

Design study of changes in home use and dwelling layout following COVID-19



Royal College of Art

Laboratory for Design and Machine Learning, Royal College of Art

This project was financially supported by the Prosit Philosophiae Foundation.

Design study of changes in home use and dwelling layout following COVID-19

Based on research conducted in the Laboratory for Design and Machine Learning on London housing standards ([London Housing: Policy, Regulation, and Typology](#)) and lived experiences in the home during COVID-19 ([The Home, the Household, and COVID-19](#)), three key demands or problems of space limiting the changing use of homes were identified.

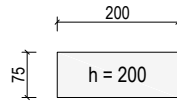
1. Storage: a need for more and clearly separate storage space.
2. Homeworking/homestudy: spaces for different household members to work and study undisturbed from home at the same time.
3. Exercise: an area large enough for light exercising at home.

These three widespread demands during COVID-19 are clarified in the following. Then the implications of these changes in use and dwelling size on recent dwelling layouts in London are tested.

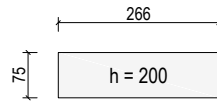
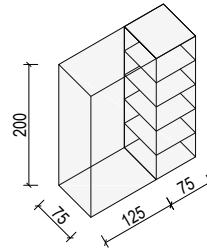
1. Storage

Common complaints are about a lack of storage and utility spaces. General storage provisions are sometimes integrated with other storage found in bedrooms or living areas. This design study thus set out basic rules that go beyond the existing storage requirements in the Building Regulations: Approved Document M, Volume 1: Dwellings (2015 edition), Section 3B and London Housing Design Guide, Section 4.7:

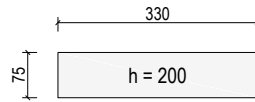
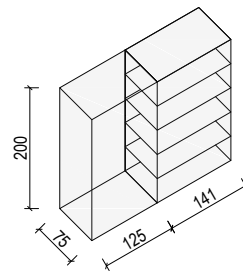
1. A separate general storage and utility space that can be directly accessed from an entrance area or circulation space is to be provided.
2. The general storage space should be large enough for at least one pram or wheelchair (minimum area of 110 x 170 cm and height of 120 cm) and the utility cupboard standard washing or heating appliances (minimum area of 75 x 150 cm and height of 200 cm).



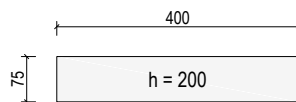
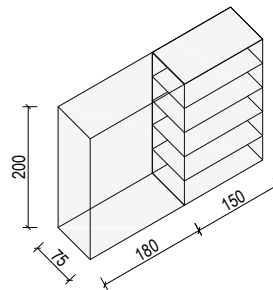
Storage for 2 person:
1.5 m²



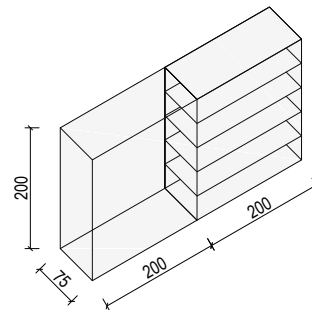
Storage for 3 person:
2 m²

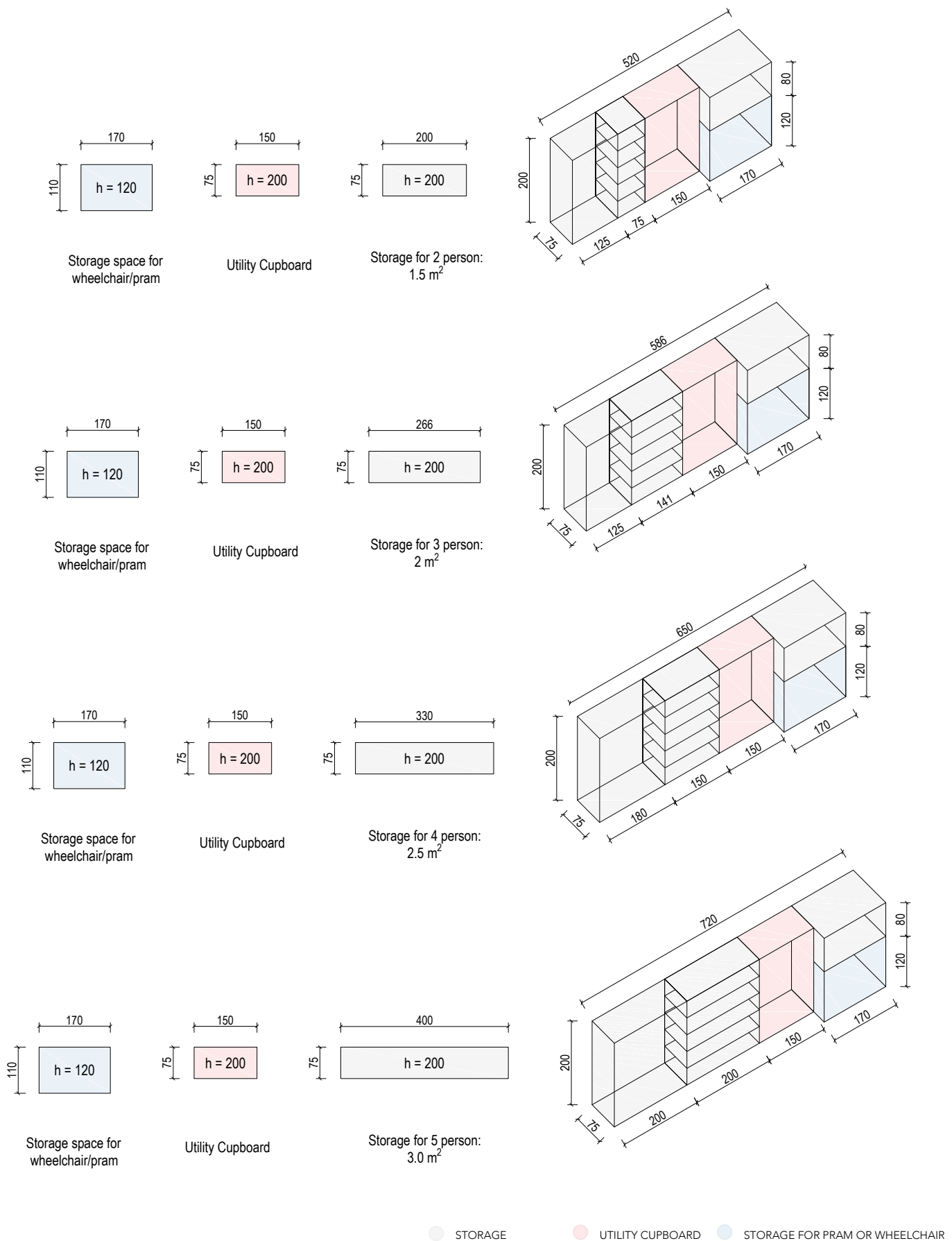


Storage for 4 person:
2.5 m²



Storage for 5 person:
3.0 m²





Caption: Existing and proposed storage and utility space requirements. Source: *London Housing Design Guide*, Appendix 1 – Space Standards Study.

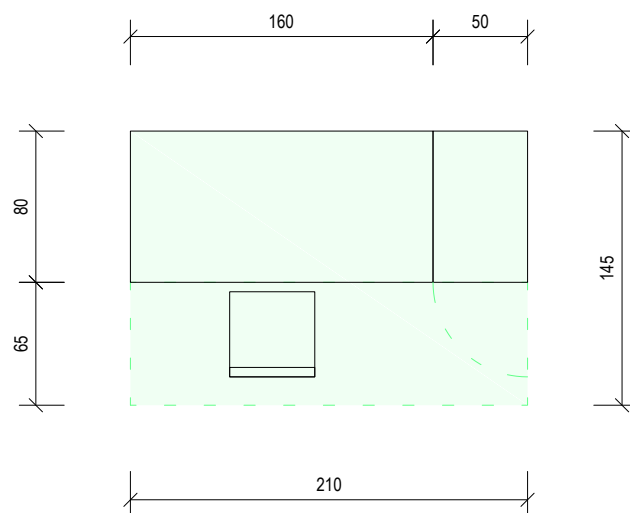
2. Homeworking and homelearning

For many, there has been a growing need for being able to work and study from home, sometimes for several household members at the same time.

According to the *London Housing Design Guide*, Section 4.8, in reference to the *Code for Sustainable Homes Technical Guide* (2009), dwellings should provide an appropriate space for a home office in the living room, a bedroom, large hall or dining area that can fit a desk, chair, and filing cabinet or bookshelf. The recommended area for this is given as a rectangle of 105 x 120 cm.

This design study sets out the following basic rules:

1. A space for study or working from home should be provided in each bedroom.
2. The minimum standard for this space should be 210 x 145 cm, compliant with the *Government Workplace Design Guide*, Version 2.0, Part 1 (2021).

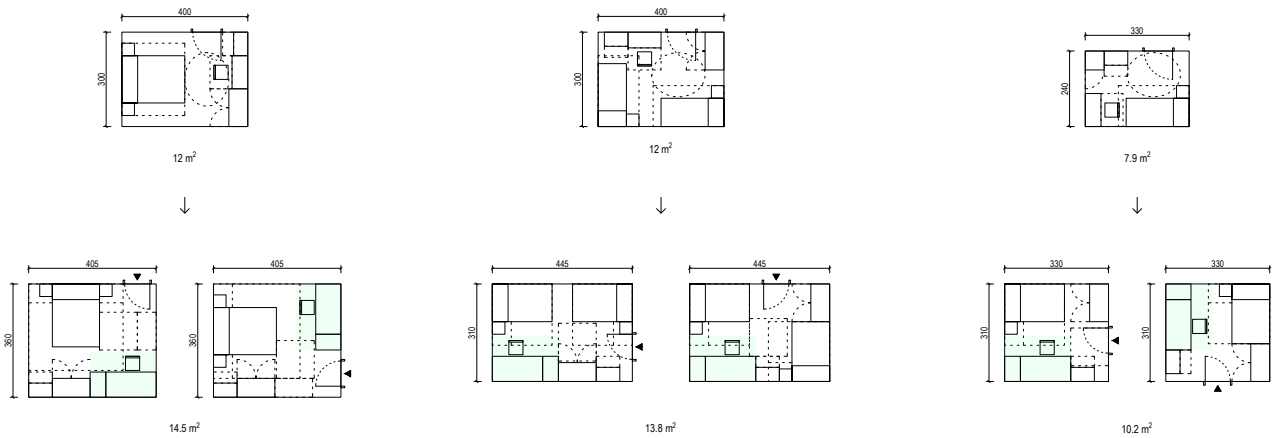


Caption: Homeworking space requirement

DOUBLE BEDROOM

TWIN BEDROOM

SINGLE BEDROOM



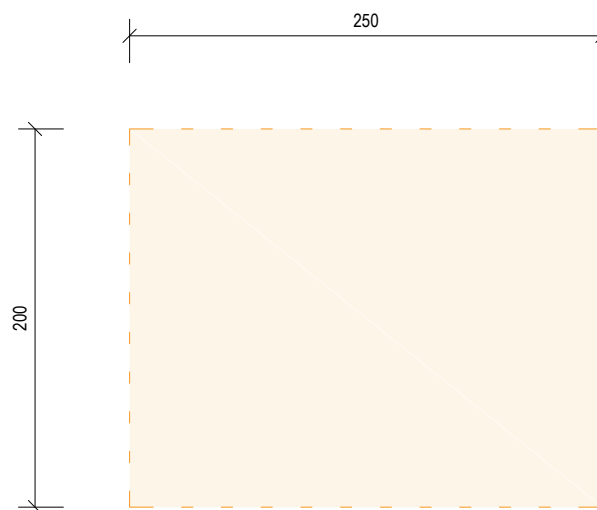
Caption: Impact on the floor area of three types of bedrooms when adding a homeworking space. Source: Building Regulations Approved Document M, Volume 1: Dwellings (2015 edition), Appendix D and London Housing Design Guide, Appendix 1 – Space Standards Study.

3. Exercising

Having to remain at home for a prolonged period during COVID-19 lockdowns, a new demand for a space to physically exercise and relax or play at home has arisen in small dwellings.

This design study sets out the following rules:

1. An area that permits common physical exercises (e.g. yoga, pilates, dancing, indoor cycling, stretching) in the living areas is to be provided in each dwelling.
2. The exercise area is to have a minimum area of 2.5 x 2.0 m (5 m²).
3. It is permitted that the exercise space overlaps with a coffee table, if there is space for this to be easily moved out of the way while exercising.



Caption: Home exercise space requirement

1 BEDROOM, 2 PERSON

2 BEDROOM, 3 PERSON

2 BEDROOM, 4 PERSON

3 BEDROOM, 5 PERSON

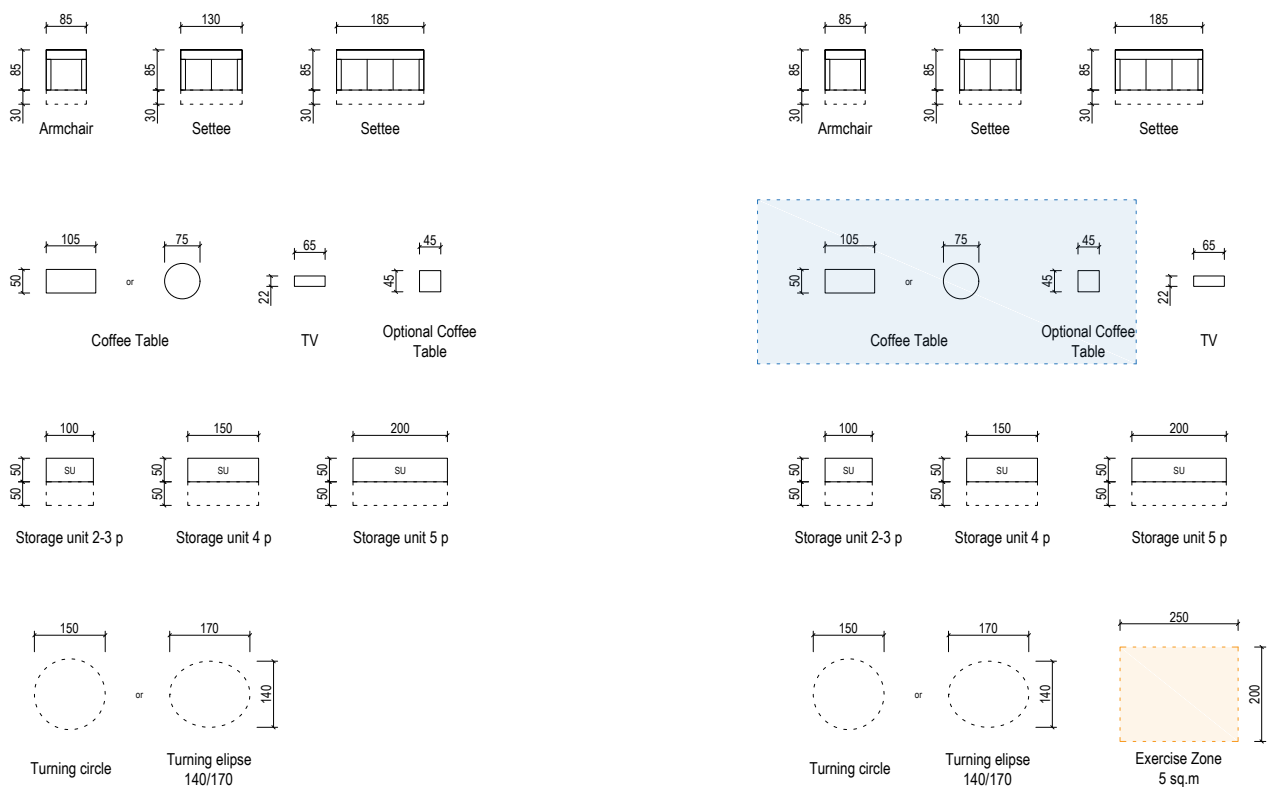


 HOME EXERCISE SPACE

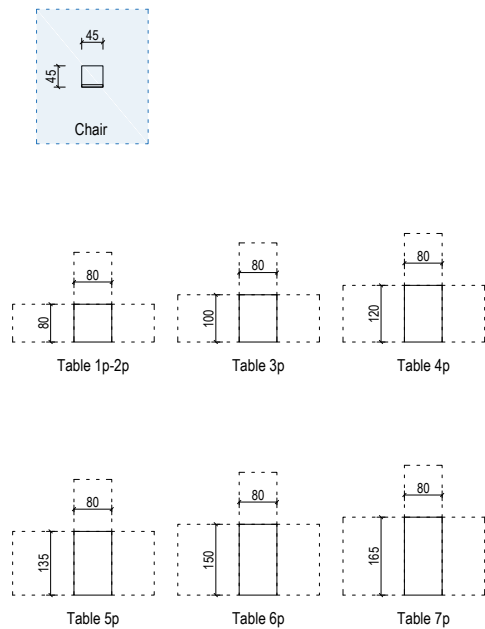
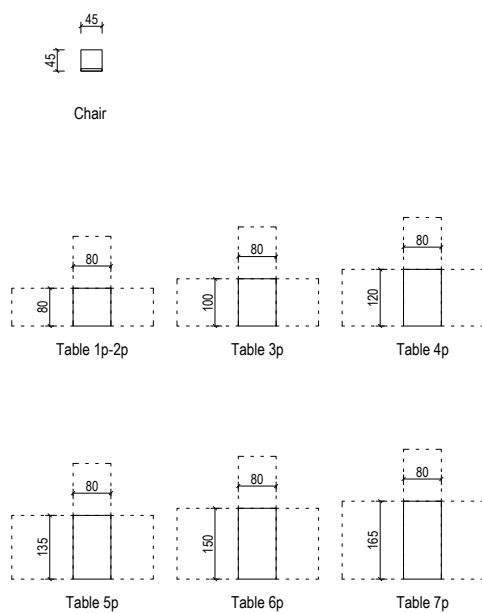
Caption: Impact on the floor area of living rooms (1 bedroom, 2 person; 2 bedroom, 3 person; 2 bedroom, 4 person; and 3 bedroom, 5 person dwellings) when adding an exercise space. Source: *London Housing Design Guide*, Appendix 1 – Space Standards Study.

Impact on current housing layouts

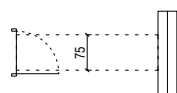
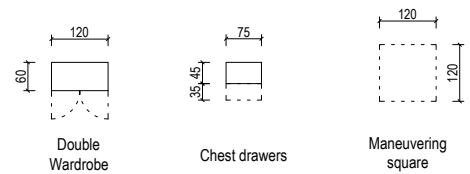
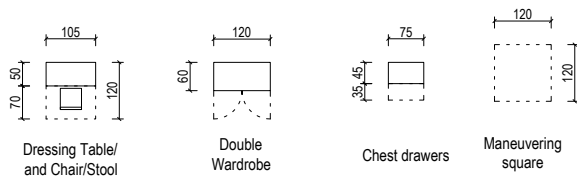
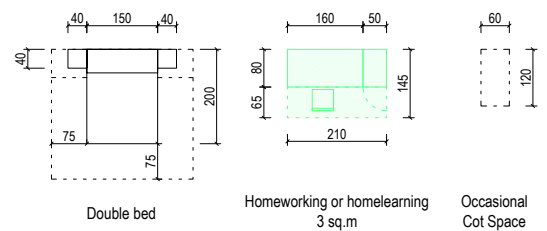
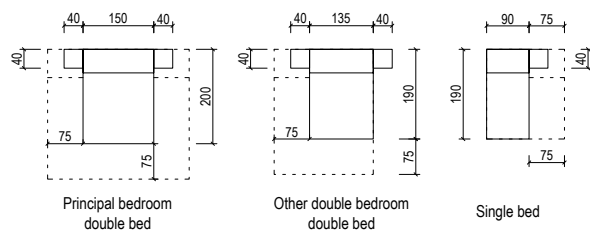
The implications of the three set of rules on dwelling size and layout are tested on a sample of 12 recently built dwellings layouts in London. The principle of the original layout organisation was maintained, however where needed to accommodate additional storage, homeworking, and exercise space, rooms and areas were enlarged accordingly. The 12 existing layouts include both dwellings from the private and affordable housing sectors.



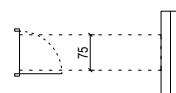
Caption: Existing and proposed furniture schedule for living space adding exercise area and marking movable furniture. Source: *London Housing Design Guide*, Appendix 2 – Furniture Schedule.



Caption: Existing and proposed furniture schedule for dining space marking movable furniture. Source: *London Housing Design Guide*, Appendix 2 – Furniture Schedule.

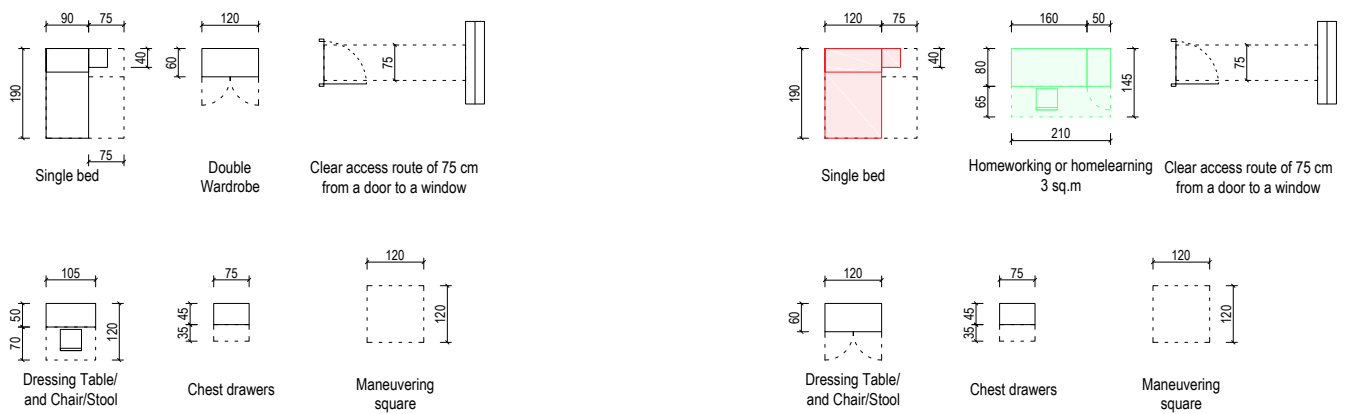


Clear access route of 75 cm
from a door to a window

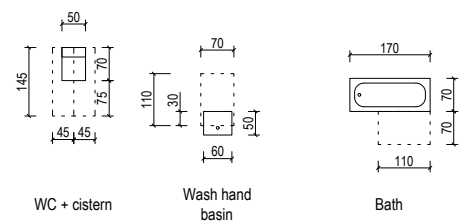
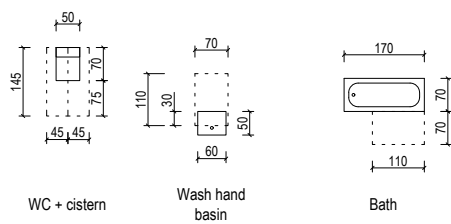


Clear access route of 75 cm
from a door to a window

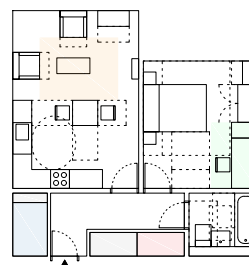
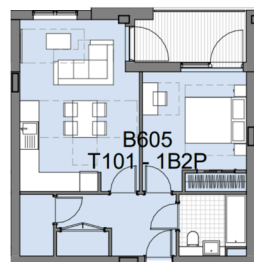
Caption: Existing and proposed furniture schedule for double bedroom adding homeworking or homelearning space. Source: *London Housing Design Guide*, Appendix 2 – Furniture Schedule.



Caption: Existing and proposed furniture schedule for single or twin bedroom adding homeworking or homelearning space and enlarging single bed. Source: *London Housing Design Guide*, Appendix 2 – Furniture Schedule.



Caption: Existing and proposed furniture schedule for bathrooms. Source: *London Housing Design Guide*, Appendix 2 – Furniture Schedule.



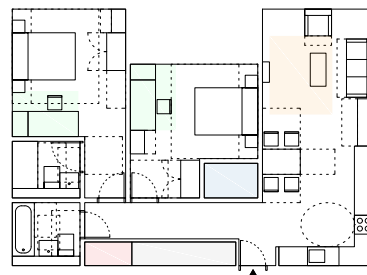
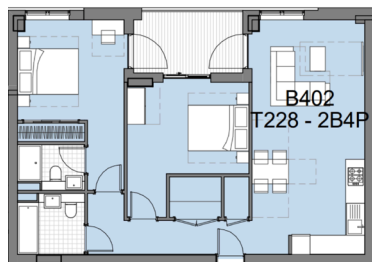
2 m

- HOME EXERCISE SPACE
- HOMEWORKING SPACE
- UTILITY CUPBOARD
- STORAGE
- STORAGE FOR PRAM

Caption: Existing: 1 bedroom, 2 person dwelling (private tenure), GFA 50 m² and IFA 47.3 m². Proposed: GFA 54.5 m² and IFA 51.7 m²; an increase of 9% in GFA and 9.2 % in IFA. Source: Planning Application Ref: DC/18/109972 for Axion House, Lewisham, project period 2019 - 2024 (under construction).



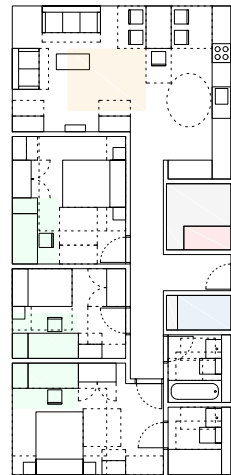
Caption: Existing: 1 bedroom, 2 person dwelling (private tenure), GFA 50 m² and IFA 48.4 m². Proposed: GFA 54 m² and IFA 51.5 m²; an increase of 8 % in GFA and 6.4 % in IFA. Source: Planning Application 151652 for Marlowe Road, Waltham Forest, project period 2014 - 2021.



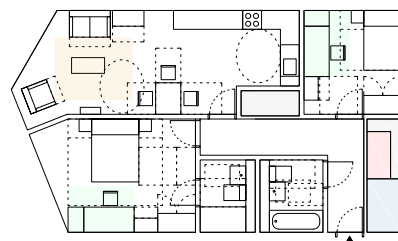
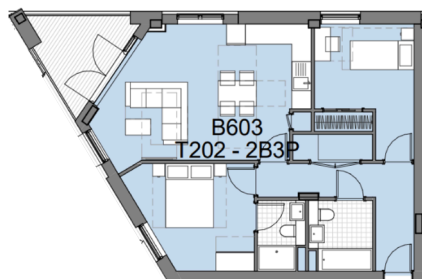
2 m

- HOME EXERCISE SPACE
- HOMEWORKING SPACE
- UTILITY CUPBOARD
- STORAGE
- STORAGE FOR PRAM

Caption: Existing: 2 bedroom, 4 person dwelling (private tenure), GFA 70 m² and IFA 65.5 m². Proposed: GFA 85.9 m² and IFA 79.5 m²; an increase of 22.7 % in GFA and 21.4 % in IFA. Source: Planning Application Ref: DC/18/109972 for Axion House, Lewisham, project period 2019 - 2024 (under construction).



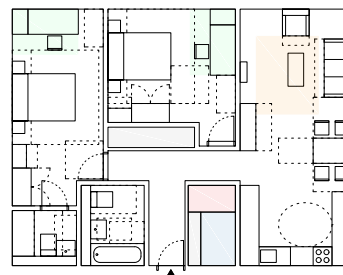
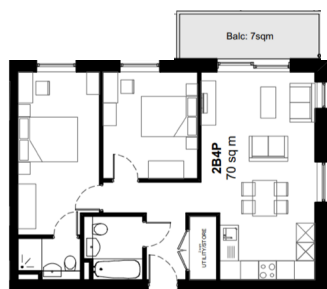
Caption: Existing: 3 bedroom, 5 person dwelling (private tenure), GFA 90.9 m² and IFA 86.8 m². Proposed: GFA 103.5 m² and IFA 97.8 m²; an increase of 13.9 % in GFA and 12.7 % in IFA. Source: Planning Application 151652 for Marlowe Road, Waltham Forest, project period 2014 - 2021.



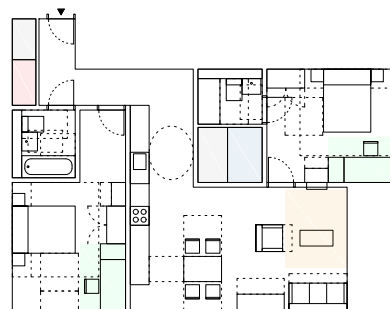
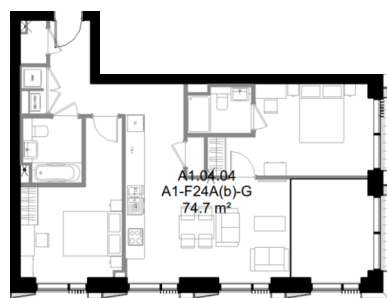
2 m

- HOME EXERCISE SPACE
- HOMEWORKING SPACE
- UTILITY CUPBOARD
- STORAGE
- STORAGE FOR PRAM

Caption: Existing: 2 bedroom, 3 person dwelling (private tenure), GFA 70.7 m² and IFA 66.7 m². Proposed: GFA 81.5 m² and IFA 76.6 m²; an increase of 15.3 % in GFA and 14.8 % in IFA. Source: Planning Application Ref: DC/18/109972 for Axion House, Lewisham, project period 2019 - 2024 (under construction).



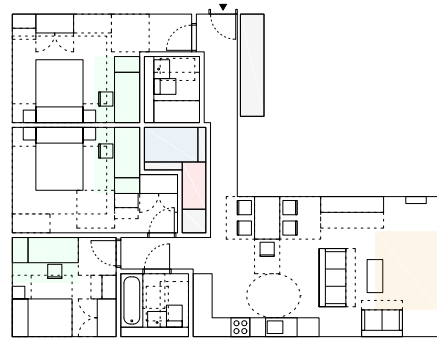
Caption: Existing: 2 bedroom, 4 person dwelling (private tenure), GFA 70 m² and IFA 63.6 m². Proposed: GFA 87.7 m² and IFA 82.7 m²; an increase of 25.3 % in GFA and 30.7 % in IFA. Source: Planning Application 151652 for Marlowe Road, Waltham Forest, project period 2014 - 2021.



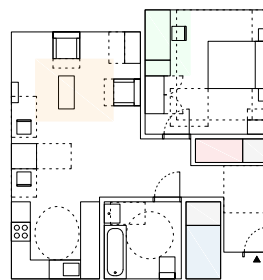
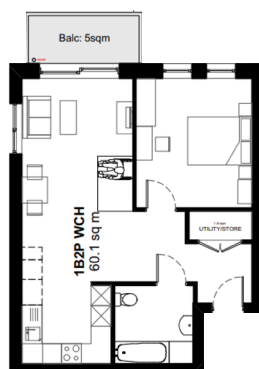
- HOME EXERCISE SPACE
- HOMEWORKING SPACE
- UTILITY CUPBOARD
- STORAGE
- STORAGE FOR PRAM

2 m

Caption: Existing: 2 bedroom, 4 person dwelling (private tenure), GFA 74.7 m² and IFA 68.6 m². Proposed: GFA 96 m² and IFA 91.2 m²; an increase of 28.5 % in GFA and 32.9 % in IFA. Source: Planning Application 15/00358/OUT for Cherry Park Lane, Stratford, project period 2019 - 2023 (under construction).



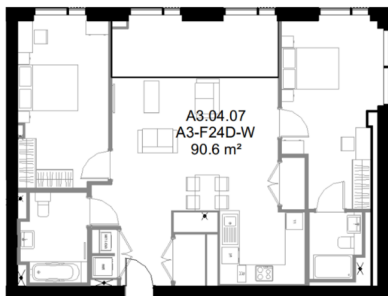
Caption: Existing: 3 bedroom, 5 person dwelling (private tenure), GFA 86 m² and IFA 78.7 m². Proposed: GFA 98.7 m² and IFA 98.7 m²; an increase of 22.1 % in GFA and 25.4 % in IFA. Source: Planning Application Ref: DC/18/109972 for Axion House, Lewisham, project period 2019 - 2024 (under construction).



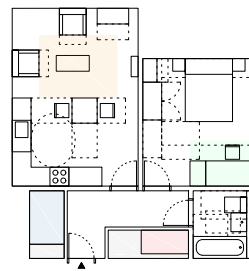
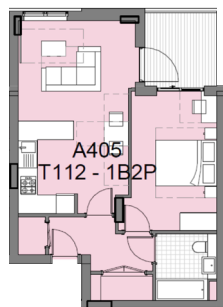
2 m

- HOME EXERCISE SPACE
- HOMEWORKING SPACE
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- STORAGE
- STORAGE FOR PRAM

Caption: Existing: 1 bedroom, 2 person dwelling (private tenure) wheelchair accessible, GFA 60.1 m² and IFA 59.4 m². Proposed: GFA 66.2 m² and IFA 63.2 m²; an increase of 10.1 % in GFA and 6.4 % in IFA. Source: Planning Application 151652 for Marlowe Road, Waltham Forest, project period 2014 - 2021.



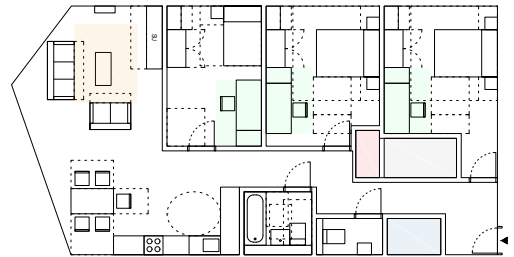
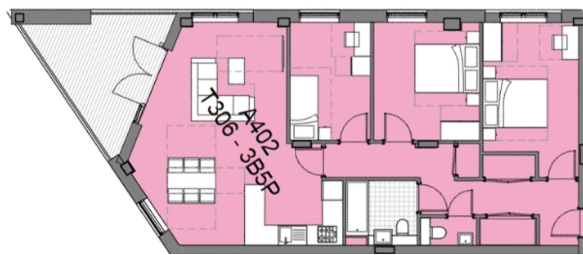
Caption: Existing: 2 bedroom, 4 person dwelling (private tenure) wheelchair accessible, GFA 90.6 m² and IFA 86.7 m². Proposed: GFA 102.4 m² and IFA 97.1 m²; an increase of 13 % in GFA and 12 % in IFA. Source: Planning Application 15/00358/OUT for Cherry Park Lane, Stratford, project period 2019 - 2023 (under construction).



2 m

- HOME EXERCISE SPACE
- HOMEWORKING SPACE
- UTILITY CUPBOARD
- STORAGE
- STORAGE FOR PRAM

Caption: Existing: 1 bedroom, 2 person dwelling (affordable tenure), GFA 50 m² and IFA 47.5 m². Proposed: GFA 54.3 m² and IFA 51.7 m²; an increase of 8.6 % in GFA and 8.8 % in IFA. Source: Planning Application Ref: DC/18/109972 for Axion House, Lewisham, project period 2019 - 2024 (under construction).



Caption: Existing: 3 bedroom, 5 person dwelling (affordable tenure), GFA 86 m² and IFA 81.2 m². Proposed: GFA 114.5 m² and IFA 107.9 m²; an increase of 33.1 % in GFA and 32.9 % in IFA. Source: Planning Application Ref: DC/18/109972 for Axion House, Lewisham, project period 2019 - 2024 (under construction).

Summary of impact on dwelling size

Increasing the storage requirements in dwellings, leads to the following increase in floor area:

- 1 bedroom, 2 person: 1.5 m² to 4.5 m²,
- 2 bedroom, 3 person: 2 m² to 5 m²,
- 2 bedroom, 4 person: 2.5 m² to 5.5 m²,
- 3 bedroom, 5 person: 3 m² to 6.0 m².

Providing a homeworking and homelearning space in each bedroom, results in following changes in the floor areas of double, twin, and single bedroom:

- Double bedroom from 12 m² to 14.5 m², an increase in floor area of 21%,
- Twin bedroom from 12 m² to 13.8 m², an increase in floor area of 15%,
- Single bedroom from 7.9 m² to 10.2 m², an increase in floor area of 29%.

Adding an exercise space to living areas that comply with the Building Regulations *Approved Document M, Volume 1: Dwellings* (2015 edition) and the Requirement M4(2): Accessible and Adaptable Dwellings, the following increases in living areas were found:

- In 1 bedroom, 2 person and 2 bedroom, 3 person dwellings, the living room area remains unchanged 12.9 m² and 14.0 m².
- In 2 bedroom, 4 person dwellings, there is an increase in the size of a living room from 14.8 m² to 15.3 m², equating to a 3.4 % increase in floor area.
- In 3 bedroom, 5 person dwellings, the living room has to increase from 16.0 m² to 17.4 m², making it 8.7% larger.

Combined, these proposed changes had the following impact on the overall size of the tested dwelling layouts:

- 1 bedroom, 2 person dwellings: average increase in GFA of 8.5% from 50 m² to 54.3 m²,
- 2 bedroom, 3 person dwellings: average increase in GFA of 15.3% from 70.7 m² to 81.5 m²,
- 2 bedroom, 4 person dwellings: average increase in GFA of 25.6 % from 71.6 m² to 89.9 m²,
- 3 bedroom, 5 person dwellings: average increase in GFA of 25.2% from 86 m² to 107.7 m².

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