AKAAL ASSOCIATES

BRE Daylight & Sunlight Study – Land adjacent to 1 Russet Close, Uxbridge

BRE Good Practice Assessment - Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice - Second Edition

06 September 2019

Daniel Watt
CIBSE Accreditation Nos:
LCCSIM084077
LCCD084077
LCEA084077

Watt Energy & Consulting Engineers Ltd
40 King Street, Manchester,
M2 6BA

t. 0161 43 43 103
w. www.wece.co.uk
e. dan.w@wece.co.uk

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Issue Status

Sustainability Director	Daniel Watt
Sustainability Consultant	Bernard Stricker

First Issue Date	Revision Issue Date	Issue Revision	Issued By
06/09/18	-	-	*BS*

1. Executive Summary

Planning permission is being sought for a new, three storey dwelling adjacent to 1 Russet Close, Uxbridge. Due to the proximity of the development to the adjacent dwellings, there are concerns that the development would have a detrimental impact on daylight to habitable rooms contrary to local planning policies.

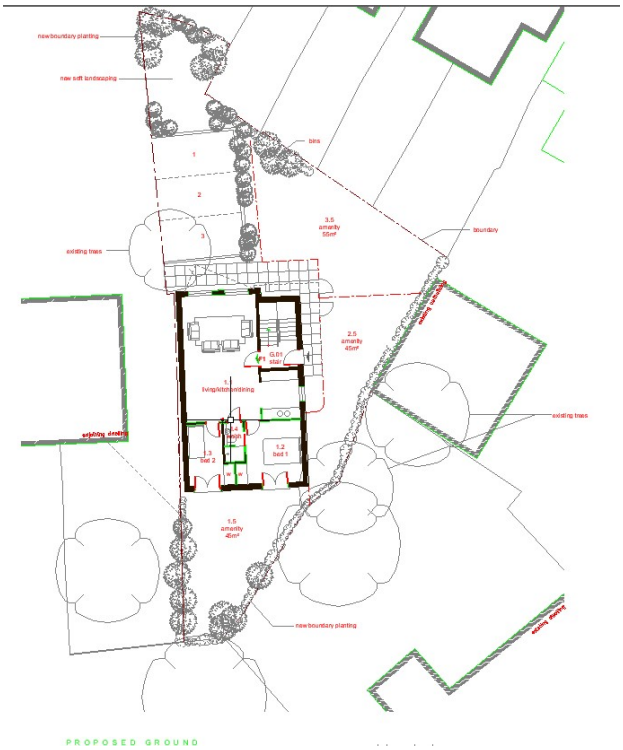


Figure 1: Location plan of the proposed development

Watt Energy & Consulting Engineers Ltd have been commissioned to undertake a daylight and sunlight study to support the planning application and assess the effect of the development in terms of daylight & sunlight on the surrounding properties.

This report is based on **Building Research Establishment Report 'Site layout planning for daylight and sunlight: A guide to good practice' 2011** (the 'BRE Guide'). In particular this report covers Chapters 2.2 (Light from Sky for Existing Buildings) and 3.2 (Sunlighting for Existing Buildings) of the BRE Guide.

The BRE Guide states that a development to a building must safeguard the daylight to nearby buildings.

In particular the guidelines states that, if applicable, the following factors should be considered:

- Light from Sky
    - Vertical Sky Component (VSC) calculation
- Sunlight
    - Annual Sunlight Hours (APSH) calculation

Using the IES Virtual Environment (VE) software suite, two models were created to investigate the effect of the proposed building on the VSC and APSH received by the surrounding properties.

All assessments were carried out in accordance with the Building Research Establishment Report 'Site layout planning for daylight and sunlight: A guide to good practice' 2011.

The results of the assessments are summarised below;

- Light from Sky:

Conclusion – the windows in the surrounding properties maintain a VSC of greater than 27% or at least 80% of their existing value

- Sunlighting:

Conclusion –The windows in the surrounding properties receive more than 25% of annual probable sunlight hours and 5% of probable sunlight hours during the winter months. Where there is a reduction in annual probable sunlight hours, this is less than 20%.

Therefore, it can be concluded that with regards to Daylight and Sunlight the proposed development does not have a detrimental impact on the surrounding dwellings.

2. Methodology of the Study

The study is based on the various numerical tests laid down in the Building Research Establishment (BRE) guide 'Site Layout Planning for Daylight and Sunlight: a guide to good practice' 2011. In general, the BRE tests are based on the requirements of the British Standard, BS 8206 Part 2.

The standards set out in the BRE guide are intended to be used flexibly. The following statement is quoted directly from the BRE guide:

> "The guide is intended for building designers and their clients, consultants and planning officials. The advice given here is not mandatory and the guide should not be seen as an instrument of planning policy; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design."

Light from the Sky

Diffuse daylight is the light received from the sun which has been diffused through the sky. Even on a cloudy day when the sun is not visible, a room will continue to be lit with light from the sky. This is diffuse daylight.

Diffuse daylight calculations should be undertaken to all rooms where daylight is required, including living rooms, kitchens and bedrooms. Usually, if a kitchen is less than 13m^2 it is considered to be a non-habitable room and the daylight tests need not be applied. The BRE guide states that windows to bathrooms, toilets, storerooms, circulation areas and garages need not be analysed.

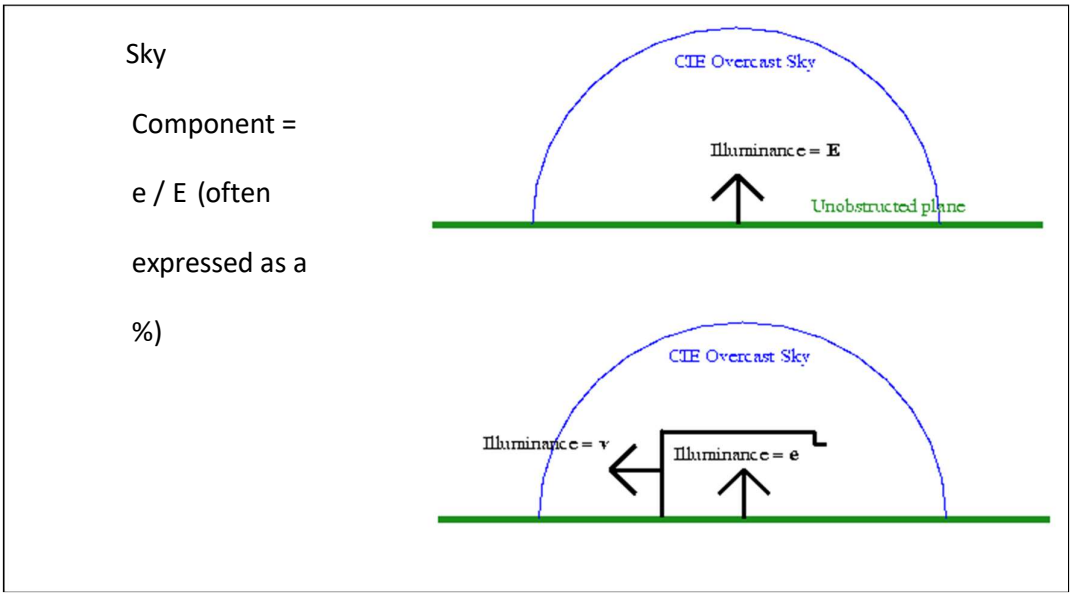
The BRE guide contains two tests which measure diffuse daylight:

- **Vertical Sky Component -** The percentage of the sky visible from the centre of a window is known as the Vertical Sky Component. Diffuse daylight may be adversely affected if after a development the Vertical Sky Component is both less than 27% and less than 0.8 times its former value.
- **Daylight Distribution -** The BRE guide states that where room layouts are known, the impact on the daylighting distribution can be found by plotting the, 'no sky line' in each of the main rooms. The no-sky line is a line which separates areas of the working plane that can and cannot have a direct view of the sky. Daylight may be adversely affected if after the development the area of

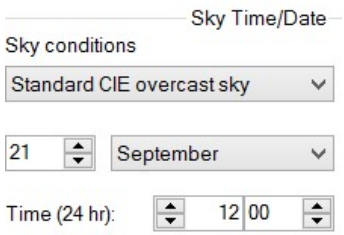
the working plane in a room which can receive direct skylight is reduced to less than 0.8 times its former value.

The ratio of the illuminance at a point on a given plane due to the light received directly from a sky of assumed or known luminance distribution, to that on a horizontal plane due to an unobstructed hemisphere of this sky. Direct sunlight is excluded from both values of illuminance (i.e. CIE Overcast Sky). [Illuminance is measured in Lux]

Note: this is the same as Daylight Factor except the indirect component has been removed.



Vertical sky component results are established by using the following standard sky data.



Sunlighting

The BRE sunlight tests should be applied to all main living rooms and conservatories which have a window which faces within 90 degrees of due south. The guide states that kitchens and bedrooms are less important, although care should be taken not to block too much sunlight.

- Annual Probable Sunlight Hours

The BRE guide states that sunlight availability may be adversely affected if the centre of the window:

- Receives less than 25% of annual probable sunlight hours, or less than 5% of annual probable sunlight hours between 21 September and 21 March and
- Following any reduction in sunlight below 25% a window should not receive less than 0.8 times its former sunlight hours during either period and has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.

Gardens and Open Spaces

The availability of sunlight should be checked for all open spaces where sunlight is required. This would normally include:

- Gardens, usually the main back garden of a house
- Parks and playing fields
- Children's playgrounds
- Outdoor swimming pools and paddling pools
- Sitting out areas, such as those between non-domestic buildings and in public squares
- Focal points for views such as a group of monuments or fountains.

The BRE guide recommends that at least 50% of the area of each amenity space listed above should receive at least two hours of sunlight on 21st March. If as a result of new development an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21st March is more than 0.8 times its former value, then the loss of light is likely to be noticeable.

3. Calculations and Results

Vertical Sky Component

Any reduction in the total amount of skylight can be calculated by finding the VSC at the centre of each main window. In the case of a floor-to-ceiling window such as patio door, a point of 1.6m above ground on the centre line of the window may be used.

The VSC is a measure of the light reaching the centre of a window. It is the ratio between the vertical illuminance on the glazing direct from the sky and the illuminance from an unobstructed sky. For a CIE

standard overcast sky with no obstructions the VSC is 40%. A VSC of 27% is regarded as offering the potential for good daylight. This corresponds to an angle of obstruction of 27°.

If the VSC for the affected window is greater than 27% then it can be considered that enough skylight should still be reaching the window of the existing building. Any reduction below this level should be kept to a minimum. If the VSC, with the new development in place, is both less than 27% and less than 0.8 times its former value, then occupants of the existing building will notice the reduction in the amount of skylight.

In order to calculate the VSC for the affected windows in the surrounding properties, the proposed development and existing buildings were modelled using IES VE Suncast and IES Radiance.

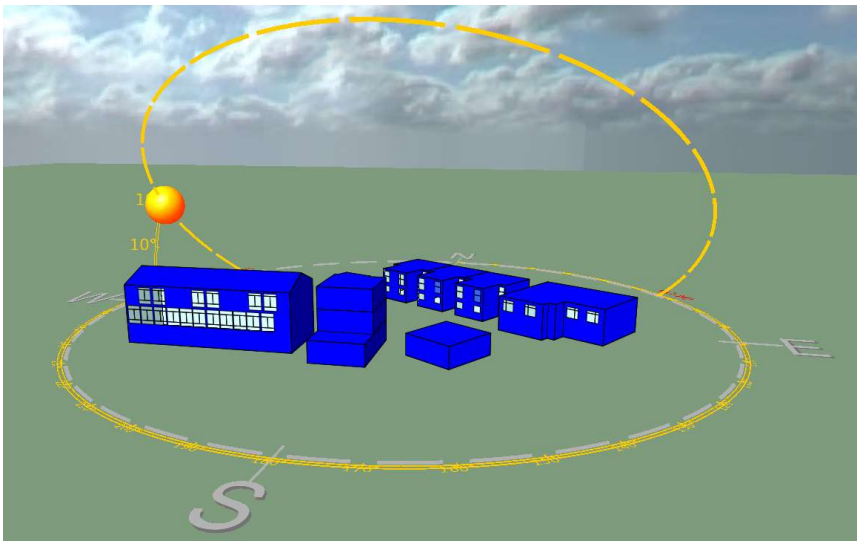


Figure 1: Image of the model taken from the IES VE software

The table below summarises the VSC results for both the existing and proposed scenarios and demonstrates that, for the proposed development, all windows have a VSC of at least 27% or at least 80% of the VSC in the existing scenario.

Window	Existing VSC	80% of Existing VSC	Proposed VSC	Proposed VSC % of Existing	% Reduction	Result
1	39.3	31.44	39.2	100%	0%	PASS
2	39.7	31.76	39.7	100%	0%	PASS
3	39.5	31.6	39.6	100%	0%	PASS
4	39.5	31.6	39.6	100%	0%	PASS
5	39.2	31.36	39.2	100%	0%	PASS
6	39.5	31.6	39.4	100%	0%	PASS
7	39.3	31.44	39.4	100%	0%	PASS
8	39.6	31.68	39.6	100%	0%	PASS
9	39.5	31.6	40	101%	-1%	PASS
10	39.7	31.76	39.7	100%	0%	PASS
11	39.5	31.6	38.9	98%	2%	PASS
12	39.5	31.6	40	101%	-1%	PASS
13	39.2	31.36	39.7	101%	-1%	PASS
14	39.7	31.76	39.7	100%	0%	PASS
15	39.5	31.6	39.2	99%	1%	PASS
16	39.2	31.36	39.4	101%	-1%	PASS
17	39.5	31.6	39.3	99%	1%	PASS
18	36.4	29.12	36.3	100%	0%	PASS
19	34.8	27.84	33.4	96%	4%	PASS
20	37	29.6	36.1	98%	2%	PASS
21	35.5	28.4	33.9	95%	5%	PASS
1	19.9	15.92	19.5	98%	2%	PASS

Window	Existing VSC	80% of Existing VSC	Proposed VSC	Proposed VSC % of Existing	% Reduction	Result
2	21.1	16.88	21.3	101%	-1%	PASS
3	12.4	9.92	12	97%	3%	PASS
4	12.3	9.84	12.5	102%	-2%	PASS
5	37.4	29.92	35.4	95%	5%	PASS
6	37.5	30	36.1	96%	4%	PASS
7	35.8	28.64	33.7	94%	6%	PASS
8	36.2	28.96	33.7	93%	7%	PASS
9	37.8	30.24	36	95%	5%	PASS
10	35.4	28.32	36.4	103%	-3%	PASS
11	37.4	29.92	33.1	89%	11%	PASS
12	35.6	28.48	33.2	93%	7%	PASS
13	22.2	17.76	22.4	101%	-1%	PASS
14	16.5	13.2	16.1	98%	2%	PASS
15	38.5	30.8	37.6	98%	2%	PASS
16	39	31.2	38.2	98%	2%	PASS
17	32.7	26.16	32.6	100%	0%	PASS
18	37.9	30.32	37.9	100%	0%	PASS

Table 1: Calculated VSC Figures for the windows in the properties surrounding 1 Russet Close.

Sunlight

Annual Probable Sunlight Hours

As the windows may be affected by loss of sunlight an Annual Probable Sunlight Hours (APSH) assessment is required. For interiors, access to sunlight can be quantified by an APSH assessment. BS 8206-2 recommends that interiors where the occupants expect sunlight should meet two criteria;

- Criteria 1 - receive at least 25% of APSH annually, including 5% in the winter months between 21 September and 21 March.

Where criteria 1 is not satisfied, an additional criterion is applicable;

- Criteria 2 – the reduction in APSH after the proposed development should be less than 20%, either annually or during the winter months.

The calculated APSH results are summarised in Appendix A of this report and demonstrate the windows in the surrounding properties meets the standards set out in BS 8206-02 in all scenarios.

4. Conclusions

In conclusion to the assessment carried out in accordance with the Building Research Establishment Report 'Site layout planning for daylight and sunlight: A guide to good practice' 2011 the following applies:

- Light from Sky:

Conclusion – the windows in the surrounding properties maintain a VSC of greater than 27% and more than 80% of their existing value

- Sunlighting:

Conclusion –the windows in the surrounding properties receive adequate sunlight, as per the criteria set out in BS 8206-02. The windows receive more than 25% of annual probable sunlight hours and 5% of annual probable sunlight hours during the winter months. Where there is a reduction in annual probable sunlight hours, this is less than 20%.

Therefore, it can be concluded that with regards to Daylight & Sunlight the proposed development will not have a detrimental effect on the surrounding properties.

5. Appendix A – Calculated Annual probable sunlight hours.

Window	EXISTING ANNUAL APSH (% hours available)	PROPOSED ANNUAL APSH (% hours available)	80% OF EXISTING	% REDUCTION	PASS/FAIL	EXISTING WINTER APSH (% hours available)	PROPOSED WINTER APSH (% hours available)	80% OF EXISTING	% REDUCTION	PASS/FAIL
1	76	74	60	3	PASS	34	32	27	6	PASS
2	76	74	61	4	PASS	35	32	28	8	PASS
3	76	74	61	3	PASS	35	32	28	7	PASS
4	76	74	61	3	PASS	34	32	27	5	PASS
5	75	73	60	3	PASS	33	31	27	7	PASS
6	75	73	60	3	PASS	34	31	27	8	PASS
7	75	73	60	3	PASS	33	31	27	6	PASS
8	75	73	60	3	PASS	33	31	27	7	PASS
9	56	56	45	0	PASS	31	31	25	0	PASS
10	60	60	48	0	PASS	32	31	25	0	PASS
11	68	67	54	1	PASS	34	33	27	2	PASS
12	63	63	51	1	PASS	34	33	27	2	PASS
13	71	70	57	2	PASS	35	34	28	4	PASS
14	74	73	59	2	PASS	35	34	28	3	PASS
15	73	72	58	2	PASS	35	34	28	4	PASS
16	70	69	56	2	PASS	35	34	28	3	PASS
17	81	81	65	0	PASS	38	38	31	0	PASS
18	81	81	65	0	PASS	38	38	31	0	PASS
19	81	81	65	0	PASS	38	38	31	0	PASS
20	81	81	65	0	PASS	38	38	31	0	PASS
21	81	81	65	0	PASS	38	38	31	0	PASS
22	81	81	65	0	PASS	38	38	31	0	PASS
23	81	81	65	0	PASS	38	38	31	0	PASS
24	81	81	65	0	PASS	38	38	31	0	PASS

Window	EXISTING ANNUAL APSH (% hours available)	PROPOSED ANNUAL APSH (% hours available)	80% OF EXISTING	% REDUCTION	PASS/FAIL	EXISTING WINTER APSH (% hours available)	PROPOSED WINTER APSH (% hours available)	80% OF EXISTING	% REDUCTION	PASS/FAIL
25	81	81	65	0	PASS	38	38	31	0	PASS
26	81	81	65	0	PASS	38	38	31	0	PASS
27	81	81	65	0	PASS	38	38	31	0	PASS
28	81	81	65	0	PASS	38	38	31	0	PASS
29	81	81	65	0	PASS	38	38	31	0	PASS
30	81	81	65	0	PASS	38	38	31	0	PASS
31	81	81	65	0	PASS	38	38	31	0	PASS
32	81	81	65	0	PASS	38	38	31	0	PASS
33	81	81	65	0	PASS	38	38	31	0	PASS
34	81	81	65	0	PASS	38	38	31	0	PASS
35	81	81	65	0	PASS	38	38	31	0	PASS
36	81	81	65	0	PASS	38	38	31	0	PASS
37	81	81	65	0	PASS	38	38	31	0	PASS
38	81	81	65	0	PASS	38	38	31	0	PASS
39	81	81	65	0	PASS	38	38	31	0	PASS
40	81	81	65	0	PASS	38	38	31	0	PASS
41	81	81	65	0	PASS	38	38	31	0	PASS
42	81	81	65	0	PASS	38	38	31	0	PASS
43	81	81	65	0	PASS	38	38	31	0	PASS
44	81	81	65	0	PASS	38	38	31	0	PASS
45	81	81	65	0	PASS	38	38	31	0	PASS
46	81	81	65	0	PASS	38	38	31	0	PASS
47	81	81	65	0	PASS	38	38	31	0	PASS
48	81	81	65	0	PASS	38	38	31	0	PASS
49	81	81	65	0	PASS	38	38	31	0	PASS
50	81	81	65	0	PASS	38	38	31	0	PASS

Window	EXISTING ANNUAL APSH (% hours available)	PROPOSED ANNUAL APSH (% hours available)	80% OF EXISTING	% REDUCTION	PASS/FAIL	EXISTING WINTER APSH (% hours available)	PROPOSED WINTER APSH (% hours available)	80% OF EXISTING	% REDUCTION	PASS/FAIL
51	81	81	65	0	PASS	38	38	31	0	PASS
52	81	81	65	0	PASS	38	38	31	0	PASS
53	81	81	65	0	PASS	38	38	31	0	PASS
54	81	81	65	0	PASS	38	38	31	0	PASS
55	81	81	65	0	PASS	38	38	31	0	PASS
56	81	81	65	0	PASS	38	38	31	0	PASS
57	81	81	65	0	PASS	38	38	31	0	PASS
58	81	81	65	0	PASS	38	38	31	0	PASS
59	81	81	65	0	PASS	38	38	31	0	PASS
60	81	81	65	0	PASS	38	38	31	0	PASS
61	81	81	65	0	PASS	38	38	31	0	PASS
62	81	81	65	0	PASS	38	38	31	0	PASS
63	81	81	65	0	PASS	38	38	31	0	PASS
64	81	81	65	0	PASS	38	38	31	0	PASS
65	81	81	65	0	PASS	38	38	31	0	PASS
66	81	81	65	0	PASS	38	38	31	0	PASS
67	81	81	65	0	PASS	38	38	31	0	PASS
68	81	81	65	0	PASS	38	38	31	0	PASS
69	81	81	65	0	PASS	38	38	31	0	PASS
70	81	81	65	0	PASS	38	38	31	0	PASS
71	81	81	65	0	PASS	38	38	31	0	PASS
72	81	81	65	0	PASS	38	38	31	0	PASS
73	81	81	65	0	PASS	38	38	31	0	PASS
74	81	81	65	0	PASS	38	38	31	0	PASS
75	81	81	65	0	PASS	38	38	31	0	PASS
76	81	81	65	0	PASS	38	38	31	0	PASS

Window	EXISTING ANNUAL APSH (% hours available)	PROPOSED ANNUAL APSH (% hours available)	80% OF EXISTING	% REDUCTION	PASS/FAIL	EXISTING WINTER APSH (% hours available)	PROPOSED WINTER APSH (% hours available)	80% OF EXISTING	% REDUCTION	PASS/FAIL
77	81	81	65	0	PASS	38	38	31	0	PASS
78	81	81	65	0	PASS	38	38	31	0	PASS
79	81	81	65	0	PASS	38	38	31	0	PASS
80	81	81	65	0	PASS	38	38	31	0	PASS
81	81	81	65	0	PASS	38	38	31	0	PASS
82	81	81	65	0	PASS	38	38	31	0	PASS
83	81	81	65	0	PASS	38	38	31	0	PASS
84	81	81	65	0	PASS	38	38	31	0	PASS
85	37	38	29	-2	PASS	10	11	8	-7	PASS
86	38	39	30	-3	PASS	10	11	8	-11	PASS
87	53	54	42	-2	PASS	16	18	13	-8	PASS
88	43	44	34	-3	PASS	12	13	9	-11	PASS
89	46	46	37	0	PASS	21	21	17	0	PASS
90	31	31	25	0	PASS	11	11	9	1	PASS
91	17	15	13	10	PASS	7	5	6	24	PASS
92	21	20	17	5	PASS	8	7	6	14	PASS
93	75	76	60	-1	PASS	33	34	27	-2	PASS
94	74	74	59	-1	PASS	32	33	26	-2	PASS
95	73	73	58	-1	PASS	31	32	25	-1	PASS
96	73	74	59	-1	PASS	32	32	25	-2	PASS
97	71	70	57	1	PASS	29	29	23	2	PASS
98	71	70	57	2	PASS	29	28	23	4	PASS
99	14	13	11	3	PASS	5	5	4	8	PASS
100	17	16	13	1	PASS	6	6	5	3	PASS
101	43	43	35	0	PASS	14	14	11	0	PASS
102	25	25	20	0	PASS	8	8	6	0	PASS

Window	EXISTING ANNUAL APSH (% hours available)	PROPOSED ANNUAL APSH (% hours available)	80% OF EXISTING	% REDUCTION	PASS/FAIL	EXISTING WINTER APSH (% hours available)	PROPOSED WINTER APSH (% hours available)	80% OF EXISTING	% REDUCTION	PASS/FAIL
103	45	45	36	2	PASS	21	20	16	3	PASS
104	32	30	25	4	PASS	12	11	10	12	PASS
105	19	15	15	17	PASS	9	6	7	36	PASS
106	22	20	18	12	PASS	9	7	7	28	PASS
107	72	73	58	0	PASS	31	31	25	-1	PASS
108	72	71	57	1	PASS	30	29	24	2	PASS
109	72	69	58	4	PASS	31	28	24	10	PASS
110	73	72	59	3	PASS	32	30	25	6	PASS
111	70	68	56	3	PASS	28	26	23	8	PASS
112	69	66	55	4	PASS	28	25	22	11	PASS
113	15	13	12	14	PASS	7	5	5	32	PASS
114	17	15	14	11	PASS	7	5	5	29	PASS
115	42	41	33	2	PASS	13	12	10	5	PASS
116	25	24	20	6	PASS	8	6	6	20	PASS
117	49	49	39	1	PASS	24	24	20	2	PASS
118	39	38	31	1	PASS	18	18	14	2	PASS
119	27	26	22	4	PASS	12	11	9	8	PASS
120	30	29	24	3	PASS	13	12	10	7	PASS
121	72	70	58	3	PASS	31	29	25	7	PASS
122	71	68	57	4	PASS	29	27	23	9	PASS
123	70	66	56	5	PASS	28	24	22	13	PASS
124	72	70	58	3	PASS	31	28	25	8	PASS
125	69	66	55	5	PASS	27	24	22	13	PASS
126	67	63	54	6	PASS	26	22	21	16	PASS