

PLANNING AND ENVIRONMENT ACT 1987
WHITEHORSE PLANNING SCHEME

31/07/2019

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DAYLIGHT MODELLING REPORT

Document No: S3593.04

Date: 3.4.2019

Daylight Modelling Report – 160 Whitehorse Road, Blackburn

Sustainable Development Consultants have modelled the design of the proposed residential development at 160 Whitehorse Road, Blackburn using the 3D modelling program Autodesk Ecotect Analysis 2011 and the Radiance plugin.

The design has been assessed against the desired daylight levels outlined under SDAPP¹ Indoor Environment Quality guidelines. For commercial areas and residential dwellings, the SDAPP desired daylight levels have been defined as:

- $\geq 0.5\%$ daylight factor achieved across at least 90% of the floor area for bedrooms;
- $\geq 1.0\%$ daylight factor achieved across at least 90% of the floor area for living areas (including kitchens).
- $\geq 2.0\%$ daylight factor achieved across at least 30% of the floor area of commercial areas.

The modelling has been undertaken based on the current development surrounding conditions, with the neighbouring buildings modelled.

Design and Performance

The development has been modelled in detail with the internal walls and windows built into the model for the selected areas in the dwellings and commercial areas. All elements that could overshadow or reflect light into the subject bedrooms and living rooms are deemed important for the assessment and were included in the model.

All apartment and retail external glazing was modelled as clear low-e double glazing with a VLT of 65%. This is the VLT of the glass only and represents a high quality clear low-e double glazed window system.

The office zones are modelled with tinted glazing with a VLT of 40%.

The floors were modelled with a reflectivity of 0.3 (30%) as is typical for carpet or darker timber flooring; the balconies were modelled with a reflectivity of 0.4 (40%).

Ceilings were assumed as white with a reflectivity of 0.7 (70%).

The external walls were modelled with a reflectivity of 0.5 (50%) and the internal walls modelled as having a reflectivity of 0.7 (70%).

All window and glazed door sizes and locations are modelled as measured from the provided floor plans and elevations. Only the vision glazing has been modelled.

Balcony balustrades have been modelled as 1m high except where required to be higher for privacy reasons such as between dwellings. In these instances balustrades were modelled as being 1.7m high.

The modelling was undertaken using a uniform design sky which is used to generate daylight factors across the spaces being tested for compliance.

¹ SDAPP – Sustainable Design Assessment in the Planning Process.

Please see the results of the modelling below for confirmation of the predicted daylight factors within the development and an analysis of the appropriateness of the design to provide good internal daylight amenity and energy efficiency (i.e. not relying on artificial lighting during the day).

In the results below, please note that common areas, wardrobes, bathrooms and corridors have been removed from the results for clarity.

Results (SDAPP Results for Dwellings)

The figures below have the following colour scale:

- Yellow; over 1% daylight factor (acceptable daylight in bedrooms and living rooms);
- Red through to dark yellow; 0.5%-1% daylight factor (acceptable daylight in bedrooms, only acceptable in living zones if small amounts present); and
- Blue through to purple; <0.5% daylight factor (typically unacceptable in living zones, small amounts acceptable in bedrooms).

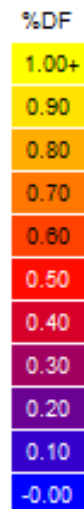


Figure 1: Colour scale of the daylight factors presented in the results below

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECH v5

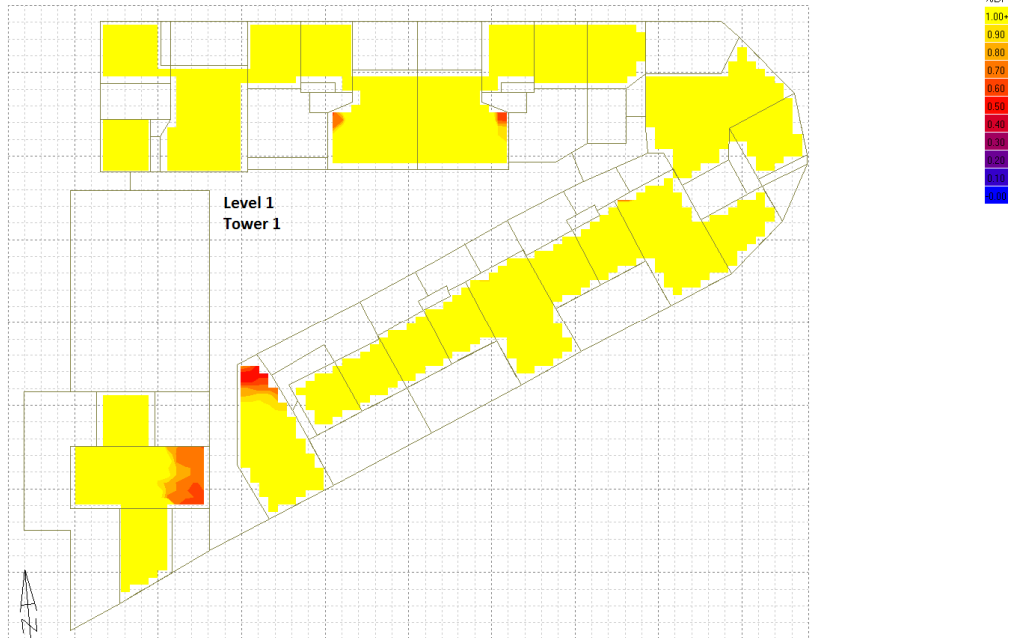


Figure 2: Daylight modelling results for the Level 1 apartments (Building D)

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECH v5

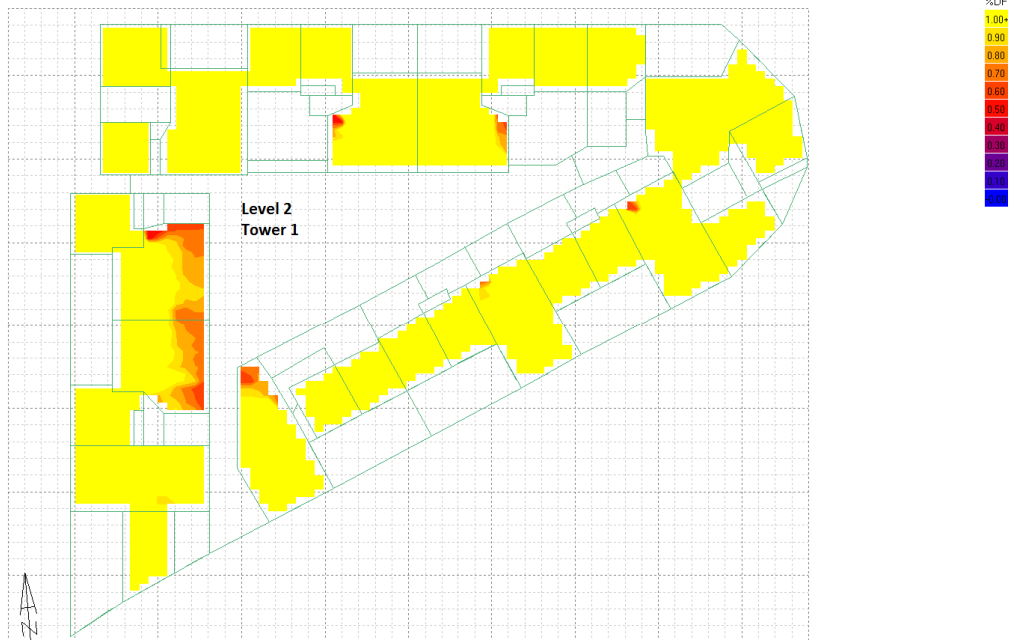


Figure 3: Daylight modelling results for the Level 2 apartments (Building D)



Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECT v5

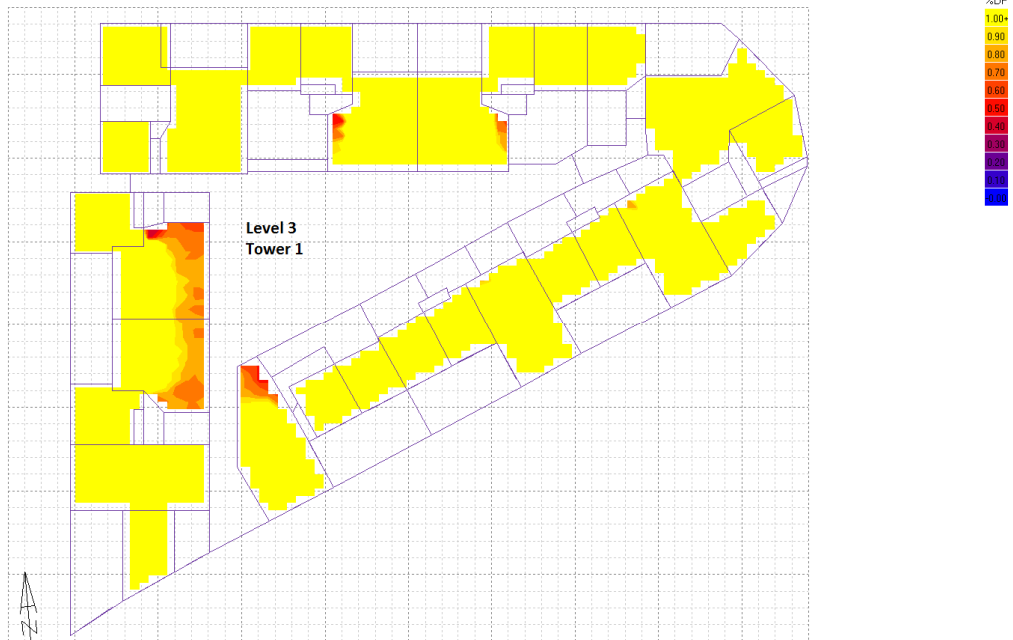


Figure 4: Daylight modelling results for the Level 3 apartments (Building D)

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECT v5



Figure 5: Daylight modelling results for the Level 4 apartments (Building D)



Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECT v5



Figure 6: Daylight modelling results for the Level 5 apartments (Building D)

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECT v5



Figure 7: Daylight modelling results for the Level 6 apartments (Building D)



Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECT v5

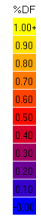


Figure 8: Daylight modelling results for the Level 7 apartments (Building D)

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECT v5

Level 1
Tower 2

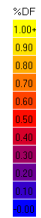
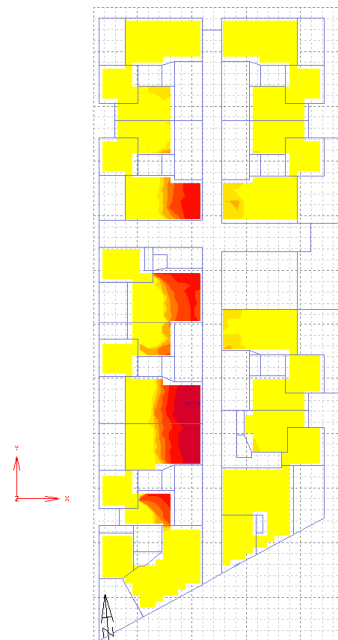


Figure 9: Daylight modelling results for the Level 1 apartments (Building C)



Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECT v5

Level 2
Tower 2

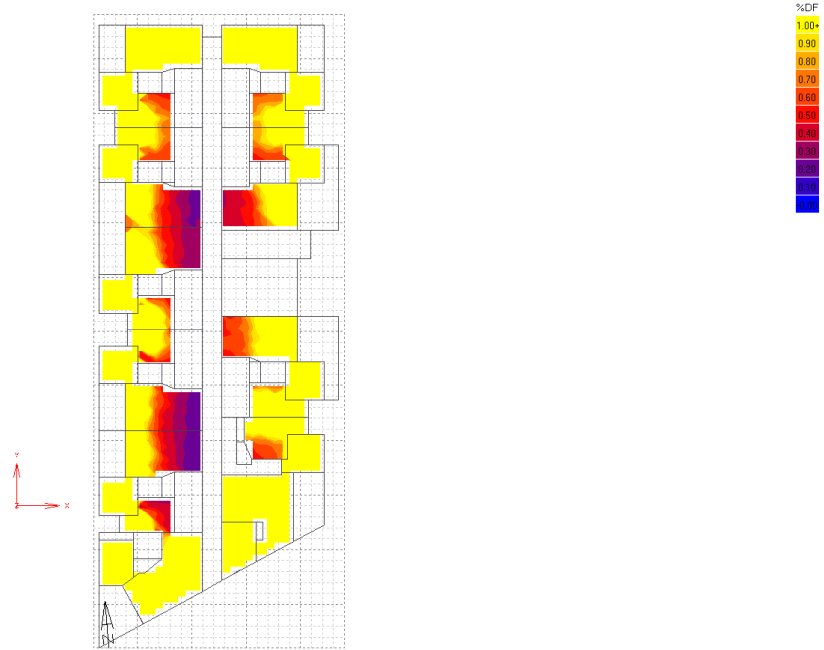


Figure 10: Daylight modelling results for the Level 2 apartments (Building C)

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECT v5

Level 3
Tower 2

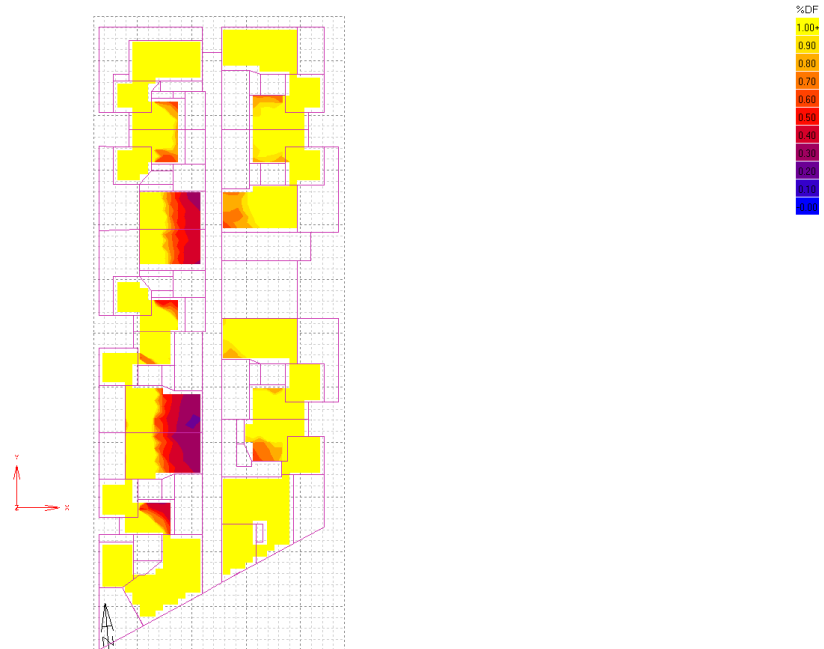


Figure 11: Daylight modelling results for the Level 3 apartments (Building C)



Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECT v5

Level 4
Tower 2



Figure 12: Daylight modelling results for the Level 4 apartments (Building C)

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECT v5

Level 5
Tower 2

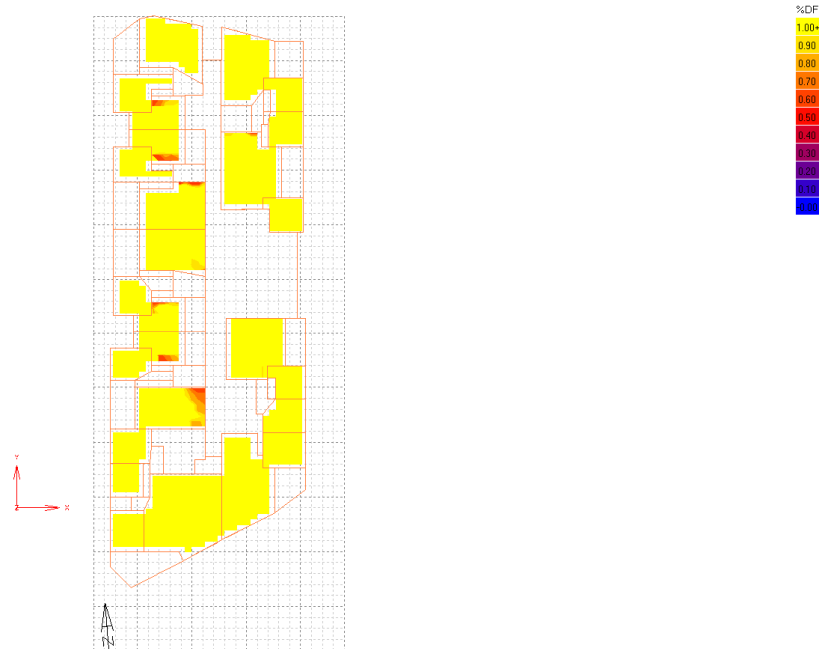


Figure 13: Daylight modelling results for the Level 5 apartments (Building C)

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECT v5

Level 6
Tower 2

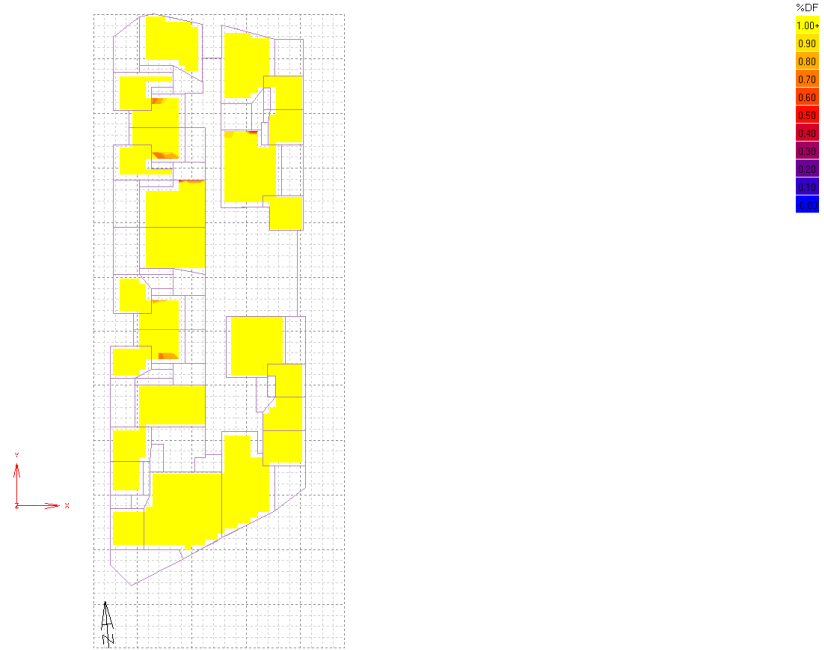


Figure 14: Daylight modelling results for the Level 6 apartments (Building C)

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECT v5



Figure 15: Daylight modelling results for the Level 1 apartments (Building B)



Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECT v5

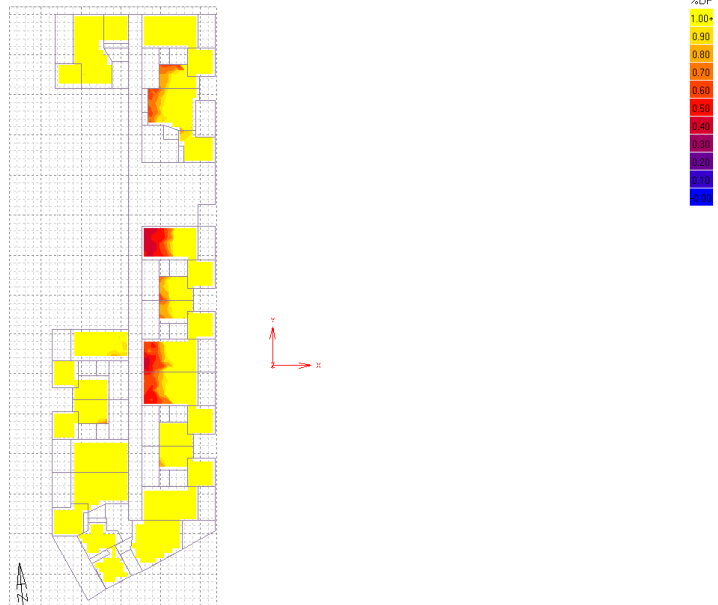


Figure 16: Daylight modelling results for the Level 2 apartments (Building B)

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECT v5



Figure 17: Daylight modelling results for the Level 3 apartments (Building B)



Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECT v5



Figure 18: Daylight modelling results for the Level 4 apartments (Building B)

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 1.00 %DF
In Steps of 0.10 %DF
©ECOTECT v5

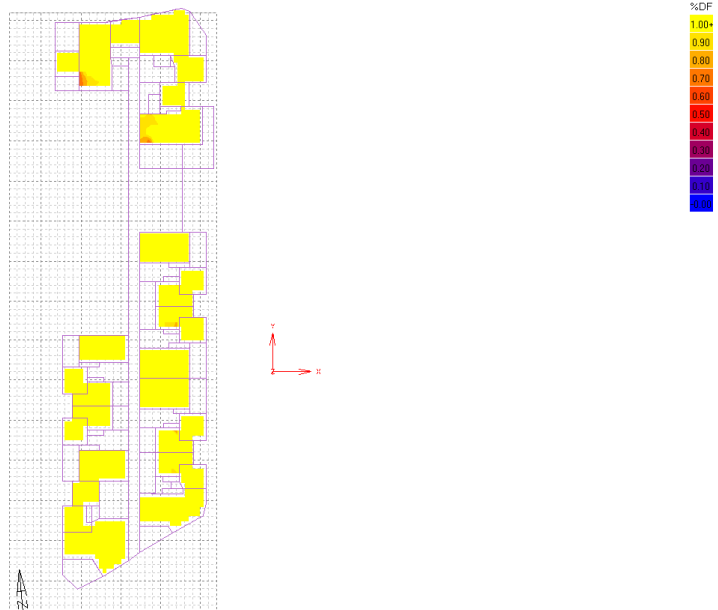


Figure 19: Daylight modelling results for the Level 5 apartments (Building B)



Analysis Grid
RAD Daylight Factors
 Contour Range: 0.00 - 1.00 %DF
 In Steps of 0.10 %DF
 ©ECOTECH v5

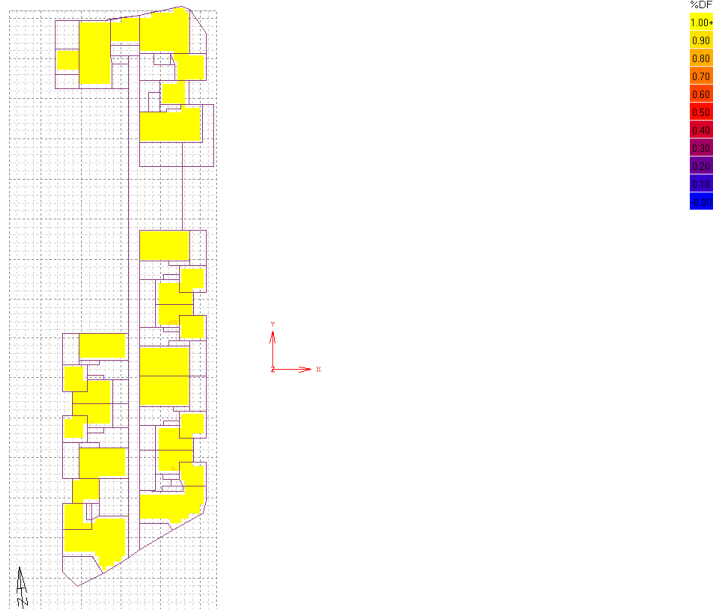


Figure 20: Daylight modelling results for the Level 6 apartments (Building B)

Analysis of Investigation

Living Rooms

On review of the results, the daylight predicted to be provided to the living zones in all but 37 dwellings within the entire development meets the best practice daylight levels set by SDAPP guidelines. Typically those dwelling which have their daylight fall below the best practice level in the living zone are located on lower levels where the light is compromised by the outlook towards another large building within the site.

With the outcome predicted by this modelling (80% compliance of living zones) the project would be awarded partial points for IEQ Daylight to living zones in the BESS tool if a BESS assessment were undertaken.

Bedrooms

On review of the results, the daylight predicted to be provided to the bedrooms in all but 5 dwellings within the development meets the best practice daylight levels set by SDAPP guidelines. This is via good design leading to few saddleback bedrooms (which typically all double up the openings side by side to provide good daylight). No apartment makes use of internal bedrooms or studies, further helping ensure that good daylight is provided to most bedrooms in the development.

With the outcome predicted by this modelling (97.5% of apartments meeting best practice daylight amenity in **all** bedrooms) the project would be awarded partial points for IEQ Daylight to bedrooms in the BESS tool if a BESS assessment were undertaken. This is a commendable design aspect.



Commercial Areas Assessment (SDAPP Results)

The daylight assessment of the commercial areas is undertaken in the same way as the assessment for residential areas (outlined above). There are a few key differences however:

- The daylight modelling is undertaken at working plane (floor level for retail, desk height for office);
- The desired daylight factor is 2% or over for at least 30% of the floor area of the commercial zones.

The results below outline how the proposed commercial zones perform with the yellow relating to area which is above 2% daylight factor (instead of 1% daylight factor represented by yellow in the images above for residential).

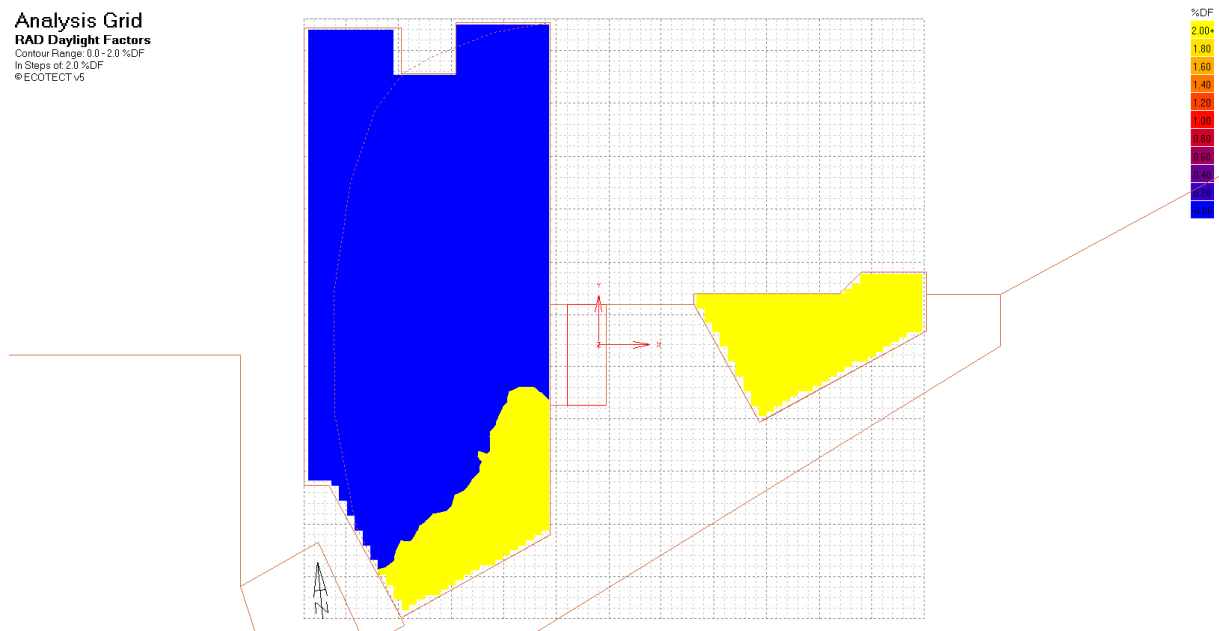


Figure 21: Daylight modelling results for the Basement 1 Retail Areas (Building C and 3)

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 2.00 %DF
In Steps of 0.20 %DF
©ECOTECT v5

Ground Floor Tenancy
under Tower 1

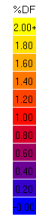
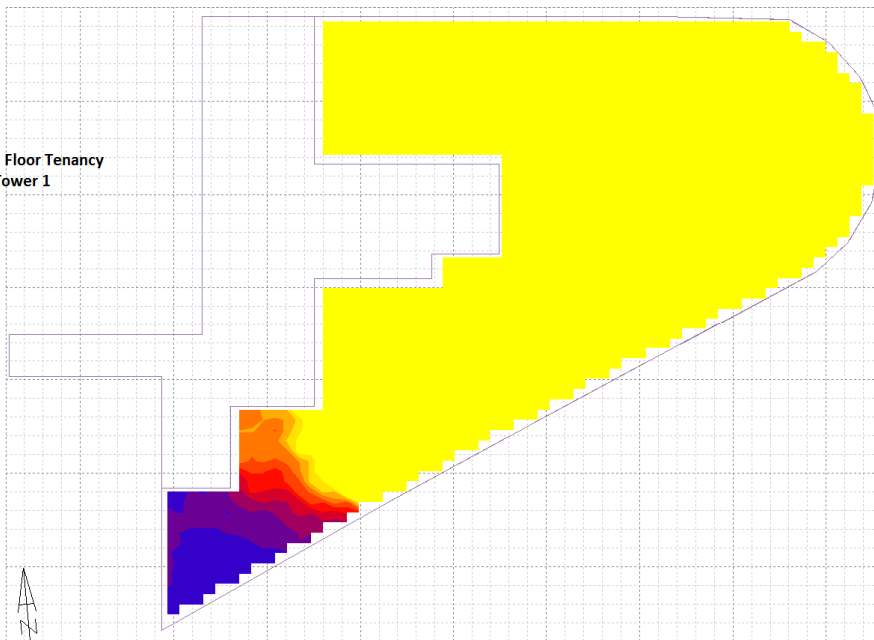


Figure 22: Daylight modelling results for the Ground Floor Retail Areas (Building D)

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 2.00 %DF
In Steps of 0.20 %DF
©ECOTECT v5

Ground Floor Tenancies
under Tower 2

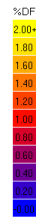
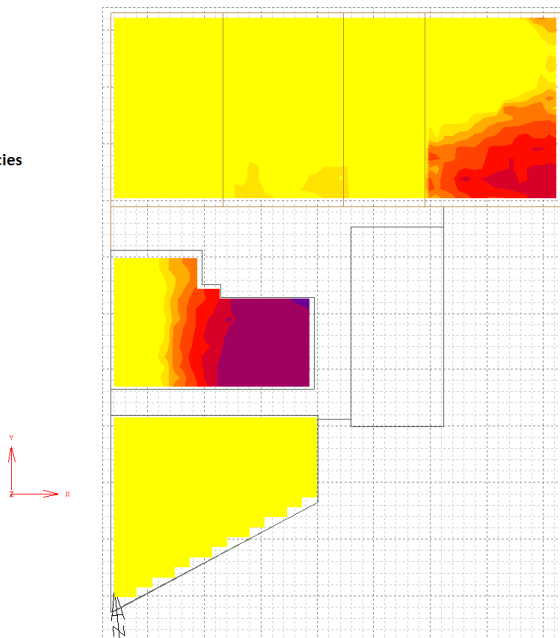


Figure 23: Daylight modelling results for the Ground Floor Retail Areas (Building C)



Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 2.00 %DF
In Steps of 0.50 %DF
©ECOTECT v5

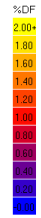
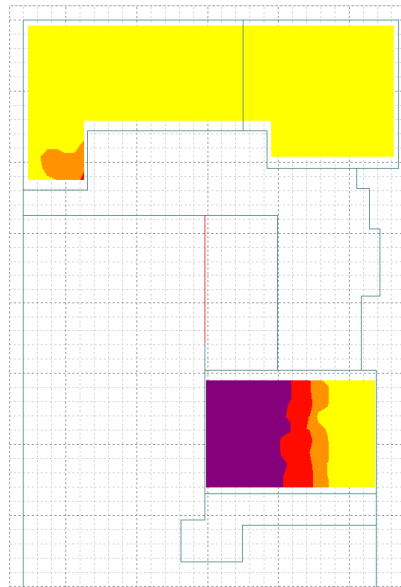


Figure 24: Daylight modelling results for the Ground Floor Retail Areas (Building B)

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 2.00 %DF
In Steps of 0.50 %DF
©ECOTECT v5

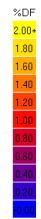
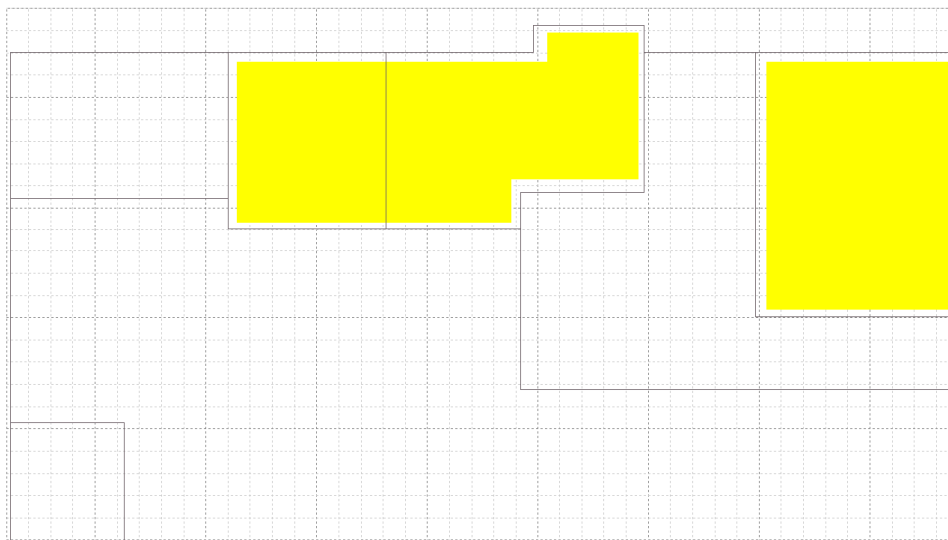


Figure 25: Daylight modelling results for the Ground Floor Retail Areas (Building A)



Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 2.00 %DF
In Steps of 0.50 %DF
©ECOTECT v5

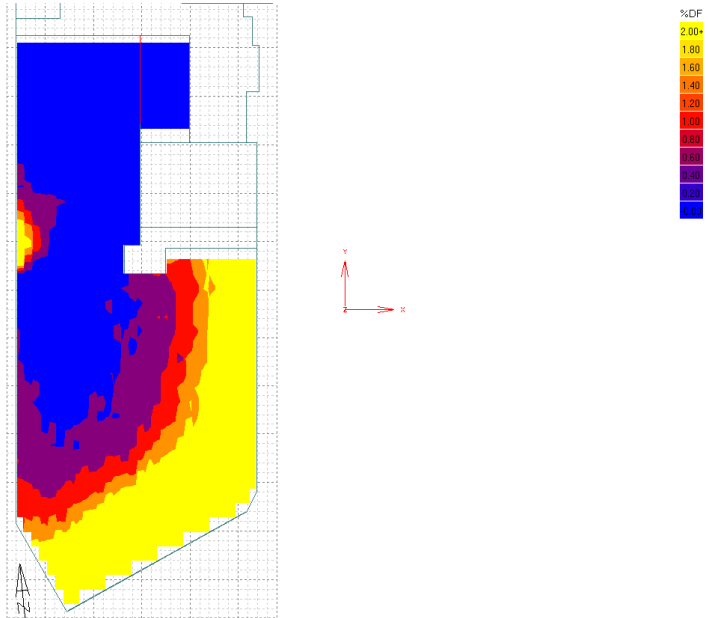


Figure 26: Daylight modelling results for the Ground Floor Office Areas (Building B)

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 2.00 %DF
In Steps of 0.50 %DF
©ECOTECT v5

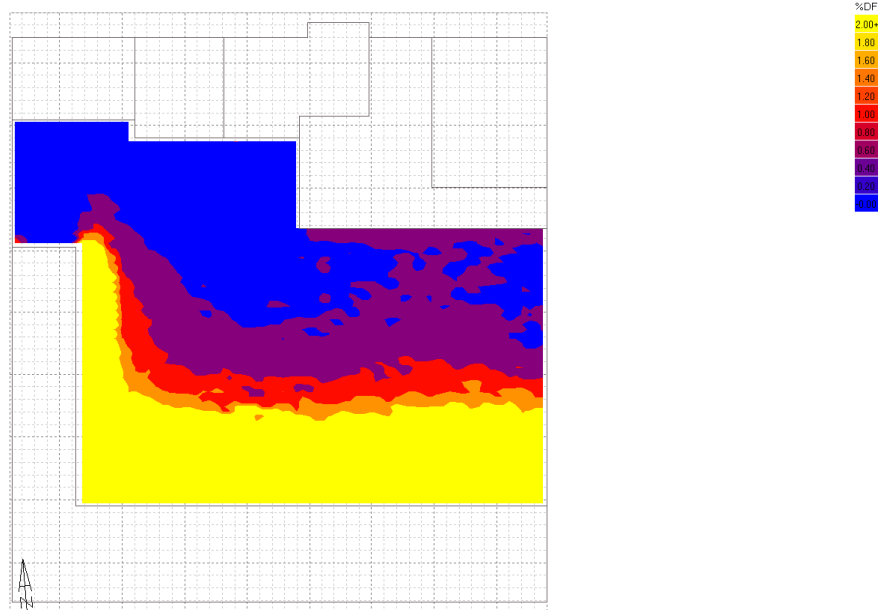


Figure 27: Daylight modelling results for the Ground Floor Office Areas (Building A)

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 2.00 %DF
In Steps of 0.50 %DF
©ECOTECT v5

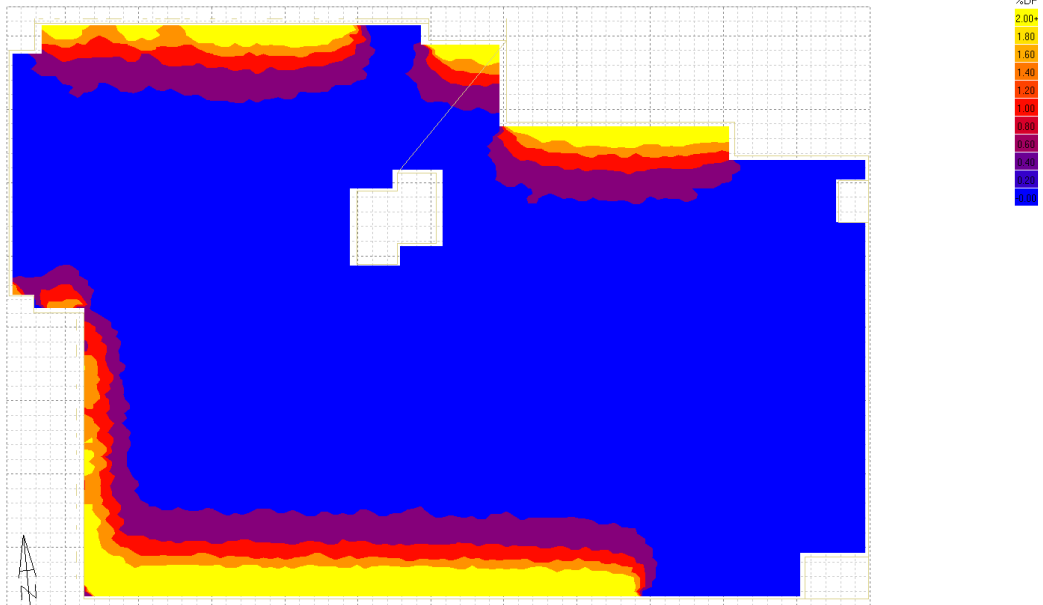


Figure 28: Daylight modelling results for the Level 1 Office Areas (Building A)

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 2.00 %DF
In Steps of 0.50 %DF
©ECOTECT v5

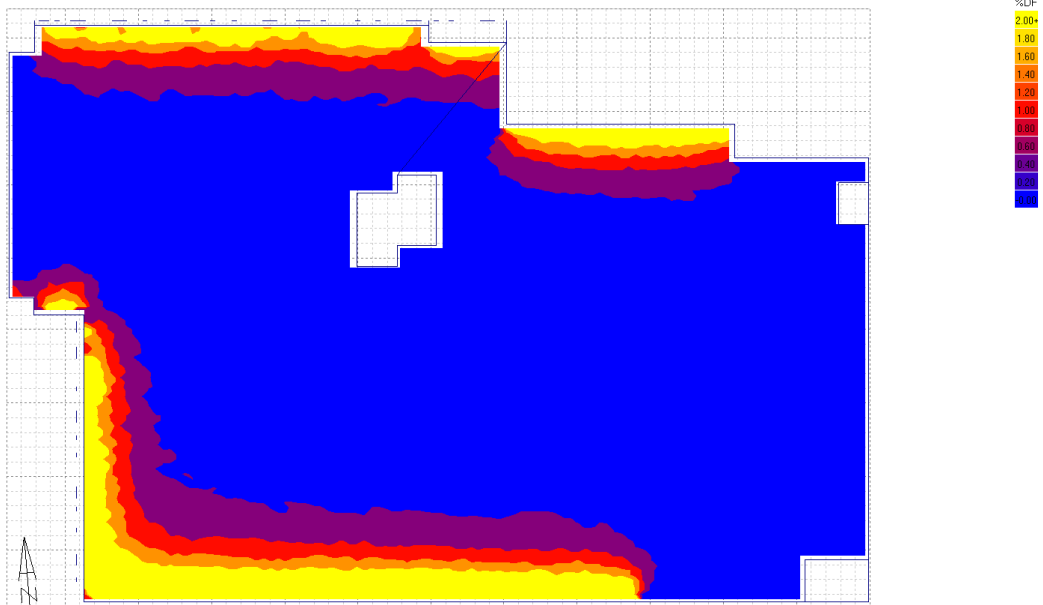


Figure 29: Daylight modelling results for the Level 2 Office Areas (Building A)



Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 2.00 %DF
In Steps of 0.50 %DF
©ECOTECT v5

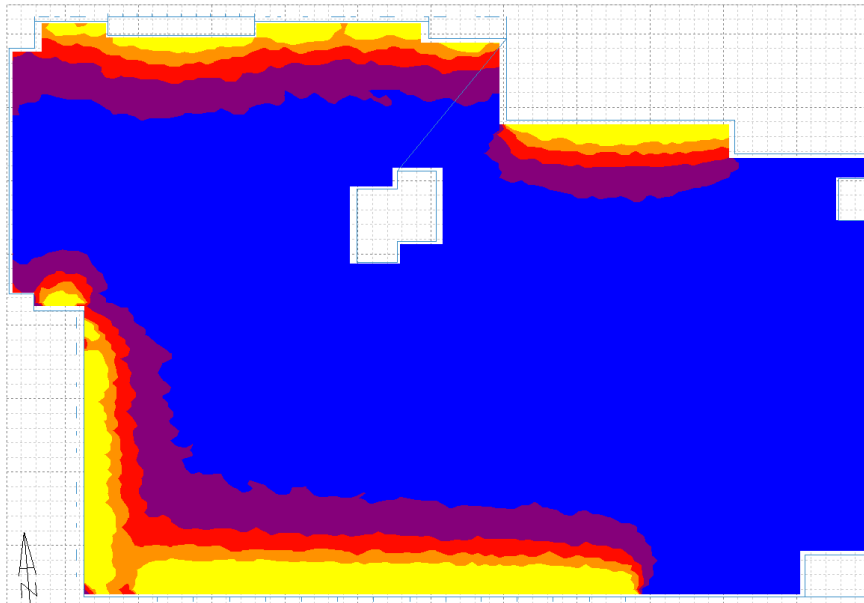


Figure 30: Daylight modelling results for the Level 3 Office Areas (Building A)

Analysis Grid
RAD Daylight Factors
Contour Range: 0.00 - 2.00 %DF
In Steps of 0.50 %DF
©ECOTECT v5

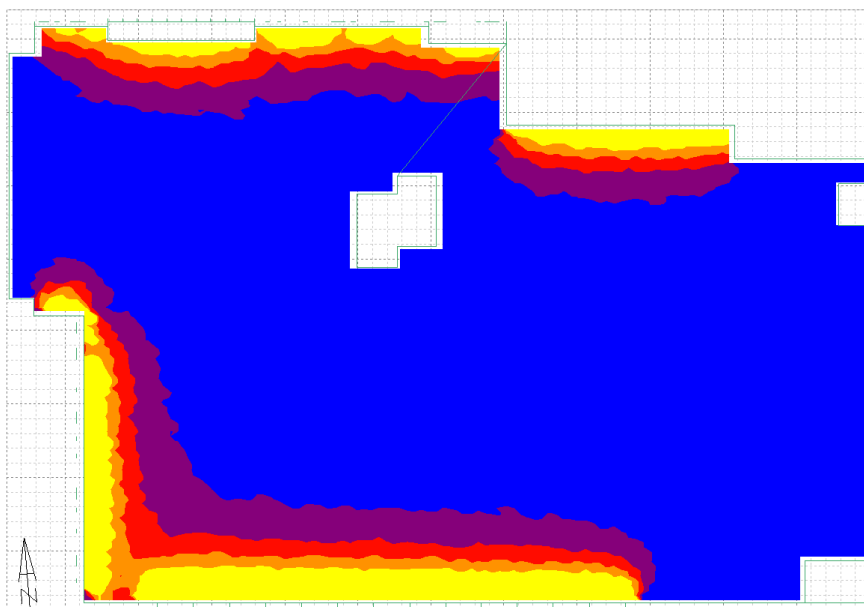


Figure 31: Daylight modelling results for the Level 4 Office Areas (Building A)



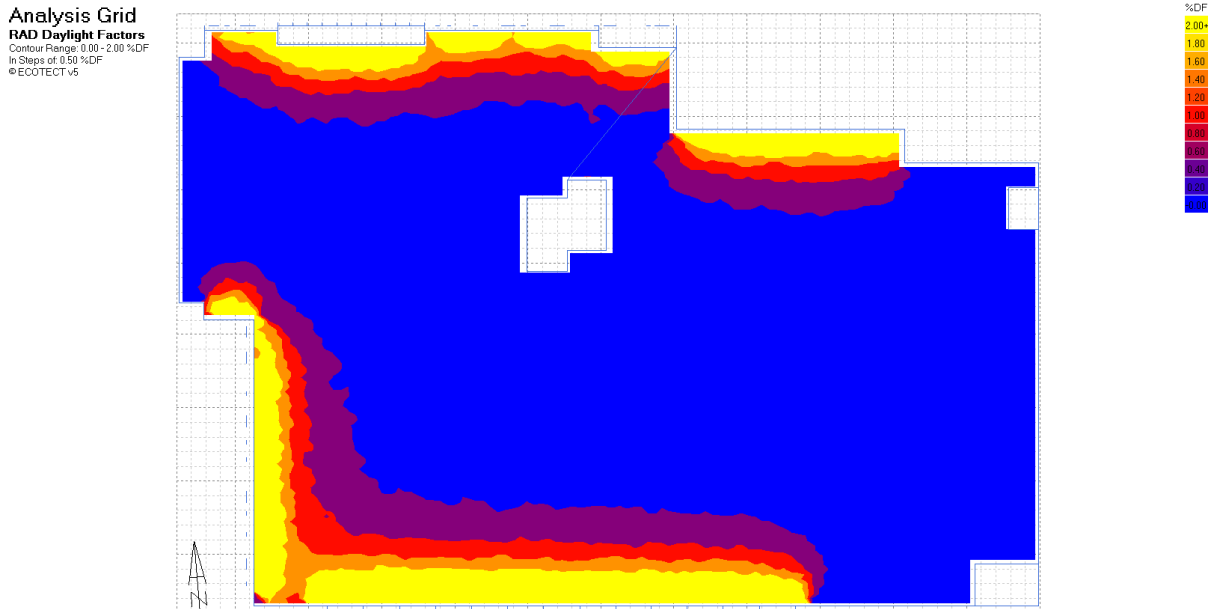


Figure 32: Daylight modelling results for the Level 5 Office Areas (Building A)

Analysis of Results

The results above demonstrate that the retail spaces are provided with best practice internal daylight across the entire floor area (for the retail facing Whitehorse Road as well as retail facing inwards between towers and to the south). The proposed supermarket will also be provided with best practice daylight to the front of the shop where staff will spend most of their time at the checkouts etc.

The office areas are not provided with best practice internal daylight amenity. This is in part due to the use of tinted glazing (which does not allow as much light to penetrate as clear glazing, however controls the solar gains much better to allow for a more energy efficient office) but also is due to the large open floor plates which do have daylight access from multiple sides, however the depth of the floor plate is such that it will not be possible to get best practice daylight levels into the central regions of the office area. The overall amenity of the offices is expected to be high with good internal air quality, high thermal comfort with the use of low-e tinted glazing and quality bike facilities and external areas for congregation and meetings.

If you should have any questions, please feel free to contact us at any time to discuss.

Regards,

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 Director

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