

In light of the judgement of the Dennis Regan v Paul Properties (2006) case - Should the 0.2% sky factor analysis solely be used to determine daylight availability within rooms for rights of light?

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Introduction

This essay is concerned with rights to light and whether it is a good measure for quality of daylight within a room. Rights to light is a legal easement in English law, as such disputed cases are judged on case history. In October 2006 a landmark case forced an injunction onto a developer and meant the demolition of part of his building. This sent shockwaves through the development community as the ruling meant that developers could no longer simply offer compensation to affected parties as a general rule. Rather careful consideration to adjoining properties has to be considered meaning that some developments may be further restricted from their original potential.

Although there are arguments for and against this perceived increased restriction, this essay aims to address whether the quality of light for the affected property within the above case is diminished to a significant extent as a result of the proposed development.

Using the original computer model from the developer's surveyor, the rights of light assessment is measured against other methods of daylight assessment. With use of the average daylight factor formula and calculating daylight factor contours it is possible to get a better understanding of the quality of daylight within the room. Further analysis is then undertaken using local climate data in order to determine the daylight autonomy within the room.

What is a right to light and how is it quantified?

The right of light Prescription Act of 1832 is a legal easement in English Law which enables a property to acquire a legal right to light over adjoining or nearby land (BRE: Site layout planning for daylight and sunlight 1991, 64). The right is generally attained through prescription if the property has enjoyed light for 20 years or more unless a legal agreement prevents this. Properties can also acquire light through legal agreements, however if that light is obstructed for more than twelve months, then the legal right is lost.

Usually of greater significance in dense urban areas, a right to light is protected under law. As such, even though a developer may be granted planning permission for his development, there may still be a right of light issue. Should the development impede upon the surrounding properties' light, then the developer has two courses of action to consider in order to remedy the situation.

If the impact is reasonable then compensation may be offered to the legal parties. This can sometimes be based upon the developers profit and amount to very large sums of money. The second option is to offer a cutback to the development whereby any infringement is reduced to a reasonable level.

If the right of light to a property is infringed to a significant level and compensation is not acceptable to the owner, then an injunction can be sought and the developer may have to pull down his building.

Right to light measures the sky alone and does not take into account sunlight or views. “Also the right is a bare minimum of light, in most circumstances well below what is recommended in the British Standard” (BRE: Site layout planning for daylight and sunlight, 1991, p64).

Since the early twentieth century, measurement of a right to light has been undertaken based upon the work by Percy Waldram. Rather than measuring daylight illumination in absolute terms, he proposed that it should be expressed as a “ratio of the total illumination simultaneously available from outside of the dome of an unobstructed sky” (Chynoweth 2004, 132). This ratio is otherwise known as the sky factor.

Further work by Waldram led him, in 1929, to propose that a sky factor of 0.2% was adequate and represented “sufficient light according to the ordinary notions of mankind” (Chynoweth 2004, p132).

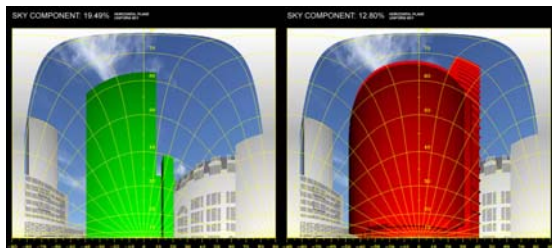


Figure 1: Rights of light Waldram diagrams showing a before and after development view for a uniform sky. From <http://www.waterslade.com> accessed 8th January 2007

The diagram above shows an example of a rights of light Waldram diagram for an existing current scenario in green and a proposed developed scenario in red from a surrounding properties window. The diagrams each show sky factors in the top left. The point at which these sky factors reach 0.2% at desk height (838.2mm) is plotted in plan view to form a contour.

These contour areas are then assessed and a loss is calculated.

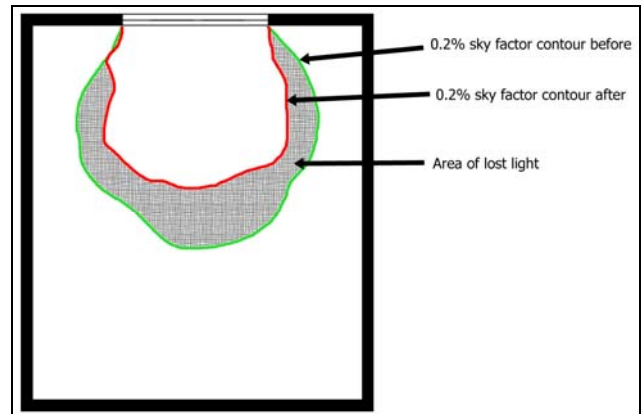


Figure 2: Example of 0.2% rights of light contours at desk height (838.2 mm) in a simple shaped room in plan with one window.

Figure 2 demonstrates how these contours may look with the area of lost light in grey hatch. It shows a room in plan with one window at the top.

Obviously to do this type of calculation by hand can, and does, take a long time, especially on sites where there are often hundreds, even thousands of rooms. Therefore computer programs are often used to accurately calculate the contours and determine the losses in light.

Dennis Regan v Paul Properties 2006

The dispute between Dennis Regan and Paul Properties originally started in October 2005 when Mr Regan wrote to the developer - whose work had started in September of that year - that he felt his right to light was being compromised by the development. Although planning permission had already been granted for the development, rights of light advice had not been sought before construction.

Figures 3 and 4 below illustrate the relationship between Mr Regan’s property and the Paul Properties development opposite.

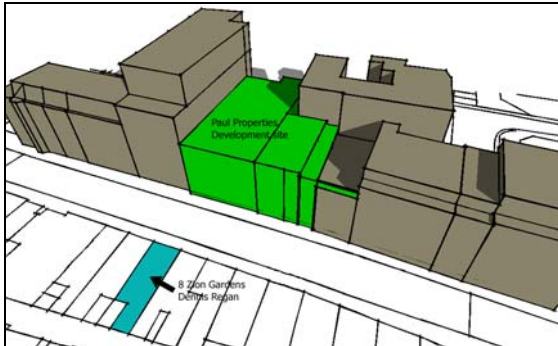


Figure 3: Dennis Regan's property in blue and Paul Properties development site with the previous "existing" building highlighted in green. (Original model from Anstey Horn Chartered Surveyors)

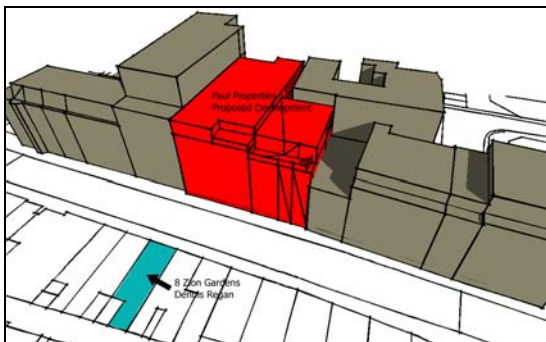


Figure 4: Dennis Regan's property in blue and Paul Properties Proposed Development highlighted in red. (Original model from Anstey Horn Chartered Surveyors)

After an initial hearing which found in favour of the developers, Mr Regan appealed and won an injunction forcing the developer to demolish part of his building.

Rights of Light calculations and alternative daylight assessments

The rights of light analysis for the Regan v Paul Properties case was analysed by surveyors acting on behalf of both parties. Before construction started the room received a reasonable level of light with a contour covering 67% of the available space (See figure 5).

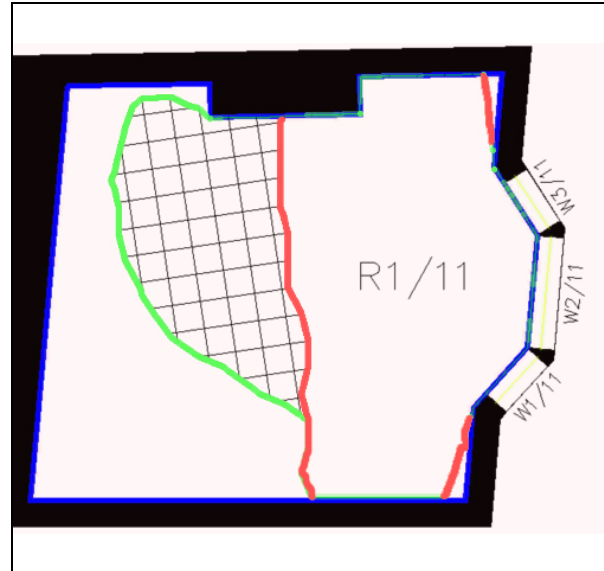
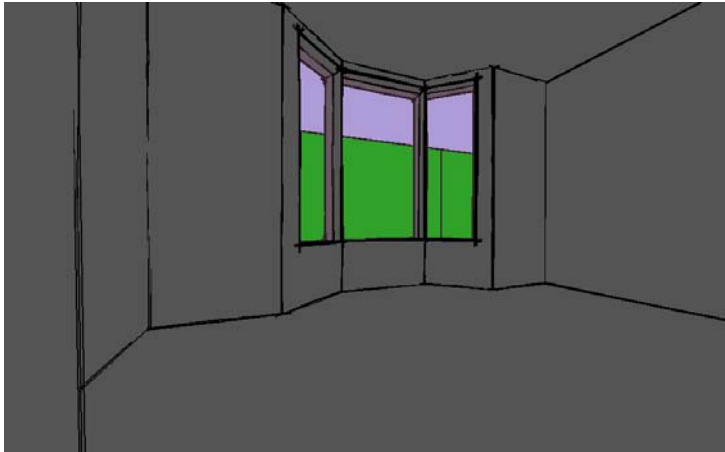


Figure 5: Rights of light contours for Mr Regan's living room with the before contour in green and as built contour in red (Anstey Horne Chartered Surveyors).

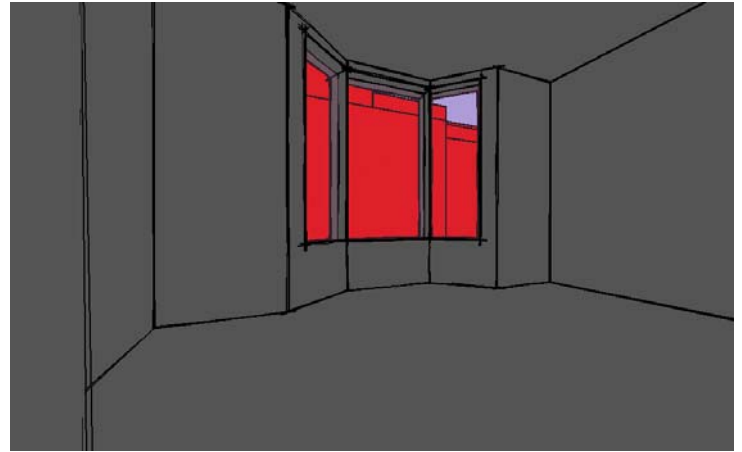
The green contour above illustrates Mr Regan's 0.2% skyline before construction whereas the red shows the 0.2% skyline for the finished planning approved proposed scheme.

The results are from the developer's right to light surveyor and show that from being 67% well lit, the proposed scenario shows the room is only 45% well lit*, a reduction of 22%. The appeal judge commented that "The consequence of the obstruction to the light in the middle of the living room was that Mr. Regan would suffer a substantial interference with the enjoyment of natural light in his living room." He also goes on to state "In order to enjoy adequate light Mr. Regan would now either have to use artificial light in the part of the living room where the natural light has become inadequate or he would have to move into the area of the living room into or close by the bay window." (England and Wales Court of Appeal (Civil Division) Decisions: Dennis Regan and Paul Properties et al 2006).

It is clear that there is a significant difference in contour areas and that the well lit area in rights of light terms has been reduced. Figures 6 and 7 below show the view from the window at desk height before and after the development construction.



Figures 6 and 7: Simulated view at desk height from Mr Regan's living room with the existing scenario in green and as built in red.



given here it is not an exact measure" (Tregenza and Loe 1998, p138). A more specific point daylight factor calculation can be achieved using daylight factor contours.

In order to determine overall natural light in a room, it is possible to calculate the average daylight factor. "The average daylight factor is used to predict the extent to which daylighting will be a significant factor in the lighting of a room." (Tregenza, P and Loe, D 1998, p135). Tregenza gives the following formula for calculating the mean average daylight factor:

$$ADF = (A_g * \theta * t) / (A * (1 - p * p))$$

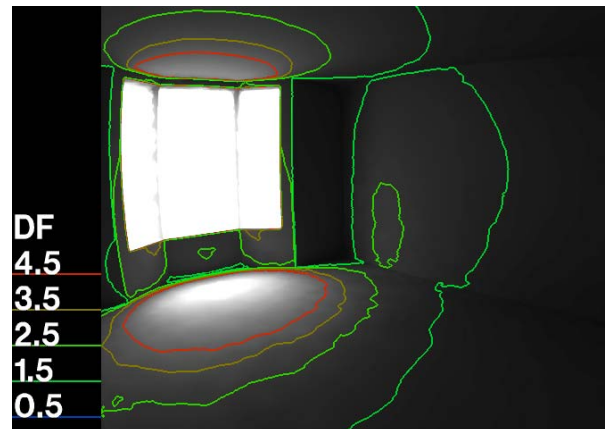
It can be shown that using the values given in appendix 1, the living room will receive an average daylight factor of 2.8% when assessed against the development proposal from an original 3.4%. This is a reduction of 16.13% in overall terms from the original. The BRE Site layout planning for daylight and sunlight suggests that, a daylight factor of 5% is required for a predominantly day lit appearance. Considering that the existing scenario is below this value, it is unfair to expect the ADF to reach 5% for the as-built scenario.

The guidelines also go on to state that for living rooms an ADF of 1.5% is a recommended level. However it is noted that this is a minimum level and supplementary lighting will be required.

Tregenza and Loe, 2006 note caution when using the ADF method. They state that although "the average daylight factor is a good indicator of overall daylight quantity...in the simple form

Daylight Factor Contours

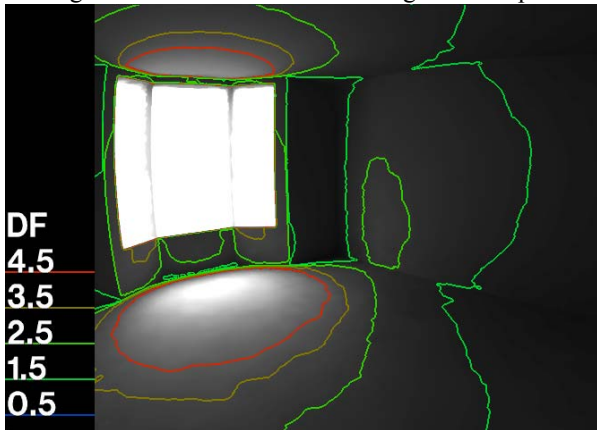
Figures 8 and 9 below show rendered Radiance images from within the living room with the previous existing scenario on the left and the as-built planning approved development on the right. It can be seen that the distribution of the



daylight factors for the as-built scenario are brought forward towards the window.

Figure 8: Existing Daylight Factors over surfaces
Figure 9: Proposed Daylight Factors over surfaces

Further to this, the Daylight Factor contours were assessed at desk height in order to get a comparison with the rights of light results. Figures 10 and 11 show the living room in plan



view.

These images interestingly show that, where there is a high daylight factor towards the window for the existing scenario, there is a similar density for the as-built scenario. Indeed it is only towards the rear of the room where the lower level contours of 1% to 1.5% that the greatest difference can be seen. These lower level contours appear to move approximately 500-700mm towards the window.

It is interesting to note that the rights of light contours in figure 5 show the same area of the room being affected.

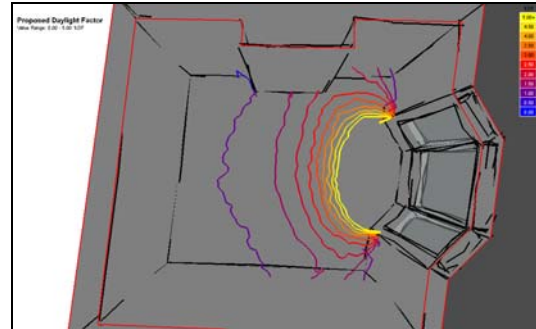
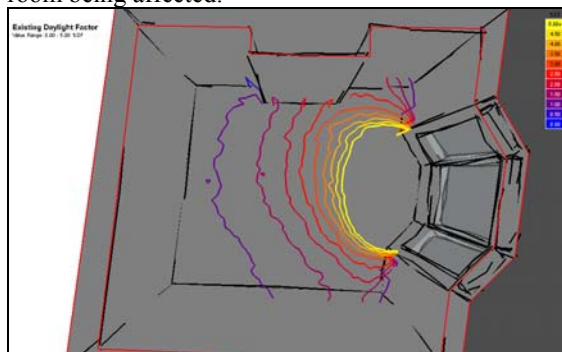


Figure 11: Plan view as-built daylight factor contours

Table 1 in appendix 1 shows a breakdown of the daylight contour analysis. It can be seen that the 1.5% to 2% contour range shows the greatest change with the proposed scheme reducing in area by 7.41%.

Daylight Autonomy

Daylight Autonomy is a relatively new form of daylighting analysis which uses local climate data files to determine illuminance over a working plane. “The daylight autonomy at a point in a building is defined as the percentage of occupied hours per year, when the minimum illuminance level can be maintained by daylight alone.” (Reinhart, C 2006 Tutorial on the Use of Daysim Simulations for Sustainable Design, p10).

There are no recommended guidelines for daylight autonomy; however it gives more information than daylight factor analysis. As well as using the climate data to consider all of the available sky conditions, it also takes building orientation and occupancy rates into consideration.

Daysim has been used for this analysis. Although it is generally applied to commercial buildings, daylight autonomy can provide useful information concerning the availability of good quality daylight. The BRE States that a well day lit room should achieve a daylight factor of 5%. Using the CIE overcast sky which has outdoor horizontal illuminance of 10 kLux (Baker and Steemers 2002, p144); it can be judged that 500lux will provide a good amount of daylight under this sky condition. Therefore the simulation and analysis was run to determine the

frequency of 500 Lux at working plane height between 8am and 5pm.

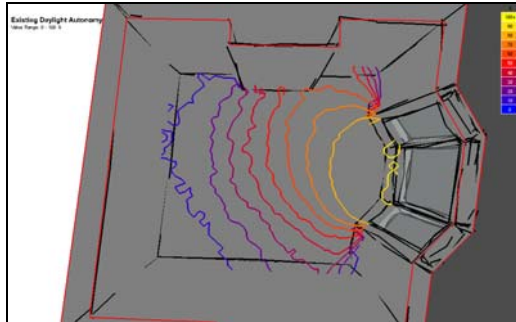


Figure 12: Existing daylight autonomy contours. Percentage frequency of 500 Lux between 8am and 5pm

Figure 12 above illustrates the distribution of 500 Lux frequencies at desk height for the existing scenario. It can be seen from table 2 appendix 1, that 500 Lux would be available for 30-40% of the year for more than half the room. Obviously there is a greater frequency at the window and there is a reduced availability to the rear.

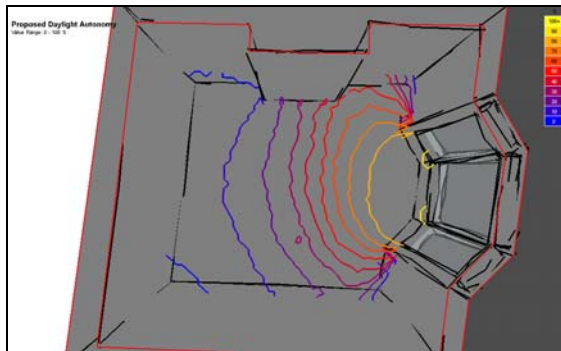


Figure 13: Proposed as-built daylight autonomy contours. Percentage availability of 500 Lux between 8am and 5pm

The proposed scenario shows that half the room has 500 Lux available for 20-30% of the year. Also the greatest reduction in daylight autonomy is over the 10-20% contour band towards the rear of the room.

Conclusion

It is clear that the planning approved proposed scheme does impose some reduction of natural light to the living room, however to quantify that reduction is difficult. Clearly the appeal judge ruled correctly in legal terms in that there was an

actionable loss of light to Mr Regan's living room; however, this cannot truly demonstrate the natural lighting levels within the room.

The average daylight factor, although crude, is favoured amongst many designers and consultants due to its simplicity. This rule-of-thumb result showed that from an original ADF value of 3.4% is reduced to 2.8% when assessed against the proposed scheme. Although there is some reduction it is arguable that perhaps this is reasonable - it is within the BRE guidelines for a living room and it is arguable as to whether this would be significant enough to be noticed by the human eye. However it does not give an indication as to where the loss occurs.

The daylight factor contours show the distribution of light loss occurs towards the rear of the room. This is consistent with the right of light results and commented on by the judge who stated that Mr Regan would need to move towards the window to enjoy daylight. However the distribution of contours to the rear of the room are similar for both the existing and proposed scenarios. Additionally the rendered images show that the change in light within the room may be quite subtle over the room surfaces.

Finally the Daylight Autonomy results give a similar distribution of contours to the daylight factor contours but show a more realistic interpretation of daylight distribution under many sky conditions.

Although there are reductions to light in all methods of analysis, the rights of light result gives a substantially larger reduction and can be deemed to be unrepresentative of what is actually happening to the light. It doesn't take any reflections to light in the room which can significantly contribute to the perceived light level. However, its sensitivity to changes in daylight could be deemed to be beneficial when protecting the light. Although rights of light analysis measures the minimum requirement of daylight, the reductions in this instance appear to be more significant and thus more sensitive to changes.

Therefore I suggest that the lighting level has been reduced but probably would not be noticeable to Mr Regan through much of the year particularly when one considers that the existing scenario provided relatively low daylight to the living room in the first instance. However, as a

means of protecting light, rights of light analysis is a reasonable method since any change in lighting level will be more pronounced than the alternative methods assessed here.

As with all simulated assessments, care should be taken in over-relying on the results as proven fact. Although the Radiance based systems used here are very well respected in the lighting field, they are not completely accurate.

Further work needs to be done in order to provide guidelines for the daylight autonomy method of analysis and to determine the validity of rights of light calculations. Rather than protecting light through a simple sky line method as used for rights of light, use of technology can help to accurately predict light. This should be used where possible in conjunction with the current method in order to get a better understanding of the daylight distribution within the room and thus provide adequate mitigation to any reductions.

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