INDICATOR PRIORITIZATION *

Project Scope

The **Greenfield Case Study Charrette** is a theoretical exercise within the Plan It Calgary project, intended to be a model for future greenfield development in Calgary. Framed within Plan It Calgary's Hybrid Scenario, this case study charrette will explore the consequences of applying the 11 Sustainability Principles approved by Council in 2007 in a generic greenfield geographical area in Calgary. The charrette will explore practical and viable design strategies, urban form, land uses, transportation, and other key issues to meet Calgary's Sustainability Principles, as well as replicability throughout similar sites across the City.

Plan It Calgary Framework

The Plan It Calgary project is framed by the Decision Support Framework, which consists of the 11 Sustainability Principles approved by Council in 2007, supporting objectives derived from imagineCALGARY, and a set of indicators that measure progress towards the objectives and principles. Each phase of the project has an indicator set appropriate to the scale of exploration.

Objective of Indicator Prioritization

The objective of the Indicator Prioritization session was to become familiar with the indicator set and identify those that the stakeholder group considered most important to understanding the success of charrette outputs in achieving the 11 Sustainability Principles. In a follow-up workshop, the stakeholder set a target for each of the priority indicators (6). The project team will measure charrette outputs against the full indicator set (15) to quantify the extent to which the proposal achieves the targets. This handout includes a description of the full set of indicators, with the priority ones indicated with bold italic letters.

Selecting Indicators and Metrics

Indicators measure progress towards objectives and can provide a basis for comparison against different scenarios. Indicators cannot measure every aspect of an objective, but when chosen correctly can serve as a useful predictor of performance.

Good indicators for the Plan It Calgary process in general, and for the Greenfield Case Study Charrette in particular, should be:

- Relevant to catalyzing and driving design decisions (as opposed to measuring performance after design has been completed);
- Easily measurable (closely tied to physical data such as lengths of roads, numbers of dwelling units, area of parks, distance to transit, etc.);
- Reliably measurable (based on available data and based on design decisions that will be "drawn on the map" at the charrette);
- Connected to local priorities;
- Sensitive to alternative approaches and related to "where we want to be"; and,
- Multi-purpose (ideally). Selected indicators may be able to be used for multiple objectives (or may rely on data that is pertinent to multiple objectives).

* This handout has been updated for the June 2008 Design Brief Learning and Consultation Sessions

PRINCIPLES & OBJECTIVES   INDICATORS

1 Create a range of housing opportunities and choices
1.1a Increase mix of market and non-market housing types within communities   *Housing Diversity*

2 Create walkable environments
2.1a Increase proximity of housing to local goods and services   Proximity to Activity Centres
2.2a Increase amount, directness, connectivity, accessibility, and safety   *Route Connectivity*
     of pedestrian routes

3 Foster distinctive, attractive communities with a strong sense of place
3.2b Focus location of community amenities at nodes   Amenity Distribution
3.4a Create mixed use activity centers and public spaces at all scales   Proximity to Activity Centres
     (regional and neighbourhood)   *Land Use Diversity*

4 Provide a variety of transportation options
4.1a Increase amount of transportation infrastructure that is multi-modal   Transportation Diversity
4.1c Increase use of non-auto transportation infrastructure   Cycling Network Intensity
                                                                       Proximity to Transit

5 Preserve open space, agricultural land, environmental beauty
and critical environmental areas
5.1a Increase size and number of protected, restored and connected open spaces   *Open Space Intensity*
     and critical environmental areas   Open Space Proximity

6 Mix land uses
6.1a Increase use mix within buildings, blocks and communities   *Land Use Diversity*
6.1b Increase use mix at transit nodes and along transportation corridors   Mixed Use Parcel Intensity

7 Strategically direct and manage redevelopment opportunities
within existing areas
7.1a Increase area of restored brownfield and greyfield land redeveloped
7.1b Increase percentage of development in existing areas

8 Support compact development
8.1a Increase overall density of development (residential and non-residential)   *Development Intensity*
                                                                       Amenity Distribution
8.2b Cluster residential and non-residential uses around activity centres   Proximity to Activity Centres
     and nodes and transportation corridors   *Proximity to Transit*

9 Connect people, goods and services locally, regionally and globally
9.1c Increase population and jobs within walking distance of major transit nodes   Cycling Network Intensity
                                                                       Proximity to Transit
9.2a Ensure access to and connectivity of natural areas   Open Space Proximity
9.4a Increase connectivity to and between communities   External Community Connectivity
                                                                       Route Connectivity

10 Provide transportation services in a safe, effective, affordable and
efficient manner that ensures reasonable accessibility to all areas
of the city for all citizens
10.1a Provide cost-effective public transit, pedestrian, and cycling service   *Proximity to Transit*
      to every part of city   Cycling Network Intensity
10.4c Ensure supportive land uses adjacent to transportation corridors   *Development Intensity*

11 Utilise green infrastructure and buildings
11.2a Promote urban forms and infrastructure that support alternative   *Development Intensity*
      and renewable energy production and reduced energy consumption   Solar Orientation Intensity
11.8a Develop alternative stormwater management systems that reduce   Green Infrastructure Intensity
      environmental impact and maintain pre-development flows and volumes

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INDICATORS

1 *Housing Diversity*

Metric: Housing diversity index

Providing a range of housing opportunities and choices is an important aspect of building complete communities. Housing diversity within a community directly relates to housing affordability, as it indicates there are housing options to meet the needs of residents of differing economic situations and household type (e.g. families with kids, without kids, singles, seniors). The Simpson's diversity index applied to housing types provides a measure of the different housing options in a community, expressed as a value between 0 and 1, where 0 means less diversity and 1 means more diversity. This metric applies the diversity index for the whole case study site (approximately 200 ha, 800m radius, 10 minute walk).

Relates to **Principle 1**

2 Proximity to Activity Centres

Metric: % of people within 400m of activity centres and linear corridors

Generally, people will walk 5 minutes (400m) to services and commercial corridors. Measuring how many people live within walking distance to these provides a good indication whether the population is distributed to support local businesses.   A greater intensity of people and uses creates more vibrant places. Well designed, interconnected routes that link residential areas and activity centres are required to encourage walking and cycling. This metric defines activity centres as commercial and service areas of sufficient size (generally larger than 1 ha) to support the provision of daily needs and activities. Larger ones are sometimes mixed use, but not always. These centres are often identified by charrette participants. Major corridors are considered as linear activity centres as they serve similar purposes.

Relates to **Principles 2,3, and 8**

3 Amenity Distribution

Metric: % commercial and civic land uses within activity centres

Clustering services and amenities is key in promoting vibrant, attractive communities. Activity centres also function as neighbourhood centres that support and are supported by compact development. Amenity distribution reflects the local conditions and values of residents. Because the specific amenities are not defined at the 1:2000 scale, this metric assumes that commercial and civic uses include different amenities, and measures the share of these uses within the rest of land uses in activity centres.

Relates to **Principles 3 and 8**

4 Transportation Diversity

Metric: Transportation Diversity Index

Providing a variety of transportation options is an important aspect of building complete communities. A multi-modal approach to transportation integrates and connects all modes: pedestrians, bicycles, transit, and automobiles. It also increases the availability of high-quality transit service. The Simpson's diversity index applied to transportation modes by length of infrastructure, provides a measure of transportation options in a community. Using the Simpson's diversity index formula, expressed as a value between 0 and 1, where 0 means less diversity and 1 means more diversity. This metric applies the diversity index for the whole case study site (approximately 200 ha, 800m radius, 10 minute walk). This metric does not consider aspects of quality and efficiency.

Relates to **Principle 4**

INDICATORS

5 Cycling Network Intensity

Metric: Length of continuous cycling network per 1000 people

Promoting cycling is one way of providing transportation options and connecting people locally and regionally in an affordable and environmentally sustainable way, as it involves no fossil fuel consumption and produces no CO_2 emissions. Cycling also contributes to health and well-being. Ensuring a continuous cycling network is a key factor in encouraging cycling as a transportation option. Improving comfort, safety, and security for cyclists also encourages cycling, although these aspects are not captured by this metric. This metric measures the total length of continuous cycling network (commuter and recreational) per 1000 people.

Relates to **Principles 4,9, and 10**

6 *Proximity to Transit*

Metric: % of people and % of jobs within 400m of high premium / capacity transit

Measuring how many people live and work within walking distance (400m) to premium / high capacity transit provides a a good indication whether population and jobs are distributed to support this type of transit. Proximity to corridors shortens total trip length, making transit more attractive to use, increasing ridership and reducing greenhouse gas emissions and traffic. A higher population and jobs base at a corridor or node also supports a greater mix of uses. For the charrette outputs measurement, this metric will use GIS analysis to calculate the population within 400m to premium / high capacity transit corridors and nodes as a percentage of the total population and jobs. This metric measures distances by network to address directness of pedestrian routes.

Relates to **Principles 4,8,9, and 10**

7 *Open Space Intensity*

Metric: open space area per 1000 people

Open space per capita is a common indicator of livability. "Parks help define the environment of our cities as well as their recreational offerings, culture, and *feel*" (Center for Public Park Excellence). This metric measures how much open space is available relative to the number of people potentially using it. Open space includes parkland, recreation and naturalized open space. This metric measures the total area designated for open space divided by the total population within the case study area. This metric does not reflect aspects such as quality, programming, connectivity, distribution of open space within a community, or intensity of use (e.g. number of users), which is key for the liveability of open spaces.

Relates to **Principle 5**

8 Open Space Proximity

Metric: % people and % jobs within 400m of open space at neighbourhood scale

Proximity to open space is a key attribute of attractive, livable communities. Maximizing the population within walking distance (400m, 5 minute walk) to open space within a community increases accessibility to open space and overall community walkability. A greater intensity of people also creates more vibrant open spaces and provides safety (i.e. "eyes on the street"). This measure provides a good indication whether population and jobs are distributed within an easily accessible distance to open space. Well designed, interconnected routes that link residential areas and open spaces are required to encourage walking.

Relates to **Principles 5 and 9**

INDICATORS

9 *Land Use Diversity*

Metric: Land Use Diversity Index
Land use diversity measures the degree to which different land uses are found within communities. Communities with a range of land uses can support residents to working close to home and walking to the services they need. The Simpson's diversity index applied to land use provides a measure of the land uses mix within a community, expressed as a value between 0 and 1, where 0 means less diversity and 1 means more diversity. The land uses distribute into eight categories: detached, attached, multi-family residential; commercial; mixed-use; civic; and, industrial. This metric applies the diversity index for the whole case study site (approximately 200 ha, 800m radius, 10 minute walk). It assumes an even balance of land uses to be optimal. It only provides a generalized indication of how well neighbourhoods provide the ideal mix of uses for a community, as an optimum land use balance does not necessarily mean an even proportion of land uses within a community's urban area.

Relates to **Principles 3 and 6**

10 Mixed Use Parcel Intensity

Metric: % parcels that contain more than one use
A mix of land uses at the parcel scale is key to achieving more complete communities, where homes, businesses, services, civic, and commercial activities are in close proximity. Mixed uses within a parcel support alternatives to driving such as walking and biking while increasing transit viability. The resulting increased number of people on the street enhance the community's vitality and perceived security. Measuring the share of parcels that contain more than one use within a community is a useful way of quantifying a community's degree of mixed-use.

Relates to **Principle 6**

11 *Development Intensity*

Metric: population, jobs, and dwelling units per hectare
This indicator measures the average density of people, jobs, and dwelling units within the total land area of a community, resulting in gross density figures. Measured over time, change in any of these densities at a community-wide scale helps describe its evolution towards a more or less compact model. Compact development supports balanced and livable communities, transit viability, and non- automobile modes of travel. It also allows for more efficient growth management toward maintaining environmental quality, preserving open space, and using infrastructure more efficiently.

Relates to **Principles 8, 10, and 11**

12 External Community Connectivity

Metric: # of connections to bounding roads per kilometre of community boundary
Increased connectivity to and between communities ensures a more effective and efficient transportation system for people, goods, and services. Measuring the number of connections to bounding roads along a community boundary and expressing them on a per kilometre basis provides a good indication of how well a community is connected to the rest of the City. Connections include roads, streets, alleys and pathways.

Relates to **Principle 9**

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INDICATORS

13 *Route Connectivity*

Metric: Intersections per square kilometre

Increased connectivity within a community ensures a more effective and efficient transportation system for people and goods, increasing walkability and cycling, and dispersing traffic to generally decrease congestion. Measuring intersection intensity - the number of intersections per square kilometre of land - provides a good indication of a community's route connectivity, where a greater value for intersection intensity indicates the community is more interconnected. Street pattern and block size are two key elements that impact intersection intensity. This metric divides the number of intersections by total land area within a given community. Intersections considered are defined by three or more roads, streets, alleys, or pathways (including bike routes). This metric does not consider qualitative aspects such as wayfinding, which should be addressed at a more detailed design/policy level.

Relates to **Principles 2 and 9**

14 Solar Orientation Intensity

Metric: % parcel frontages oriented south

South orientation in buildings enables solar gain to reduce energy consumption and facilitates implementation of renewable energy such as solar energy. Maximizing solar orientation is a way of promoting urban forms and infrastructure that support alternative and renewable energy production, reduced energy consumption, reduced community and environmental impacts, and reduced private and public costs. Although there are many other variables affecting solar orientation intensity (e.g. shade by other buildings, trees, etc.), measuring the proportion of parcels within a community that are oriented to the south provides a good indication of the extent to which the community has the capacity to utilize solar power.

Relates to **Principle 11**

15 Green Infrastructure Intensity

Metric: % of tree coverage and effective permeability

For the purposes of this charrette, this indicator focusses on water and air quality. Integrating natural systems into a community's infrastructure reduces costs and environmental impact. For instance, alternative stormwater management systems including stormwater retention and recharge maintain pre-development flows and volumes to reduce flooding and impact to streams, rivers, and habitat, and improve water quality. Measuring the percentage of tree coverage in the study area and its effective permeability provides a good indication of whether the community can expect these kinds of benefits. Other aspects of green infrastructure such as energy systems and recycling are not considered by this indicator.

Relates to **Principle 11**