03 Urban Density Study

BACKGROUND REPORT
SOUTHBANK STRUCTURE PLAN

3.0 Contents of the Urban Density Study

3.1 Introduction to the Urban Density Study

The intention of the density study is to analyse global cities that are renowned for inner city living. The case studies are intended to inform qualitative and quantitative techniques that will be applied to the thinking behind recommendations for a sustainable Southbank Structure Plan.

Global precedents have been sourced through AECOM offices in the United States, Europe, Asia and Australia. These case studies have been deliberately sourced to include a range of different urban forms with examples drawn from highly urbanised cities, such as Hong Kong and New York, along with more recent urban edge examples, such as Beddington Zero in England (also included as a benchmark carbon neutral development).

Selection of Sites

Each site had to be an inner urban development (within 2km of a CBD) and contain elements of community activity/use.

Examples of high density, low-rise were encouraged as it is the typology least understood for providing high density living, however, not at the exclusion of gaining a better, more rounded understanding of different workable urban situations. In order to facilitate direct comparisons the study area nominated for each case study is the same – 400m x 400m, that is, 16 hectares and 5 minutes walk. This also facilitated the analysis of a piece of city rather than an analysis of discrete urban developments. The intention was to research how different urban environments operate as sustainable holistic places, not just as benchmark architectural or sustainable project examples.

Key Criteria

The key indicators that the study aims to identify are densities for the following criteria – population density, residential density, employment density and car parking density (to serve the residential population). This provides a quantitative appreciation of the densities achieved within different urban locations. Higher densities are associated with more sustainable urban outcomes as they provide the population capacity to support the provision of better social and infrastructure facilities and services. To gain an understanding of the relationship between the quality of life and urban density an analysis of each site is provided with themes based around the Site, the Built Form, Context and ESD as follows:

Site

An overview of the site area including land use percentages (building footprints and open space) and a brief description of the development history.

Built Form

An analysis of the existing urban form including dwelling built form typologies, building heights and setbacks, car parking distribution and typical interface arrangements to the street.

Context

An analysis of the access provided to services and infrastructure within the site and within 500m of the site area. This includes access to public transport, parks and community facilities. An analysis of water and energy sources is also incorporated to assess how each piece of city is performing environmentally.

ESD

Provides an overview of the water and energy sources servicing each study area to give a snapshot of the environmental credentials of each site.

3.2 Assessment Tools of the Urban Density Study

The following definitions provide further explanation of the framework used to inform many of the assessed criteria.

DENSITY

Population Density

The number of people residing per hectare within the 16 hectare site area.

1 person = 10 people/ha (An average of two people per dwelling are assumed if exact statistics are unavailable).

Residential Density

The number of dwellings per hectare. The case studies represent gross densities, that is, the total number of dwellings per hectare (inclusive of roads, waterways, public spaces etc).

1 house picture = 10 dwellings/ha

Car Density

The provision of car parks per hectare within the site area to support the resident population.

1 car picture = 10 cars/ha (An average of 1 car per two dwellings is assumed if exact statistics are unavailable).

Employment Density

The number of jobs per hectare within the site area.

The densities are illustrated in the following way to enable quick comparison between each study area.

1 person (employment) = 50 people/ha

LAND USE

Building Footprint

The building footprint is the total area of the site occupied by built form.

Open Space

The open space is the total area of the site without built form. This is usable space and water is not included but removed from the percentages.

BUILT FORM

Car Parking

The percentages of car parking typologies in or around the site.

Tower Apartments

Apartment towers typically on a podium of 2-10 storeys. Apartment tower in excess of 10 stories.

Mid-rise Apartments

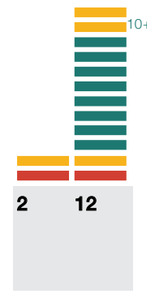
3-10 storey buildings, typically no podium level although nonresidential uses common at ground and first floor.

Low-rise Attached Housing

1-3 storey attached or semi-attached dwellings - typically low scale walk-ups, stacked townhouses, terraces or duplexes.

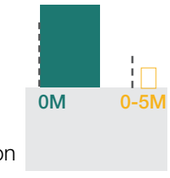
Low-rise Detached Housing

1-3 storey conventional houses.



Height Range

Heights are considered to be of low desirability at single story and at heights over 10 storeys.



Street Setback

A zero setback is an urban response and most desirable with increasing setbacks reducing in desirability.

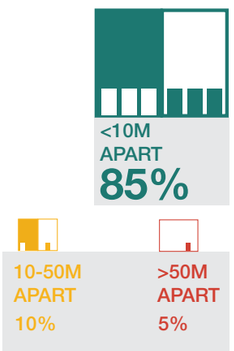
Street Interface

The street interface was categorised into three alternate arrangements:

Active/positive interface at all building levels.

Active/positive interface at ground level with inactive floors immediately above (typically car parking).

Inactive/negative interface at ground floor.



Building Entrances

The closer the entrances are, the more street activity and liveliness is achieved.

Under 10m distances between entrances is a desirable urban grain.

Any entrance further than 10m creates an environment dominated by walls, parking entrances and glazed facades lacking any interaction.

Non Residential Uses

These are purely indicative to the range of other uses in the area and not necessarily a qualitative assessment of the uses themselves.

ACCESS TO OPEN SPACE/ SOCIAL AND COMMUNITY INFRASTRUCTURE

Nominates facilities, infrastructure and services either within the study area or within 500m walk.

Open Space

Access to small community spaces or squares provides respite from the typical street activity and traffic noise.

Access to large parks provides for play facilities and improves general environmental quality.

Education

Access to community, tertiary and higher education facilities provides an indication of the range of educational possibilities enjoyed by the immediate community and thus the likely profile of residents.

Community Facilities

Access to the general facilities that provide services to enable families to live and function at their most integrated.

ESD

Measures the percentage of ESD components generally utilised in the area. This is broken down into water and energy.

3.3 Case Study 01 Melbourne CBD

SITE

DENSITY

PEOPLE/HA 108
1.6 PER DWELLING

DWELLINGS /HA 66

CARS/HA 33

66/HA

JOBS/HA 1255

1255/HA

1:5,000

SITE AERIAL

DATE 1800S - 2009
DIST. TO CBD 0KM / 0 MIN

Melbourne's CBD in its current grid form has developed over the past 170 years. It is a mixed use area, with primary uses being commercial, retail and increasingly residential. Recent local government initiatives have increased the number of residents by 850% in a 15 year period.

BUILDING FOOTPRINT

11.95 HA
73%

1:10,000

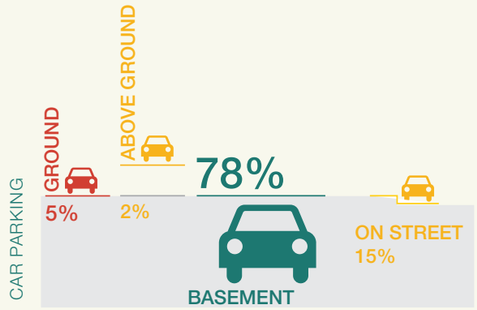
OPEN SPACE

4.4 HA
27%

PRIVATE OPEN SPACE 0%
COMMUNAL OPEN SPACE 0%
PUBLIC OPEN SPACE 27%

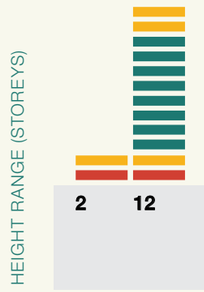
BUILT FORM

CAR PARKING

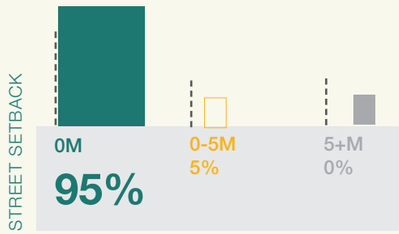


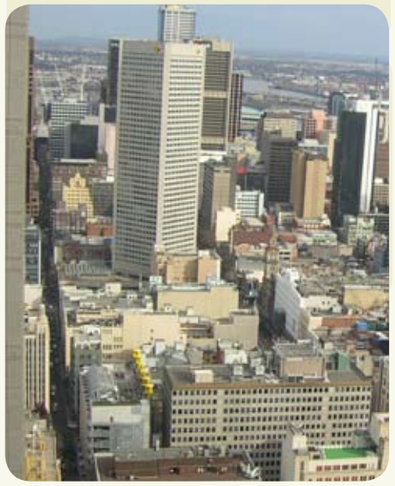
DWELLING TYPOLOGY

HEIGHT RANGE (STOREYS)



STREET SETBACK





SITE PHOTOS

WATER SOURCE

99% POTABLE TOWN SUPPLY
0.5% STORMWATER REUSED WITHIN SITE AREA
0.1% GREYWATER REUSE
0.1% BLACKWATER REUSE

ENERGY SOURCE

100% GRID
0% SELF GENERATED
0% DISTRICT DISTRIBUTED NETWORK

ACCESS TO SOCIAL / COMMUNITY INFRASTRUCTURE

0 PRIMARY SCHOOL
0 SECONDARY SCHOOL
4 UNIVERSITY

2 LIBRARY
1 SPORTS CENTRE
20 CULTURAL CENTRE / INSTITUTIONS
100 CAFES / RESTAURANTS

30 MEDICAL SERVICES
3 CHILDCARE

12 CONVENIENCE SHOPPING

ACCESS TO PUBLIC TRANSPORT

BUS 0M / 0 MIN WALK
TRAIN 0M / 0 MIN WALK
TRAM 0M / 0 MIN WALK
FERRY 800M / 10 MIN WALK

NON-RESIDENTIAL USES

COMMERCIAL
RETAIL
INDUSTRIAL

ACCESS TO OPEN SPACE

SMALL PARK/ SQUARE
2

LARGE PARK
2

STREET INTERFACE

90%
5%
5%

BUILDING ENTRANCES

<10M APART
85%

10-50M APART
10%

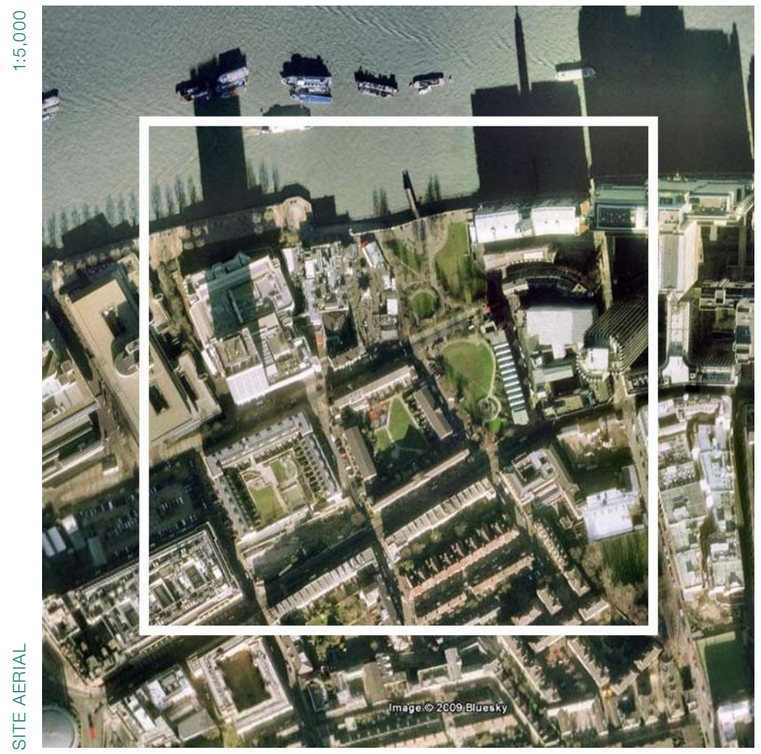
>50M APART
5%

CONTEXT

3.4 **Case Study 02** Coin Street, London, UK

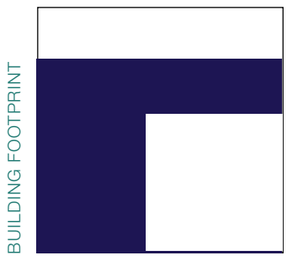
100/HA

300/HA



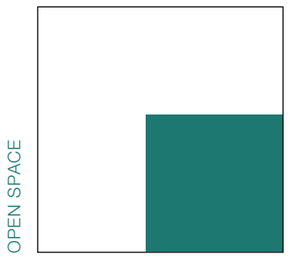
DATE 1974 - 2009
DIST. TO CBD 0 KM / 0 MIN

All residential developments in Coin Street are social housing. Four housing developments in the area are each run by 'fully-mutual' co-operatives. Members vote on all decisions made by the cooperative and therefore have a strong involvement in the future direction of their housing area.



11.95 HA
50%

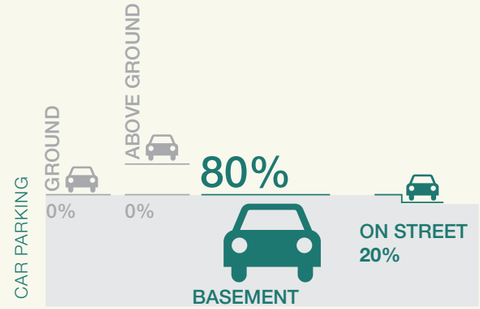
1:10,000

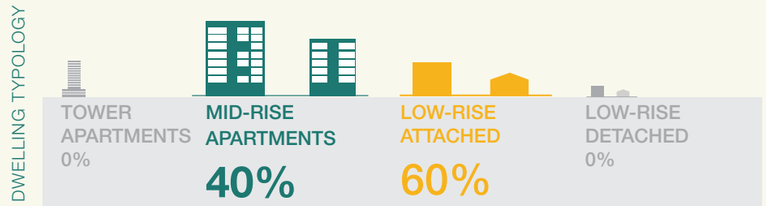


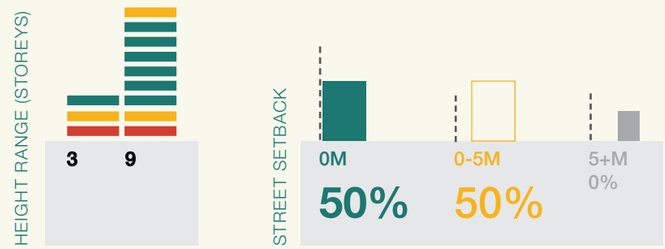
5.6 HA
35%

PRIVATE OPEN SPACE 5%
COMMUNAL OPEN SPACE 10%
PUBLIC OPEN SPACE 25%

SITE







BUILT FORM

SITE PHOTOS

WATER SOURCE

100% POTABLE TOWN SUPPLY
0% STORMWATER REUSED WITHIN SITE AREA
0% GREYWATER REUSE
0% BLACKWATER REUSE

ENERGY SOURCE

80% GRID
20% SELF GENERATED
0% DISTRICT DISTRIBUTED NETWORK

ACCESS TO SOCIAL / COMMUNITY INFRASTRUCTURE

1	PRIMARY SCHOOL
1	SECONDARY SCHOOL
2	UNIVERSITY
0	LIBRARY
1	SPORTS CENTRE
6	CULTURAL CENTRE / INSTITUTIONS
20	CAFES / RESTAURANTS
1	CHURCHES
1	MEDICAL SERVICES
2	CHILDCARE
4	CONVENIENCE SHOPPING

ACCESS TO PUBLIC TRANSPORT

BUS	0M / 0 MIN WALK
TRAIN	400M / 5 MIN WALK
TRAM/METRO	400M / 5 MIN WALK
FERRY	400M / 5 MIN WALK

ACCESS TO OPEN SPACE

SMALL PARK/ SQUARE 6

LARGE PARK 1

NON-RESIDENTIAL USES

COMMERCIAL

RETAIL

INDUSTRIAL

STREET INTERFACE

80% 0% 20%

BUILDING ENTRANCES

<10M APART 95%

10-50M APART 5%

>50M APART 5%

CONTEXT

3.5 Case Study 03 Borneo Sporenburg, Amsterdam, Netherlands

DENSITY

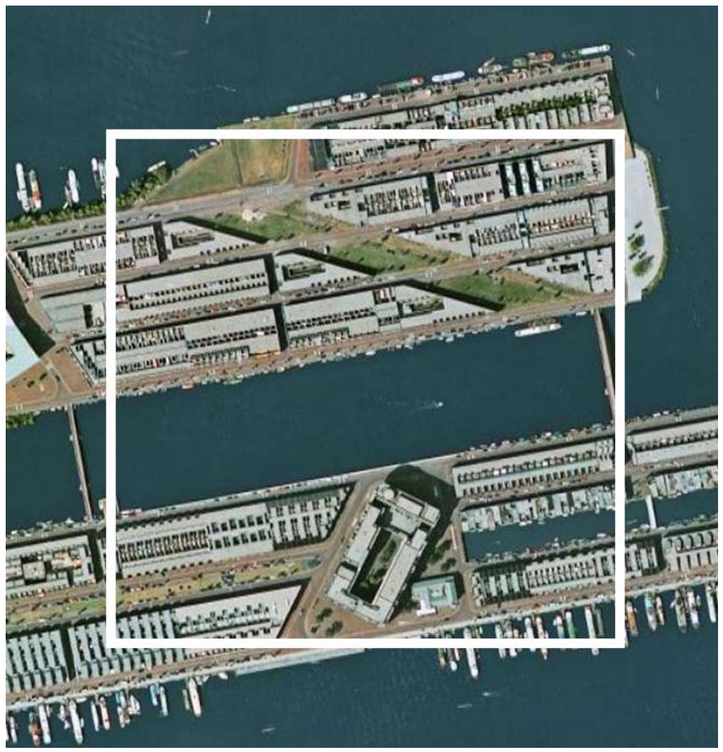
PEOPLE/HA 200
DWELLINGS /HA 100
CARS/HA 50

100/HA

JOBS/HA 2.5

2.5/HA

1:5,000

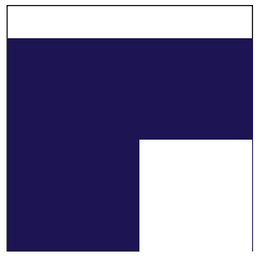


SITE AERIAL

DATE 1996 - 2000
DIST. TO CBD 2 KM

Of the 17,000 housing units in the Eastern Docklands, those in Borneo Sporenburg are the most innovative, offering a vision of urban living tuned to an aspiration by many to live in the city's historic core, or some place like it.

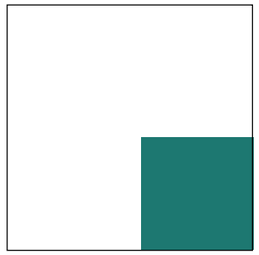
BUILDING FOOTPRINT



11.95 HA
60%

1:10,000

OPEN SPACE

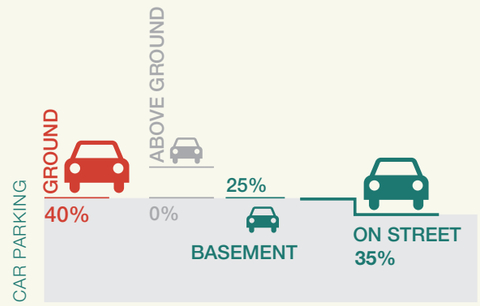


3.2 HA
20%

PRIVATE OPEN SPACE 6%
COMMUNAL OPEN SPACE 2%
PUBLIC OPEN SPACE12%

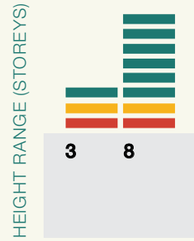
SITE

CAR PARKING

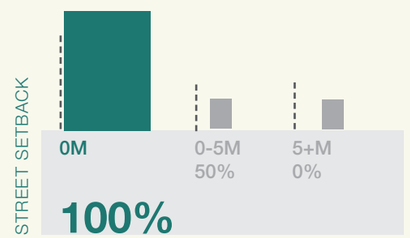


DWELLING TYPOLOGY

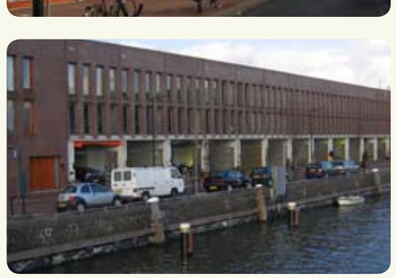
HEIGHT RANGE (STOREYS)



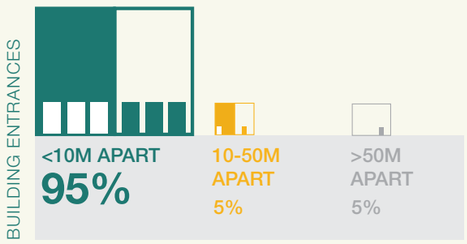
STREET SETBACK



BUILT FORM



SITE PHOTOS



WATER SOURCE

60% POTABLE TOWN SUPPLY
20% STORMWATER REUSED WITHIN SITE AREA
20% GREYWATER REUSE
0% BLACKWATER REUSE

ENERGY SOURCE

100% GRID
0% SELF GENERATED
0% DISTRICT DISTRIBUTED NETWORK

ACCESS TO SOCIAL / COMMUNITY INFRASTRUCTURE

1 PRIMARY SCHOOL
1 SECONDARY SCHOOL
0 TAFE/TECHNICAL COLLEGE/UNIVERSITY

0 LIBRARY
0 SPORTS CENTRE
0 CULTURAL CENTRE / INSTITUTIONS
11 CAFES / RESTAURANTS

1 MEDICAL SERVICES
1 CHILDCARE

4 CONVENIENCE SHOPPING

NON-RESIDENTIAL USES

COMMERCIAL
RETAIL
INDUSTRIAL

ACCESS TO OPEN SPACE

SMALL PARK/ SQUARE
2

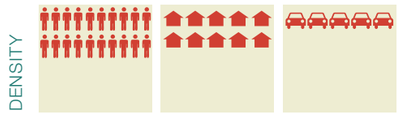
LARGE PARK
0

ACCESS TO PUBLIC TRANSPORT

BUS	0M / 0 MIN WALK
TRAIN	2KM / 25 MIN WALK
TRAM	0M / 0 MIN WALK
FERRY	0M / 0 MIN WALK

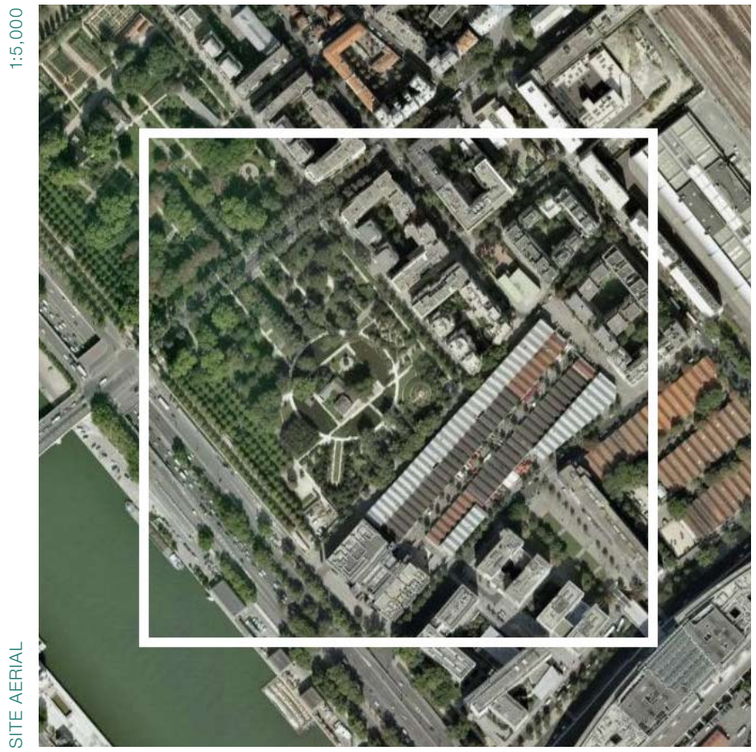
CONTEXT

3.6 Case Study 04 Bercy, Paris, France



100/HA

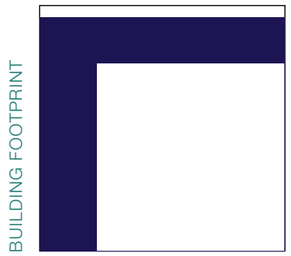
16/HA

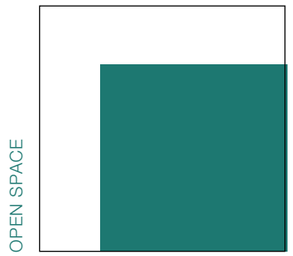


Date 1997-1999

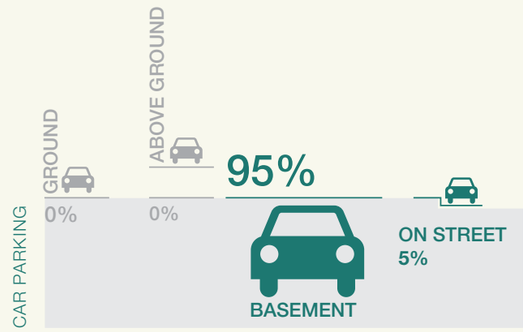
Dist. to CBD 2 km

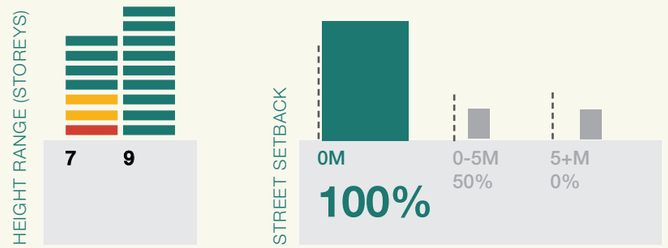
Mixed use development with a new park, high density residential and retail, commerical and leisure facilities





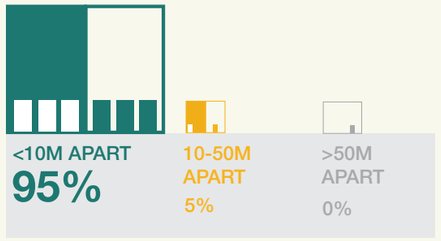
SITE

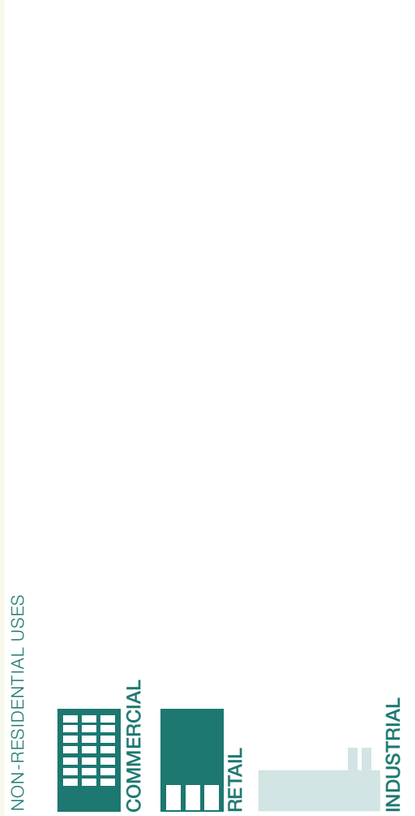




BUILT FORM

SITE PHOTOS





CONTEXT

WATER SOURCE

90% POTABLE TOWN SUPPLY
10% STORMWATER
0% GREYWATER REUSE
0% BLACKWATER REUSE

ENERGY SOURCE

100% GRID
0% SELF GENERATED
0% DISTRICT DISTRIBUTED NETWORK

ACCESS TO SOCIAL / COMMUNITY INFRASTRUCTURE

1 PRIMARY SCHOOL
1 SECONDARY SCHOOL
0 UNIVERSITY

0 LIBRARY
1 SPORTS CENTRE
1 CULTURAL CENTRE / INSTITUTIONS
9 CAFES / RESTAURANTS

4 MEDICAL SERVICES
1 CHILDCARE

12 CONVENIENCE SHOPPING

ACCESS TO PUBLIC TRANSPORT

BUS 0M / 0 MIN WALK
TRAIN 400M / 5 MIN WALK
TRAM 0M / 0 MIN WALK
FERRY NA

3.7 Case Study 05 Long Beach, California

DENSITY

PEOPLE/HA 50

DWELLINGS /HA 24

CARS/HA 24

24/HA

JOBS/HA 92

92/HA

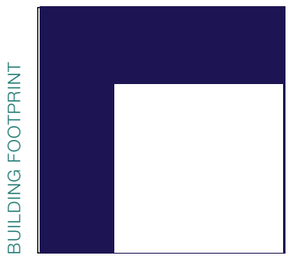
1:5,000

SITE AERIAL

DATE 1880S-2009
DIST. TO CBD 0 KM

Downtown Long Beach in its current gridded form has developed since the late 1880s. It is a mixed use area, with primary uses being commercial, retail and increasingly residential. Due to public investment and market preferences, Downtown population has increased by 32% since 1990.

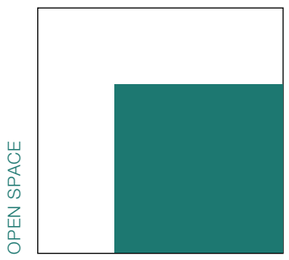
BUILDING FOOTPRINT



9.28 HA
58%

1:10,000

OPEN SPACE

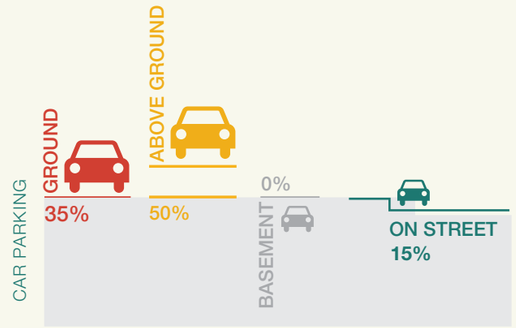


6.72 HA
42%

PRIVATE OPEN SPACE 15%
COMMUNAL OPEN SPACE 18%
PUBLIC OPEN SPACE 20%

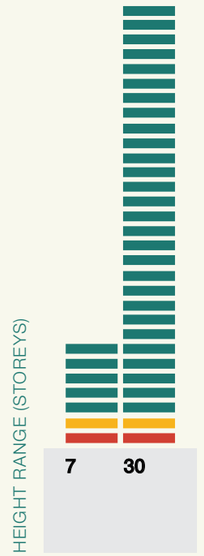
SITE

CAR PARKING

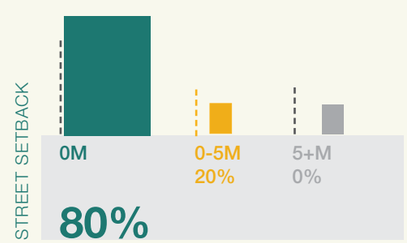


DWELLING TYPOLOGY

HEIGHT RANGE (STOREYS)



STREET SETBACK



BUILT FORM

SITE PHOTOS

WATER SOURCE

100% POTABLE TOWN SUPPLY
0% STORMWATER
0% GREYWATER REUSE
0% BLACKWATER REUSE

ENERGY SOURCE

100% GRID
0% SELF GENERATED
0% DISTRICT DISTRIBUTED NETWORK

ACCESS TO SOCIAL / COMMUNITY INFRASTRUCTURE

E
5 PRIMARY SCHOOL
3 SECONDARY SCHOOL
3 UNIVERSITY

C
4 LIBRARY
9 SPORTS CENTRE
3 CULTURAL CENTRE / INSTITUTIONS
30 CAFES / RESTAURANTS

9 MEDICAL SERVICES
5 CHILDCARE

$
5 CONVENIENCE SHOPPING

ACCESS TO PUBLIC TRANSPORT

BUS	60M / 1 MIN WALK
TRAIN	150M / 3 MIN WALK
TRAM	NO
FERRY	600M / 8 MIN WALK

NON-RESIDENTIAL USES

COMMERCIAL
RETAIL
INDUSTRIAL

ACCESS TO OPEN SPACE

SMALL PARK/ SQUARE
2

LARGE PARK
1

STREET INTERFACE

65% 15% 20%

BUILDING ENTRANCES

<10M APART
50%

10-50M APART
20%

>50M APART
30%

CONTEXT

3.8 Case Study 06: Battery Park, New York

DENSITY

PEOPLE/HA 240 | DWELLINGS /HA 100 | CARS/HA 50

100/HA

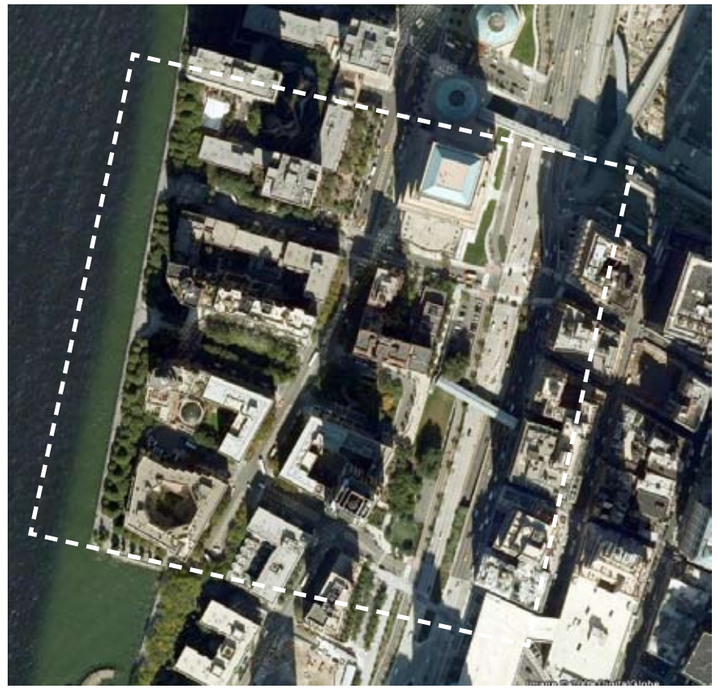
JOBS/HA

830/HA

DATE 1960S-2009
DIST. TO CBD 0 KM

Battery Park City was built on landfill created during the early 1960's and completed during the construction of the World Trade Center. The plan is essentially gridded following alignments from the adjacent Lower Manhattan Street grid.

1:5,000



SITE AERIAL

BUILDING FOOTPRINT

9.92 HA
62%

1:10,000

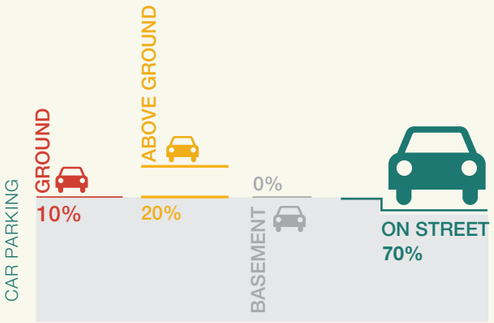
OPEN SPACE

6.08 HA
38%

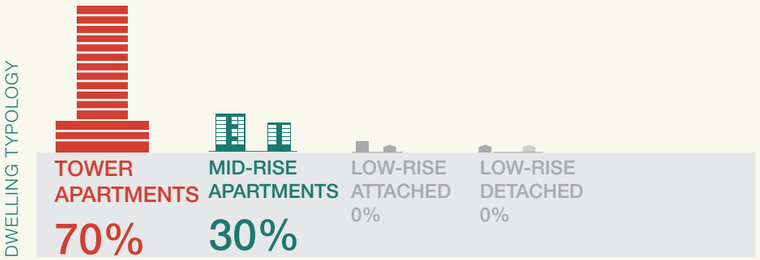
PRIVATE OPEN SPACE 10%
COMMUNAL OPEN SPACE 10%
PUBLIC OPEN SPACE 30%

SITE

CAR PARKING

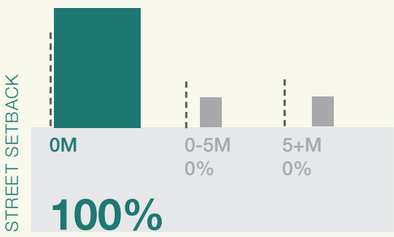


DWELLING TYPOLOGY

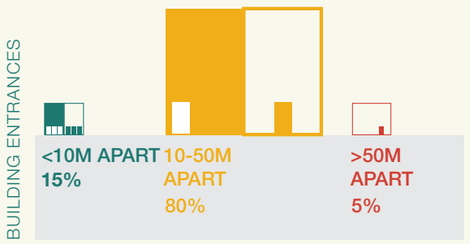


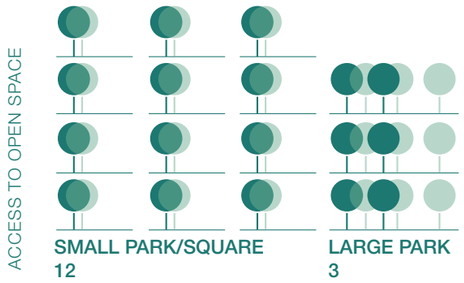
HEIGHT RANGE (STOREYS)

STREET SETBACK



BUILT FORM





CONTEXT

WATER SOURCE

99% POTABLE TOWN SUPPLY
1% STORMWATER
0% GREYWATER REUSE
0% BLACKWATER REUSE

ENERGY SOURCE

100% GRID
0% SELF GENERATED
0% DISTRICT DISTRIBUTED NETWORK

ACCESS TO SOCIAL / COMMUNITY INFRASTRUCTURE

1 PRIMARY SCHOOL
2 SECONDARY SCHOOL
0 UNIVERSITY

0 LIBRARY
1 SPORTS CENTRE
4 CULTURAL CENTRE / INSTITUTIONS
39 CAFES / RESTAURANTS

0 MEDICAL SERVICES
6 CHILDCARE

42 CONVENIENCE SHOPPING

ACCESS TO PUBLIC TRANSPORT

BUS	100M / 1 MIN WALK
TRAIN	200M / 2 MIN WALK
TRAM	NO
FERRY	200M / 2 MIN WALK

SITE PHOTOS

3.9 Case Study 07 Southbank, Melbourne, Australia

DENSITY

PEOPLE/HA
58
1.3 PER DWELLING

DWELLINGS /HA
41

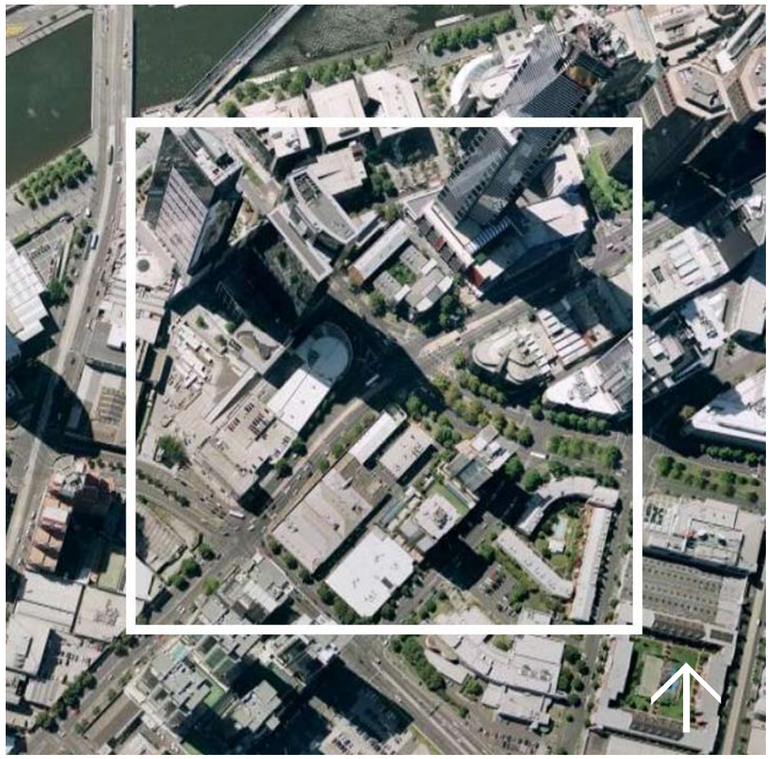
CARS/HA
41

41/HA

JOBS/HA

252/HA

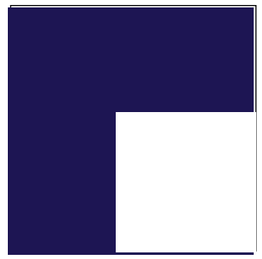
SITE AERIAL 1:5,000



DATE 1840S-2009
DIST. TO CBD 0 KM

Southbank in its current form was developed in the 1980s from its pre-existing industrial use.

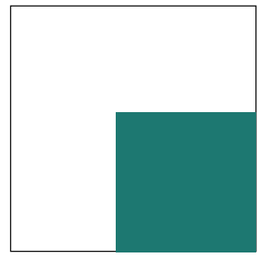
BUILDING FOOTPRINT



8.0 HA
50%

1:10,000

OPEN SPACE

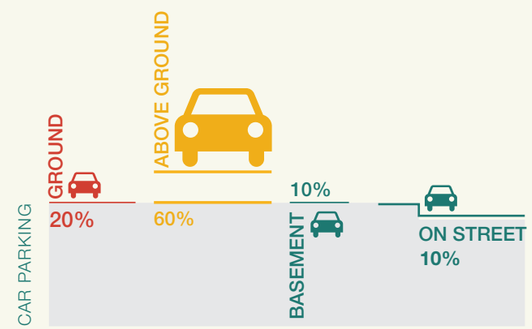


8.0 HA
50%

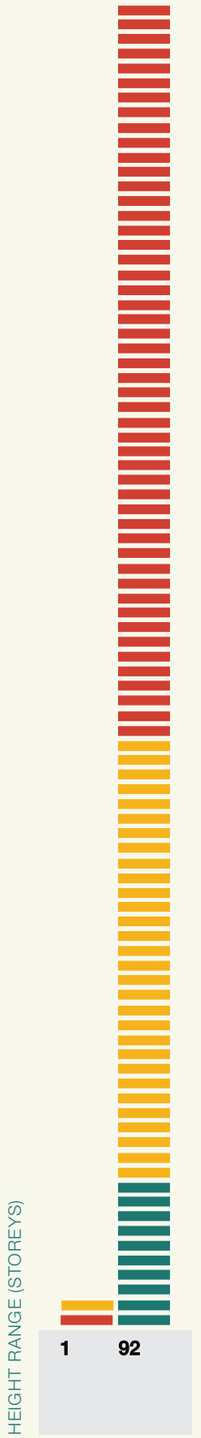
PRIVATE OPEN SPACE 0%
COMMUNAL OPEN SPACE 5%
PUBLIC OPEN SPACE 45%

SITE

CAR PARKING

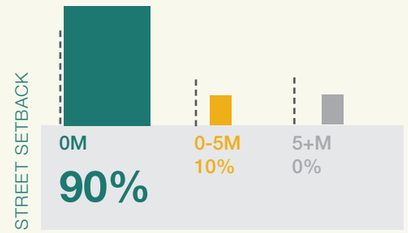


HEIGHT RANGE (STOREYS)



DWELLING TYPOLOGY

STREET SETBACK



BUILT FORM

WATER SOURCE

100% POTABLE TOWN SUPPLY
0% STORMWATER
0% GREYWATER REUSE
0% BLACKWATER REUSE

ENERGY SOURCE

100% GRID
0% SELF GENERATED
0% DISTRICT DISTRIBUTED NETWORK

STRUCTURE

0 PRIMARY SCHOOL
1 SECONDARY SCHOOL
1 UNIVERSITY

ACCESS TO SOCIAL / COMMUNITY INFRA

0 LIBRARY
0 SPORTS CENTRE
10 CULTURAL CENTRE / INSTITUTIONS
40 CAFES / RESTAURANTS

0 MEDICAL SERVICES
0 CHILDCARE

4 CONVENIENCE SHOPPING

NON-RESIDENTIAL USES

COMMERCIAL
RETAIL
INDUSTRIAL

STREET INTERFACE

20% 45% 35%

BUILDING ENTRANCES

<10M APART 20%
10-50M APART 50%
>50M APART 30%

ACCESS TO OPEN SPACE

SMALL PARK/ SQUARE 3
LARGE PARK 1

ACCESS TO PUBLIC TRANSPORT

BUS	0M / 0 MIN WALK
TRAIN	400M / 5 MINS WALK
TRAM	100M / 2 MINS WALK
FERRY	800M / 10 MINS WALK

CONTEXT

SITE PHOTOS

3.10 Case Study 08 Beddington Zero, Surrey, UK

DENSITY

PEOPLE/HA
100

DWELLINGS /HA
62

CARS/HA
15

62/HA

JOBS/HA

10/HA

CAR PARKING

GROUND
20%

ABOVE GROUND
0%

BASEMENT
0%

ON STREET
80%

DATE 2000
DIST. TO CBD 0 KM

Beddington Zero Energy Neighbourhood was developed as a prototype of a carbon neutral neighbourhood.

1:5,000

SITE AERIAL

BUILDING FOOTPRINT

9.92 HA
62%

1:10,000

OPEN SPACE

6.08 HA
38%

PRIVATE OPEN SPACE 10%
COMMUNAL OPEN SPACE 10%
PUBLIC OPEN SPACE 30%

DWELLING TYPOLOGY

TOWER APARTMENTS
0%

MID-RISE APARTMENTS
100%

LOW-RISE ATTACHED
0%

LOW-RISE DETACHED
0%

HEIGHT RANGE (STOREYS)

3 3

STREET SETBACK

0M
0%

0-5M
100%

5+M
0%

SITE

BUILT FORM

SITE PHOTOS

WATER SOURCE

70% POTABLE TOWN SUPPLY
15% STORMWATER
15% GREYWATER REUSE
0% BLACKWATER REUSE

ENERGY SOURCE

50% GRID
50% SELF GENERATED
0% DISTRICT DISTRIBUTED NETWORK

ACCESS TO SOCIAL / COMMUNITY INFRASTRUCTURE

1 PRIMARY SCHOOL
0 SECONDARY SCHOOL
0 UNIVERSITY

0 LIBRARY
2 SPORTS CENTRE
2 CULTURAL CENTRE / INSTITUTIONS
5 CAFES / RESTAURANTS

1 MEDICAL SERVICES
1 CHILDCARE

3 CONVENIENCE SHOPPING

ACCESS TO PUBLIC TRANSPORT

BUS 0M / 0 MIN WALK
TRAIN 600M / 7 MIN WALK
TRAM NO
FERRY NO

NON-RESIDENTIAL USES

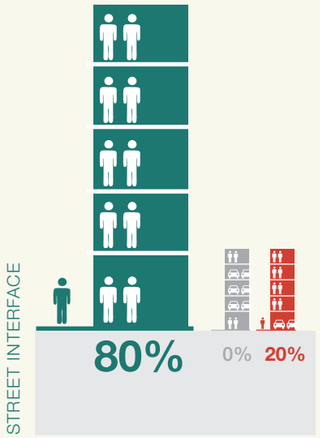
COMMERCIAL
RETAIL
INDUSTRIAL

ACCESS TO OPEN SPACE

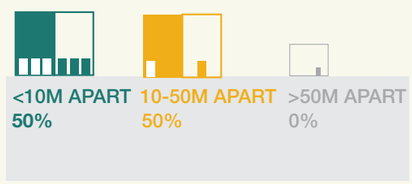
SMALL PARK/SQUARE
2

LARGE PARK
1

STREET INTERFACE



BUILDING ENTRANCES



CONTEXT

3.11 Case Study 09: Mid-Levels, Hong Kong

DENSITY

PEOPLE/HA 308

DWELLINGS /HA 118

CARS/HA 15

118/HA

JOBS/HA 45

45/HA

1:5,000

SITE AERIAL

DATE 1800S - 2009
DIST. TO CBD 1.8 KM / 10 MIN

The Mid Levels of Hong Kong is a vibrant mixed use district within close range of the CBD, Central. Accessed via a series of covered escalators, the area contains a variety of community amenities, universities, restaurants and local grocers. It is well integrated and contains numerous open spaces.

BUILDING FOOTPRINT

9.28 HA
58%

1:10,000

OPEN SPACE

4.4 HA
42%

PRIVATE OPEN SPACE 3%
PUBLIC SQUARE 4%
PUBLIC PARKS 20%

SITE

CAR PARKING

GROUND 15%

ABOVE GROUND 75%

BASEMENT 5%

ON STREET 5%

HEIGHT RANGE (STOREYS)

40+

10+

8 45

DWELLING TYPOLOGY

TOWER APARTMENTS 75%

MID-RISE APARTMENTS 25%

LOW-RISE ATTACHED 0%

LOW-RISE DETACHED 0%

STREET SETBACK

0M 95%

0-5M 5%

5+M 0%

BUILT FORM

SITE PHOTOS

WATER SOURCE

99% POTABLE TOWN SUPPLY
0.5% STORMWATER REUSED WITHIN SITE AREA
0.1% GREYWATER REUSE
0.1% BLACKWATER REUSE

ENERGY SOURCE

100% GRID
0% SELF GENERATED
0% DISTRICT DISTRIBUTED NETWORK

ACCESS TO SOCIAL / COMMUNITY INFRASTRUCTURE

15 PRIMARY SCHOOL
8 SECONDARY SCHOOL
1 UNIVERSITY

1 LIBRARY
1 SPORTS CENTRE
4 CULTURAL CENTRE / INSTITUTIONS
27 CAFES / RESTAURANTS

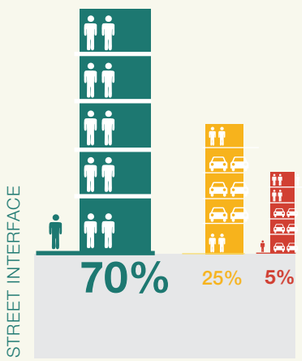
32 MEDICAL SERVICES
3 CHILDCARE

10 CONVENIENCE SHOPPING

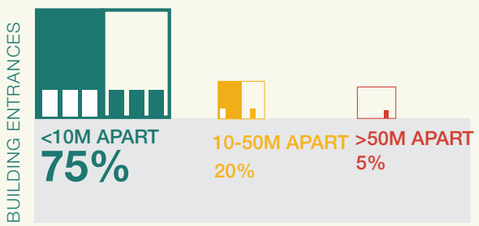
NON-RESIDENTIAL USES

COMMERCIAL
RETAIL
INDUSTRIAL

STREET INTERFACE



BUILDING ENTRANCES



ACCESS TO OPEN SPACE

ACCESS TO PUBLIC TRANSPORT

BUS	0M / 0 MIN WALK
TRAIN	0M / 0 MIN WALK
TRAM	1 KM / 12 MIN WALK
FERRY	1.2 KM / 15 MIN WALK

CONTEXT

3.12 Case Study 10: Eixample, Barcelona, Spain

DENSITY

PEOPLE/HA
351

DWELLINGS /HA
230

CARS/HA
140

230/HA

JOBS/HA
78

78/HA

1:5,000

SITE AERIAL

DATE 1850-1900
DIST. TO CBD 2KM

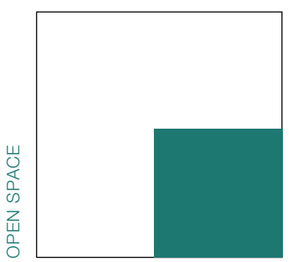
The Eixample district in Barcelona was designed by Cerdes as an extension to the city beyond the traditional defensible walls. The grid block layout is repeated across the 7.5 square kilometre suburb. It is Barcelona's densest city area.

BUILDING FOOTPRINT

11.04 HA
69%

1:10,000

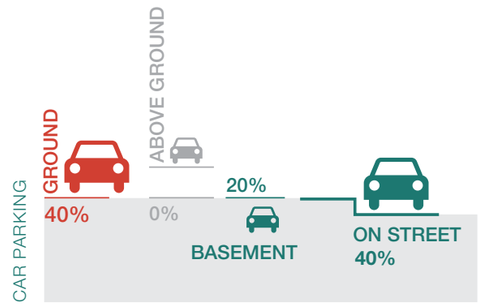
OPEN SPACE



4.96 HA
31%

PRIVATE OPEN SPACE 0%
COMMUNAL OPEN SPACE 3%
PUBLIC OPEN SPACE 28%

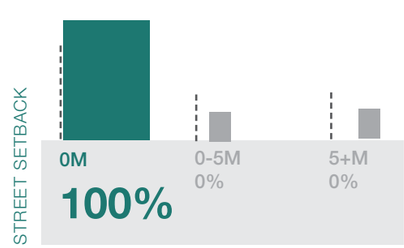
CAR PARKING



DWELLING TYPOLOGY

HEIGHT RANGE (STOREYS)

STREET SETBACK



WATER SOURCE

100% POTABLE TOWN SUPPLY
0% STORMWATER REUSED WITHIN SITE AREA
0% GREYWATER REUSE
0% BLACKWATER REUSE

ENERGY SOURCE

100% GRID
0% SELF GENERATED
0% DISTRICT DISTRIBUTED NETWORK

ACCESS TO SOCIAL / COMMUNITY INFRASTRUCTURE

17 PRIMARY SCHOOL
17 SECONDARY SCHOOL
0 UNIVERSITY

X LIBRARY
X SPORTS CENTRE
X CULTURAL CENTRE / INSTITUTIONS
61 CAFES / RESTAURANTS

1+ MEDICAL SERVICES
X CHILDCARE

41 CONVENIENCE SHOPPING

URBAN DENSITY STUDY

STREET INTERFACE

95% 0% 5%

NON-RESIDENTIAL USES

COMMERCIAL
RETAIL
INDUSTRIAL

BUILDING ENTRANCES

<10M APART 50%
10-50M APART 50%
>50M APART 0%

ACCESS TO OPEN SPACE

SMALL PARK/ SQUARE 1
LARGE PARK 0

ACCESS TO PUBLIC TRANSPORT

BUS 0M / 0 MIN WALK
TRAIN NA
TRAM 0M / 0 MIN WALK
FERRY NA

3.13 Conclusions from the Urban Density Case Study

The following is a summary of the case studies ordered according to residential densities.

3.13.01 Densities

Densities

Five of the case study examples all achieved dwelling densities in the order of 100 dwellings per hectare. These included Hong Kong, Bercy, Borneo-Sporenburg, Coin Street and Battery Park. The remaining four case studies recorded densities of 66 (Melbourne), 50 (Beddington Zero), 41 (Southbank) and 24 (Long Beach).

Employment densities varied greatly with four case studies exceeding 100 jobs per hectare. These were Coin Street, Battery Park, Melbourne CBD and Southbank. Long Beach was within reach of this number at 92 jobs/hectare. The remaining three case studies Bercy, Borneo-Sporenburg and Beddington Zero recorded distinctly lower densities ranging from 2.5 to 16 jobs per hectare. These figures reflect the predominantly residential use of these sites.

In order to achieve a successful mixed use area, it will be important to balance sustainable residential and employment densities.

Car densities were typically difficult to determine with information on car ownership not readily available for each case study. Similarly, population data that we defined for the relatively small study areas analysed was not easily accessible. Considering the reliance on assumed ratios of car ownership and the number of residents per dwelling the recommendations drawn from this study will focus primarily on dwelling and employment densities.

THE RESULTS
ALL DENSITIES

	POPULATION	DWELLING		CARS	CARS/ DWELLING	EMPLOYMENT	
01 EIXAMPLE, BARCELONA	351	230	230/HA	140	0.6/🏠		78/HA
02 MID LEVELS, HONG KONG	308	118	118/HA	15	0.1/🏠		45/HA
03 COIN ST, LONDON	200	100	100/HA	20	0.2/🏠		300/HA
03 BORNEO SPORENBURG, AMSTERDAM	200	100	100/HA	50	0.5/🏠		2.5/HA
03 BERCY, PARIS	200	100	100/HA	50	0.5/🏠		16/HA
03 BATTERY PARK, NEW YORK	240	100	100/HA	50	0.5/🏠		830/HA
07 MELBOURNE CBD	108	66	66/HA	33	0.5/🏠		1255/HA
08 BEDDINGTON ZERO, SURREY	100	50	50/HA	12	0.2/🏠		10/HA
09 SOUTHBANK, MELBOURNE	58	41	41/HA	41	1.0/🏠		252/HA
10 LONG BEACH, CALIFORNIA	50	24	24/HA	24	1.0/🏠		92/HA

3.13.02 Site

Built Footprint

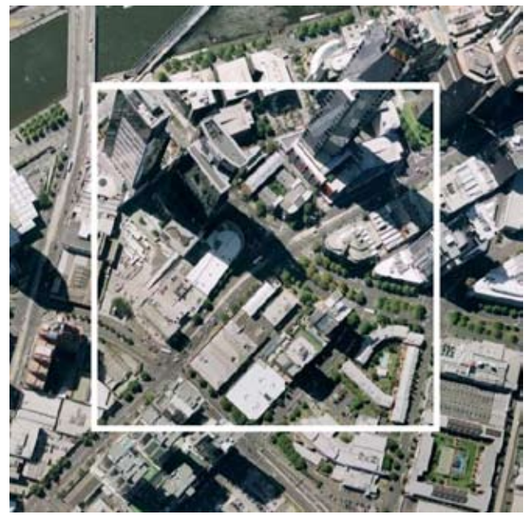
The building site coverage across the case studies ranged from 47% (Bercy) to 73% (Melbourne CBD). The majority of study areas were within excess of -8 percentage points of the average of 58% site coverage. Melbourne CBD and Barcelona had the highest percentage of site coverage at 73% and 69% respectively. There was no relationship evident in this study between the residential or employment densities, and building footprints.

The building coverage for Southbank was 50% which was 8 percentage points lower than the average.

Open Space

The area of each site attributed to open space ranged from 20% to 50%. The majority of this area in each case was provided as public space predominantly in the road corridors/transit ways but also as accessible urban parkland. Private open space accounted for a maximum of 10% of the site area (Bercy and Beddington Zero) and was not evident within Mid Levels, Battery Park, Melbourne CBD, Southbank or Barcelona.

Southbank recorded the equal highest area of open space (50%) and the highest area of public open space (45%). Bercy and Beddington Zero also recorded 50% open space area followed closely by Hong Kong (48%). However a review of the aerial photographs illustrates that within Southbank a significant portion of this area is road infrastructure and not available as green community active or passive recreation areas.



Case Study	Dwelling Density	Employment Density	Building Footprint
Eixample, Barcelona	230	78	69%
Mid Levels, Hong Kong	118	45	58%
Bercy, Paris	100	16	47%
Borneo-Sporenburg	100	2.5	60%
Coin Street	100	300	50%
Battery Park	100	830	62%
Melbourne CBD	66	1255	73%
Beddington Zero	50	10	50%
Southbank	41	252	50%
Long Beach	24	92	58%

3.13.A BUILDING FOOTPRINT BREAKDOWN

Case Study	Dwelling	Employment Density	Open Space	Private	Communal	Public
Eixample, Barcelona	230	78	31%	-	3%	28%
Mid Levels, Hong Kong	118	45	48%	-	5%	43%
Bercy, Paris	100	16	50%	10%	10%	30%
Borneo-Sporenburg	100	2.5	20%	6%	2%	12%
Coin Street	100	300	35%	5%	10%	20%
Battery Park	100	830	38%	-	10%	28%
Melbourne CBD	66	1255	27%	-	-	27%
Beddington Zero	50	10	50%	10%	20%	20%
Southbank	41	252	50%	-	5%	45%
Long Beach	24	92	42%	4%	18%	20%

3.13.B OPEN SPACE BREAKDOWN

Building Typology

The predominant typology across all case studies was mid-rise apartments. Tower apartments only featured prominently in the Mid Levels, Battery Park and Southbank examples. There were no cases of low rise detached houses.

While the study only assesses a limited number of examples, there is an evident relationship between the building typology and the dwelling density recorded with four of the highest density case studies containing only mid-rise apartments and low-rise attached dwellings. Mid Levels and Battery Park are the exceptions where 75% and 70% respectively of the residential population lives in high-rise apartments.

Southbank recorded the highest provision of apartment living at 90%.

01 EIXAMPLE, BARCELONA

02 MID LEVELS, HONG KONG

03 COIN ST, LONDON

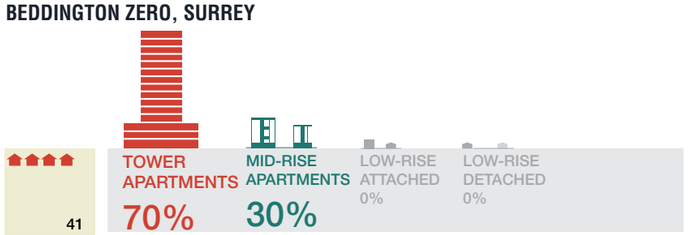
03 BORNEO SPORENBURG, AMSTERDAM

03 BERCY, PARIS

03 BATTERY PARK, NEW YORK

07 MELBOURNE CBD

08 BEDDINGTON ZERO, SURREY



09 SOUTHBANK, MELBOURNE

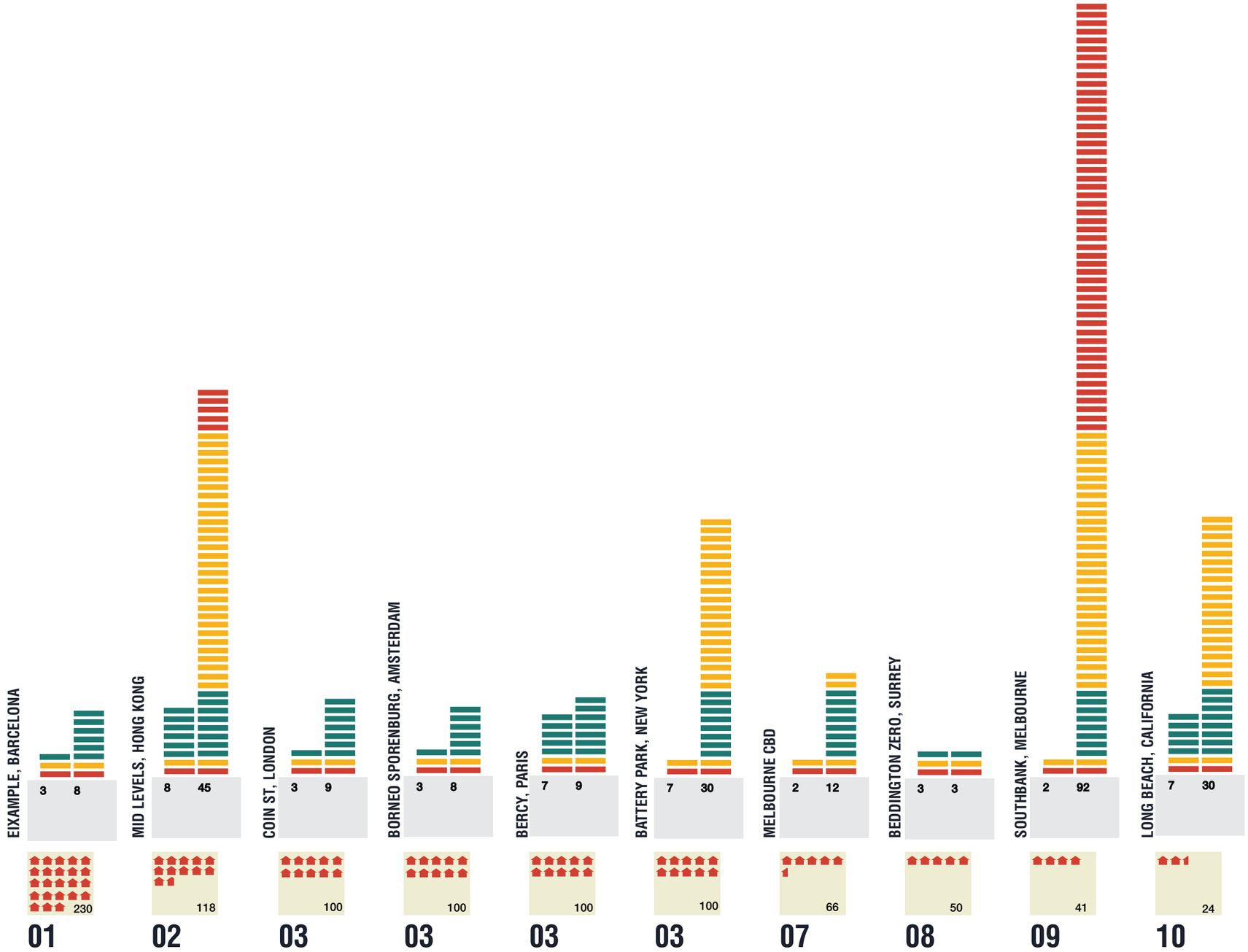
10 LONG BEACH, CALIFORNIA

Building Height

Following the building typology mix, the predominant height range for buildings was 2-10 storeys. The maximum height of any dwelling was the Eureka Tower in Southbank at 92 storeys. This far surpassed the next tallest building at 42 storeys in Hong Kong. Four of the five highest dwelling density examples did not exceed 9 storeys. Higher buildings were associated with higher employment densities.

The relationship between building heights and densities is illustrated in Figure 3.13E.

Southbank has the most differentiation between building heights within the study areas with the highest and lowest building heights recorded.



3.13.E BUILDING HEIGHT BREAKDOWN

Car Parking

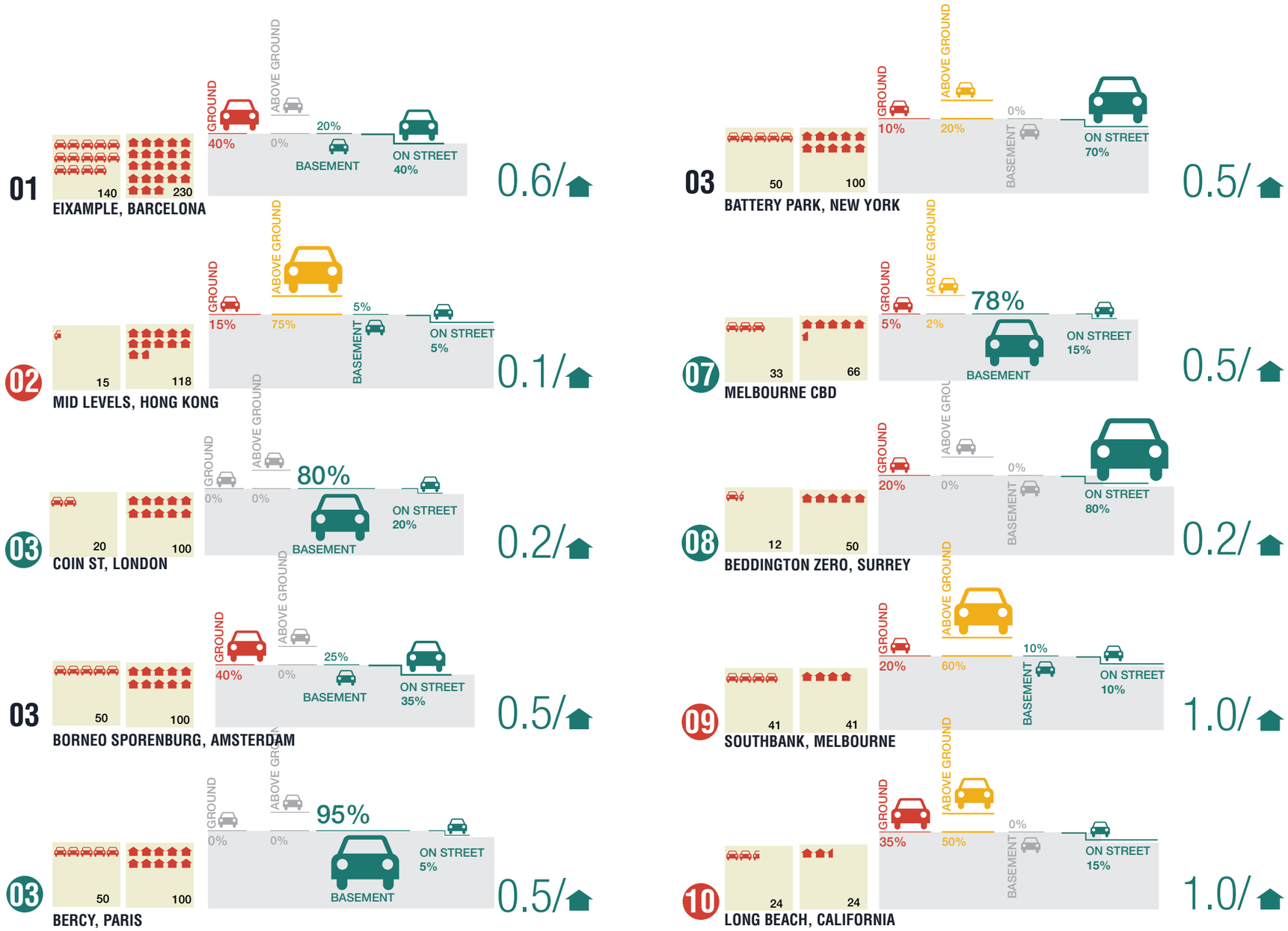
There was a wide range of car parking configurations across the case studies. Five of the six sites with the highest residential densities had a significant share of their car parking located either in the basement or on-street. These two parking arrangements provide the best public realm experience as they avoid locating the inactive use of car storage at the street interface or overlooking the street.

The parking arrangements of Southbank, Long Beach and Hong Kong suggest that these cities provide the worst public realm outcome with a minimum of 80% of car parking located at ground level or in multi deck car parks. The effect may be mitigated to a degree however in Hong Kong where car ownership is significantly lower that in Southbank or Long Beach.

This study identifies a direct relationship between car parking arrangements and building heights as these three city examples were also those that recorded buildings exceeding 30 storeys.

BEST PERFORMERS >80% POSITIVE

WORST PERFORMERS >80% NEGATIVE



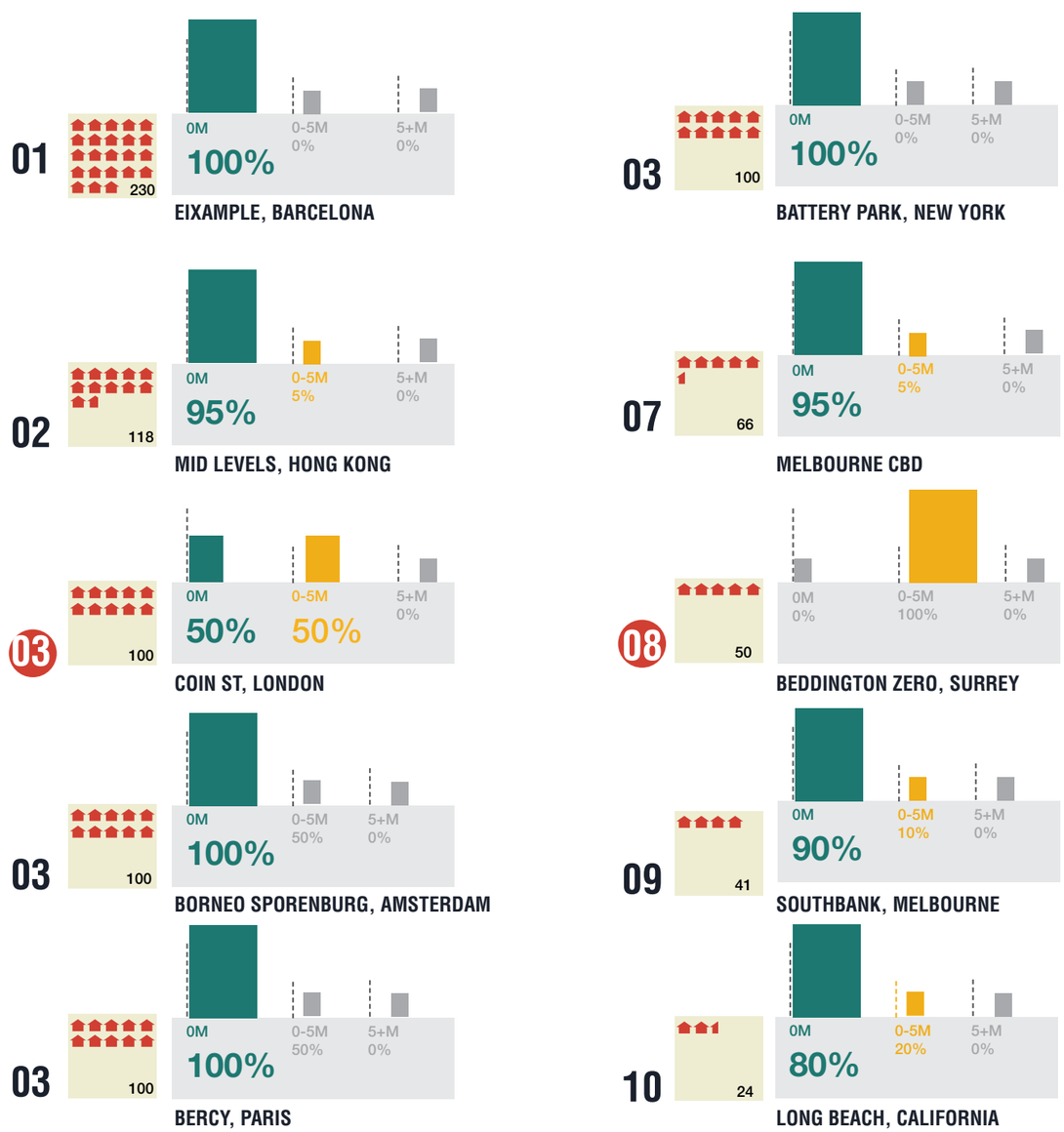
Street Setback

Zero setbacks were the most common followed by 0-5m. Setbacks greater than 5m were not recorded in any case study.

Southbank was comparable with the remaining study areas with 90% of the building footprint with no street setback and 10% setback 0-5m.

Beddington Zero recorded the highest extent of setbacks. Considering its suburban location comparative to the other case studies this is not unexpected.

BEST PERFORMERS >80% POSITIVE
WORST PERFORMERS >80% NEGATIVE



3.13.F STREET SETBACK BREAKDOWN

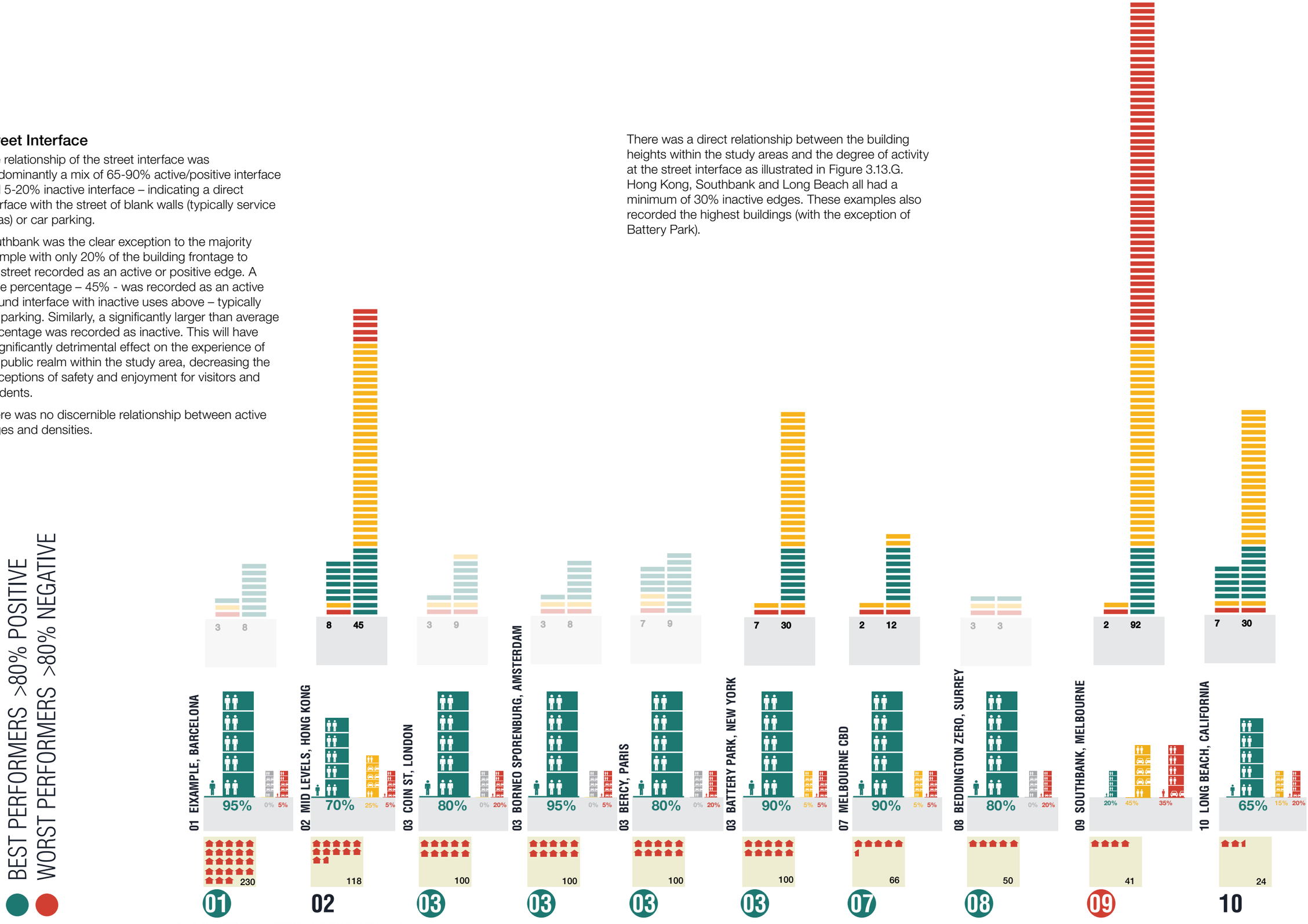
Street Interface

The relationship of the street interface was predominantly a mix of 65-90% active/positive interface and 5-20% inactive interface – indicating a direct interface with the street of blank walls (typically service areas) or car parking.

Southbank was the clear exception to the majority example with only 20% of the building frontage to the street recorded as an active or positive edge. A large percentage – 45% - was recorded as an active ground interface with inactive uses above – typically car parking. Similarly, a significantly larger than average percentage was recorded as inactive. This will have a significantly detrimental effect on the experience of the public realm within the study area, decreasing the perceptions of safety and enjoyment for visitors and residents.

There was no discernible relationship between active edges and densities.

There was a direct relationship between the building heights within the study areas and the degree of activity at the street interface as illustrated in Figure 3.13.G. Hong Kong, Southbank and Long Beach all had a minimum of 30% inactive edges. These examples also recorded the highest buildings (with the exception of Battery Park).



3.13.G STREET INTERFACE BREAKDOWN

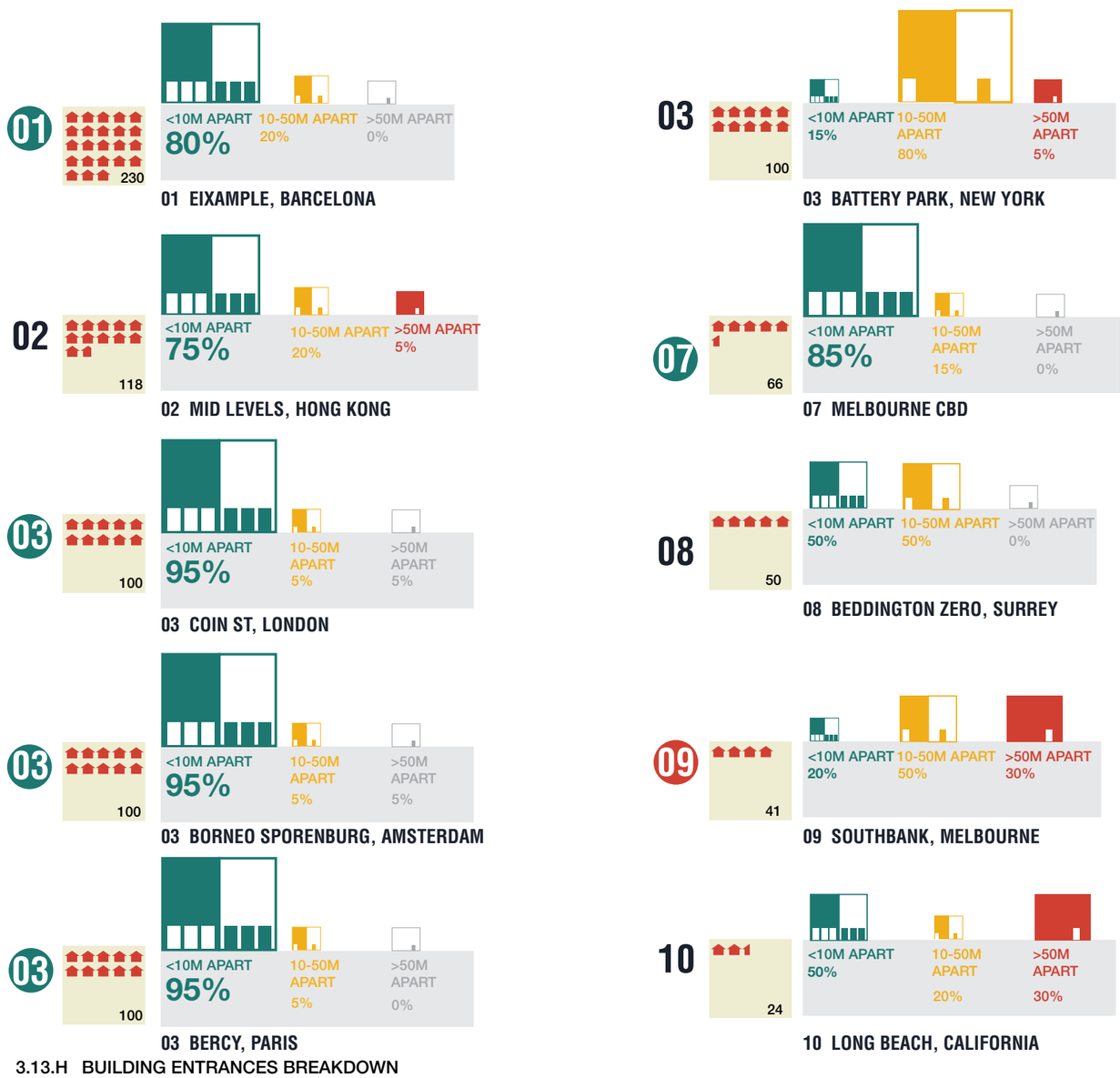
Building Entrances

The distance between building entrances indicates the grain of urban development and provides a strong indication of the intensity of different premises within the site and the built form character. Entrances that are close together (less than 10m) indicate a fine grain of development that adds diversity and interest and vibrancy to an urban area. Entrances less than 10m apart were the most common (above 50% in most case studies).

Building entrances greater than 10m were recorded against all four of the lowest residential densities. There was no clear correlation between building entrance densities and employment densities.

There is an identified relationship between the distances between entrances and building typologies. The two examples with the greatest distances recorded between building entrances were Battery Park (85% of entrances greater than 10m apart) and Southbank (80% of entrances greater than 10m apart). This suggests that these two examples incorporate a coarser urban grain. Coin Street and Beddington Zero each had approximately 50% of dwellings 10-50m apart, with none greater than 50m. Battery Park and Southbank also recorded two of the three highest percentages of tower apartments and it is possible to associate this coarser urban grain with the tower apartment typology.

BEST PERFORMERS >80% POSITIVE
WORST PERFORMERS >80% NEGATIVE



3.13.H BUILDING ENTRANCES BREAKDOWN

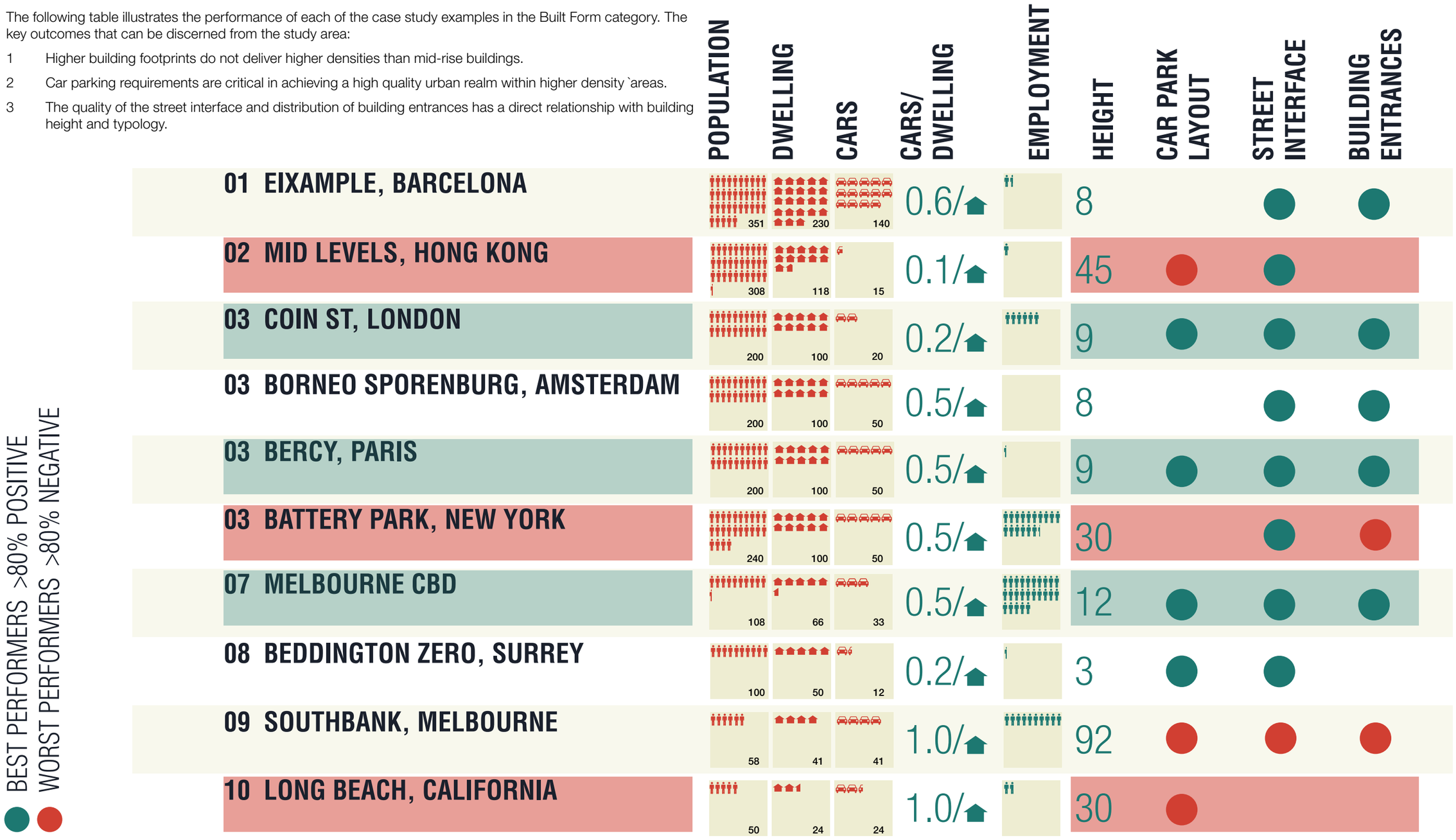
KEY OUTCOMES: BUILT FORM

The following table illustrates the performance of each of the case study examples in the Built Form category. The key outcomes that can be discerned from the study area:

1 Higher building footprints do not deliver higher densities than mid-rise buildings.

2 Car parking requirements are critical in achieving a high quality urban realm within higher density `areas.

3 The quality of the street interface and distribution of building entrances has a direct relationship with building height and typology.



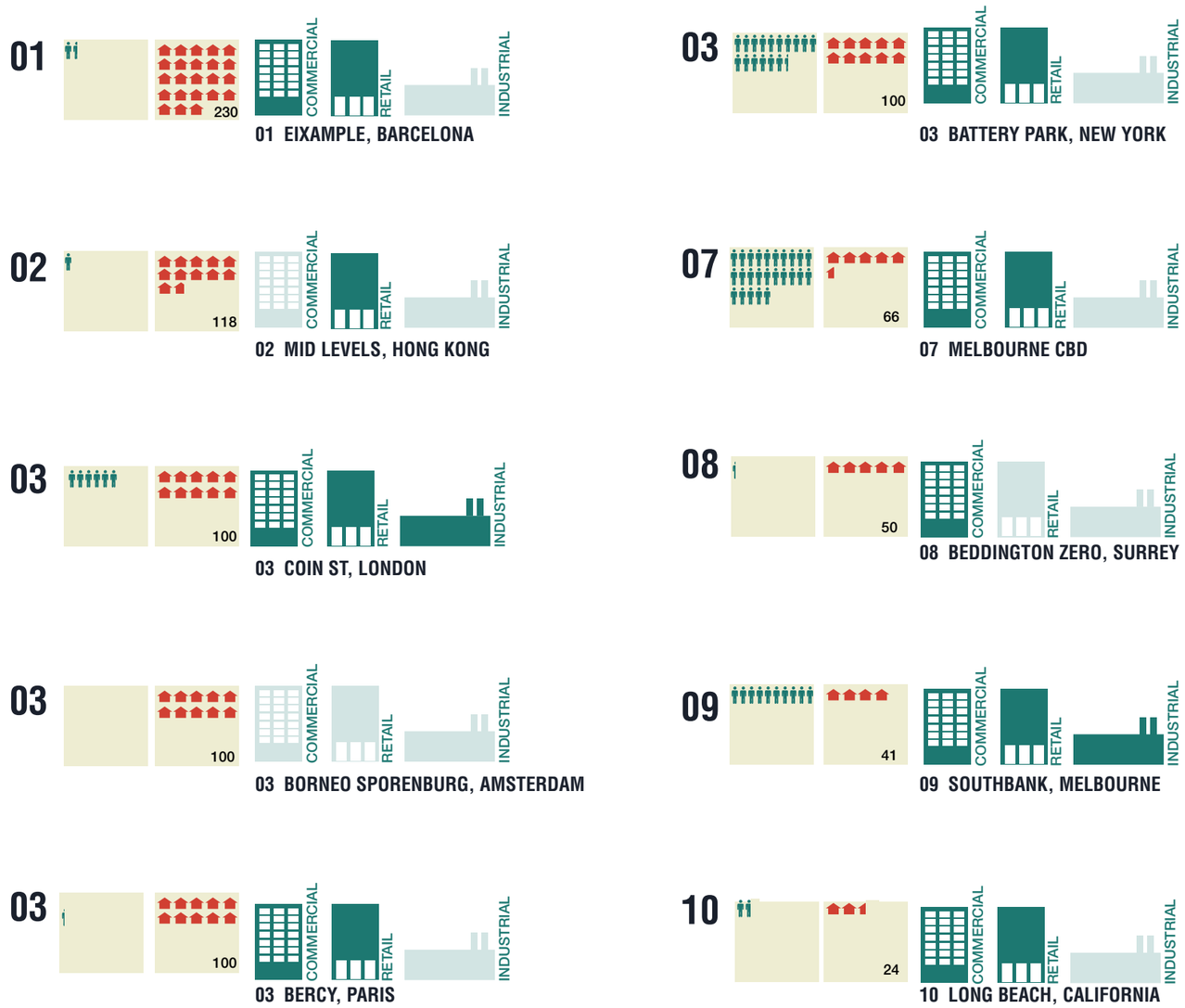
3.13.03 Context

The context analysis provides a useful tool to assess the livability of each case study. Access to open space, employment, social and community facilities and public transport all directly contribute to the quality of life offered to residents and visitors within urban environments.

Non-Residential Uses

Most of the case studies incorporated non residential uses with the exception of Borneo Sporenburg. Beddington Zero only incorporated commercial uses in addition to residential uses. These two case studies also recorded the lowest densities in employment. Only Coin Street and Southbank incorporated industrial uses within the study areas.

Southbank, along with Coin Street, recorded the greatest mix of uses within the site.



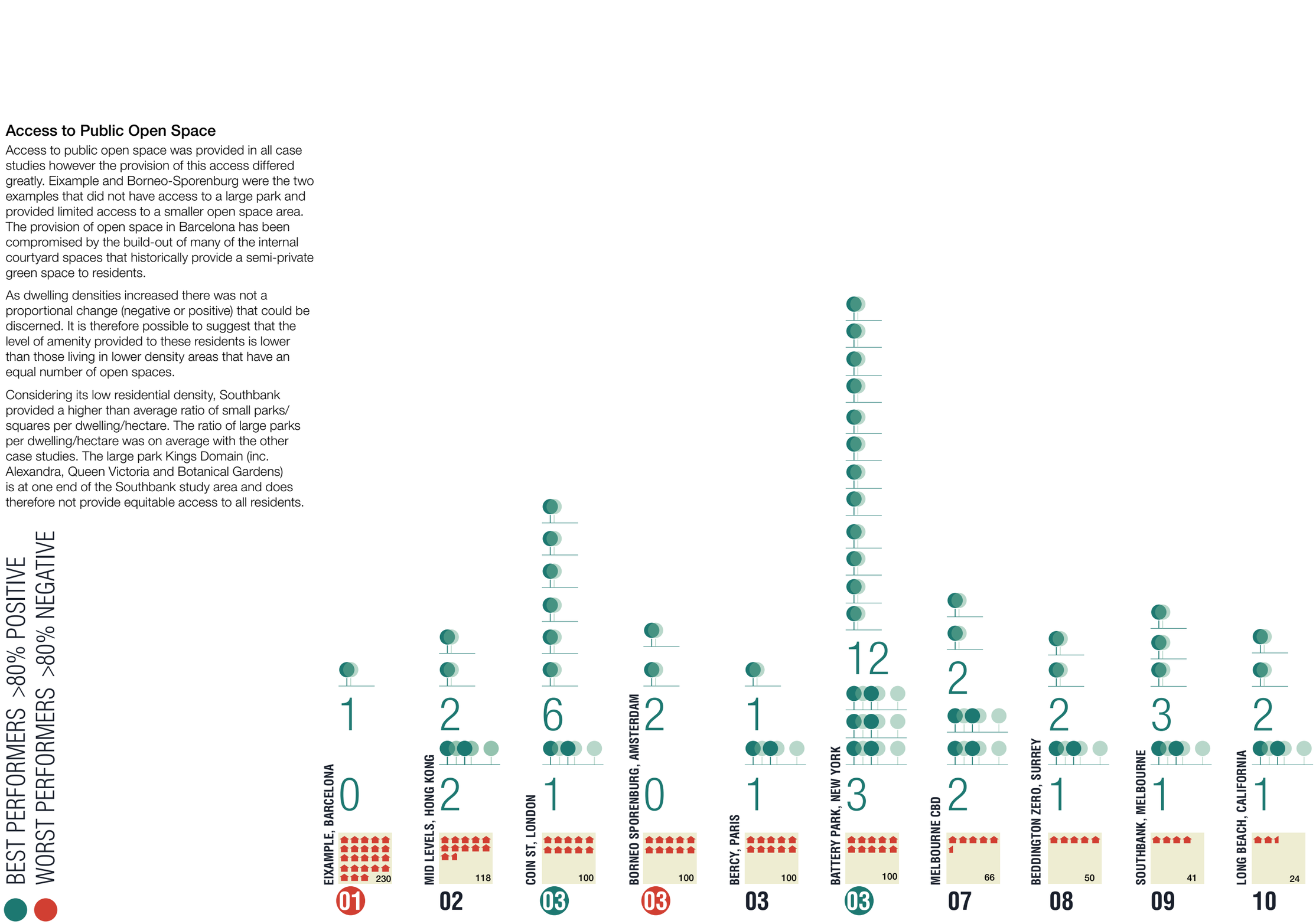
3.13.I NON RESIDENTIAL LAND USE BREAKDOWN

Access to Public Open Space

Access to public open space was provided in all case studies however the provision of this access differed greatly. Eixample and Borneo-Sporenburg were the two examples that did not have access to a large park and provided limited access to a smaller open space area. The provision of open space in Barcelona has been compromised by the build-out of many of the internal courtyard spaces that historically provide a semi-private green space to residents.

As dwelling densities increased there was not a proportional change (negative or positive) that could be discerned. It is therefore possible to suggest that the level of amenity provided to these residents is lower than those living in lower density areas that have an equal number of open spaces.

Considering its low residential density, Southbank provided a higher than average ratio of small parks/ squares per dwelling/hectare. The ratio of large parks per dwelling/hectare was on average with the other case studies. The large park Kings Domain (inc. Alexandra, Queen Victoria and Botanical Gardens) is at one end of the Southbank study area and does therefore not provide equitable access to all residents.



3.13.J ACCESS TO OPEN SPACE BREAKDOWN

Access to Social /Community Infrastructure: Education

The provision of educational institutions varied across the sites and cannot be directly related to densities. A significant gap in provision is evident – particularly in primary/secondary schools where proximity to schools from residences is of greater importance than the distance between universities and residences (it can be assumed that an adult can travel more independently and therefore further than young children). In this case Melbourne CBD and Southbank recorded a distinct gap in the provision of childhood education, both not providing either a primary or secondary school. Beddington Zero was the only other example that failed to provide both levels of schooling within no secondary school within 500m of the development.

The provision of Universities in the area can have a significant impact on the vibrancy of the neighbourhoods with a prevalence of affordable eateries and social venues typically collocated with University student populations. The Mid Levels and Eixample both delivered a high number of schools to service the high density populations.

Access to Social /Community Infrastructure: Community Facilities

The provision of community facilities within each study area was mixed. The provision of public libraries was generally low as only Mid Levels, Eixample, Melbourne CBD and Long Beach provided this public service. The highest provision of cultural centres/institutions were found in the Eixample, Melbourne CBD and Southbank.

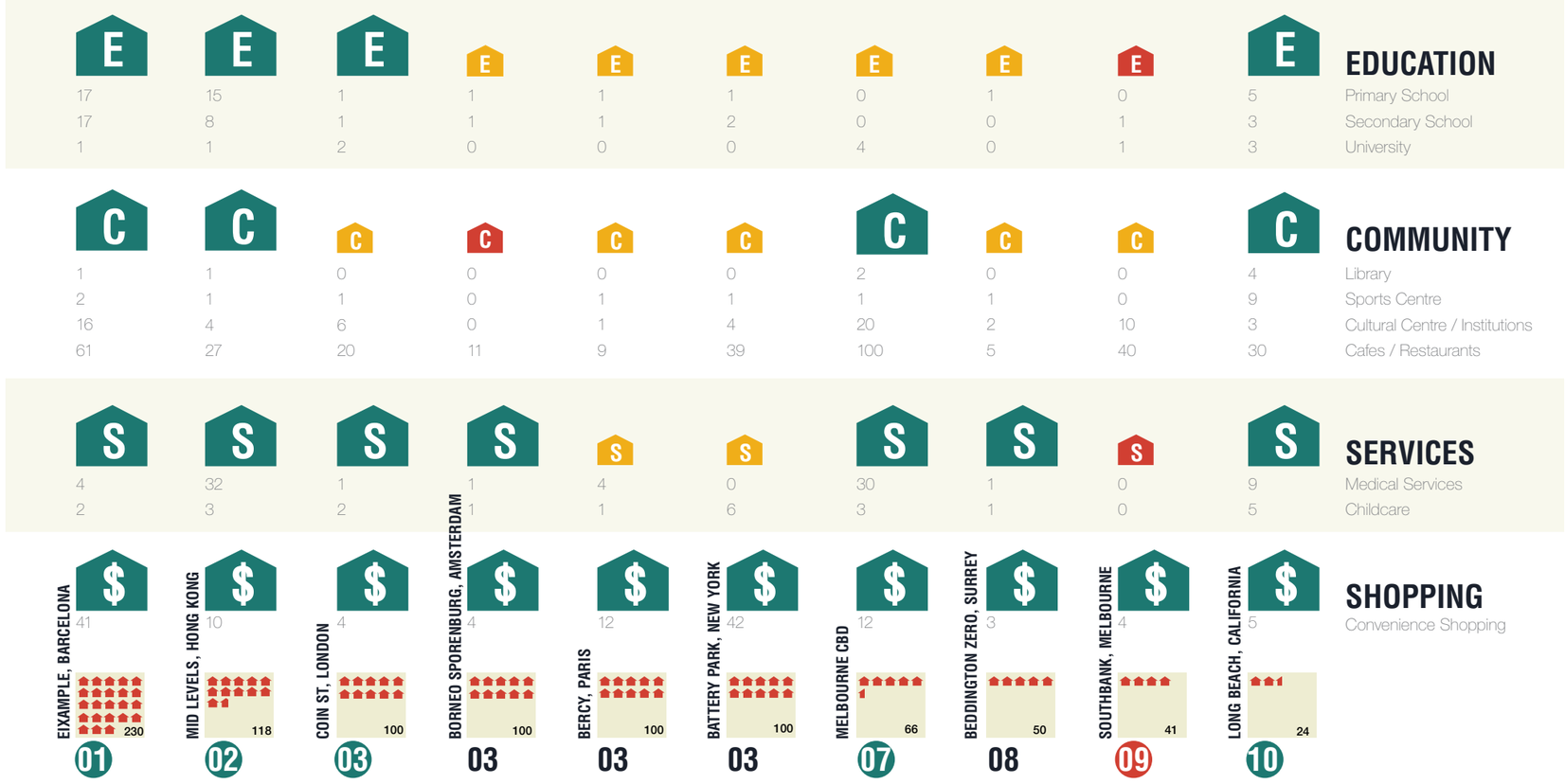
Southbank incorporated many large cultural venues: institutional galleries, performance spaces and an arts centre. The provision of these facilities in Eixample and Melbourne CBD are predominantly attributed to smaller scale premises, particularly small art/design galleries. Cafes/Restaurants were prevalent in all case studies, with the highest provisions associated with higher densities in employment – this was the case for Coin Street, Battery Park, Melbourne CBD, Southbank and Long Beach.

Significant gaps in the provision of community infrastructure were evident in Bercy, Borneo-Sporenburg and Beddington Zero. These are predominantly residential developments that do not exhibit a high level of social infrastructure amenity.

Southbank does not provide either a public library or sports facility. In relation to its residential density it offers a high degree of access to participation in cultural events.

Access to Social /Community Infrastructure: Social Services

Access to social services is low in most examples considering the residential densities recorded, with the exception of Mid Levels, with the same reason as discussed above. Further investigative research would be useful to break down the provision of medical services – Melbourne CBD records a high provision of medical facilities, however as the CBD of a state capital this is to be expected as it will provide a range of specialist services only found here within Victoria.



Access to Public Transport

All sites had access to at least two modes of public transport. With the exception of Beddington Zero, all case studies had access to three modes of public transport within a 10 minute walk.

Public transport is critical to achieving urban sustainability. It has been recommended that the population densities to support an urban transit centres are in the order of the following (refer Peter Newman's submission to the recent Garnaut Report):

- Viable Transit Centre – 10,000 people and jobs within a 1km radius (equates to 3.14km2, that is 314 hectares). This translates to 32 people and jobs per hectare (gross).
- Regional Transit Centre – 100,000 people and jobs within a 3km radius (equates to 28.27km2, that is 2827 hectares). This translates to 35 people and jobs per hectare (gross).
- Walking Oriented Centre – Over 100 people and jobs per hectare in the 1km pedestrian shed. This translates to residential densities of approximately 40 dwellings per hectare.

Newman suggests that the mix between residents and jobs is not critical in supporting public transport services as long as the threshold of 100 people and jobs per hectare is met. These are minimum thresholds only and increases in density above these levels will have a significant impact on the choice of transport mode. Densities below this level result in a sharp increase in car use, while densities above this level result in an exponential increase in the preference for walking, cycling and public transport as the preferred mode of travel. These increased densities therefore have a significant impact on the environmental sustainability of urban environments and should be pursued to achieve the best low fossil fuel outcomes.

Case Study	Dwelling Density	Employment Density	Bus		Train		Tram/Metro		Ferry	
			m	Min. Walk	m	Min. walk	m	Min. walk	m	Min. walk
Mid Levels, Hong Kong	118	45	-	-	-	-	1000	12	1200	15
Bercy, Paris	100	16	0	0	400	5	0	0	-	-
Borneo-Sporenburg	100	2.5	0	0	2000	25	0	0	0	0
Coin Street	100	300	0	0	400	5	400	5	400	5
Battery Park	100	830	100	1	200	2	-	-	200	2
Melbourne CBD	66	1255	0	0	0	0	0	0	800	10
Beddington Zero	50	10	0	0	600	7	-	-	-	-
Southbank	41	252	0	0	400	5	100	2	600	8
Long Beach	24	92	60	1	150	3	-	-	600	8

3.13.K COMMUNITY FACILITIES BREAKDOWN

KEY OUTCOMES: CONTEXT

The following table illustrates the performance of each of the case study examples in the Context category. The key outcomes that can be discerned from the study area:

- The provision of good amenity through the delivery of open space, community infrastructure and public transport was not directly related to density, however it was possible to discern the highest performing examples with Coin Street representing the best recorded outcome.
- Southbank was one of the two worst performers along with Borneo Sporenburg.

	POPULATION	DWELLING	CARS	CARS/ DWELLING	EMPLOYMENT	OPEN SPACE	COMMUNITY/ SOCIAL	PUBLIC TRANSPORT
01 EIXAMPLE, BARCELONA	351	230	140	0.6/		●	●	●
02 MID LEVELS, HONG KONG	308	118	15	0.1/			●	●
03 COIN ST, LONDON	200	100	20	0.2/		●	●	●
03 BORNEO SPORENBURG, AMSTERDAM	200	100	50	0.5/		●		●
03 BERCY, PARIS	200	100	50	0.5/				●
03 BATTERY PARK, NEW YORK	240	100	50	0.5/		●		●
07 MELBOURNE CBD	108	66	33	0.5/			●	●
08 BEDDINGTON ZERO, SURREY	100	50	12	0.2/				
09 SOUTHBANK, MELBOURNE	58	41	41	1.0/			●	●
10 LONG BEACH, CALIFORNIA	50	24	24	1.0/				●

3.13.04 ESD

Water Source

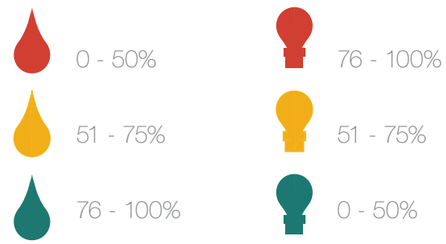
The majority of case studies relied on the potable water supply to service the development. The exceptions were Borneo-Sporenburg and Beddington Zero which only partly used other water sources. These figures reflect the fact that although there might be the odd development undertaking water capture and reuse, the majority do not.

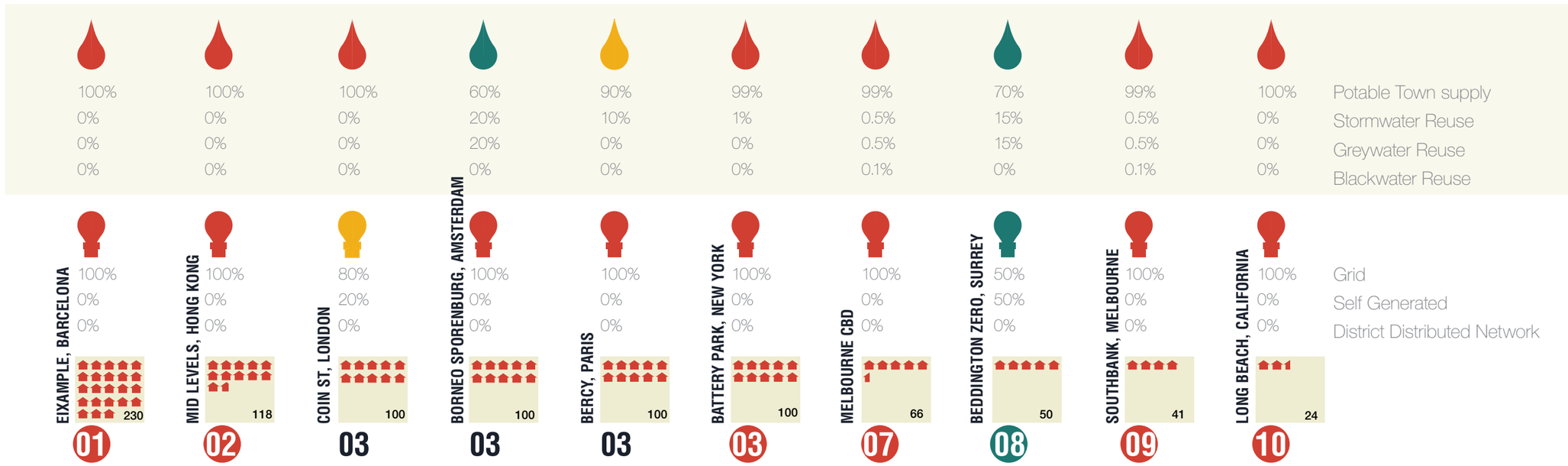
- The residents of Beddington Zero use 50% less water than the local average.

Energy Source

The majority of the case studies relied on the energy grid to provide power requirements. The exceptions were Coin Street and Beddington Zero. Beddington Zero relied on a combination of solar and wind technology to generate energy demands.

- The residents of Beddington Zero use 45% less energy than the local average. A biomass treatment plant is designed to service the development. This is yet to come online but is intended to replace all energy currently sourced from the grid.





3.13.L PUBLIC TRANSPORT BREAKDOWN

KEY OUTCOMES: ESD

The following table illustrates the performance of each of the case study examples in the ESD category. With the exception of Beddington Zero no case studies recorded outstanding ESD results.

It is important to note that the ESD study was focused on the method of provision of water and energy supply and did not delve into the ecological performance of each city zone - for example water quality, air quality, microclimate or residential comfort.

	POPULATION	DWELLING	CARS	CARS/ DWELLING	EMPLOYMENT	ESD
01 EIXAMPLE, BARCELONA	351	230	140	0.6/		
02 MID LEVELS, HONG KONG	308	118	15	0.1/		
03 COIN ST, LONDON	200	100	20	0.2/		
03 BORNEO SPORENBURG, AMSTERDAM	200	100	50	0.5/		
03 BERCY, PARIS	200	100	50	0.5/		
03 BATTERY PARK, NEW YORK	240	100	50	0.5/		
07 MELBOURNE CBD	108	66	33	0.5/		
08 BEDDINGTON ZERO, SURREY	100	50	12	0.2/		
09 SOUTHBANK, MELBOURNE	58	41	41	1.0/		
10 LONG BEACH, CALIFORNIA	50	24	24	1.0/		

KEY PRINCIPLES

01 Higher is not necessarily denser

02 Too high leads to worse urban realm outcomes

03 Car parking requirements (numbers and their locations) are critical in achieving a high quality urban realm

04 Residential densities of 100+/ha and employment densities of 50+/ha are required to support social infrastructure

05 Look to Eixample, Barcelona and Coin St, London

	POPULATION	DWELLING	CARS	CARS/ DWELLING	EMPLOYMENT	HEIGHT	CAR PARK LAYOUT	STREET INTERFACE	BUILDING ENTRANCES	OPEN SPACE	COMMUNITY/ SOCIAL	PUBLIC TRANSPORT	ESD
01 EIXAMPLE, BARCELONA	351	230	230/HA	140	0.6/	78/HA	8	●	●	●	●	●	●
02 MID LEVELS, HONG KONG	308	118	118/HA	15	0.1/	45/HA	45	●	●		●	●	●
03 COIN ST, LONDON	200	100	100/HA	20	0.2/	300/HA	9	●	●	●	●	●	●
03 BORNEO SPORENBURG	200	100	100/HA	50	0.5/	2.5/HA	8	●	●	●		●	
03 BERCY, PARIS	200	100	100/HA	50	0.5/	16/HA	9	●	●	●		●	
03 BATTERY PARK, NY	240	100	100/HA	50	0.5/	830/HA	30	●	●	●		●	●
07 MELBOURNE CBD	108	66	66/HA	33	0.5/	1255/HA	12	●	●	●	●	●	●
08 BEDDINGTON ZERO	100	50	50/HA	12	0.2/	10/HA	3	●	●				●
09 SOUTHBANK, MELB	58	41	41/HA	41	1.0/	252/HA	92	●	●	●	●	●	●
10 LONG BEACH, CA	50	24	24/HA	24	1.0/	92/HA	30	●				●	●

3.14 Recommendations for the Southbank Structure Plan

There are some clear distinctions between the global precedent examples and the present Southbank urban conditions. For an urban suburb located within 400m of the Melbourne CBD, Southbank residential densities are considerably low. The site layout, built form and urban context that generates these densities is categorised by particular characteristics that compromise the densities and livability of Southbank.

These were most marked in the following criteria and recommendations to address each of these shortfalls are provided below.

Open Space

While Southbank incorporated the equal highest area of open space (50%) and the highest area of public open space (45%) the greatest portion of this area is dedicated to road infrastructure and not available as community active or passive recreation areas.

The Southbank study area incorporates only 5% of community open space. This is associated with one development and does not therefore contribute significantly to informal or spontaneous interactions between the residents across the site. Spaces for shared residential uses are typically provided within upper floors of residential towers – for example communal gym facilities/lap pool. There is a distinct lack of green open space.

Recommendation:

- Increase the extent of public open space dedicated to active and passive recreational community uses; and
- Encourage developments that incorporate shared communal open spaces to more effectively encourage interaction between residents in new developments.

Car Parking and Street Interface

Southbank recorded one of the worst public realm outcomes with a minimum of 80% of car parking located at ground level or in upper level car parks (incorporated into high-rise podiums). This results in a significant reduction in casual visual surveillance of the street both at street level and from the overlooking vantage points provided from upper floors. It also decreases the visual interest for pedestrians through the provision of largely inactive edges to the building frontages.

Recommendation:

- Reduce car parking requirements for all new developments in Southbank; and
- Develop residential edges to multi deck car parking or encourage basement provision.

Building Typologies and Heights

Southbank represented the greatest divergence in building typologies from the other 9 case study sites. In Southbank, 90% of the residential buildings were tower apartments with only 10% provided as Mid-rise apartments. A relationship between densities and heights was not evident as Southbank recorded a low average residential density. Southbank had the tallest building by 62 storeys. The footprint of this building is significant and the impact that it has on the surrounding urban environment is detrimentally affecting the quality of the urban realm.

Recommendation:

- Tower apartments are effective at achieving high densities. They have however, a significant impact on the public realm and the livability of urban environments. To achieve higher levels of density it is recommended that the Southbank Structure Plan Stage 2 consider the efficiencies of density that can be achieved with lower building typologies – in particular mid-rise apartments which can achieve densities in the order of 100-235 dwellings per hectare.

Building Entrances and Street interface

Southbank recorded a much coarser grain of development than Melbourne CBD and the European case studies. Southbank, Long Beach and Battery Park (USA examples) all had the majority of building entrances greater than 10 metres apart. This provides less opportunity for more complex and interesting experiences within the urban realm and inhabitants and visitors have to travel much further to access the same number of premises. The relationship between the tower apartment typologies and the coarser grain suggests that alternative built form scenarios would deliver a much richer, more interesting urban experience to Southbank.

Southbank also provided a generally poor and inconsistent interface to the street with only 20% of the building frontage to the street recorded as an active or positive edge. A large percentage – 45% - was recorded as an active ground interface with inactive uses above – typically car parking as discussed above. Similarly, a significantly larger than average percentage was recorded as inactive. This has a significantly detrimental effect on the experience of the public realm. It establishes Southbank as a less stimulating place with less visible human activity which reduces the attractiveness of the area to further public life.

Recommendations:

- Encourage building typologies with smaller footprints to provide a greater density of entrance points to different premises and a finer grain of urban development; and
- Discourage blank and inactive interfaces to the street scape. The City of Melbourne's planning controls for the CBD recommend a minimum 85% active interface to the street but with an additional requirement for entrances at finer grain than 10m.

Access to Social /Community Infrastructure: Education

Southbank recorded a distinct gap in the provision of childhood education with no primary or secondary school in the area.

Recommendation:

- Establish local schools which can support the residential population.

Access to Social /Community Infrastructure: Community Facilities

Southbank lacks community public facilities such as a sports centre or public library. An increase in the provision of these facilities would significantly increase the livability of the area. A range of community services should be assessed.

Recommendation:

- Establish new public community facilities to service the existing and future residential populations.

Access to Social /Community Infrastructure: Social Services

Southbank had the lowest provision of social services within the case studies with no medical or child care services provided.

Recommendation:

- Establish new social service facilities to service the existing and future residential populations.

Access to Public Transport

While Southbank exceeds the minimum density thresholds to services a transit centre, with only 58 residents people per hectare, it is reliant on its employment population to support any transport service. This will affect the capacity of the residential population to support transport services in non-peak times.

Recommendation:

- Increase residential densities to better support existing and future public transport infrastructure requirements.

ESD

With the exception of Beddington Zero, most case studies performed poorly in the environmental categories that tested water and energy source supply. From the information provided in the case study it is not possible to draw any conclusions about the densities required to achieve environmentally sustainable developments. Beddington Zero achieves 62 dwellings per hectare, however the proposed plans for the carbon neutral MASDAR initiative currently in development in Abu Dhabi is aiming to deliver 140 dwellings/hectare. The greater the density the more economical it is to deliver the assets required to achieve carbon and water neutrality such as solar parks, biomass plants of wastewater treatment plants.

Recommendation:

- Southbank could significantly change its carbon footprint and water requirements by putting into place initiatives to draw energy from sustainable resources or to capture or reuse and stormwater, grey water and waste water that exits the site.