

Dense urban forms are vital to achieving sustainable neighborhoods. When a large number of people reside in a community, a wide range of amenities and planning strategies become economically viable and possible to introduce. Public transit, commercial and institutional amenities can all become part of the design which will also make the place walkable. The challenge is to choose an appropriate density and make these places appealing and livable. This chapter outlines principles of places whose density exceeds 25 units/acre (62 units/ha). It offers yardsticks, forms and planning strategies for denser communities, introduce methods of waste management and district heating, and illustrate those principles using a design of a community.

2.1 Choosing a Form

A community location and its chosen urban form are often related to the presence and type of major transit systems. A community may have a main arterial road, be it located a short distance from a major highway, or have a railway line and a station at their heart to name a few (Fig. 2.1). Such features can dictate other key aspects of the road network that needs to regard a range of uses and users including motorists, cyclists, and pedestrians.

Since the beginning of the twentieth century and with the proliferation of cars, road configuration has changed as a result of parallel evolution in planning concepts. The rise of suburbia and landmark developments such as Radburn, New Jersey, cast a model that influenced residential design to this day. In general, concepts that reduce area allocated to roads and increase dwelling density are more likely to turn a community sustainable. The need for the densification and reduction of urban sprawl witness a call for closing gaps between urban hubs and edge cities (Fig. 2.2). In a nutshell, circulation networks that connect places rather than facilitate movement are likely to be more successful.

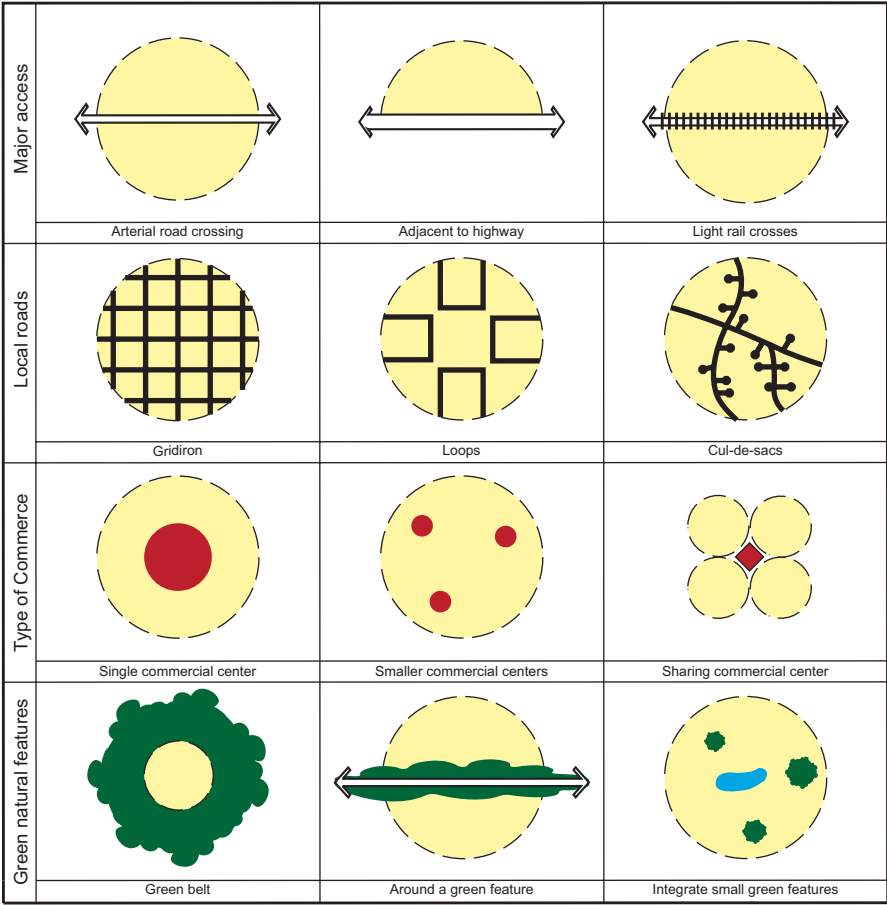


Fig. 2.1 Key elements affecting the form of a community are: adjacency to major access and thoroughfares, local roads, type of commerce, and natural features

Determining areas and types of the public and private open spaces system is another key conceptual stage in a high-density neighborhood planning. Open spaces are easily accessible networks of green areas that range from the regional to individual dwelling unit levels. Large-scale parks, located outside the neighborhood, will often constitute the majority of the public green spaces. Enclosed outdoor areas adjacent to homes, on the other end, are the private ones. Within these two extremes are neighborhood parks and communal areas for clusters of homes. As density increases, the importance of open spaces rises, since the amount of area allocated to each home declines. In addition to traditional roles, open spaces let sunlight and fresh air into the heart of the neighborhood and accommodate the recreational needs of people of all ages.

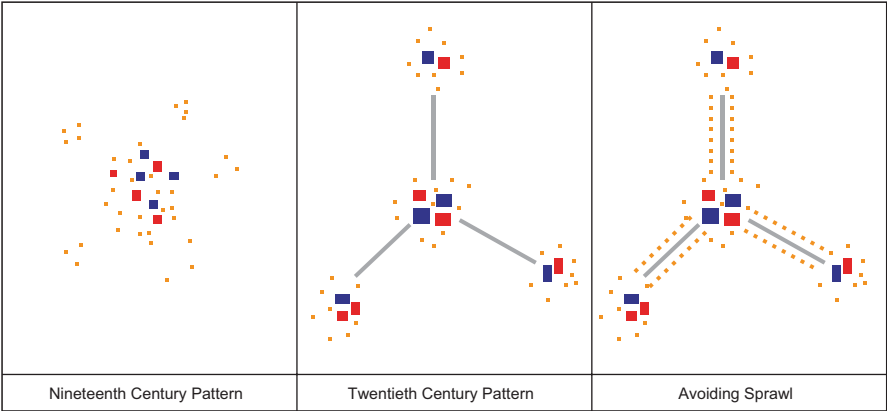


Fig. 2.2 The need for the densification and reduction of urban sprawl witness a call for closing gaps between urban hubs and edge cities

Deciding about the type of homes and how they should relate to each other is another phase in conceiving a sustainable community. To reach higher-density, the traditional single-family dwelling on a large lot needs to be replaced with multifamily configurations. Apartment houses or stacked dwellings need to be considered (Fig. 2.3). In addition, clustering structures of various densities will lead to a variety of dwelling types and mixed households. In addition, the combination of land uses will also foster a different neighborhood dynamic and will affect its mobility. These issues are elaborated in the following sections.

2.2 Rethinking Urban Density

Once the location of a neighborhood has been chosen, and its edges drawn, the desired density will be considered. With an overall drive to curb urban sprawl and increase density, several researchers looked at the relation between higher-density and liveability. Shibu (2010) noted that more than the overall density, what affects social interactions in a community is how those places have been planned (Fig. 2.4). Such a view was supported by Lovejoy et al. (2010) and Howley et al. (2009), who found that what affects residents' satisfaction is not whether the planning follows traditional or suburban principles but aspects such as housing types, schools' standing, noise, lack of community involvement, traffic, and absence of amenities.

As for compactness, several factors determine what would be considered low-, medium-, or high-density neighborhood. Choices made with respect to the average dwellings' size, type of parking and the amount of private outdoor space will all affect the resulting densities. For example, attached units can be mixed with detached houses to elevate the overall density and limit sprawl. The attached dwellings can provide owners with privacy, affordability, and help foster a sense of place. The

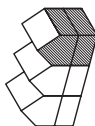
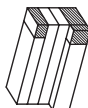
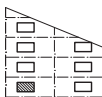
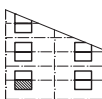
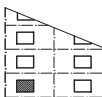
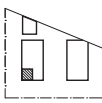
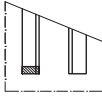
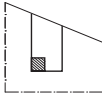
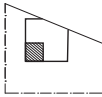
Dwelling type			1 Single detached		2 Semi detached		3 Row house		4 Triplex		5 3-story walk-up apartment		6 Combined apartments & row houses		7 Slab block apartment		8 High rise point block apartment	
Isometric																		
																		
	8 (20)	14 (35)	19 (47)	21 (52)	65 (160)	84 (207)	90 (222)	120 (296)										
	Dwelling units/acre (dwelling units/hectare)	0.24 76%	0.38 81%	0.56 72%	0.60 80%	1.36 55%	1.92 62%	1.78 62%	2.62 87%									
Floor area ratio % open space	1200 (111.5)	1200 (111.5)	1200 (111.5)	1200 (111.5)	800 (74.3)	800 & 1200 (74.3 & 111.5)	800 (74.3)	800 (74.3)										
Unit area in square feet (unit area in square meters)	1 or 2	1 or 2	1 or 2	1	1	1 and 2	1	1										
Number of floors/unit																		

Fig. 2.3 To achieve higher-density, housing prototypes other than single-family homes need to be considered

Fig. 2.4 Having public open spaces that facilitate social interaction between residents can contribute to the appreciation of higher-density communities by their residents, as shown in this Querétaro, Mexico neighborhood



higher-density also lowers the need for privately owned vehicles since the increased number of residents makes public transit economically viable.

Single-family detached dwellings on their typically low-density of 4–6 units/acre (10–15 units/ha) are not sustainable. These homes accommodate 25% fewer people, consume 15–67% more energy than row houses or apartment for example. The increase in smaller households due to having families with fewer children, single parent, and an ageing population, means that detached houses once built for nuclear families may no longer meet future demand. In addition, many small households cannot afford to buy a home due to lower income, land scarcity, increasing infrastructure, and construction costs. From a development perspective, dense designs such as townhomes that are illustrated in Fig. 2.5 are more profitable because they require less investment in infrastructure and produce more units per land area.

At present, land available for development, particularly in North America, does not seem to be overly scarce. Yet, constraints due to the need to preserve natural and agricultural areas, the high cost of fuel, and the distance that people are willing to commute to their workplaces, all place a finite limit on the amount of land around a city that can be developed. Nonetheless, for any residential development to be feasible, it must appeal to potential homebuyers. In other words, be it a low-density or a high-density development, the design must be attractive. Therefore, the introduction and success of higher-density housing prototypes need to depend on design factors that are carefully thought out to create a place where people enjoy their living environment.

Restrictions of dense residential development revolve around several factors. First, zoning in many places favours single-family detached dwellings because municipal governments collect more taxes when costly homes are built. Second, historically poor perception of row houses continues to stigmatise the modern adaptations of these units. On the other hand, history also demonstrates that properly designed compact housing forms can offer very pleasant living environments.

Fig. 2.5 Townhouses accommodate more people per unit area and consume less energy due to their attached configuration



Despite some legal and market barriers to dense residential designs, those challenges can be overcome. Issues involving circulation and parking, private and public open space provisions, and individual and community identity can all be thoughtfully addressed to attract residents who are looking for quality affordable accommodation. Attractive, dense sustainable communities can accommodate automobile and pedestrian movement, the clustering of multiuse living arrangements, and reduce energy consumption (Calthorpe 1993; Barton 2000).

2.3 Designing Denser Communities

The introduction of communities with high-density dwellings needs to be undertaken with caution. The advantageous aspects of single-family homes, such as privacy and open space, must be incorporated in new designs. Simultaneous elimination of environmentally unsustainable elements such as excessive road coverage must also be considered. Several key aspects that affect the design of such developments have been assembled here, selected in accordance with their contribution to the environmental, economic, and social viability of a place.

2.3.1 Density Yardsticks

Urban density is a subjective term that relates to a particular location and culture. An Asian neighborhood is likely to be much denser than its North American counterpart, for example. The question is, therefore, how should density be regarded and what are the common yardsticks of such neighborhoods?

Typical twentieth century suburban and city forms have two distinct densities. The first is of considerably lower and averages 7 units/acre (17 units/ha). The large lot size and infrastructure costs per unit are high and may result in higher dwelling

costs and foster urban sprawl. In contrast, a high-density area has over 31 units/acre (77.5 units/ha), which is likely to be unpopular with the typical buying public. Typical would-be buyers will be reluctant to accept crowded communities that lack public and private open spaces, for example.

By combining planning features from low-density and high-density designs as illustrated in Fig. 2.6, one can introduce urban forms with a unique character. Such a design averages 25 units/acre (55 units/ha), with rear private parking and yards for each unit. Minimal, though acceptable, widths separate the houses. Moreover, green open space located at the center of the cluster can be made accessible from each unit, which is associated with the notion that public parks are crucial to community interaction. The new design for high-density communities mixes ideas taken from traditional, late nineteenth century high-density communities with contemporary designs.

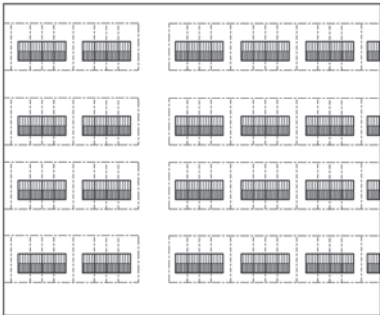
2.3.2 Lot Dimensions and Siting

Choice of lot dimensions and home siting is a rudimentary phase in higher-density planning. A typical lot size in post-World War II suburban design was 50 by 100 ft (15 by 30 m). Over time, similar lot sizes have been written into the bylaws of many municipalities. Increasing density, however, is mandating choice of a narrower lot. To achieve this, the planner must transform the house's traditional siting and move the garage, often located at the front, to the rear, which also requires the introduction of a lanes system. The front setback can be reduced and the home can be "pushed" forward. The length of the lot could then be shortened from the common 100 ft (30 m) to 92 ft (28 m), with a 16 ft (5 m) rear lane. A narrow street with slightly taller buildings will also foster a more pleasant human scale.

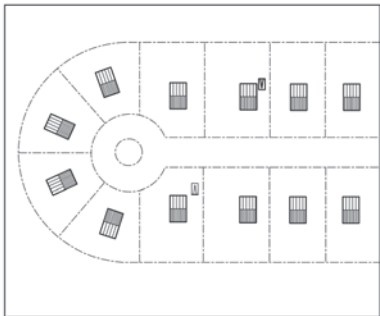
When subdividing land, the tendency in low density development is to have more homes face a green open space, be it a park or a golf course. This practice needs to be used with care in higher-density developments. A desirable situation will be to have streets with homes on either side which would also make efficient use of costly infrastructure. The intermittent introduction of small public squares and parks can help alleviate feelings of crowdedness (Fig. 2.7).

Reduction of lot sizes means that arrangements for privacy and landscaping must be reconfigured to accommodate higher-density. Houses, for example, can be clustered, which preserves any natural areas around the build site. Clustered dwellings work well for groups of 8–12 units where open, shared common spaces can be placed between buildings and smaller private yards can be part of each home as demonstrated in Fig. 2.8. The different orientation of the dwellings also allows for views onto green areas as opposed to views into other units. In the past high-density developments, individual private open spaces, even though small, were appreciated and used for such activities as clothes drying, children's play, sitting, and gardening.

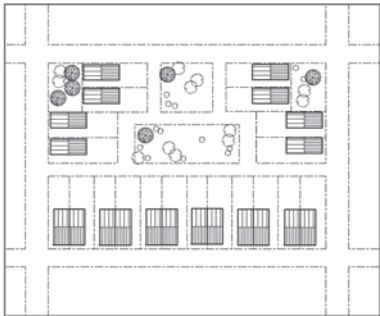
Fig. 2.6 Mixing aspects of high-density neighborhoods with privacy and green open spaces can create livable denser communities



High density developments from the twentieth century with 31 units per acre (77.5 units per hectare) are likely to be unwelcome by many suburban towns and deemed unfavourable by buyers.



Dwellings with a density of 7 units per acre (17 units per hectare) are common in contemporary suburbs.



A community with a medium density of 20 to 25 units per acre (50 to 63 units per hectare) can leave open space for residents to enjoy when properly planned.

Fig. 2.7 A front green open space can lessen the higher-density effect of townhomes as shown in this Montreal, Canada project



Fig. 2.8 Orientation of clusters of dwellings toward common green areas can alleviate the feeling of crowdedness as shown in this project in Haarlem, the Netherlands



2.4 Waste Management

The conventional methods of dealing with waste entail shipping garbage to a seemingly limitless, out-of-sight landfill. However, present landfills are becoming increasingly concerning as waste levels rise, leachates pollute groundwater, and odors permeate inhabited areas. According to studies by the city of Halifax and Environment Canada (1992), about a third of all the total nonhazardous waste is generated by residential sources. The burden of waste collection and removal on the environment and community's finances can be greatly reduced if sustainable recycling programs are made available and attractive (Fig. 2.9). The potential of such actions becomes evident as up to approximately 75% of this waste could be recycled, re-used, or composted, diverting it away from toxic landfill systems.

Fig. 2.9 Recycling domestic waste has become a common practice in many cities



By virtue of its layout, a high-density community already contributes to reduction of waste in construction material and energy needed to construct and provide basic services such as roads, electrical wiring, and wastewater treatment. The additional impact of the dense housing offers opportunity for communal composting and recycling centers that require less land and storage space for waste and recyclables than personal composters or recycling boxes. Composters, purchased or made from recycled wooded pallets, are size-adjustable to accommodate more than one household. Leaves, lawn clippings, fruit and vegetable wastes and scraps, and wood ash from fireplaces or wood stoves can all be added to a compost pile. The bin can be located away from uncontrollable water sources, far away from the edge of a roof, and aerated to speed composting.

The combined savings from composting waste from landfills reduces landfill costs to the community and slows extraction of natural resources for new materials. Implementing composting, and recycling strategies in a new or existing neighborhood could be accomplished with little disruption to original plans. Communal and personal composters can be installed in backyards and common areas. By designing areas for compostable waste, inhabitants will be encouraged to reduce their impacts on the environment.

2.5 District Heating

When a central, common source of heating is powering a neighborhood, it is referred to as *district heating*. The source can be of any kind, including wind, solar, geothermal, or even fuel-based (Fig. 2.10). The advantage of such a system is the savings that it offers to each household. No heating system has to be purchased by individual homeowners. The system is installed by the developing firm, which charges each dweller based on consumption. It offers savings through economies

<http://www.springer.com/978-3-319-10746-2>

Fundamentals of Sustainable Neighbourhoods

Friedman, A.

2015, XIII, 178 p. 176 illus., 137 illus. in color.,

Hardcover

ISBN: 978-3-319-10746-2