system for use as a baseline, and comparison of future operational scenarios that meet *Sustainable DC* goals, improve operational efficiency, and optimize services. To develop these scenarios, the Arcadis Team met in workshops with DCDPW representatives and experts to:

- a) Confirm and map the component elements of the DCDPW system to be addressed in the SR study
- b) Correlate the Sustainable DC goals achievable or affected by best practice alternatives applied to DCDPW modularized process components, and
- c) Identify scenario designs that compare best practice structural and technical process alternatives to meet Sustainable DC goals.

This technical memo incorporates findings and direction developed in these workshops. Additional design and scenario development will occur as part of a public scoping process scheduled in 2014.

A. DPW Operational System Components

1. Locations and Participants

Solid residual material treated as “trash” or “garbage” in DC is a dual public/private system with both local and extra-territorial natural capital parameters to the system. Both DPW and private hauling companies carry out collection/transfer phase activities primarily within the DC geographic and natural capital scope. However, the full cycle handling of all phases handling of residual material assets include natural capital of other jurisdictions. A simplified matrix of these dual features of the DC system is as follows:

	Intra-borders	Regional
DPW/DC Government	Collection; Diversion (Water, Reuse), Sorting, Transfer	Sorting; Recycling, Fuel, Landfill
Private Haulers	Collection; Diversion (Reuse), Sorting, Transfer	Sorting, Recycling, Fuel, Landfill

2. Overview Data of System Loads

A full depiction of the dimensions of DC waste management is underway as part of the SR tasks. The following material handling amounts are general estimate levels outlined on the District of Columbia website and provide a basic introduction to the nature of the system load:

- 900,000 tons Residual Material managed in the District, 500,000 tons through its two transfer stations, 100,000 additional tons are reported as recycled by commercial haulers, and 300,000 tons of municipal solid wastes (MSW) are processed through private sector transfer stations
- 135,000 tons per year DC DPW collected
25,000 tons of recyclables and 8,000 tons of leaves from residential properties. DPW collects an additional 50,000 tons of materials through its street and alley cleaning program and citizen drop-off services;
42,000 tons from District government agencies and contractors servicing government building at the transfer stations
- 225,000 tons of solid waste exported to the Fairfax County Energy Resource Recovery Facility in Lorton
- Recyclables and organics (tonnage TBD) go to Maryland and Virginia facilities for processing.

3. Volume/Flow Throughput Process Phases

The DPW system for material processing is comprised of four main operational activity phases:

- Generation** - Residual material discarded by DC homes, businesses, and government entities; litter and street accumulation
- Collection** - Vehicles and processes used to accumulate, transport, and deposit discarded materials for further management
- Diversion** - Sorting, separation, and transfer of materials for a variety of follow-on options that can include, reuse, bio-reuse (compost), recycling, refining (energy production), or other options
- Disposition** - final disposal of discarded material with no further use intended

4. Opportunity Linkages between Sustainable DC Goals and DPW Operational Phases

The following chart depicts the foundational mapping of the phases of the DPW processes to the Sustainable DC goals, thereby identifying the potential gains and contributions that process improvements in those phases could contribute to the Plan, and the Air, land, and water assets potentially affected (A/L/W).

Sustainable DC/DPW Goal Map

DPW Phase	DC Sustainability Goal	Best or Available Practice Options	Natural Capital Capacity Affected (DC and Regional)
Phase I: Residual Material Generation	<ol style="list-style-type: none"> 1. 15% Reduction in Residual Material (RM) Generation 2. Recast Materials as Reusable 3. 20% reuse of Construction/Demolition Material 4. Styrofoam Elimination 	<ol style="list-style-type: none"> a. Bans b. Content Regulations c. FAR 	DC A/L/W Regional A/L/W Banked Capacity/ Credits
Phase II: Collection	<ol style="list-style-type: none"> 1. Reduce Greenhouse Gases by 50% (truck fuel) 	<ol style="list-style-type: none"> a. Combined Collections b. Fuel Switch c. Shrink distances 	DC A/L/W Regional A/L/W Banked Capacity/ Credits
Phase III: Diversion	<ol style="list-style-type: none"> 1. 80% Diversion of RM from landfills 2. 50% reduction in GHG (methane leakage) 3. 50% increase in renewable energy 4. Ensure Capacity/Capability for Population Growth 5. Grow DC Economy 	<ol style="list-style-type: none"> a. DC-based Energy Refining b. Increased regional Energy Refining b. DC-based increased recycling c. Increased Regional recycling 	DC A/L/W Regional A/L/W Banked Capacity/ Credits
Phase IV: Final Disposition	<ol style="list-style-type: none"> 1. Zero RM to Landfill 	See Phase III	DC A/L/W Regional A/L/W Banked Capacity/Credits

B. Scenario Development Parameters

Project workshop meetings held with DCDPW client representatives confirmed the strategic directions of the DCDPW, the linkages to the Sustainable DC goals, and preliminary scope of the comparative scenario structure:

1. Overarching Strategic Goals/Direction

The combination of future growth planning and sustainability planning/goals provides opportunities and economies of scale to the District to:

- Restructure and green its flow and management of solid materials
- Design and operate the system to bring greater value and return to the DC economy and its citizens in the form of jobs, renewable energy, local control, energy resiliency, natural capital capacity, and technological advancement

Key aspects of the analysis will be informed by *Sustainable DC* goals for economic development as applicable to waste management through the following precepts:

- Residual solid materials should be viewed as usable, recoverable, or refinable economic assets, and
- Geographically internalized management can be a potential positive economic and environmental activity for a municipality (San Jose is potential model for this concept)

2. Goal and Future Practice Elements

As previously identified, the DCDPW solid materials management system consists of four phases (Generation, Collection, Diversion, and Disposition) each with possible location, technology, and process options that can optimize operations in conjunction with DC economic and sustainability goals. As a result of the mapping correlation between goals and process phases, the Generation and Diversion Phases provided the widest field of opportunity for meeting sustainability goals, and will be a primary focus of the scenarios. Using research, workshop discussions and reviews, and subject matter expert input, planned scenarios will be based on the following core concepts:

- A. A “Baseline” Scenario comprised of air, land, water and cost elements of the current system (including both internal/DC and regional system elements such as landfills, transfer stations, collection processes), and “throw” rates.
- B. A source reduction in “throw rate” equal to the planned Sustainable DC goal of 15% will be included in the Generation phase of each alternative scenario
- C. “Alternative” scenarios will use a matrix format to assess location, technology, and process options that best implement the overarching strategic goals for economic and sustainability optimization aligned with Sustainable DC goals and will include:

- ▶ An 80% total diversion rate to optimized recycling and recovery practices using assets in the DC tax base
 - ▶ An 80% total diversion rate to optimized recycling and recovery practices using assets in the metropolitan area
 - ▶ An 80% total diversion rate to optimized energy refining and/or production with assets in the DC tax base
 - ▶ An 80% total diversion rate to optimized energy refining and/or production with assets in the metropolitan area
- D. The scenarios will also take into account District sustainability/economic goals including (but not limited to) job creation, renewable energy, water savings, greenhouse gas reductions, density, and population increase
- E. Implementation options evaluated will compare financial and natural capital consumption (e.g., emissions, process water, lairage) by best available, commercially viable technologies meeting agreed criteria
- F. Scenario revisions or additions, including composite options that recombine one or more goal-structured capabilities among the modular process phases, will respond to scoping inputs received through public and stakeholder meetings

As a result of the system analysis and workshop activities, a scenario design has been developed as depicted in the following chart:

Alternative Scenarios Matrix

Scenario/Process Activity	Phase 1 Load Production	Phase 2 Load Collection	Phase 3 Load Diversion	Phase 4 Load Disposition
Baseline	Baseline	Baseline	Baseline	Baseline
Optimization A1	15% Source Reduction	TBD	80% Diversion through Recycling with DC Built and Natural Infrastructure	Landfill Minimization/Elimination
Optimization A2	15% Source Reduction	TBD	80% Diversion through Recycling with Regional Built and Natural Infrastructure	Landfill Minimization/Elimination
Optimization B1	15% Source Reduction	TBD	80% Diversion through Refining with DC Built and Natural Infrastructure	Landfill Minimization/Elimination
Optimization B2	15% Source Reduction	TBD	80% Diversion through Refining with Regional Built and Natural Infrastructure	Landfill Minimization/Elimination

C. Scenario Comparison Parameters

To meet the Mayor's *Sustainable DC* plan goals, the District of Columbia's material management system must be capable of achieving an economical increase in the District's waste diversion rate, capturing embedded waste stream economic value, and optimizing system component choices among jurisdictional entities while assuring sustainable economic growth over the long term. To do so, DCDPW will assess solid residual management process options that can achieve sustainability goals, and develop factual, quantity-based, empirical data, information, and knowledge to inform residual handling decisions with evidence-based alternatives analysis.

To structure a materials management system with these capabilities, DCDPW must develop program, process, and technology options to sustainably use natural and financial asset capacity. For purposes of this study, actual levels of air, land, and water consumption or other permanent use of natural infrastructure asset capacity available and accessible under regulatory and supply restrictions are considered primary sustainability criteria along with investment costs to evaluate system operation and future management strategy.

1. Capacity to Capability Analysis

Arcadis is providing the requested project evaluation using a *Capacity to Capability* analytic method. *Capacity to Capability* analysis enables client decision-makers to build capability-based, sustainable system design strategies by first identifying and measuring capital asset capacity needed to meet capability goals. It then develops scenario options that efficiently reduce or minimize capacity needed to generate the highest levels of system performance at the lowest capital use rates. The *Capacity to Capability* analysis also captures reduced asset capacity use as equity value that can be made available to other system capability needs, economic development, or recorded as credits for future use.

The goals established in the *Sustainable DC* plan constitute the intended governance and service capabilities sought for a future sustainable District of Columbia. DCDPW intends to optimize its capabilities through practice improvements so as to contribute to meeting these capability-based goals. The SR's capability-based scenarios as further refined in public scoping meetings will include various technology and process elements whose natural, physical, and financial infrastructure capacity is sustainably available, accessible, and affordable to meet sustainability/capability goals.

Each scenario element will be inventoried for its use levels of natural, physical, and financial capital assets, whether available to the system or necessary to acquire. The evaluation process will address overall governance requirements, including siting, regulatory, legal, institutional and other requirements applicable or contingent to each scenario alternative. In addition, project analytics will include jurisdictional and operational partnering opportunities within the residual asset management system

region-wide. Facilitated public participation activities will be included at key steps to provide review and input on the project progress and deliverables.

2. Natural Capital Asset Management (NCAM)

By focusing on the measurable volumes of natural, physical, and financial capital that are, or might be used to avoid, reduce, or handle materials managed by the residuals/waste system, this evaluation quantitatively identifies needed technology and processes capable of providing system-wide capability for handling residual materials at the lowest asset capacity use levels. As part of its analysis, Arcadis will use Natural Capital Asset Management (NCAM) to provide the framework for completing this work. NCAM is a relational database tool that has been developed to allow for the comparison of alternative solutions to complex problems and give decision-makers information they need to select solutions which uses the lowest or most efficient volumes of capital assets to achieve the greatest system capability performance, as well as consider other key capital factors.

An NCAM measures deeds, leases, permits, and other natural element access rights as natural infrastructure—an essential category of working capital to physical, financial, and workforce assets—whose usable and affordable capacity generally define the upper limits of operational capability for enterprise activities. NCAM records inventory levels, utilization rates, and cost/value elements for natural assets using analytic modalities comparable to these other enterprise capital elements. Operational alternatives under consideration by an enterprise system are measured and compared for the total amount of capital assets used in key categories indexed against the units of productivity achieved. Project and operational activities are thus evaluated for their sustainability, allowing decision-makers to optimize enterprise capability and output by selecting alternatives with the lowest capital use for greatest output.

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3. Affected DC Natural Capital Assets

DPW process phases use Natural Infrastructure Asset capacity in both Operational (OPS) and Residual Material Management (RMM) activities. Each DCDPW Process Phase uses a definable volume of air,

land, and water that can be determined through actual measurement or formulaic calculation. The likely affected asset capacity is charted below.

Anticipated Natural Capital Asset Use Categories in DPW Systems

Air Asset Capacity (RMM)	Land Asset Capacity (OPS, RMM)	Water Asset Capacity (OPS, RMM)
○ Criteria Pollutants	○ Built Infrastructure (Stationary, Transport)	○ Process
○ Greenhouse Gases	○ Storage	○ NPDES
○ Hazardous Pollutants	○ Safety/Setback	○ Sanitary/Sewer
	○ Fill/Burial	

III. Implementation Activities

Tasks are underway as part of the project plan to collect data on the baseline activity phases and operational processes available for implementation under the scenarios developed. In particular, the proposed scenarios will be made available for review, comment, and revision in public meetings planned in the early part of 2014.

The initial data review, compilation efforts, and follow-on activities developed while scoping the baseline depiction will be outlined and summarized in a separate technical memo under development.

###

From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Monday, January 06, 2014 2:32:33 PM
To: Clemm, Hallie (DPW)
Cc:
Subject: RE: Draft Technical Memo

I only get two? For cryn out loud.

Biff Corning | Principal Consultant | biff.corning@arcadis-us.com
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From: Clemm, Hallie (DPW) [<mailto:hallie.clemm@dc.gov>]
Sent: Monday, January 06, 2014 1:30 PM
To: Corning, Bruce (Biff)
Subject: RE: Draft Technical Memo

This is really good.....2 points....

1. In the Overview Data of System Loads section.....we should mention that most privately collected MSW ends up in landfills in either Virginia or Pennsylvania.
2. In the Alternative Scenarios Matrix.....I thought we were to run a scenario that just incorporates source reduction and continues other activities as we do now.

Once those two points are addressed, this is great and good to go.

Thanks much.

Look out for those in need this winter. When the temperature or wind chill is 32°F or below, the District issues a Hypothermia Alert. For assistance during an Alert, call the [Shelter Hotline](#) at **1-800-535-7252** or **311**.

From: Corning, Bruce (Biff) [<mailto:Bruce.Corning@arcadis-us.com>]
Sent: Monday, January 06, 2014 11:35 AM
To: Clemm, Hallie (DPW)
Subject: Draft Technical Memo

Good Morning Hallie: Hope all is going well in your corner of the earth today. So here is the latest and greatest version of the TM. Once approved, I will start on the briefing page. Also, I have made an executive decision that we will address data in a separate TM. I felt like it was getting too complex to address both in the same memo. These TMs will be an important part of our final report, so while I am not suggesting they are cast in concrete once approved, we will use them as reference as we move forward and document our decisions, etc. Capish?
Regards, Biff

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From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Monday, January 06, 2014 2:33:34 PM
To: Clemm, Hallie (DPW)
Cc:
Subject: You are Calling...

Sorry – I am on a call. Will call you back later today?.....

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From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Friday, January 10, 2014 9:57:04 AM
To: Clemm, Hallie (DPW)
Cc:
Subject: Draft TM and Brief
Attachments: Draft Technical Memo_DCDPW Scenario DesignRev1614.doc; HowlandBrief.docx

Hallie: I did find your voice mail...I turned off my phone and restarted it. Presto, voicemails. Please find the two documents we discussed transmitted herewith. I urge you to have Bill read the whole TM to give him context for the abbreviated version. Let me know. Biff

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From: The Arcadis Team
To: Sybil Hammond/Hallie Clemm (DCDPW)
Re: Technical Memo - DC DPW Strategic Roadmap Scenario Design
Date: January 6, 2014

I. Background

Sustainability goals for the DC Department of Public Works (DCDPW) are part of a broader plan for *Sustainable DC* established by Mayor Gray. The plan includes a series of integrated goals encompassing job growth, economic development; city-wide health improvements from clean air and water along with healthier food supplies and lifestyles; diversity and improved social access to needed services; and protection of local environmental assets for citizens, wildlife, and future generations. DC agencies, including the DCDPW, will require investment and continuous process improvements to its governance and service capabilities to make the District the healthiest, greenest, most livable city in the nation over the next 20 years.

Among the goals directed at current waste management operations by Mayor Gray's *Sustainable DC* Plan is zero waste in 2032 that includes an 80% diversion rate of the collected materials from disposal options. For success, the District must develop an integrated solid waste management system that redefines solid waste from a burden that needs to disappear to a resource with economic, environmental and social value. Reductions in waste generated, and value capture through reuse, recycling, and composting along with refined energy production, are both considered integral to achieving this goal.

The inherent definition of sustainability is the wise and efficient use of natural and financial assets by current generations to assure viability for those in the future. The DC Department of Public Works (DCDPW) Strategy Roadmap is a planning tool to achieve that sustainability. It will provide identification and assessment of natural and financial capital investments relative to technology and process options that, in turn, provides an evidence-based guide for implementing future policies and programs to develop and sustain critical systems, as well as optimize outcomes that will meet the planned sustainability goals.

The Strategy Roadmap (SR) is evaluating alternative integrated solid waste management scenarios (including the current state) that can maximize the embedded value of DPW assets and management processes to meet *Sustainable DC* goals; develop an evaluation strategy and framework to quantitatively compare the investments necessary for each of these alternatives; and to evaluate the results. By quantifying and comparing investments needed to optimize baseline waste management operations for the future, the District will be in a better position to identify programming alternatives that contribute to a *Sustainable DC* while making informed management choices regarding its future operations.

The SR study will map strategic and process options needed to achieve the spectrum of goals established in the *Sustainable DC* plan by more specifically evaluating whether and how to:

- Increase the District’s recycling diversion rate
- Recapture the embedded energy and economic value of its waste (or residual material assets)
- Optimize the value of the waste (residual) stream while providing economic sustainability over the long term
- Interact with jurisdictional partners in operating a solid waste (residual material) management system
- Make the most efficient use of constrained air, land, and water assets within DC and in the surrounding jurisdictions to enable both conservation and future growth.

II. Study Design and Structure

The design basis of this strategic evaluation study includes depiction of the current system for use as a baseline, and comparison of future operational scenarios that meet *Sustainable DC* goals, improve operational efficiency, and optimize services. To develop these scenarios, the Arcadis Team met in workshops with DCDPW representatives and experts to:

- a) Confirm and map the component elements of the DCDPW system to be addressed in the SR study
- b) Correlate the Sustainable DC goals achievable or affected by best practice alternatives applied to DCDPW modularized process components, and
- c) Identify scenario designs that compare best practice structural and technical process alternatives to meet Sustainable DC goals.

This technical memo incorporates findings and direction developed in these workshops. Additional design and scenario development will occur as part of a public scoping process scheduled in 2014.

A. DPW Operational System Components

1. Locations and Participants

Solid residual material treated as “trash” or “garbage” in DC is a dual public/private system with both local and extra-territorial natural capital parameters to the system. Both DPW and private hauling companies carry out collection/transfer phase activities primarily within the DC geographic and natural capital scope. However, the full cycle handling of all phases handling of residual material assets include natural capital of other jurisdictions. A simplified matrix of these dual features of the DC system is as follows:

	Intra-borders	Regional
DPW/DC Government	Collection; Diversion (Water, Reuse), Sorting, Transfer	Sorting; Recycling, Fuel, Landfill
Private Haulers	Collection; Diversion (Reuse), Sorting, Transfer	Sorting, Recycling, Fuel, Landfill

2. Overview Data of System Loads

A full depiction of the dimensions of DC waste management is underway as part of the SR tasks. The following material handling amounts are general estimate levels outlined on the District of Columbia website and provide a basic introduction to the nature of the system load:

- 900,000 tons Residual Material managed in the District, 500,000 tons through its two transfer stations, 100,000 additional tons are reported as recycled by commercial haulers, and 300,000 tons of municipal solid wastes (MSW) are processed through private sector transfer stations
- 135,000 tons per year DC DPW collected
 25,000 tons of recyclables and 8,000 tons of leaves from residential properties. DPW collects an additional 50,000 tons of materials through its street and alley cleaning program and citizen drop-off services;
 42,000 tons from District government agencies and contractors servicing government building at the transfer stations
- 225,000 tons of solid waste exported to the Fairfax County Energy Resource Recovery Facility in Lorton
- Recyclables and organics (tonnage TBD) go to Maryland and Virginia facilities for processing.

3. Volume/Flow Throughput Process Phases

The DPW system for material processing is comprised of four main operational activity phases:

- **Generation** - Residual material discarded by DC homes, businesses, and government entities; litter and street accumulation
- **Collection** - Vehicles and processes used to accumulate, transport, and deposit discarded materials for further management
- **Diversion** - Sorting, separation, and transfer of materials for a variety of follow-on options that can include, reuse, bio-reuse (compost), recycling, refining (energy production), or other options
- **Disposition** - final disposal of discarded material with no further use intended

4. Opportunity Linkages between Sustainable DC Goals and DPW Operational Phases

The following chart depicts the foundational mapping of the phases of the DPW processes to the Sustainable DC goals, thereby identifying the potential gains and contributions that process improvements in those phases could contribute to the Plan, and the Air, land, and water assets potentially affected (A/L/W).

Sustainable DC/DPW Goal Map

DPW Phase	DC Sustainability Goal	Best or Available Practice Options	Natural Capital Capacity Affected (DC and Regional)
Phase I: Residual Material Generation	<ol style="list-style-type: none"> 1. 15% Reduction in Residual Material (RM) Generation 2. Recast Materials as Reusable 3. 20% reuse of Construction/Demolition Material 4. Styrofoam Elimination 	<ol style="list-style-type: none"> a. Bans b. Content Regulations c. FAR 	DC A/L/W Regional A/L/W Banked Capacity/ Credits
Phase II: Collection	<ol style="list-style-type: none"> 1. Reduce Greenhouse Gases by 50% (truck fuel) 	<ol style="list-style-type: none"> a. Combined Collections b. Fuel Switch c. Shrink distances 	DC A/L/W Regional A/L/W Banked Capacity/ Credits
Phase III: Diversion	<ol style="list-style-type: none"> 1. 80% Diversion of RM from landfills 2. 50% reduction in GHG (methane leakage) 3. 50% increase in renewable energy 4. Ensure Capacity/Capability for Population Growth 5. Grow DC Economy 	<ol style="list-style-type: none"> a. DC-based Energy Refining b. Increased regional Energy Refining b. DC-based increased recycling c. Increased Regional recycling 	DC A/L/W Regional A/L/W Banked Capacity/ Credits
Phase IV: Final Disposition	<ol style="list-style-type: none"> 1. Zero RM to Landfill 	See Phase III	DC A/L/W Regional A/L/W Banked Capacity/Credits

B. Scenario Development Parameters

Project workshop meetings held with DCDPW client representatives confirmed the strategic directions of the DCDPW, the linkages to the Sustainable DC goals, and preliminary scope of the comparative scenario structure:

1. Overarching Strategic Goals/Direction

The combination of future growth planning and sustainability planning/goals provides opportunities and economies of scale to the District to:

- Restructure and green its flow and management of solid materials
- Design and operate the system to bring greater value and return to the DC economy and its citizens in the form of jobs, renewable energy, local control, energy resiliency, natural capital capacity, and technological advancement

Key aspects of the analysis will be informed by *Sustainable DC* goals for economic development as applicable to waste management through the following precepts:

- Residual solid materials should be viewed as usable, recoverable, or refinable economic assets, and
- Geographically internalized management can be a potential positive economic and environmental activity for a municipality (San Jose is potential model for this concept)

2. Goal and Future Practice Elements

As previously identified, the DCDPW solid materials management system consists of four phases (Generation, Collection, Diversion, and Disposition) each with possible location, technology, and process options that can optimize operations in conjunction with DC economic and sustainability goals. As a result of the mapping correlation between goals and process phases, the Generation and Diversion Phases provided the widest field of opportunity for meeting sustainability goals, and will be a primary focus of the scenarios. Using research, workshop discussions and reviews, and subject matter expert input, planned scenarios will be based on the following core concepts:

- A. A “Baseline” Scenario comprised of air, land, water and cost elements of the current system (including both internal/DC and regional system elements such as landfills, transfer stations, collection processes), and “throw” rates.
- B. A source reduction in “throw rate” equal to the planned Sustainable DC goal of 15% will be included in the Generation phase of each alternative scenario
- C. “Alternative” scenarios will use a matrix format to assess location, technology, and process options that best implement the overarching strategic goals for economic and sustainability optimization aligned with Sustainable DC goals and will include:

- ▶ An 80% total diversion rate to optimized recycling and recovery practices using assets in the DC tax base
 - ▶ An 80% total diversion rate to optimized recycling and recovery practices using assets in the metropolitan area
 - ▶ An 80% total diversion rate to optimized energy refining and/or production with assets in the DC tax base
 - ▶ An 80% total diversion rate to optimized energy refining and/or production with assets in the metropolitan area
- D. The scenarios will also take into account District sustainability/economic goals including (but not limited to) job creation, renewable energy, water savings, greenhouse gas reductions, density, and population increase
- E. Implementation options evaluated will compare financial and natural capital consumption (e.g., emissions, process water, lairage) by best available, commercially viable technologies meeting agreed criteria
- F. Scenario revisions or additions, including composite options that recombine one or more goal-structured capabilities among the modular process phases, will respond to scoping inputs received through public and stakeholder meetings

As a result of the system analysis and workshop activities, a scenario design has been developed as depicted in the following chart:

Alternative Scenarios Matrix

Scenario/Process Activity	Phase 1 Load Production	Phase 2 Load Collection	Phase 3 Load Diversion	Phase 4 Load Disposition
Baseline	Baseline	Baseline	Baseline	Baseline
Optimization A1	15% Source Reduction	TBD	80% Diversion through Recycling with DC Built and Natural Infrastructure	Landfill Minimization/Elimination
Optimization A2	15% Source Reduction	TBD	80% Diversion through Recycling with Regional Built and Natural Infrastructure	Landfill Minimization/Elimination
Optimization B1	15% Source Reduction	TBD	80% Diversion through Refining with DC Built and Natural Infrastructure	Landfill Minimization/Elimination
Optimization B2	15% Source Reduction	TBD	80% Diversion through Refining with Regional Built and Natural Infrastructure	Landfill Minimization/Elimination

C. Scenario Comparison Parameters

To meet the Mayor's *Sustainable DC* plan goals, the District of Columbia's material management system must be capable of achieving an economical increase in the District's waste diversion rate, capturing embedded waste stream economic value, and optimizing system component choices among jurisdictional entities while assuring sustainable economic growth over the long term. To do so, DCDPW will assess solid residual management process options that can achieve sustainability goals, and develop factual, quantity-based, empirical data, information, and knowledge to inform residual handling decisions with evidence-based alternatives analysis.

To structure a materials management system with these capabilities, DCDPW must develop program, process, and technology options to sustainably use natural and financial asset capacity. For purposes of this study, actual levels of air, land, and water consumption or other permanent use of natural infrastructure asset capacity available and accessible under regulatory and supply restrictions are considered primary sustainability criteria along with investment costs to evaluate system operation and future management strategy.

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	○ Fill/Burial	

III. Implementation Activities

Tasks are underway as part of the project plan to collect data on the baseline activity phases and operational processes available for implementation under the scenarios developed. In particular, the proposed scenarios will be made available for review, comment, and revision in public meetings planned in the early part of 2014.

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The inherent definition of sustainability is the wise and efficient use of natural and financial assets by current generations to assure viability for those in the future.

The DC Department of Public Works (DCDPW) is developing a Strategy Roadmap that is a planning tool to achieve that sustainability.

The Strategy Roadmap (SR) is evaluating alternative integrated solid waste management scenarios (including the current state) that can maximize the embedded value of DPW assets and management processes to meet *Sustainable DC* goals; develop an evaluation strategy and framework to quantitatively compare the investments necessary for each of these alternatives; and to evaluate the results.

DPW Operational System Components

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Volume/Flow Throughput Process Phases

The DPW system for material processing is comprised of four main operational activity phases:

Generation - Residual material discarded by DC homes, businesses, and government entities; litter and street accumulation

Collection - Vehicles and processes used to accumulate, transport, and deposit discarded materials for further management

Diversion - Sorting, separation, and transfer of materials for a variety of follow-on options that can include, reuse, bio-reuse (compost), recycling, refining (energy production), or other options

Disposition - final disposal of discarded material with no further use intended

The following chart depicts the foundational mapping of the phases of the DPW processes to the *Sustainable DC* goals, thereby identifying the potential gains and contributions that process improvements in those phases could contribute to the Plan, and the Air, land, and water assets potentially affected (A/L/W).

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Phase II: Collection	Reduce Greenhouse Gases by 50% (truck fuel)	a. Combined Collections b. Fuel Switch c. Shrink distances	DC A/L/W Regional A/L/W Banked Capacity/ Credits
Phase III: Diversion	80% Diversion of RM from landfills 50% reduction in GHG (methane leakage) 50% increase in renewable energy Ensure Capacity/Capability for Population Growth Grow DC Economy	a. DC-based Energy Refining b. Increased regional Energy Refining b. DC-based increased recycling c. Increased Regional recycling	DC A/L/W Regional A/L/W Banked Capacity/ Credits
Phase IV: Final Disposition	Zero RM to Landfill	See Phase III	DC A/L/W Regional A/L/W Banked Capacity/Credits

Using research, workshop discussions and reviews, and subject matter expert input, planned scenarios will be based on the following core concepts:

Baseline” Scenario comprised of air, land, water and cost elements of the current system (including both internal/DC and regional system elements such as landfills, transfer stations, collection processes), and “throw” rates.

A source reduction in “throw rate” equal to the planned Sustainable DC goal of 15% will be included in the Generation phase of each alternative scenario

“Alternative” scenarios will use a matrix format to assess location, technology, and process options that best implement the overarching strategic goals for economic and sustainability optimization aligned with Sustainable DC goals and will include:

- 80% total diversion rate to optimized recycling and recovery practices using assets in the DC tax base
- 80% total diversion rate to optimized recycling and recovery practices using assets in the metropolitan area
- 80% total diversion rate to optimized energy refining and/or production with assets in the DC tax base
- 80% total diversion rate to optimized energy refining and/or production with assets in the metropolitan area

The scenarios will also take into account District sustainability/economic goals including (but not limited to) job creation, renewable energy, water savings, greenhouse gas reductions, density, and population increase

Implementation options evaluated will compare financial and natural capital consumption (e.g., emissions, process water, acreage) by best available, commercially viable technologies meeting agreed criteria

Scenario revisions or additions, including composite options that recombine one or more goal-structured capabilities among the modular process phases, will respond to scoping inputs received through public and stakeholder meetings

As a result of the system analysis and workshop activities, a scenario design has been developed as depicted in the following chart:

Alternative Scenarios Matrix

Scenario/Process Activity	Phase 1 Load Production	Phase 2 Load Collection	Phase 3 Load Diversion	Phase 4 Load Disposition
Baseline	Baseline	Baseline	Baseline	Baseline
Optimization A1	15% Source Reduction	TBD	80% Diversion through Recycling with DC Built and Natural Infrastructure	Landfill Minimization/Elimination
Optimization A2	15% Source Reduction	TBD	80% Diversion through Recycling with Regional Built and Natural Infrastructure	Landfill Minimization/Elimination

Optimization B1	15% Source Reduction	TBD	80% Diversion through Refining with DC Built and Natural Infrastructure	Landfill Minimization/Elimination
Optimization B2	15% Source Reduction	TBD	80% Diversion through Refining with Regional Built and Natural Infrastructure	Landfill Minimization/Elimination

We are using a *Capacity to Capability* analytic method. *Capacity to Capability* analysis enables client decision-makers to build capability-based, sustainable system design strategies by first identifying and measuring capital asset capacity needed to meet capability goals. It then develops scenario options that efficiently reduce or minimize capacity needed to generate the highest levels of system performance at the lowest capital use rates

. *Natural Capital Asset Management (NCAM)*

By focusing on the measurable volumes of natural, physical, and financial capital that are, or might be used to avoid, reduce, or handle materials managed by the residuals/waste system, this evaluation quantitatively identifies needed technology and processes capable of providing system-wide capability for handling residual materials at the lowest asset capacity use levels.

As part of its analysis, we will use Natural Capital Asset Management (NCAM) to provide the framework for completing this work.

NCAM is a relational database tool that has been developed to allow for the comparison of alternative solutions to complex problems and give decision-makers information they need to select solutions which uses the lowest or most efficient volumes of capital assets to achieve the greatest system capability performance, as well as consider other key capital factors.

Anticipated Natural Capital Asset Use Categories in DPW Systems

Air Asset Capacity (RMM)	Land Asset Capacity (OPS, RMM)	Water Asset Capacity (OPS, RMM)
Criteria Pollutants	Built Infrastructure (Stationary, Transport)	Process
Greenhouse Gases	Storage	NPDES
Hazardous Pollutants	Safety/Setback	Sanitary/Sewer
	Fill/Burial	

From: Clemm, Hallie (DPW) </O=DC GOVERNMENT/OU=FIRST ADMINISTRATIVE GROUP/CN=RECIPIENTS/CN=HALLIE.CLEMM>
Sent: Friday, January 10, 2014 10:00:45 AM
To: Corning, Bruce (Biff)
Cc:
Subject: RE: Draft TM and Brief

Thanks.

From: Corning, Bruce (Biff) [mailto:Bruce.Corning@arcadis-us.com]
Sent: Friday, January 10, 2014 8:57 AM
To: Clemm, Hallie (DPW)
Subject: Draft TM and Brief

Hallie: I did find your voice mail...I turned off my phone and restarted it. Presto, voicemails. Please find the two documents we discussed transmitted herewith. I urge you to have Bill read the whole TM to give him context for the abbreviated version. Let me know. Biff

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From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Friday, January 10, 2014 3:23:52 PM
To: Clemm, Hallie (DPW)
Cc:
Subject: Data

Hallie: So, tell me again, how do you want us to request the data from the privates and the receivers? Shall I have Tiffany call you and let her know what she wants, or how best to get it? I would like to have the data documented by the sender/provider as if we are asked by people like Mary Cheh or others, we can provide them with the source, so it is formal and documented. Thoughts? Biff

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From: Clemm, Hallie (DPW) </O=DC GOVERNMENT/OU=FIRST ADMINISTRATIVE GROUP/CN=RECIPIENTS/CN=HALLIE.CLEMM>
Sent: Friday, January 10, 2014 3:25:18 PM
To: Corning, Bruce (Biff)
Cc:
Subject: RE: Data

We can do a letter for Sybil's signature....have Tiffany call me Monday.

From: Corning, Bruce (Biff) [mailto:Bruce.Corning@arcadis-us.com]
Sent: Friday, January 10, 2014 2:24 PM
To: Clemm, Hallie (DPW)
Subject: Data

Hallie: So, tell me again, how do you want us to request the data from the privates and the receivers? Shall I have Tiffany call you and let her know what she wants, or how best to get it? I would like to have the data documented by the sender/provider as if we are asked by people like Mary Cheh or others, we can provide them with the source, so it is formal and documented. Thoughts? Biff

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From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Monday, January 13, 2014 2:38:09 PM
To: Clemm, Hallie (DPW)
Cc:
Subject: FW: Special Events Waste Diversion Act

So have you seen this?

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From: Chancee Lundy [mailto:clundy@nspiregreen.com]
Sent: Monday, January 13, 2014 1:36 PM
To: Corning, Bruce (Biff)
Subject: Special Events Waste Diversion Act

Biff,

February 5th is the date of the hearing for this bill.

<http://dclims1.dccouncil.us/images/00001/20130619121437.pdf>

--

Chancee Lundy
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Nspiregreen, LLC
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Washington, DC 20004

O: 202 434 8921
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From: Clemm, Hallie (DPW) </O=DC GOVERNMENT/OU=FIRST ADMINISTRATIVE GROUP/CN=RECIPIENTS/CN=HALLIE.CLEMM>
Sent: Monday, January 13, 2014 5:07:24 PM
To: Corning, Bruce (Biff)
Cc:
Subject: RE: Special Events Waste Diversion Act

Bill read the briefing and the TM....he has questions and needs to be walked through.....I will know a time tomorrow morning...is there a particularly impossible time for you over the next 3 days?

You don't have to come in....you can do this by phone. Please advise and thank you.

From: Corning, Bruce (Biff) [mailto:Bruce.Corning@arcadis-us.com]
Sent: Monday, January 13, 2014 1:38 PM
To: Clemm, Hallie (DPW)
Subject: FW: Special Events Waste Diversion Act

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From: Chancee Lundy [mailto:clundy@nspiregreen.com]
Sent: Monday, January 13, 2014 1:36 PM
To: Corning, Bruce (Biff)
Subject: Special Events Waste Diversion Act

Biff,

February 5th is the date of the hearing for this bill.

<http://dcclims1.dccouncil.us/images/00001/20130619121437.pdf>

--

Chancee Lundy
Partner/Principal Environmental Manager
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Facebook: NspiregreenLLC

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From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Thursday, January 16, 2014 6:32:49 PM
To: Clemm, Hallie (DPW)
Cc:
Subject: Re: tomorrow

Hey. Am now driving back from Harrisburg and am on the phone now. Does 130 or 2 work? I am easy really. Biff

Sent from my iPhone

On Jan 16, 2014, at 5:12 PM, "Clemm, Hallie (DPW)" <hallie.clemm@dc.gov> wrote:

I just left you a message.....can you help walk Bill and Sybil through the technical memo tomorrow afternoon...what time works best?

Look out for those in need this winter. When the temperature or wind chill is 32°F or below, the District issues a Hypothermia Alert. For assistance during an Alert: call the Shelter Hotline at 1-800-535-7252 or 311. Or, send an email to the Shelter Hotline (uposh@upo.org).

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From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Friday, January 17, 2014 8:55:00 AM
To: Clemm, Hallie (DPW)
Cc:
Subject: Accepted: Solid Waste Management Study

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From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Thursday, January 23, 2014 12:17:34 PM
To: Clemm, Hallie (DPW)
Cc:
Subject: As Requested
Attachments: ChehRodmap Bullet points.doc

Here you go kiddo

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- Thank you for developing this important bill for the future of the District of Columbia.
 - The DC Department of Public Works (DPW) welcomes the inputs provided by the proposed legislation
 - Ms. Cheh is a recognized and vital supporter of the Mayor's "Sustainable DC Plan" (the Plan) (note: the favorable reporting last November of the "Sustainable DC Act of 2012" by the Committee on Environment, Public Works, and Transportation which she chairs)
- DPW been working hard to develop a strategic posture and execution plan that outlines its commitment to the integrated environmental, economic, and social goals of the Plan and a way forward
 - To accomplish this, DPW is developing a Strategic Roadmap to provide a preliminary evaluation of its baseline operations and future options.
- The Roadmap will evaluate current operations and future optimization by comparing financial and natural capital use and investment levels likely needed to:
 - Reduce trash generation
 - Cut greenhouse gases
 - Reduce other potentially harmful emissions and discharges
 - Create jobs in DC
 - Enable population growth
 - Increase renewable energy production
- Key to this effort is recognition that our technology choices cannot occur in a data vacuum.
 - Currently, nearly one million tons of residual materials are collected in DC every year by DPW and private haulers.
 - The following are but a few illustrative examples of the data elements (and voids) of the DC Waste Management system we feel it imperative to review and assess before implementing process requirements that may not contribute to the Sustainability goals, or may, in fact, impede their achievement:
 - The DPW trucks performing only collection phase activities use over 600,000 gallons of fuel annually, whose GHG and other emissions must be reduced under the Sustainability Plan (this volume does not include the fuel and emissions from transport to recycling, energy, and landfill facilities that are also part of the total materials handling system)
 - Tipping fee outlays and other charges paid by DC contribute to the job and tax base of other regional entities
 - No public data exists as to the volumes of water used and/or consumed by recycling and other diversion activities in the system; water use is a key aspect of sustainability that must be discovered from our partner organizations and reviewed as part of due-process compliant decision-making
- To develop a data-based strategic posture, we are crafting a Strategic Roadmap that will baseline the financial and natural capital currently in use by the Waste Management System, and compare it to commercially available alternatives that can be operated both inside DC and within the region

From: Clemm, Hallie (DPW) </O=DC GOVERNMENT/OU=FIRST ADMINISTRATIVE GROUP/CN=RECIPIENTS/CN=HALLIE.CLEMM>
Sent: Thursday, January 23, 2014 12:19:24 PM
To: Corning, Bruce (Biff)
Cc:
Subject: Re: As Requested

Merci beaucoup neSent from my Sprint phone. nene"Corning, Bruce (Biff)" <Bruce.Corning@arcadis-us.com> wrote: ne

Here you go kiddo

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From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Thursday, January 23, 2014 10:02:01 AM
To: Clemm, Hallie (DPW)
Cc:
Subject: Today

We are having a group meeting today to start populating the data into the NCAM matrix. Do you want to address the crowd or make any comments? Biff

Biff Corning | biff.corning@arcadis-us.com
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From: Clemm, Hallie (DPW) </O=DC GOVERNMENT/OU=FIRST ADMINISTRATIVE GROUP/CN=RECIPIENTS/CN=HALLIE.CLEMM>
Sent: Thursday, January 23, 2014 10:13:45 AM
To: Corning, Bruce (Biff)
Cc:
Subject: RE: Today

Can you possibly resend me the response you drafted to Cheh's legislation? I need to put together testimony and I cannot find it. Thanks.

From: Corning, Bruce (Biff) [mailto:Bruce.Corning@arcadis-us.com]
Sent: Thursday, January 23, 2014 9:02 AM
To: Clemm, Hallie (DPW)
Subject: Today

We are having a group meeting today to start populating the data into the NCAM matrix. Do you want to address the crowd or make any comments? Biff

Biff Corning | biff.corning@arcadis-us.com
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From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Friday, January 24, 2014 9:23:16 AM
To: Clemm, Hallie (DPW)
Cc:
Subject: You

Have time for a quick call?

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From: Clemm, Hallie (DPW) </O=DC GOVERNMENT/OU=FIRST ADMINISTRATIVE GROUP/CN=RECIPIENTS/CN=HALLIE.CLEMM>
Sent: Friday, January 24, 2014 9:27:58 AM
To: Corning, Bruce (Biff)
Cc:
Subject: RE: You

I just called....no answer...call me in the office...202-645-5141.

From: Corning, Bruce (Biff) [mailto:Bruce.Corning@arcadis-us.com]
Sent: Friday, January 24, 2014 8:23 AM
To: Clemm, Hallie (DPW)
Subject: You

Have time for a quick call?

Biff Corning | biff.corning@arcadis-us.com

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From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Saturday, January 25, 2014 11:35:26 AM
To: Clemm, Hallie (DPW)
Cc:
Subject: This and That

So I was thinking about our conversation from yesterday and had these thoughts having digested it a bit. I completely understand your concerns, and your analogy of would I tell CH2 about my operating budget, etc. is a good one. Having said that, the difference is that the District is under a mandate, from the Mayor if not their own acquisition rules to pick the most environmentally preferable alternative when it comes to products and services. It seems to me that an argument could be made to your service providers is that you are in the process of determining the environmental preferable option as required by your acquisition rules. These companies are not (true for us too!) protecting the secret formula for coca cola. The District, in spending public funds, under a mandate to protect the environment when possible, are under an obligation to make these choices. But I do know that there are political realities, and there may be important relationships and all that sort of thing to protect, and obviously you have to make that call. And I am changing the letter. But I also urge you to draw yourself back from the tactical role that you, by nature of your job, play and use this project as the opportunity if not excuse to show the bosses on how it is time if not their obligation to think strategically. No? Biff

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From: Clemm, Hallie (DPW) </O=DC GOVERNMENT/OU=FIRST ADMINISTRATIVE GROUP/CN=RECIPIENTS/CN=HALLIE.CLEMM>
Sent: Wednesday, January 29, 2014 2:57:34 PM
To: Corning, Bruce (Biff)
Cc:
Subject: RE: This and That

Yes please

From: Corning, Bruce (Biff) [mailto:Bruce.Corning@arcadis-us.com]
Sent: Wednesday, January 29, 2014 1:57 PM
To: Clemm, Hallie (DPW)
Subject: RE: This and That

Yes, I just got home because I have to put a workshop together. I can talk.....shall I call you?

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From: Clemm, Hallie (DPW) [mailto:hallie.clemm@dc.gov]
Sent: Wednesday, January 29, 2014 1:56 PM
To: Corning, Bruce (Biff)
Subject: RE: This and That

Are you available?

Look out for the homeless this winter. When the actual or forecasted temperature or wind chill is 32 degrees F or below, the District issues a Hypothermia Alert. To request support for persons who are homeless and on the street now, contact the Shelter Hotline at 1-800-535-7252 or 311 or email uposh@upo.org.

From: Corning, Bruce (Biff) [mailto:Bruce.Corning@arcadis-us.com]
Sent: Saturday, January 25, 2014 10:35 AM
To: Clemm, Hallie (DPW)
Subject: This and That

So I was thinking about our conversation from yesterday and had these thoughts having digested it a bit. I completely understand your concerns, and your analogy of would I tell CH2 about my operating budget, etc. is a good one. Having said that, the difference is that the District is under a mandate, from the Mayor if not their own acquisition rules to pick the most environmentally preferable alternative when it comes to products and services. It seems to me that an argument could be made to your service providers is that you are in the process of determining the environmental preferable option as required by your acquisition rules. These companies are not (true for us too!) protecting the secret formula for coca cola. The District, in spending public funds, under a mandate to protect the environment when possible, are under an obligation to make these choices. But I do know that there are political realities, and there may be important relationships and all that sort of thing to protect, and obviously you have to make that call. And I am changing the letter. But I also urge you to draw yourself back from the tactical role that you, by nature of your job, play and use this project as the opportunity if not excuse to show the bosses on how it is time if not their obligation to think strategically. No? Biff

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From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Thursday, January 30, 2014 10:30:14 AM
To: Clemm, Hallie (DPW)
Cc:
Subject: SWMP Memorandum
Attachments: SWMP Memorandum _Nspiregreen v 1.docx

I am deciding. Biff

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Memorandum

To: Sybil Hammond/ Hallie Clemm (DCDPW)

From: ARCADIS Team

Subject: DCDPW's Strategic Roadmap

Date: January 28, 2014

Introduction

DCDPW is working with a team of consultants to develop a plan that does the following:

- (1) Embraces the viewpoint that solid waste (more favorably called residual material) is an untapped asset rather than a burden to the District
- (2) Critically reviews the current solid waste management operations in the District and their ability to meet the goals set forth by Mayor Vincent Gray's Sustainable DC Plan
- (3) Develops a set of scenarios that use the available waste management technologies (i.e. recycling, land fills, etc.) in the most cost-effective and sustainable manner.

This plan is called the Strategic Roadmap. With the finalization of the Sustainable DC Plan and an opportunity to shift current operations, the team will complete and deliver a system evaluation with options for a new system model.

Executive Summary

The DCDPW team is currently developing a plan, the Strategic Roadmap, to analyze the current system and develop new models, which enable DC to meet its sustainability goals by 2032.

The Strategic Roadmap will:

- View solid waste management planning as an asset, source of capital and as a potential energy source, rather than a burden.

- Examine a range of scenarios (including a current-system baseline analysis), which evaluate the best use of our natural capital assets (i.e. air, land, and water resources) in handling residual material.
- Evaluate each scenario by its ability to help DC to meet its sustainability goals
- Consider a variety of existing and new technologies (i.e. recycling, composting, land fills, etc.) that are available commercially
- Apply best practices to each technology in each of the system components (i.e. generation, collection, diversion, disposition) of the model to inform and guide policy-making for DC officials.
- Reveal the true natural capital (air, land and water) costs associated with technologies and practices of handling residual material

Background Information

The current system handles almost one million tons of residual material that is collected by both DCDPW and private haulers each year. DCDPW has the opportunity to evaluate its current system's cost effectiveness and its ability to meet goals set forth within the Sustainable DC Plan.

2032 Goals by Sustainable DC

Sustainable DC has set forth a number of goals that are relevant to the development of the Strategic Roadmap. These goals are:

1. Achieve zero waste through reducing consumption and reuse
2. Increase green goods and services jobs 5 times over
3. Cut city-wide unemployment by 50%
4. Attract and retain 250,000 new and existing residents
5. Cut city-wide greenhouse gas emissions by 50%
6. Increase use of renewable energy to 50%

Barriers to Success in the Current System

Within the current system, many aspects may not be helping, in some cases actually impeding DC from reaching its sustainability goals. See the two examples below:

- DCDPW trucks currently consume over 600,000 gallons of fuel annually during the collection of residual material alone. In order to meet the Sustainable DC goal of cutting greenhouse gases by 50% by the year 2032, this number must be reduced and/or a cleaner fuel, green vehicles, and a more strategic approach to collections must be used.
- DC currently pays tipping fees and other costs associated with residual material management to other regional municipalities which supports their tax base and provides jobs to areas outside of DC. With the Sustainable DC goal of cutting unemployment and expanding opportunities for green-sector jobs, the use of new technologies that are based in DC should be a priority.

DPW Strategic Roadmap

The Strategic Roadmap is the plan that the DPW team is developing to evaluate the current system of solid waste management and provide options, which are cost effective and help to guide DC to reach its sustainability goals.

Turn a Negative into a Positive

"Trash" is the most common term for solid waste, which implies a negative connotation. It is currently viewed as a burden on our society, rather than a potential valuable commodity. Therefore the DCDPW team has developed a new set of terms to be used in discussing this work. For example:

Old Term	New Term
Solid waste	Residual material
Air, water, and land resources (used to process solid waste)	Natural capital assets
Solid waste management	Natural capital asset management

Elements of the Strategic Roadmap

System components: In the management of residual material, there are four system components that will be studied and used in the Natural Capital Asset Management (NCAM) model.

These components are:

Components	Definition
<u>Generation:</u>	materials discarded by DC residents, businesses, government agencies, as well as litter and other sediment found in DC streets and public spaces.
<u>Collection:</u>	pick-up, transportation, and delivery of residual material for further processing
<u>Diversion:</u>	sorting, separation, and transfer of materials to undergo further processes such as recycling, reuse, composting, refining (energy production), and other options
<u>Disposition:</u>	final disposal of discarded material with no further use intended

The NCAM Model

The Natural Capital Asset Management Model is a relational database tool that will be used to evaluate the measurable amounts of natural, physical, and financial capital assets that are used or may be used to manage residual material in reducing, reusing, and otherwise handling such material. The model is described below:

- First, the model identifies the capacity of the current system of natural capital assets. A system's capacity is defined as the amount of air, land, and water space or volume currently available within the boundaries of the study area (based on permits, leases, deeds and other access rights).
- The model then uses data from applicable technologies and practices and compares it to the system capacity, generating a set of numbers. For example, recycling uses "x" amount of air from emissions, "x" amount of acres for a plant, and "x" amount of water for the process. A best practice may be to establish bottle recycling at grocery stores, thereby eliminating "x" amount of glass and plastic bottles from the recycling stream. Therefore the amount of system capacity used is reduced.
- Through some analysis of the numbers, technologies and practices can be identified which enhance a system's capability to handle residual material while also using the lowest amount of capital assets.

In our case, a baseline analysis will be used to determine the current use of natural capital assets in the capacity of the DC system. From this baseline, scenarios will be run which depict increase or decreases in capacity as well as asset usage.

Scenario Development

Scenarios will be built which apply best and available practices to each of the technologies used in each of the system components. These scenarios will be developed through the use of research, interviews with experts, and workshops with stakeholders and the public. Each scenario will be input into the NCAM model matrix to evaluate the affects of each technology, its location, and any best practices applied against its use of DC's natural capital assets in the management of residual material. Scenarios will then be evaluated against the Sustainable DC goals, and its ability to enable DC to reach those goals.

A draft set of scenario models have been produced in the chart below and will be altered as necessary depending on feedback from the public and stakeholders through workshops. We hope to have workshop participants build their own scenario that will be run through the model as well.

Scenarios Matrix

Scenario/ Process Activity	Phase 1 Load Production	Phase 2 Load Collection	Phase 3 Load Diversion	Phase 4 Load Disposition
Baseline	Baseline	Baseline	Baseline	Baseline
Optimization A1	15% Source Reduction	TBD	80% Diversion through Recycling with DC Built and Natural Infrastructure	Landfill Minimization/Elimination
Optimization A2	15% Source Reduction	TBD	80% Diversion through Recycling with Regional Built and Natural Infrastructure	Landfill Minimization/Elimination
Optimization B1	15% Source Reduction	TBD	80% Diversion through Refining with DC Built and Natural Infrastructure	Landfill Minimization/Elimination
Optimization B2	15% Source Reduction	TBD	80% Diversion through Refining with Regional Built and Natural Infrastructure	Landfill Minimization/Elimination

From: Clemm, Hallie (DPW) </O=DC GOVERNMENT/OU=FIRST ADMINISTRATIVE GROUP/CN=RECIPIENTS/CN=HALLIE.CLEMM>
Sent: Friday, January 31, 2014 3:27:14 PM
To: Corning, Bruce (Biff)
Cc:
Subject: RE: SWMP Memorandum

[Is it worth my time to read this?](#)

From: Corning, Bruce (Biff) [mailto:Bruce.Corning@arcadis-us.com]
Sent: Thursday, January 30, 2014 9:30 AM
To: Clemm, Hallie (DPW)
Subject: SWMP Memorandum

I am deciding. Biff

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From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Tuesday, February 04, 2014 10:43:30 AM
To: Clemm, Hallie (DPW)
Cc:
Subject: Invoices

Would you please send me an email that says that you would like me/Arcadis to send both the contracts person as well as you, the COTR the invoices. If you would, would you please send it as a new email rather than a response to this. Please? Working on the other stuff. Biff

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From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Tuesday, February 04, 2014 3:09:56 PM
To: Clemm, Hallie (DPW)
Cc:
Subject: Spilling Out of My Head
Attachments: DPWMSW2413.docx

Is this too simple?

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Current Situation

The District of Columbia has to make decisions about how to handle municipal solid waste over the next twenty years.

In order to do so legally and effectively, DPW must comply with the requirements of the DC Sustainability Plan and also be prepared to handle a projected 250,000 increase in population over the next twenty years.

As well, DC has set goals to reduce its climate footprint and other air, water, land footprints (natural infrastructure).

DC should benefit from the economic value of handling residual assets and have them accrue in DC rather than outside the jurisdiction.

Solution

Therefore DPW is developing an analytic framework that handles substantive data and information that defines the current DC solid waste management system and compares it, using the same data variables, alternative designs for a solid waste management system that accounts for current technologies, regulations, City mandated actions, and environmentally preferable actions.

These design elements are not now fully integrated into the current system because they were not required at that time. DPW will have the ability now to consider these variables in considering options.

DPW is going to map their strategy from the process of solid waste management rather than just from the materials we collect.

Current strategies include singular acts such as limiting Styrofoam. DPW is going to use a more systematic approach to decision making. We are taking an executive management approach to the entire system.

DPW is including these features of natural capital asset management with financial information as part of the due process in evaluating technology choices and understanding their environmental, economic and political outcomes.

Below is snapshot of what that analytic tool DPW will use.

From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Tuesday, February 04, 2014 3:12:50 PM
To: Clemm, Hallie (DPW)
Cc:
Subject: Forgot

I forgot to include that the data and information in the spreadsheet gives DC the knowledge to:

Understand the current Natural Capital Use in its system, and relate that to DC Sustainability Goals

Identify process and technology options MOST LIKELY to actually meet sustainability goals based on real-time air, land, and water use

Communicate with stakeholders as decisions are developed and implemented

And we will add financial data will be added as we progress.

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From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Wednesday, February 05, 2014 9:38:02 AM
To: Clemm, Hallie (DPW)
Cc:
Subject: Hearing

Good Morning! So what time is the hearing? I am going to try to listen on line. Biff

Sent by Biff

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From: Corning, Bruce (Biff) <Bruce.Corning@arcadis-us.com>
Sent: Friday, February 07, 2014 11:53:52 AM
To: Clemm, Hallie (DPW)
Cc:
Subject: Leaving

My office now

Sent by Biff

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