Calgary Affordable Housing Multi-Criteria Analysis 2018 Update
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1.0 Introduction

1.1 Affordable Housing at The City of Calgary
The City of Calgary is committed to creating "complete communities" as part of its Council-approved Municipal Development Plan (2007). Affordable housing is recognized as an integral part of this commitment in a number of The City’s plans. The availability of housing options for all citizens is a key success measure.

On July 25th 2016, The City of Calgary Council approved *Foundations for Homes: The Corporate Affordable Housing Strategy and Implementation Plan*, and confirmed affordable housing as a Council Priority (PFC2016-0512). *Foundations for Homes* identifies six strategic directions and associated targets. Two targets specifically relate to site selection; a target of five parcels of City land per year to be disposed of at below market value to non-market housing providers and a target of 270 new non-market units to be designed and built by The City in 2017 and 2018 (The City of Calgary, 2016).
1.2 Project Background
This report is a 2018 update to the Calgary Affordable Housing Multi-Criteria analysis (2015). Going forward, the updated affordable housing site selection tool replaces the existing 2015 tool. It will continue to be used to aid in internal land circulation and to help identify sites for disposition of land to non-profit and for City-led affordable housing developments.

The selection of a site is an early and critical step in the development of affordable housing, with far reaching implications for ease of development, the local community and the day-to-day lives of future residents. Prior to 2015, affordable housing sites were selected in response to Provincial funding availability in a somewhat reactive approach. At the time, there were over 8,000 parcels of city-owned land, which made the selection process time and administrative time intensive.

In 2015, The City of Calgary conducted the first GIS-based multi-criteria analysis of sites for affordable housing. The purpose of the analysis was to help narrow down the large number of city-owned sites for further analysis. The results of the analysis included an affordable housing site suitability index (tool) that indicated the areas of Calgary with the highest site suitability scores for affordable housing, as well as a short-list of city-owned sites identified by the index as well as further analysis. The methodology and results are outlined in Calgary Affordable Housing Multi-Criteria Site Selection Analysis.

To date, the 2015 tool has been used consistently to aid in internal land circulations, as well as to identify future sites to be designated for disposition to non-profits and for city-led affordable housing development. One of the key recommendations of the 2015 analysis is that the tool be revised periodically to account for changes in data as well as to provide an opportunity to revisit the criteria and constraints.

It is important to note that this tool is only one of many factors that are taken into consideration when sites are selected for affordable housing. Other considerations include: site availability, size, shape, and slope, environmental contamination, community characteristics and proximity to other affordable housing sites.

In 2018, three separate affordable housing site suitability tools were developed for three different target markets: general, families with children, and families without children or singles. This decision was made because different affordable housing providers target different markets and these groups have different needs and preferences.
The following points are the top changes from the 2015 analysis:

- To enable appropriate site selection for different types of non-market housing development, there is now a general affordable housing suitability index, as well as separate indexes for suitability for affordable housing serving families and singles;
- Light Rail Transit (LRT) stations and bus stops along the primary transit network have been split into two criteria;
- Large employment centres and community services have been added as criteria, high schools have been removed;
- All data have been updated
2.0 Methodology

The research team held several meetings in March and April 2018 with a stakeholder group that included: representatives from the affordable housing policy & development groups, and key staff from Calgary Housing Company. The group agreed that different criteria would be important depending on the population served by an affordable housing development. Accordingly, the group determined that the following three tools would be created:

- general affordable housing tool,
- families with children affordable housing tool,
- Families without children and singles affordable housing tool

2.1 Identification of Criteria, Classification & Weighting

Identification of the final criteria and constraints occurred through a process of brainstorming, voting, research on data availability and discussion with the stakeholder group. Subsequently, the research team developed a classification scheme to score each criteria and weighting for the assigned criteria with the help of a pair-wise analysis calculator\(^1\).

### General Classification Scheme

<table>
<thead>
<tr>
<th></th>
<th>Criterion Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100/100</td>
</tr>
<tr>
<td>Grocery Store</td>
<td>0 – 1,000 m</td>
</tr>
<tr>
<td>Elementary School</td>
<td>0 – 500 m</td>
</tr>
<tr>
<td>Bus Stop</td>
<td>0 – 400 m</td>
</tr>
<tr>
<td>LRT Station</td>
<td>0 – 800 m</td>
</tr>
<tr>
<td>Employment Centre</td>
<td>0 – 4,000 m</td>
</tr>
<tr>
<td>Park</td>
<td>0 – 600m</td>
</tr>
<tr>
<td>Junior High School</td>
<td>0 – 2,000 m</td>
</tr>
<tr>
<td>Community Service</td>
<td>0 – 1,000 m</td>
</tr>
<tr>
<td>Recreation Facility</td>
<td>0 – 2,000 m</td>
</tr>
</tbody>
</table>

\(^1\) [http://bpmsg.com/academic/ahp_calc.php](http://bpmsg.com/academic/ahp_calc.php)
Below is the classification scheme and weighting for the suitability score for affordable housing for families with children:

### Families with Children Classification Scheme

<table>
<thead>
<tr>
<th>Category</th>
<th>100/100</th>
<th>50/100</th>
<th>25/100</th>
<th>0/100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grocery Store</td>
<td>0–1,000</td>
<td>1,001–1,500</td>
<td>1,501–3,000</td>
<td>3,001 +</td>
</tr>
<tr>
<td>Elementary School</td>
<td>0–500</td>
<td>501–1,000</td>
<td>1,001–2,000</td>
<td>2,001 +</td>
</tr>
<tr>
<td>Bus Stop</td>
<td>0–400</td>
<td>401–600</td>
<td>601–801</td>
<td>801 +</td>
</tr>
<tr>
<td>Park</td>
<td>0–600</td>
<td>601–1,000</td>
<td>1,001–1,500</td>
<td>1,501 +</td>
</tr>
<tr>
<td>LRT Station</td>
<td>0–800</td>
<td>801–1,500</td>
<td>1,501–2,000</td>
<td>2,001 +</td>
</tr>
<tr>
<td>Recreation Facility</td>
<td>0–2,000</td>
<td>2,001–3,000</td>
<td>3,001–5,000</td>
<td>5,001 +</td>
</tr>
<tr>
<td>Junior High School</td>
<td>0–2,000</td>
<td>2,001–3,000</td>
<td>3,001–4,000</td>
<td>4,001 +</td>
</tr>
<tr>
<td>Library</td>
<td>0–1,000</td>
<td>1,001–1,500</td>
<td>1,501–2,000</td>
<td>2,001 +</td>
</tr>
<tr>
<td>High School</td>
<td>0–1,000</td>
<td>1,001–1,500</td>
<td>1,501–3,000</td>
<td>3,001 +</td>
</tr>
</tbody>
</table>

### Family Criteria Weightings (%)
Below is the classification scheme and weighting for the suitability score for affordable housing serving families without children and singles:

### Families without Children and Singles Classification Scheme

<table>
<thead>
<tr>
<th>Criterion</th>
<th>100/100</th>
<th>50/100</th>
<th>25/100</th>
<th>0/100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grocery Store</td>
<td>0 – 1,000 m</td>
<td>1,001 – 1,500 m</td>
<td>1,501 – 3,000 m</td>
<td>3,001 m +</td>
</tr>
<tr>
<td>Hospital/Medical Clinic</td>
<td>0 – 2,000 m</td>
<td>2,001 – 3,000 m</td>
<td>3,001 – 5,000 m</td>
<td>5,001 m +</td>
</tr>
<tr>
<td>Local Commercial</td>
<td>0 – 500 m</td>
<td>501 – 1,000 m</td>
<td>1,001 – 2,000 m</td>
<td>2,001 m +</td>
</tr>
<tr>
<td>Bus Stop</td>
<td>0 – 400 m</td>
<td>401 – 600 m</td>
<td>601 – 801 m</td>
<td>801 m +</td>
</tr>
<tr>
<td>Park</td>
<td>0 – 600 m</td>
<td>601 – 1,000 m</td>
<td>1,001 – 1,500 m</td>
<td>1,501 m +</td>
</tr>
<tr>
<td>LRT Station</td>
<td>0 – 800 m</td>
<td>801 – 1,500 m</td>
<td>1,501 – 2,000 m</td>
<td>2,001 m +</td>
</tr>
<tr>
<td>Recreation Facility</td>
<td>0 – 2,000 m</td>
<td>2,001 – 3,000 m</td>
<td>3,001 – 5,000 m</td>
<td>5,001 m +</td>
</tr>
<tr>
<td>Library</td>
<td>0 – 1,000 m</td>
<td>1,001 – 1,500 m</td>
<td>1,501 – 2,000 m</td>
<td>2,001 m +</td>
</tr>
<tr>
<td>Community Hall</td>
<td>0 – 1,000 m</td>
<td>1,001 – 1,500 m</td>
<td>1,501 – 2,000 m</td>
<td>2,001 m +</td>
</tr>
<tr>
<td>Employment Centre</td>
<td>0 – 4,000 m</td>
<td>4,001 – 5,000 m</td>
<td>5,001 – 7,000 m</td>
<td>7,001 m +</td>
</tr>
</tbody>
</table>

### Singles Criteria Weightings (%)

- Grocery Store, 24.3
- LRT Station, 14
- Local Commercial, 8.8
- Library, 2.1
- Recreation Facility, 2.9
- Community Hall, 0.9
- Employment Centre, 7.1
- Park, 4.1
- Bus Stop, 34.3
2.2 Criteria Data

**Grocery Stores:** the layer from the 2015 GIS analysis was modified to create a 2018 layer. The 2015 layer of grocery stores was originally prepared for “Calgary Eats! A Food System Assessment and Action Plan for Calgary”. The 2015 analysis saw removal of 58 specialty stores. A 2018 scan of google maps identified grocery stores to be added, removed or modified. The 2018 grocery store layer was cross referenced with grocery stores identified through business licensing. Only major grocery stores are included.

**Schools:** The layer CALGIS.BLDG.PROV_SCHOOLS was used from The City of Calgary’s internal geodatabase. The data steward for this layer is The Government of Alberta. The layer is updated via data feed annually in November of each year. This data is channeled through The City’s Building Central to The City’s spatial database engine (SDE). The schools were split into three separate layers: elementary schools, junior high and high schools. The layers excludes all schools with the authority types “private” and “ECS private operator”.

**Bus Stops:** Transit provided the Bus Stops layer with a 400m buffer surrounding the Primary Transit Network (PTN). The PTN is included as an accompanying map to the Calgary Municipal Development Plan. Use of this network is appropriate because it represents a high level of service, and is a long-range planning document. Also included in the 2018 update is creation of a new layer with all the bus stops that fall within the buffer area except for stops that had been removed manually by Transit because they were not meaningfully within the PTN (e.g. because a bus would not have access onto the adjacent main corridor). Stops along the following BRT routes were added: North Crosstown, South Crosstown and 17 Ave SE.

**LRT Stations:** The layer CALGIS.LRT_STATIONS from The City of Calgary’s internal geodatabase was used with stage 1 green line stations added.

**Large Employment Centres:** A group of University of Calgary students developed an initial layer of large employment centres for use in the analysis. This layer included: 11 large shopping malls, 6 hospitals, 4 post-secondary institutions, the Calgary Airport, 3 Costcos, and Downtown. Based on stakeholder input, the 2 shuttle stop locations for CrossIron Mills were also added, as well as all of the industrial communities in Calgary (as identified by a midpoint).

**Local Commercial:** The layer CALGIS.CNTST_LANDUSE_1P2007 was used from The City of Calgary’s internal geodatabase. From this layer, only the following land uses are retained: local commercial, community commercial, commercial corridor 2 (mixed pedestrian/auto-oriented commercial), commercial corridor 1 (pedestrian oriented), community mixed use in East Village and pedestrian-oriented commercial in centre city.

**Parks:** The layer PARIS_SITE_C_V was used from The City of Calgary’s internal geodatabase. This layer shows sites where Parks Maintenance Operations occurs. It is maintained by the Parks business unit. There is elimination of non-titled parcels
to remove boulevards and small strips. Added to this parks layer is Fish Creek Park, a provincial park.

**Community Services:** The layer CALGIS.CITY_COMMUNITY_SERVICE was used from The City of Calgary’s internal geodatabase. Only community centres, libraries, PHS clinics, and social development centres have been retained from this layer.

**Hospital/Medical Clinic:** The layer CALGIS.CITY_COMMUNITY_SERVICE was used from The City of Calgary’s internal geodatabase. Only hospitals and PHS clinics have been retained from this layer.

**Library:** The layer uses CALGIS.CITY_COMMUNITY_SERVICE was used from The City of Calgary’s internal geodatabase. Only libraries have been retained from this layer.

**Community Halls:** The layer CALGIS.CITY_COMMUNITY_SERVICE was used from The City of Calgary’s internal geodatabase. From this layer only community halls were retained.

**Recreation:** The layer CALGIS.RECREATION_FACILITIES was used from The City of Calgary’s internal geodatabase. This layer is on The City’s SDE in CALGIS.FACILITIES and is maintained by Capital Asset Management in the Recreation business unit. The data reflects a removal of all golf courses, a sailing club and a canoe club as these were considered too high-end or specialized to be meaningful recreation amenities for affordable housing residents.

### 2.3 Constraint Data

**Landfill Setbacks:** The layer CALGIS.WRS_MGA_RED_DEV_BUFFER was used to identify landfill setbacks for public landfills. The landfills themselves were then merged with the setbacks. This layer was obtained from The City of Calgary’s internal geodatabase.

**Airport Area:** The layer CALGIS.CNTST_NEF was used to identify areas around the airport with a NEF of 30 or greater. These areas are deemed unsuitable for residential development. This layer was obtained from The City of Calgary’s internal geodatabase.

**Flood & Environmental Reserve Areas:** The layer CALGIS_CNTST_FLOOD_100YR (100 year flood area) was merged with CALGIS_ENVI_RESERVE_ER_SETBACK (environmental reserve) to create another constraint layer. This layer was obtained from The City of Calgary’s internal geodatabase.

**Major Roads (for affordable housing for families with children only):** Application of a 50m setback to all major roads (class codes 1 & 15 only) is used. This layer was obtained from The City of Calgary’s internal geodatabase.
2.4 The Model
Once the input layers were prepared, the following steps were taken to create the model using the GIS ‘ModelBuilder’ tool. The figure below shows an example section of the model for demonstration purposes.

1. For each of the nine input layers (e.g. parks), a measurement of the distance from each criterion point (e.g. nearest park) to every pixel in Calgary using the “Euclidean Distance” tool produced an output layer of distances (e.g. EucDist_F_Park).

2. The model uses a recategorisation of the output layer of distances according to the scheme, using the “Reclassify” tool. This process converted distances to scores, so that areas that are nearest to amenities receive higher scores. This produced an output layer of scores (e.g. Reclass_EucD6).

3. All nine output layers of scores for each of the nine criteria were summed according to the weights using the “Weighted Sum” tool. This exercise produced a single output layer of scores (out of 100) (e.g. WeightRed1).

Example Section of the 2018 Affordable Housing Site Selection Tool (General)

2.5 Step-by-Step Analysis for General Affordable Housing Suitability Score 2018 (starting next page)
Criterion 1  Grocery Store Distances (meters)

Grocery Store Score

- Grocery Store
- 0 - 810
- 820 - 1,600
- 1,700 - 2,400
- 2,500 - 3,300
- 3,400 - 4,100
- 4,200 - 4,900
- 5,000 - 5,700
- 5,800 - 6,500
- 6,600 - 7,300
- 7,400 - 8,100

- Grocery Store
- 0
- 25
- 50
- 100
Criterion 2 Elementary Schools Distances (meters)

Elementary Schools Score
Criterion 4  LRT Stations Distance (meters)

LRT Stations Score
Criterion 5 Employment Centres Distance (meters)

Employment Centres Score
Criterion 6

Parks Distances (meters)

Parks Score
Criterion 7  Junior High School Distances (meters)
Criterion 8  Community Services Distances (meters)

Community Services Score

- H_CommunityServices_Apr2016

- 0 - 1,000
- 1,100 - 2,600
- 2,100 - 3,100
- 3,200 - 4,100
- 4,200 - 5,100
- 6,200 - 6,100
- 6,200 - 7,200
- 7,500 - 8,200
- 8,300 - 9,200
- 9,300 - 10,000
Constraints

Suitability score = zero
3.0 Results

3.1 General Affordable Housing Suitability Score 2018
Results show that the most suitable areas in Calgary for new affordable housing are more central, closer to amenities such as transit, groceries and employment centres.

3.2 Comparison to 2015 Results
The following page shows a comparison of the 2015 and 2018 results. The 2018 results show more differentiation in higher scoring (i.e. much more areas scoring 54-71). There are also areas with extremely low scores (>1). Scores have risen in some peripheral areas to reflect the addition of new amenities such as grocery stores and bus rapid transit lines.
3.2 Families with Children Affordable Housing Suitability Score 2018

The “family” affordable housing suitability score, for households with children, is very similar to the general affordable housing suitability score. This is likely due to the fact that the top weighted criteria are the same.
3.4 Families without Children and Singles Affordable Housing Suitability Score 2018

The “singles” affordable housing suitability score, for households without children, has high scoring areas more tightly concentrated around transit compared to the general affordable housing suitability score. This is likely due to the fact that proximity to transit (both LRT and bus) makes up nearly 50% of the weighting of the “singles” affordable housing suitability score. Furthermore, shorter distances are necessary for high scores on transit criteria, compared to other criteria.
3.5 Limitations of the analysis
It is important to note that there are several limitations to this analysis. This analysis does not, and is not intended to include a complete and comprehensive list of all of the factors that need to be taken into consideration when selecting a site for affordable housing. Other considerations include: site availability, size, shape, and slope, environmental contamination, community characteristics and proximity to other affordable housing sites.

Considerations may be missing from this analysis because:

• They were not identified by the stakeholder group,
• They were identified by the stakeholder group, but data was unavailable or problematic (e.g. location of daycares), or
• They were identified by the stakeholder group, but deemed too complex for inclusion in this stage of analysis (e.g. the incorporation of school zones into the analysis

It bears repeating that the goal of this analysis is to narrow down the total number of potential sites to a more manageable number for further analysis. Any final site selection will be conducted by a project manager after a more in-depth evaluation has taken place.

The data presented does not preclude development in any of the categories following more detailed review.

3.6 Next steps
This updated affordable housing site selection tool replaces the existing 2015 tool going forward. It will continue to be used to aid in internal land circulation and to help identify sites for disposition of land to non-profit housing providers and for City-led affordable housing developments.

The model should continue to be revisited and revised over time in response to feedback on the model as well as changes in priorities and data availability.