OVERHEATING ASSESSMENT

DYNAMIC METHODOLOGY

Site Name:	Phase 1C, Brookleigh, Burgess Hill, West Sussex
Developer:	Hill Partnership
Date of Issue:	July 2025
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Revisions			
Issue Number	Author	Date	Reason
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1. Results Summary

Table 1: Assessment Details

Part O. Dynamic Modelling Results	
Project Name	Phase 1C, Brookleigh, Burgess Hill, West Sussex
Site Name	Phase 1C, Brookleigh, Burgess Hill, West Sussex
Site Address	Phase 1C, Brookleigh, Burgess Hill, West Sussex
Developer	Hill Partnership
Plot Type Overall Result	Pass

Table 2: Assessment Results Summary

Plot Details
Criteria for predominantly naturally ventilated homes

Block	Zone	Criterion A (%)	Criterion B (hr)	Pass/Fail
Residential				
BINDON0F	KD	0.4	N/A	Pass
BINDON0F	STUDY	1.72	N/A	Pass
BINDON1F	BED1	0.16	5.17	Pass
BINDON1F	LIVING	1.62	N/A	Pass
BINDON2F	BED2	0.21	5.17	Pass
BINDON2F	BED3	0.11	5.33	Pass
BINDON2F	BED4	0.14	4.5	Pass
BLOCKB1F	2BED1	0.48	11.17	Pass
BLOCKB1F	2BED2	0.98	12.17	Pass
BLOCKB1F	2LKD	0.39	N/A	Pass
BLOCKB1F	3BED1	0.33	6.17	Pass
BLOCKB1F	3LKD	0.31	N/A	Pass
BLOCKB1F	4BED1	0.4	8.67	Pass
BLOCKB1F	4LKD	0.68	N/A	Pass
BLOCKB1F	5BED1	0.17	2.83	Pass
BLOCKB1F	5BED2	0.32	5.5	Pass
BLOCKB1F	5LKD	0.34	N/A	Pass
BLOCKB3F	27BED1	0.3	2.5	Pass
BLOCKB3F	27BED2	0.56	3.17	Pass

BLOCKB3F	27LKD	0.4	N/A	Pass
BLOCKB3F	28BED1	0.19	1.5	Pass
BLOCKB3F	28LKD	0.35	N/A	Pass
BLOCKB3F	29BED1	0.19	1.83	Pass
BLOCKB3F	29LKD	0.88	N/A	Pass
BLOCKB3F	30BED1	0.11	0	Pass
BLOCKB3F	30BED2	0.18	1.17	Pass
BLOCKB3F	30LKD	0.34	N/A	Pass
BLOCKC0F	100BED1	0.59	7.17	Pass
BLOCKC0F	100BED2	0.61	6.33	Pass
BLOCKC0F	100LKD	0.49	N/A	Pass
BLOCKC0F	97BED1	0.15	1	Pass
BLOCKC0F	97LKD	0.31	N/A	Pass
BLOCKC0F	98BED1	1.33	11.17	Pass
BLOCKC0F	98BED2	0.82	9	Pass
BLOCKC0F	98LKD	0.37	N/A	Pass
BLOCKC0F	99BED1	0.79	15.17	Pass
BLOCKC0F	99LKD	0.59	N/A	Pass
BLOCKC2F	105BED1	0.13	0	Pass
BLOCKC2F	105LKD	0.3	N/A	Pass
BLOCKC2F	106BED1	1.22	2	Pass
BLOCKC2F	106BED2	0.68	2	Pass
BLOCKC2F	106LKD	0.36	N/A	Pass
BLOCKC2F	107BED1	0.64	3.67	Pass
BLOCKC2F	107LKD	0.61	N/A	Pass
BLOCKC2F	108BED1	0.47	0.5	Pass
BLOCKC2F	108BED2	0.5	1.67	Pass
BLOCKC2F	108LKD	0.57	N/A	Pass
FARLEIGH0F	LKD	0.62	N/A	Pass
FARLEIGH1F	BED1	0.35	7.83	Pass
FARLEIGH1F	BED2	0.18	6.5	Pass

FARLEIGH1F	BED3	0.15	11.83	Pass
FARLEIGHAR0F	LKD	0.67	N/A	Pass
FARLEIGHAR1F	BED1	0.61	31.33	Pass
FARLEIGHAR1F	BED2	0.26	23.5	Pass
FARLEIGHAR1F	BED3	0.18	8	Pass
HADDINGTON0F	LKD	0.7	N/A	Pass
HADDINGTON1F	BED1	0.27	7.83	Pass
HADDINGTON1F	BED2	0.18	6.67	Pass
HADDINGTON1F	BED3	0.17	6.83	Pass
KINGS0F	KD	1.24	N/A	Pass
KINGS0F	LIVING	2.8	N/A	Pass
KINGS1F	BED1	0.9	11.33	Pass
KINGS1F	BED2	0.41	5	Pass
KINGS1F	BED3	0.41	15.33	Pass
KINGSAR0F	KD	1.34	N/A	Pass
KINGSAR0F	LIVING	2.58	N/A	Pass
KINGSAR1F	BED1	0.64	31.33	Pass
KINGSAR1F	BED2	0.48	16.67	Pass
KINGSAR1F	BED3	0.4	23.17	Pass
PURBECK0F	LKD	0.63	N/A	Pass
PURBECK1F	BED1	0.17	6.17	Pass
PURBECK1F	BED2	0.34	7.5	Pass
SO2BED0F	KITCHEN	1.19	N/A	Pass
SO2BED0F	LD	0.46	N/A	Pass
SO2BED1F	BED1	0.14	6	Pass
SO2BED1F	BED2	0.28	7.5	Pass
WAINWRIGHT0F	KD	0.62	N/A	Pass
WAINWRIGHT0F	LIVING	1.8	N/A	Pass
WAINWRIGHT0F	STUDY	1.92	N/A	Pass
WAINWRIGHT1F	BED1	0.2	3.5	Pass
WAINWRIGHT1F	BED2	0.57	9.33	Pass

WAINWRIGHT1F	BED3	0.17	6.5	Pass
WAINWRIGHTAR1F	BED4	0.27	23.33	Pass
WALBURY0F	LKD	0.81	N/A	Pass
WALBURY1F	BED3	0.19	9	Pass
WALBURY1F	LIVING	2.31	N/A	Pass
WALBURY2F	BED1	0.61	11.17	Pass
WALBURY2F	BED2	0.18	6.5	Pass
Extra Care				
EXTRACARE0F	1BED1	0.18	16.33	Pass
EXTRACARE0F	1LKD	1.62	N/A	Pass
EXTRACARE0F	2BED1	0.57	26.83	Pass
EXTRACARE0F	2BED2	1.18	31.5	Pass
EXTRACARE0F	2LKD	2.12	N/A	Pass
EXTRACARE0F	3BED1	0.85	28.5	Pass
EXTRACARE0F	3BED2	0.43	25	Pass
EXTRACARE0F	3LKD	1.57	N/A	Pass
EXTRACARE0F	4BED1	0.87	29.5	Pass
EXTRACARE0F	4LKD	2.25	N/A	Pass
EXTRACARE0F	5BED1	0.36	20.33	Pass
EXTRACARE0F	5BED2	0.19	16.67	Pass
EXTRACARE0F	5LKD	0.38	N/A	Pass
EXTRACARE0F	6BED1	0.34	17.67	Pass
EXTRACARE0F	6BED2	0.61	21.5	Pass
EXTRACARE0F	6LKD	0.49	N/A	Pass
EXTRACARE0F	7BED1	0.42	24.17	Pass
EXTRACARE0F	7BED2	0.19	15.5	Pass
EXTRACARE0F	7LKD	0.85	N/A	Pass
EXTRACARE3F	10BED1	1.47	23.17	Pass
EXTRACARE3F	10LKD	2.09	N/A	Pass
EXTRACARE3F	11BED1	1.47	21.33	Pass
EXTRACARE3F	11LKD	2.08	N/A	Pass

EXTRACARE3F	12BED1	0.4	12.67	Pass
EXTRACARE3F	12LKD	1.4	N/A	Pass
EXTRACARE3F	13BED1	0.55	12.33	Pass
EXTRACARE3F	13LKD	1.68	N/A	Pass
EXTRACARE3F	22BED1	0.94	23.17	Pass
EXTRACARE3F	22LKD	2.99	N/A	Pass
EXTRACARE3F	23BED1	0.38	12.17	Pass
EXTRACARE3F	23LKD	2.62	N/A	Pass
EXTRACARE3F	24BED1	0.19	6	Pass
EXTRACARE3F	24LKD	1.94	N/A	Pass
EXTRACARE3F	8BED1	1.59	15.5	Pass
EXTRACARE3F	8LKD	2.51	N/A	Pass
EXTRACARE3F	9BED1	1.5	22.67	Pass
EXTRACARE3F	9LKD	2.34	N/A	Pass

The dwelling/type assessed has met the thermal comfort criteria outlined in TM59 for the examined zones.

It has effectively integrated both passive and active design strategies to minimise the risk of overheating. Modelling confirms that the dwelling/type complies with the overheating standards defined in CIBSE TM59 under the defined weather conditions.

The following passive and active design measures has been optimised:

- Energy efficient lighting and appliances have been recommended to reduce internal heat gains;
- The building fabric will be insulated over and above the standards set out by Building Regulations and reduced solar gains from glazing factor as low as 0.33.
- Mechanical Ventilation specified with sufficient Flow Rate and Air Changes per Hour (ACH);

Table 3: Overheating Checklist

2b.1 Modelling details	
Dynamic software name and version	DesignBuilder v7.2.0.032
Weather file location used, including any additional, more extreme weather files	London Gatwick DSY1
Number of sample units modelled, including an explanation of why the size/selection has been chosen	The dwelling/type has been assessed based on the worst-case orientation of the most glazed façade, representing the plot most likely to overheat for each type present on site.
2b.2 Modelled occupancy	
Has the project passed the assessment described in CIBSE's TM59, taking into account the limits detailed in paragraphs 2.5 and 2.6?(1)	Yes
Details of the occupancy profiles used	TM59 Occupancy profiles allocated as per the number of bedrooms of the dwelling
Details of the equipment profiles used	TM59 equipment profiles
Details of the opening profiles used	TM59 occupancy opening profiles
2b.3 Modelled overheating mitigation strategy	
Free areas	Each window pane calculated in line with TM59/Part O
Infiltration and mechanical flow rates	Natural ventilation where possible determined by the window schedule and opening profiles, mechanical ventilation system 3 achieving Part F compliant air changes per hour. Windows treated as closed at night for ground floor and acoustically impacted bedrooms.
Whole Window g-value	0.33
Shading strategy	No internal blinds

Mechanical cooling	Residential apartments serviced by Nilan Compact P units
2b.4 Modelling results	
Has the project passed the assessment described in CIBSE's TM59, taking into account the limits detailed in paragraphs 2.5 and 2.6?	Yes
What is the overall overheating strategy (i.e. what design features are key to the project passing)?	Solar control glazing, openable window schedule and Nilan Compact P to residential and system 3 mechanical ventilation to the extra care achieving Part F compliant flow rates Ground floor extra care bedrooms serviced by 40l/s purge fans

2. Scope and Exclusions

Abbey Consultants (Southern) Ltd. has been tasked by Hill Partnership to conduct an overheating analysis for House HT-5B9P-1 & Oast at Phase 1C, Brookleigh, Burgess Hill, West Sussex. The purpose of this analysis is to offer design stage recommendations and enhance the comfort levels for occupants. As a result, we have conducted thermal modeling to ensure compliance with the standards outlined in CIBSE TM59.

All outcomes and tactics are directly influenced by the inputs documented herein. Any deviation from these inputs is likely to yield distinct results. It is essential to acknowledge that in any modeling endeavor, certain assumptions and approximations are necessary. Specific details regarding the assumptions and approximations employed are included as part of the report.

It's important to emphasize that all outcomes are derived from computer modeling software, which relies on climatic conditions and usage patterns. These conditions may not perfectly mirror real-world situations. Consequently, these results should be interpreted as following the overheating mitigation risk calculation methodology rather than serving as guaranteed real-life observations.

When assessing the available ventilation space for sleeping hours, it's essential to exclusively consider the portion of openings that can be securely opened to facilitate effective ventilation. This is especially crucial in the following situations, where openings may be susceptible to unauthorized access by a casual or opportunistic intruder:

a) Bedrooms located on the ground floor.
b) Bedrooms that are easily accessible.

All of the following limits on CIBSE's TM59, section 3.3, apply.

When a room is occupied during the day (8am to 11pm), openings should be modelled to do all of the following:

i. Start to open when the internal temperature exceeds 22°C.
ii. Be fully open when the internal temperature exceeds 26°C.
iii. Start to close when the internal temperature falls below 26°C.
iv. Be fully closed when the internal temperature falls below 22°C.

When a room is occupied during the day (8am to 11pm), openings should be modelled to do all of the following:

i. Start to open when the internal temperature exceeds 22°C.
ii. Be fully open when the internal temperature exceeds 26°C.
iii. Start to close when the internal temperature falls below 26°C.
iv. Be fully closed when the internal temperature falls below 22°C.

Solar gains in summer should be limited by any of the following means.

a) Fixed shading devices, comprising any of the following:
    i. Shutters.
    ii. External blinds.
    iii. Overhangs.
    iv. Awnings.
b) Glazing design, involving any of the following solutions:
    i. Size.
    ii. Orientation.
    iii. g-value.
    iv. Depth of the window reveal.
c) Building design – for example, the placement of balconies.
d) Shading provided by adjacent permanent buildings, structures or landscaping.

Although internal blinds and curtains provide some reduction in solar gains, they should not be taken into account when considering whether requirement O1 has been met.

Foliage, such as tree cover, can provide some reduction in solar gains. However, it should not be taken into account when considering whether requirement O1 has been met.

3. BUILDING REGULATIONS APPROVED DOCUMENT O (2021)

Approved Document O sets out building regulation requirements for mitigating overheating within new build dwellings in which it states the following.

1) Reasonable provision must be made in respect of a dwelling, institution or any other building containing one or more rooms for residential purposes, other than a room in a hotel ("residences") to
    a) limit unwanted solar gains in summer;
    b) provide an adequate means to remove heat from the indoor environment.

2) In meeting the obligations in paragraph
    a) account must be taken of the safety of any occupant, and their reasonable enjoyment of the residence; and
    b) mechanical cooling may only be used where insufficient heat is capable of being removed from the indoor environment without it.

In the Secretary of State's view, requirement O1 is met by designing and constructing the building to achieve both of the following:

a. Limiting unwanted solar gains in summer.
b. Providing an adequate means of removing excess heat from the indoor environment.

NOTE: The guidance and regulations are written for the purposes of protecting health and welfare. Following this guidance does not guarantee the comfort of building occupants.

To demonstrate compliance using the dynamic thermal modelling method, all of the following guidance should be followed:

a. CIBSE's TM59 methodology for predicting overheating risk.
b. The limits on the use of CIBSE's TM59 methodology set out in paragraphs 2.5 and 2.6.
c. The acceptable strategies for reducing overheating risk in paragraphs 2.7 to 2.11.

The building control body should be provided with a report that demonstrates that the residential building passes CIBSE's TM59 assessment of overheating. This report should contain the details in CIBSE's TM59, section 2.3.

4. Managing Overheating Risk

In the event of a heatwave, the following measures should be considered to minimize the risk of overheating in the new dwellings and ensure comfort for the future occupants. These guidelines should be included in the Home User Guide distributed to the occupants:

- Provide comprehensive instructions to future occupants on how to operate windows and curtains effectively to control thermal comfort in their rooms.

- Advise occupants that during the summer, if internal room temperatures exceed 22 degrees Celsius, they should keep windows open. However, if external temperatures are higher than internal temperatures on hot summer days, windows should remain closed until external temperatures drop below internal ones, at which point they can be opened again.

- Encourage occupants to leave their windows open during hot summer nights to allow cooler external air to naturally cool the rooms.

- Instruct occupants to use curtains consistently on sunny days to prevent direct solar heat gain in the rooms.

- Recommend that occupants use curtains or blinds in a way that partially covers the windows, preventing excessive solar heat gain while still allowing airflow. The curtains should be designed and installed to leave some openable space on the window for air circulation.

- Emphasize the importance of using energy-efficient fixed building elements such as ceiling lights and fridges. Encourage occupants to use energy-efficient equipment, such as LED light fixtures and A+ rated electrical appliances like energy-efficient TVs, to minimize internal heat gains. Advise against prolonged use of appliances during hot summer days.

These measures are vital for maintaining comfort and energy efficiency during heatwaves and should be communicated to occupants through the Home User Guide.

5. Overheating Assessment

5.1 Methodology

The approach adopted in this report involves establishing optimal thermal comfort levels in occupied spaces using dynamic simulation modelling. We have responded by incorporating appropriate passive design strategies to mitigate solar heat gains, ensure adequate ventilation, and enhance thermal mass within the building. Our methodology adheres to stringent national regulations, and we have conducted multiple iterations to identify suitable enhancements to the building's fabric. Detailed assumptions for the modelling can be found in the model inputs section of this report.

Furthermore, we have considered the potential impact of climate change in this assessment. The inclusion of climate change scenarios accounts for the likelihood of rising external temperatures. As a result, we may need to implement additional measures to counteract the risk of overheating, particularly during summer peak temperatures.

In this assessment, we have utilized the CIBSE TM52 (2013) Category II thermal comfort category as our reference standard.

5.2 Natural Ventilation

According to CIBSE TM59:2017 – Design methodology for the assessment of overheating risk in homes, to reduce the risk of overheating the space has to comply with the following criteria:

> Criterion A
>
> *For living rooms, kitchen and bedrooms: the number of hours during which ΔT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3 per cent of occupied hours (Same as Criterion 1 of TM52)*
>
> Criterion B
>
> *For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26°C for more than 1% of the annual hours (1% of the annual hours between 22:00 and 07:00, equivalent to 32 hours)*

5.3 Mechanical Ventilation

CIBSE TM59 also provides the following guidance for space that are predominantly mechanically ventilated:

> *For homes with restricted window openings, the CIBSE fixed temperature test must be followed, i.e. all occupied rooms should not exceed an operative temperature of 26°C for more than 3% of the annual occupied annual hours.*

5.4 Nighttime Security

For any house types where there are bedrooms on the ground floor, the following applies:

In the day, the ground floor bedroom windows, patio doors and balcony doors should be modelled as open, if this can be done securely.

At night, the ground floor bedroom windows, patio doors and balcony doors should be modelled as closed.

6. Design Criteria

The following information has been used to produce the building model:

Table 4: Building Services

Building Services	
Passive	Optimised design to enable controlled solar gain and improved direct and indirect natural lighting.
Fabric	Building fabric U values have been enhanced over and above those detailed with Part L 2021
Heating	Residential Houses – Individual Air Source Heat Pumps Residential Apartments – Nilan Compact P Extra Care Building – Communal Air Source Heat Pumps
Hot Water	Residential – Hot Water Cylinders (water heated via ASHP) Non-Residential – ASHP VRF system
Mechanical Cooling	Residential Apartments – via Nilan Compact P units
Ventilation	Low design air permeability (DAP) Houses & Extra Care Apartments – Mechanical extract ventilation (system 3) Apartments – Mechanical ventilation with heat recovery (system 4) via Nilan Compact P Extra Care Building (Communal Areas) – Natural ventilation (system 1)
Lighting	Energy efficient LED Lighting where applicable
Low Carbon Technologies	ASHP technology as detailed above

Table 5: Construction Properties

Construction Properties	
Fabric Element	U-value
External Walls	0.18 W/m^2K
Floors	0.12 W/m^2K
Roof	0.11 W/m^2K

Table 6: Construction Types

Construction Type	Area Applied	Thermal Mass Parameter
External Wall (masonry with plasterboard)	All	Low
Internal walls (plasterboard partitions)	All	Low
Internal Ceiling (plasterboard)	All	Low

Table 7: Window Properties

Whole Window properties	
U-value	1.2 W/m^2K
g-value	0.33 *
Patio Door U-value	1.2 W/m^2K

Patio Door G-value	0.33 *
Guarding	The current window designs do not meet the 1100 mm guarding clearance requirement; therefore, we assume that internal guarding will be provided.
*Glass only G-value: 0.53 Free Area has been calculated assuming a coefficient of discharge (Cd) of 0.62. Each opening free area is individually calculated. No blinds specified.	

Simulation Software

An overheating analysis has been conducted employing Dynamic Simulation Modeling, specifically Design Builder, Version 7.2.0.032. Design Builder is an approved simulation environment endorsed by the Department for Communities and Local Government, meeting the criteria outlined in CIBSE Guide A.

Weather File

For the scope of this report, the weather data utilized is the CIBSE Design Summer Year (DSY1) dataset for London Gatwick in the 2020s. This dataset corresponds to high emissions and represents the 50th percentile scenario.

Adjacent Buildings

The model does not incorporate details of nearby buildings. This approach is considered optimal for overheating analysis since it does not rely on shading provided by neighboring structures to mitigate overheating concerns.

7. Internal Conditions

Defined by dynamic simulation model a per TM59:2017, Section 6, Table 2:

Table 8: TM59:2017, Section 6, Table 2

Unit/ room type	Occupancy	Equipment load
Studio	2 people at 70% gains from 11 pm to 8 am 2 people at 100% gains from 8 am to 11 pm	Peak load of 450 W from 6 pm to 8 pm*. 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and 10 pm to 12 pm Base load of 85 W for the rest of the day
1-bedroom apartment: living room/kitchen	1 person from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
1-bedroom apartment: living room	1 person at 75% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
1-bedroom apartment:kitchen	1 person at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm Base load of 50 W for the rest of the day
2-bedroom apartment: living room/kitchen	2 people from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
2-bedroom apartment: living room	2 people at 75% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
2-bedroom apartment:kitchen	2 people at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm Base load of 50 W for the rest of the day
3-bedroom apartment: living room/kitchen	3 people from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
3-bedroom apartment: living room	3 people at 75% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
3-bedroom apartment:kitchen	3 people at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm Base load of 50 W for the rest of the day
Double bedroom	2 people at 70% gains from 11 pm to 8 am 2 people at full gains from 8 am to 9 am and from 10 pm to 11 pm, 1 person at full gains in the bedroom from 9 am to 10 pm	Peak load of 80 W from 8 am to 11 pm Base load of 10 W during the sleeping hours
Single bedroom (too small to accommodate double)	1 person at 70% gains from 11 pm to 8 am 1 person at full gains from 8 am to 11 pm	Peak load of 80 W from 8 am to 11 pm Base load of 10 W during sleeping hours
Communal corridors	Assumed to be zero	Pipework heat loss only; see section 3.1 above