# PLANNING AMENDMENT

**For office use only**

Application No. H20/0996/94.

Date Registered 11 OCT 1995

Case Officer JB

1. Please complete in block letters

**NAME AND ADDRESS OF APPLICANT**

KINGS QUALITY HOMES,
HOLBEACH MANOR.
FLEET RD, HOLBEACH

Tel. No.

**NAME AND ADDRESS OF AGENT**
(if form completed by agent)

G.R MERCHANT
UNIT 3, WRIGHTS MEWS,
12A PARK RD, HOLBEACH.
Tel. No. 01406 490800 (Contact)

Please complete in block letters

**FULL POSTAL ADDRESS OF THE APPLICATION SITE**

LAND OFF CHAPELGATE, SUTTON ST. JAMES

Please complete
**APPLICATION No.**
This amendment **cannot be considered** unless the relevant reference is stated

H20/0996/94.

Building Regulation reference relating to same development (if any)

—

2. Please tick **one** box only

Amendment is proposed where permission already granted — A [ ]
If yes, submit two forms and two plans.

or

Amendment is to a proposal currently being considered — B [✓]
If yes, submit four forms and four plans.

Please complete

I attach the necessary plans and request that the changes described below be accepted as an amendment. I understand that the Council may require a fresh application, together with fee if appropriate. If the amendment relates to a current application, I agree to an extension of the terminal date.

Signed ... J. Merchant ..... Date ... 9.10.95 .....
pp G R Merchant

3. Please complete in block letters

**FULL DESCRIPTION OF DEVELOPMENT IN ORIGINAL APPLICATION**

RESIDENTIAL DEVELOPMENT.

State details of amendments proposed

(Give a full detailed list of the changes, and also mark these clearly on the accompanying plans. Only the changes listed here will be considered.)

AMENDED LAYOUT AND NOISE ATTENUATION REPORT AS PER LETTER DATED 19. SEPT. 1995 REF: JB/JJ H20/0996/94.

State drawing no's of the current submission

—

Has this amendment been requested by the Council? (If so, state Officer dealing with the application)

YES / ~~NO~~ JOHN BLACKLOCK / ROGER SMITH.

Describe any part of the original development which is excluded by virtue of the amendment, and state any alteration to plot numbers

—

Has a similar amendment been submitted under Building Regulations? ~~Yes~~ / No

## AMENDMENT RECORD SHEET - POST DECISION

### Admin

**Validation:**

**Inadequate/Inappropriate** ☐

**Clarification/Details required:**

**Appears valid** ✓ KL

**Registered** SAH 7/8

## DC Procedural Assessment

**Is the information given correct?** **Yes/~~No~~** (If No, state above what details are needed)

**Is it an amendment in principle?** **Immaterial/~~Needs fee app~~**

**Confirmed:** 9/8/26

**Give a revised description if the details accepted are different to the submission:**

**Acceptance issued:**

56

**MRS SALLY WALTHAM** BA (Hons) F.C.I.H. Director of Housing & Planning Services

Housing & Planning Services Department
Council Offices,
Priory Road, Spalding.
Lincolnshire. PE11 2XE

Telephone: (01775) 761161
Fax: (01775) 710772

24 MAY 1995
Housing & Planning
Services

AMENDED PLANS HAVE BEEN RECEIVED

SOUTH HOLLAND DISTRICT COUNCIL
HOUSING & PLANNING SERVICES DEPARTMENT

Application no: H20/0996/94

Applicant: Kings Quality Homes
Holbeach Manor
Fleet Road
Holbeach
Spalding, Lincs

Agent: G R Merchant
Unit 3
12A Park Road
Holbeach
Spalding Lincs

Description: Residential development

Location: Off Chapelgate Sutton St James
Spalding Lincs

Type: FULL

Date received: 27-OCT-94

16-MAY-95

Dear Cllr Mrs E O Hall-Patch

NOTIFICATION TO WARD MEMBER

I have received an application for the above proposal in your ward.
The officer dealing with this application is J BLACKLOCK

As applications can be determined under delegated powers in many cases, please let me know by 23-MAY-95 if you feel that this proposal should be brought to the attention of the Planning Committee for any reason.

Yours faithfully
Mrs S A Waltham
Director of Housing and Planning Services

E. Hall-Patch

---

Cllr Mrs E O Hall-Patch
Garsington
277 Broadgate, Sutton St Edmund
Spalding, Lincs
PE12 0LR

I request that this application be considered by Planning Committee, because

Following concerns expressed at Site Visit, I feel Cllrs must be fully conversant with any plans submitted to deal with noise.

Signed: E. Hall-Patch

# G.R. Merchant I.Eng. AMICE FIWO

Architectural, Structural & Land Drainage Consultant

Unit 3, Wrights Mews, 12A Park Road, Holbeach, Spalding, Lincs. PE12 7EE Tel: 01406 490800 Fax: 01406 490800


Your ref: JB/JJ. H20/0996/94
Our ref : GRM/JJM/KQH-SSJ

6th October, 1995.

S.H.D.C.
Planning Dept.,
Priory Road,
Spalding,
Lincs.

Dear Sir,

**RESIDENTIAL DEVELOPMENT, LAND OFF CHAPELGATE, SUTTON ST JAMES.**

Further to your letter of the 19th September and my recent discussions, I enclose amended plans and noise assessment reports as requested.

As discussed, the amendments are as the second option, as referred to in your letter, namely:

> Introduce bungalows to Plots 18,19 and 20 to the South of the site.
>
> First floor bedrooms to Plots 4 to 10 and 26 to 29 have either been repositioned to create 'box rooms' (third bedroom) at the front facing the noise source or an additional window has been introduced on elevations not facing directly towards the noise source.

I trust the enclosures are sufficient to enable you to determine this application, but should you require any further information, please do not hesitate to contact me.

Yours faithfully,

G.R. Merchant.

**MRS SALLY WALTHAM** BA (Hons) F.C.I.H. Director of Housing & Planning Services

Housing & Planning Services Department
Council Offices,
Priory Road, Spalding
Lincolnshire. PE11 2XE

Telephone: (01775) 761161
Fax: (01775) 710772

SOUTH HOLLAND DISTRICT COUNCIL

HOUSING & PLANNING SERVICES DEPARTMENT

AMENDED PLANS HAVE BEEN RECEIVED

95/X/31P

Application no: H20/0996/94

Applicant: Kings Quality Homes
Holbeach Manor
Fleet Road
Holbeach
Spalding, Lincs

Agent: G R Merchant
Unit 3
12A Park Road
Holbeach
Spalding Lincs

Description: Residential development

Location: Off Chapelgate Sutton St James
Spalding Lincs

Type: FULL

Date received: 27-OCT-94

20-OCT-95

Dear Sir/Madam

CONSULTATION WITH PARISH COUNCIL

I have received an application for the above proposal and enclose a copy for your information. Any observations which the Parish Council wish to make should be set out below and returned to me by 03-NOV-95. If no observations have been received by that date, it will be assumed that the Parish Council have no comments to make. The officer dealing with this application is J BLACKLOCK

Yours faithfully
Mrs S A Waltham
Director of Housing and Planning Services

---

Clerk to Sutton St James PC
Kelling Lodge
Old Main Road
Fosdyke, Boston, Lincs
PE20 2BU

FOR PARISH COUNCIL USE ONLY

Comments: The Parish Council supports the amended plan No H20/0996/94, but would consider it to be dangerous if the access Roads protrude too far into Chapelgate

Signed: J G Jeeves.

SB

SOUTH HOLLAND DISTRICT COUNCIL

M E M O R A N D U M

---

FROM : DIRECTOR OF ENVIRONMENT AND LEISURE SERVICES

DATE : 24.10.95

OUR REF : JC/SS/PC

TO : DIRECTOR OF HOUSING AND PLANNING SERVICES

YOUR REF :

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Planning Application H20/0996/95
Residential Development, Chapelgate, Sutton St. James

I write in response to the above and would confirm that the revised scheme with additional side windows will achieve an internal noise standard (32dBA) below the World Health Organisation recommended guideline of 35dB(A). The BS 8233 guideline of 30-40 db(A) is also satisfied. The bedrooms to plots 8 and 26-29 will require acoustic vents.

Director of Environment & Leisure Services



FILE COPY

SOUTH HOLLAND DISTRICT COUNCIL

Application no: H20/0996/94

Applicant: Kings Quality Homes
Holbeach Manor
Fleet Road
Holbeach
Spalding, Lincs

Agent: G R Merchant
Unit 3
12A Park Road
Holbeach
Spalding Lincs

Description: Residential development

Location: Off Chapelgate
Sutton St James
Spalding
Lincs

Amendment: Amended layout and noise attenuation report as per letter dated 19.09.95 ref: JB/JJ H20/0996/94

20-OCT-95

Dear Sir/Madam

ACKNOWLEDGEMENT OF AMENDMENT

I acknowledge receipt of the amended details in respect of the above proposal. These have been incorporated into the application which will now only be considered in its amended form.

The terminal date for dealing with the application has now been extended to 06-DEC-95, based on the date of receipt of the amendment, and your rights of appeal remain as explained on the original acknowledgement.

You are reminded that revision to any submission made under the Building Regulations may also be necessary.

Yours faithfully

Director of Housing and Planning Services

**MRS SALLY WALTHAM** BA (Hons) F.C.I.H. Director of Housing & Planning Services

Housing & Planning Services Department, Council Offices, Priory Road, Spalding, Lincolnshire. PE11 2XE (Tel: 01775 761161)

# AMENDMENT RECORD SHEET – LIVE APPLICATION

## Admin

Validation:

Inadequate/Inappropriate ☐

Clarification/Details required:

Appears valid ☑ HL

Registered .....

Terminal date/committee updated ..... 17/10 6/12/95

## DC Procedural Assessment

Is the information given correct? Yes/No (If No, state above what details are needed)

Has this amendment been requested? Yes/No *
If Yes, is it what was asked for? Yes/No *

Who do you need to reconsult as a result of this amendment? PC ✓ None ☐
WM ✓
Press
Residents
Other – CHIEF ENVIRONMENT SERVICES DIRECTOR.

Is it an amendment in principle? Yes/No

Is it the same character/description for fee purposes? Yes/No (Refer to Admin ?) *

If No, but Yes to (*) requested :–

Do development objectives outweigh financial objectives? Yes/No Confirmed.....

REJECTED as an amendment – new application needed

Confirmed: .....

Notes/Advice/Rejection Reason:

☐ Tick if you wish this note to be a paragraph in the Rejection Notice

AUTHORISED to treat as amendment

Confirmed: ..... 5/12/95

Superseded details removed ☑

Give a revised description if the details accepted are different to the submission:

Acceptance issued: J
Public register updated: J 13/12

## DC Professional Assessment

NOTES:

# AMENDMENT RECORD SHEET – LIVE APPLICATION

## Admin

**Validation:**

Inadequate/Inappropriate ☐

Clarification/Details required:

Appears valid ☑

Registered 10/5/95

Terminal date/committee updated .....

## DC Procedural Assessment

Is the information given correct? Yes/~~No~~ (If No, state above what details are needed)

Has this amendment been requested? Yes/~~No~~ *

If Yes, is it what was asked for? Yes/~~No~~ *

Who do you need to reconsult as a result of this amendment?

PC ✓ None ☐

WM ✓

Press

Residents – A · M · JOHNSON – JOHNSON AND SONS SUTTON ST JAMES PE12 0EE

Other (1) DIRECTOR of ENVIRONMENTAL SERVICES

DONE 16/5/95

(2) MR E · ASHLEY LINCOLNSHIRE POLICE POLICE HEADQUARTERS P.O BOX 999 LINCOLN LN5 7PH.

Is it an amendment in principle? Yes/~~No~~

Is it the same character/description for fee purposes? Yes/~~No~~ (Refer to Admin ?)

If No, but Yes to (*) requested :-

Do development objectives outweigh financial objectives? Yes/No Confirmed.....

REJECTED as an amendment – new application needed

Confirmed: .....

Notes/Advice/Rejection Reason:

☐ Tick if you wish this note to be a paragraph in the Rejection Notice

AUTHORISED to treat as amendment

Confirmed: 15/5/95 ✓

Superseded details removed ☑

Give a revised description if the details accepted are different to the submission:

Acceptance issued: ✓ 16/5

Public register updated:

## DC Professional Assessment

NOTES:

**MRS SALLY WALTHAM** BA (Hons) F.C.I.H Director of Housing & Planning Services

Housing & Planning Services Department
Council Offices,
Priory Road, Spalding,
Lincolnshire. PE11 2XE

Telephone: (01775) 761161
Fax: (01775) 710772

FILE COPY

SOUTH HOLLAND DISTRICT COUNCIL
HOUSING & PLANNING SERVICES DEPARTMENT

Application no: H20/0996/94

Applicant: Kings Quality Homes
Holbeach Manor
Fleet Road
Holbeach
Spalding, Lincs

Agent: G R Merchant
Unit 3
12A Park Road
Holbeach
Spalding Lincs

Description: Residential development

Location: Off Chapelgate
Sutton St James
Spalding
Lincs

Amendment: Noise attenuation report and measures on site (drawing number K/SSJ/1A)

16-MAY-95

Dear Sir/Madam

TOWN AND COUNTRY PLANNING ACT 1990
NOTICE OF ACCEPTANCE OF AMENDMENT

The amended details submitted in respect of the above proposal have now been considered, and I am able to inform you that the changes are able to be incorporated into application, which will now be considered only in its amended form. You are reminded that revision may also be needed to any submission made under the Building Regulations.

In view of the need to repeat certain procedures as a result of the amendment, the terminal date for the Authority to determine the application will now be extended to 04-JUL-95, based on the date of receipt of the amendment, and your rights of appeal remain as explained on the original acknowledgement. It will not necessarily take that length of time to reach a decision of course.

If you do not agree to this extension of time and wish instead to have your application dealt with more quickly but on the basis of the original submission, please let me know in writing within the next 5 days.

Yours faithfully

S A Waltham

Director of Housing and Planning Services

# G.R. Merchant I.Eng. AMICE FIWO

Architectural, Structural & Land Drainage Consultant

Unit 3, Wrights Mews, 12A Park Road, Holbeach, Spalding, Lincs. PE12 7EE Tel: 01406 490800 Fax: 01406 490800


Your ref: JB/JJ. H20/0996/94
Our ref: GRM/JJM/KQH-SSJ

AMENDED PLAN
Ref.

SOUTH HOLLAND DC
HOUSING & PLANNING
09 MAY 1995
Ref: 0996/94

1st May, 1995.

S.H.D.C.
Planning Dept.,
Priory Road,
Spalding,
Lincs.

Dear Sir

**RESIDENTIAL DEVELOPMENT, LAND OFF CHAPELGATE, SUTTON ST JAMES. KINGS QUALITY HOMES,**

Further to your letter of the 6th March with respect to the above application, please find enclosed amended plans as requested.

Due to the breakdown of negotiations with my clients and Messrs Johnson & Son, the amended plans include noise attenuation measures on the site, as recommended in the report produced by Acoustic Associates (Peterborough), this course of action is unfortunate as it would be so much easier and less costly to deal with the noise problem at source.

Should you require any further information, please do not hesitate to contact me.

Yours faithfully,

G.R. Merchant.

SOUTH HOLLAND DISTRICT COUNCIL

PLANNING & BUILDING CONTROL DEPARTMENT

**BRIAN SMITH**
Dip TP MRTPI
Director of Planning and Building Control Services

Mr G R Merchant,
Unit 3,
12a Park Road,
Holbeach,
Lincs.

*Your Contact:* Mr J Blacklock

*Our Ref:* JB/JJ H20/0996/94

*Your Ref:*

*Date:* 19 Jan 1995

Dear Sir,

RESIDENTIAL DEVELOPMENT
LAND OFF CHAPELGATE, SUTTON ST JAMES.

I refer to your recent discussion with my Officer, Mr J Blacklock, in respect of the above and write to confirm that I consider a number of changes need to be made to the layout.

These are as follows:-

1. The provision of walling connecting the dwelling on plot 1 with its garage to ensure privacy in the rear garden of that property.

2. The garage on plot 10 is awkwardly placed and should be moved to one of the two garage blocks in the enclosed garage court.

3. There would not appear to be the need for a turning facility on plot 10.

4. The garages on plots 26, 28 and 29 should be repositioned within the enclosed garage court to allow for the better movement and manoeuvering of vehicles.

5. The garage on plot 18 should be repositioned to allow for open space at the end of the hammerhead.

6. The dwelling on plot 19 and the garage on plot 17 should be moved further away from the adjacent tree belt.

Planning & Building
Control Department
Council Offices,
Priory Road,
Spalding,
Lincolnshire. PE11 2XE

Telephone: (0775) 761161
Fax: (0775) 710772

7. The length of the private drive servicing plots 20, 21 and 19 is unnecessary as is the provision of a 'hammerhead' - a view which the Director of Highways and Planning endorses.

I trust you will find these comments of assistance. They are offered, of course, without prejudice to the eventual decision of the Authority on the application and also without prejudice to any changes which may need to be made to accommodate noise attenuation measures.

Yours faithfully

N Midlen
Principal Planning Officer
Development Control

# PLANNING AMENDMENT

**For office use only**

Application No. H20/0996/94/2

Date Registered 06 AUG 1996

Case Officer TB

1. Please complete in block letters

**NAME AND ADDRESS OF APPLICANT**

KINGS QUALITY HOMES
HOLBEACH MANOR
FLEET ROAD, HOLBEACH.

Tel. No.

**NAME AND ADDRESS OF AGENT**
(if form completed by agent)

G R MERCHANT
UNIT 3, WRIGHTS MEWS
12A PARK ROAD, HOLBEACH.

Tel. No. 01406 424800 (Contact)

Please complete in block letters

**FULL POSTAL ADDRESS OF THE APPLICATION SITE**

OFF CHAPEL GATE, SUTTON ST. JAMES.

Please complete

**APPLICATION No.**

This amendment **cannot be considered** unless the relevant reference is stated

H20/0996/94

Building Regulation reference relating to same development (if any)

2. Please tick **one** box only

Amendment is proposed where permission already granted — If yes, submit two forms and two plans. — A: ✓

or

Amendment is to a proposal currently being considered — If yes, submit four forms and four plans. — B:

Please complete

I attach the necessary plans and request that the changes described below be accepted as an amendment. I understand that the Council may require a fresh application, together with fee if appropriate. If the amendment relates to a current application, I agree to an extension of the terminal date.

Signed J. Merchant pp. GR Merchant Date 6.8.96

3. Please complete in block letters

**FULL DESCRIPTION OF DEVELOPMENT IN ORIGINAL APPLICATION**

RESIDENTIAL DEVELOPMENT.

State details of amendments proposed

(Give a full detailed list of the changes, and also mark these clearly on the accompanying plans. Only the changes listed here will be considered.)

PLOT 17.

INCLUDE UTILITY ROOM.

State drawing no's of the current submission

K SSJ/9A. K/SSJ/1.

Has this amendment been requested by the Council? (If so, state Officer dealing with the application)

~~YES~~ / NO

Describe any part of the original development which is excluded by virtue of the amendment, and state any alteration to plot numbers

Has a similar amendment been submitted under Building Regulations? Yes / No

**MRS SALLY WALTHAM** BA (Hons) F.C.I.H. Director of Housing & Planning Services

Housing & Planning Services Department
Council Offices,
Priory Road, Spalding,
Lincolnshire PE11 2XE

Telephone: (01775) 761161
Fax: (01775) 710772

SOUTH HOLLAND DISTRICT COUNCIL

HOUSING & PLANNING SERVICES DEPARTMENT

Application no: H20/0996/94

Applicant: Kings Quality Homes
Holbeach Manor
Fleet Road
Holbeach
Spalding, Lincs

Agent: G R Merchant
Unit 3
12A Park Road
Holbeach
Spalding Lincs

Description: Residential development

Location: Off Chapelgate
Sutton St James
Spalding
Lincs

Amendment: Plot 17 - to include utility room
(drawing nos. K/SSJ/1G and K/SSJ/9A)

12-AUG-96

Dear Sir/Madam

TOWN AND COUNTRY PLANNING ACT 1990
NOTICE OF ACCEPTANCE OF AMENDMENT

The amended details submitted in respect of the above proposal have now been considered, and I am able to inform you that there are no objections to the amendment being implemented to the extent described above.

Note: This Notice does not convey any approval under the Building Regulations and you may need to make a new submission.

Yours faithfully

Director of Housing and Planning Services

AMENDED PLAN
Ref.

# ENVIRONMENTAL NOISE ASSESSMENT OF THE PROPOSED RESIDENTIAL DEVELOPMENT OFF CHAPEL GATE, SUTTON ST. JAMES.

**(REVISED LAYOUT)**

CLIENT: Kings Quality Homes
Holbeach Manor
Fleet Road
Holbeach PE12 7AX

AGENT: Mr G R Merchant
Unit 3, Wrights Mews
12A Park Road
Holbeach PE12 7EE

REPORT No: RAP/J64/4477

AUTHOR: R A Pettitt, CEng, MIMechE, MIOA, FIDiagE.

DATE: 4th October 1995

HOUSE ... PLANNING
11 OCT 1995
H20/0996/94

**ACOUSTIC ASSOCIATES (PETERBOROUGH)**
34 Ashcroft Gardens, Peterborough, PE1 5LP. Tel/Fax 01733 896346

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## 1. OBJECTIVES

1.1 To assess the noise implications of the latest proposals (see Reference 1), for the planned residential development, off Chapel Gate, Sutton St James.

## 2. CONCLUSIONS

2.1 Assuming that noise attenuation cannot be achieved by treating the fans at source, an acceptable situation can also be achieved by:-

a) Building 3 bungalows at the south of the site.

b) Providing ventilation to bedrooms through additional windows located on an elevation not facing the noise source.

This assumes that a 3 metre barrier is built on the north-east and southern boundaries of the site, as shown on the site layout (see Architects drawing K/SSJ/1.B').

2.2 The proposed measures will result in an Assessment Level, to British Standard BS4142 : 1990 of -1dB* at the ground floor level of the dwellings nearest to the noise sources, during the daytime. The guidelines given in BS4142 would indicate that this situation is not likely to give rise to complaints.

2.3 The noise level inside the bedrooms at night, due to the fan noise, is likely to be 32 dB(A). The recommended maximum levels given in BS8233 : 1987 (as specified in PPG 24) is 30 - 40 dB(A).

2.4 The noise assessment was carried out using noise data previously measured and reported for the site (see References 3 - 6)

## 3. RECOMMENDATIONS

3.1 If, at a future date off-site noise reduction can be used, i.e., treatment to the grain drying fans, this should be used in preference to building a 3 metre barrier on site.

*** See Appendix 1 for Glossary Of Terms.**

## 4. BACKGROUND

Planning permission is being sought for a proposed residential development, off Chapel Gate, Sutton St James. The site location plan is shown on Figure 1. Concern has been expressed about the noise from the adjacent grain drying fans. Several noise assessments have previously been carried out, References 2 - 6. These assessments have shown that the ideal method of achieving an acceptable noise situation at the site would be to treat the fans at source. However, it is understood that the owner of the fans will not allow this to happen. Therefore, alternative methods of reducing the noise on-site have been investigated. At a meeting between the SHDC planning officials and the builders agent (Mr G R Merchant), a planning officer advised that the following should be should be adopted as a means of overcoming the noise problems:-

a) Bungalows should be specified for the dwellings at the southern end of the site (Plots 18,19 and 20).

b) The existing layout of the northern section should be retained but on the basis that the houses directly affected by noise could be redesigned internally in order that sufficient noise attenuation could be secured at first floor level. This could be achieved by providing for additional/alternative ventilation through a window to the habitable rooms (bedrooms) - a window located on an elevation not facing the noise source, or by re-arranging the internal accommodation at first floor level to ensure that only a boxroom or third bedroom faced the noise source. The site layout assessed shows that the former of these options has been adopted.

The current layout is as shown on G R Merchant's site plan, drawing number K/SSJ/1.B

## 5. NOISE ASSESSMENT

### 5.1 Standards Used

Where proposed residential developments are close to industrial and commercial developments, Planning Policy Guidance PPG 24 (Ref 7) states that the likelihood of complaints about the noise can be assessed using the guidance given in British Standard BS4142 : 1990. Therefore, this assessment has been carried out in accordance with BS4142 :1990 (Ref. 8). In addition, PPG 24 states that guidance on acceptable noise levels within buildings can be found in British Standard BS 8233 : 1987 (Ref 9).

5.2 Specific Noise Sources

The specific sources of noise were:

a) a grain drying fan to the north-east of the site

and,

b) 3 fans to the south of the site

5.3 Specific Noise Source Levels

The noise levels used in this report are those previously measured, and were documented in Reference 3. It has been assumed that the noise levels have remained the same, and no additional noise measurements were taken for this re-assessment. The noise levels incident on the dwellings closest to the noise sources have been calculated (See Reference 6) as shown in Table 1.

| Location | Noise Level $L_{Aeq,T}$ |
|---|---|
| Dwellings 6 - 10, North-east of site facing East | 48 |
| Dwellings 26 -29, North-east of site facing North | 48 |
| Dwellings 18 - 20, South of site. | <43 |

**Table 1. Calculated Noise Levels At The Proposed Dwellings Closest To The Fans**

The effect of erecting a 3 metre barrier on both the north-east and Southern boundaries was calculated (See Reference 6), the results of which are shown in Table 2.

| Location | | External Noise Level Due To The Specific Noise From The Fans ($L_{Aeq,T}$) |
|---|---|---|
| Dwellings 6 - 10 | First Floor | 47 |
| | Ground Floor | 38 |
| Dwellings 26 -29 | First Floor | 47 |
| | Ground Floor | 38 |
| Dwellings 18 - 20 | First Floor | N/A (Bungalows) |
| | Ground Floor | <32 |

**Table 2. Calculated Noise Levels At The Proposed Dwellings Closest To The Fans, With A 3m High Barrier At The Boundary.**

The noise from the fan units could occur continuously during both the day and the night.

The dwellings identified in Table 2 will represent the worst case situation, since other properties on the site will be further away from the sources of noise, and/or will be shielded by these particular dwellings.

## 5.4 Subjective Aspects Of The Noise

The noise from the fans did not contain any tonal components or distinguishable characteristics and sounded like "wind" noise. The general background noise was typical of that experienced in the countryside.

## 5.5 Rating Level ($L_{Ar,T}$)

Where the noise source contains distinct impulses in the noise, (ie. bangs, clicks, clatters, or thumps), or if the noise is irregular enough in character to attract attention, then a +5 dB correction factor is added to the specific noise level to obtain the 'Rating Level'. However, in this particular case it is considered that the +5 dB correction factor should not be added to specific noise level. Thus, the Rating Levels (see Table 3) will be numerically the same as the Specific Noise Source levels.

| Location | | $L_{Ar,T}$ |
|---|---|---|
| Dwellings 6 - 10 | First Floor | 47 |
| | Ground Floor | 38 |
| Dwellings 26 -29 | First Floor | 47 |
| | Ground Floor | 38 |
| Dwellings 18 - 20 | First Floor | N/A (Bungalows) |
| | Ground Floor | <32 |

**Table 3 - Rating Level ($L_{Ar,T}$) at the Facade of the Dwelling**

## 5.6 Background Noise Levels ($L_{A90,T}$)

The measured minimum background noise levels ($L_{A90,T}$) were as reported in Reference 6 and are shown in Table 4.

| Reference Period | Lowest Background Noise Levels dB(A) |
|---|---|
| Daytime, 0700-2300 hours -<br>Night-time, 2300-0700 hours - | 39<br>26 |

**Table 4 - Background Noise Levels ($L_{A90,T}$)**

5.7 Assessment Level ($L_{Ar,T} - L_{A90,T}$)

For the assessment procedure, the likelihood of a noise provoking complaints depends on its level relative to the background noise level, ie. Rating Level - Background Level. A difference of around +10 dB or higher indicates that complaints are likely. A difference of around +5 dB is of marginal significance. At a difference below +5 dB, the lower the value the less likelihood there is that complaints will occur. A difference of -10 dB is a positive indication that complaints are unlikely. Table 5 shows the Assessment Level at the facades of the dwellings closest to the noise sources.

| Location | Floor | Day/Night | Rating Level | Background Noise | Assessment Level |
|---|---|---|---|---|---|
| Dwellings 6 - 10 | First | Day | 47 | 39 | +8 |
| | | Night | 47 | 26 | +21 |
| | Ground | Day | 38 | 39 | -1 |
| | | Night | 38 | 26 | +12 |
| Dwellings 26 - 29 | First | Day | 47 | 39 | +8 |
| | | Night | 47 | 26 | +21 |
| | Ground | Day | 38 | 39 | -1 |
| | | Night | 38 | 26 | +12 |
| Dwellings 18 - 20 | First | Day | N/A | N/A | N/A |
| | | Night | N/A | N/A | N/A |
| | Ground | Day | <32 | 39 | -<7 |
| | | Night | <32 | 26 | +<6 |

**Table 5 - Assessment Levels at the facade of the Nearest Dwelling**

The assessment levels shown in Table 5 indicate, according to BS4142 : 1990, that all of the dwellings will be exposed to acceptable noise levels at the ground floor level during the daytime. At night, the dwellings will be exposed to higher levels of noise than those recommended by BS4142. However, during the night, the occupants of the dwellings will be inside the bedrooms

5.8 Internal Noise Levels

The recommended Maximum noise levels for steady intrusive noises are documented in BS8233 : 1987, and are shown below:-

a) Bedrooms: $L_{Aeq,T}$ = 30 to 40 dB(A)

b) Living areas: $L_{Aeq,T}$ = 40 to 45 dB(A)

The acoustic "weak link" of a dwelling facade is usually the windows. The minimum noise reduction through windows, as documented in PPG 24, is shown in Table 6.

| Window Type | Minimum Noise Reduction (dB) |
|---|---|
| Partially Open Window | 10 |
| Single Glazed | 27 |
| Double Glazed | 32 |

**Table 6 - Noise Reduction Through Windows**

It can be seen from Table 6 that the minimum noise reduction obtained with an open window is 10 dB. Also, if a window is positioned on a side wall of a dwelling so that it is not directly facing the source of the noise, an additional attenuation of 5 dB can be obtained. Thus, the noise on the inside of a dwelling, with an open side window, will be 15 dB lower than the noise incident on the front face of the dwelling. The Architect (G R Merchant) has included a window in the side facades of the various types of dwellings facing the noise source on the North- East of the site. The dwellings (bungalows) to the south of the site do not require this feature, and, the garages/study are located closest to the fans to the south, which will also be beneficial. The details of the dwellings, closest to the noise sources, can be seen on the Architects drawings for the various types, as listed in Table 7.

| Dwelling | Dwelling Type | Comments |
|---|---|---|
| 6 -7 | A | Detached house |
| 8 - 9 - 10 | C | Linked houses |
| 26 - 27 - 28 - 29 | B1 | Semi-detached house |
| 18 - 19 - 20 | Holkham | Detached bungalows |

**Table 7 - Types of Dwellings on the Site**

Assuming a 15 dB attenuation between the outside and the inside of the dwellings the noise levels in the bedrooms will be as shown in Table 8.

| Dwelling | Noise Level In Bedroom With Open Window ($L_{Aeq,T}$) |
|---|---|
| Dwellings 6 - 10 | 32 |
| Dwellings 26 - 29 | 32 |
| Dwellings 18 - 20 | <17 |

**Table 8 - Noise Levels Inside Bedrooms**

## 6. DISCUSSION

Previous assessments (see References 2 - 6) have shown that the best way to tackle the noise from the grain drying fans to the north-east and south would be to tackle them at source. However, it is understood that this optimum solution will not permitted by the owner of the fans. This current assessment has shown that an acceptable noise situation can be achieved for all dwellings at the ground floor level, in accordance with the guidelines given in BS4142 : 1987. This requires a 3 metre noise barrier to the north-east and south of the site, as shown on the Architects Site plan. However, this barrier will not be very effective at the first floor levels. Since the bedrooms are at the first floor level the most important aspect is the noise level in the bedrooms, rather than outside.

By incorporating the SHDC's Planning officers recommendations (see Reference 1) by of having windows, for ventilation purposes, on the side of the dwellings, an acceptable situation can be obtained. It has been shown that the noise in the bedrooms due to the fans will be 32 dB(A), compared to the British Standard/PPG recommended levels of 30 - 40 dB(A). The Architect has also designed the dwellings to have 3rd bedrooms/box rooms on the sides facing the noise sources, where possible. The rear gardens of the dwellings at the north-east corner of the site will be protected from the noise by the shielding effect of the dwellings.

The 3 metre high barriers at the north-east corner and the at the southern boundary can be built from any combination of acoustic fence, wall or bund, an example of which is shown in the Architects site plan.

The assessment relates to the dwellings closest to the noise sources, which will represent the worst case situation. These dwellings will shield the other dwellings behind them from the sources of noise (see Figure 2). These other dwellings will also benefit from the increased distance from the noise.

## APPENDIX 1

### Glossary of Terms

**Sound Pressure** The variation of ambient pressure that is detected by the ear as sound.

**Decibel (dB)** Ten times the logarithm of the square of the ratio of the Sound Pressure to a reference pressure (20 micro-pascals).

**Sound Pressure Level ($L_p$)** The decibel version of the Sound Pressure.

**A-Weighting** A frequency weighting which simulates the response of the ear.

$L_{Aeq,T}$ The value of the A-weighted sound pressure level, in decibels [dB(A)], of a continuous steady sound that with-in a specified time interval (T), has the same mean-square sound pressure as a sound that varies with time.

$L_{A10,T}$ The value of the A-weighted sound pressure level, in decibels, which is exceeded for 10% of a given time interval. The $L_{A10}$ is used in measurement of Road Traffic Noise.

$L_{A90,T}$ The value of the A-weighted sound pressure level, in decibels, which is exceeded for 90% of a given time interval. The $L_{A90}$ is often used as a measure of "background" noise.

$L_{Ar,T}$ The Rating Level of a specific noise, in terms of $L_{Aeq,T}$ plus any correction for character.

$L_W$ The sound power level of a sound source which produces the $L_p$ at a particular position.

$T_r$ The reference time interval over which an equivalent continuous A-weighted sound pressure is determined.
Day time = 1 hour
Night time = 5 minutes

$T_m$ The measurement time interval over which measurements are taken.

**Ambient Noise** Total sound in a given situation at a given time.

**Residual Noise** The ambient noise remaining at a given position in a given situation when the specific noise is suppressed to a degree such that it does not contribute to the ambient noise.

**Specific Noise Level** The $L_{Aeq,T}$ of the noise sources being assessed at a site.

## REFERENCES


1. Letter, from N Midlen (SHDC) to Mr John King.
   Reference JB/JJ H20/0996/94, dated 19th September 1995.

2. Land To Rear Of Needham House Sutton-St-James
   Reported by T J Hickman, SRL report C/7456/407/1, dated 28 February 1989

3. Noise Investigation Carried Out At Sutton St James Housing Site
   Reported by R A Pettitt, Acoustic Associates (Peterborough) report RAP/J64/2636, dated 28th July 1992.

4. Noise Assessment Of The Proposed Residential Development, Off Chapel Gate, At Sutton St James.
   Reported by R A Pettitt, Acoustic Associates (Peterborough) report RAP/J64/4201, dated 1st January 1995.

5. Noise Assessment Of The Proposed Residential Development, Off Chapel Gate, At Sutton St James.
   Reported by R A Pettitt, Acoustic Associates (Peterborough) report RAP/J64/4201-1, dated 2nd February 1995.

6. Noise Assessment Of The Proposed Residential Development, Off Chapel Gate, At Sutton St James.
   Reported by R A Pettitt, Acoustic Associates (Peterborough) report RAP/J64/4289, dated 20th April 1995.

7. Planning Policy Guidance: Planning and Noise, PPG 24
   Department of the Environment, September 1994.

8. British Standard BS4142:1990 - Method for Rating industrial noise affecting mixed residential and industrial areas.

9. British Standard BS8233 : 1987 -Sound insulation and noise reduction for buildings.

10. Noise Control in Industry,
    Third edition. Sound Research Laboratories Ltd.

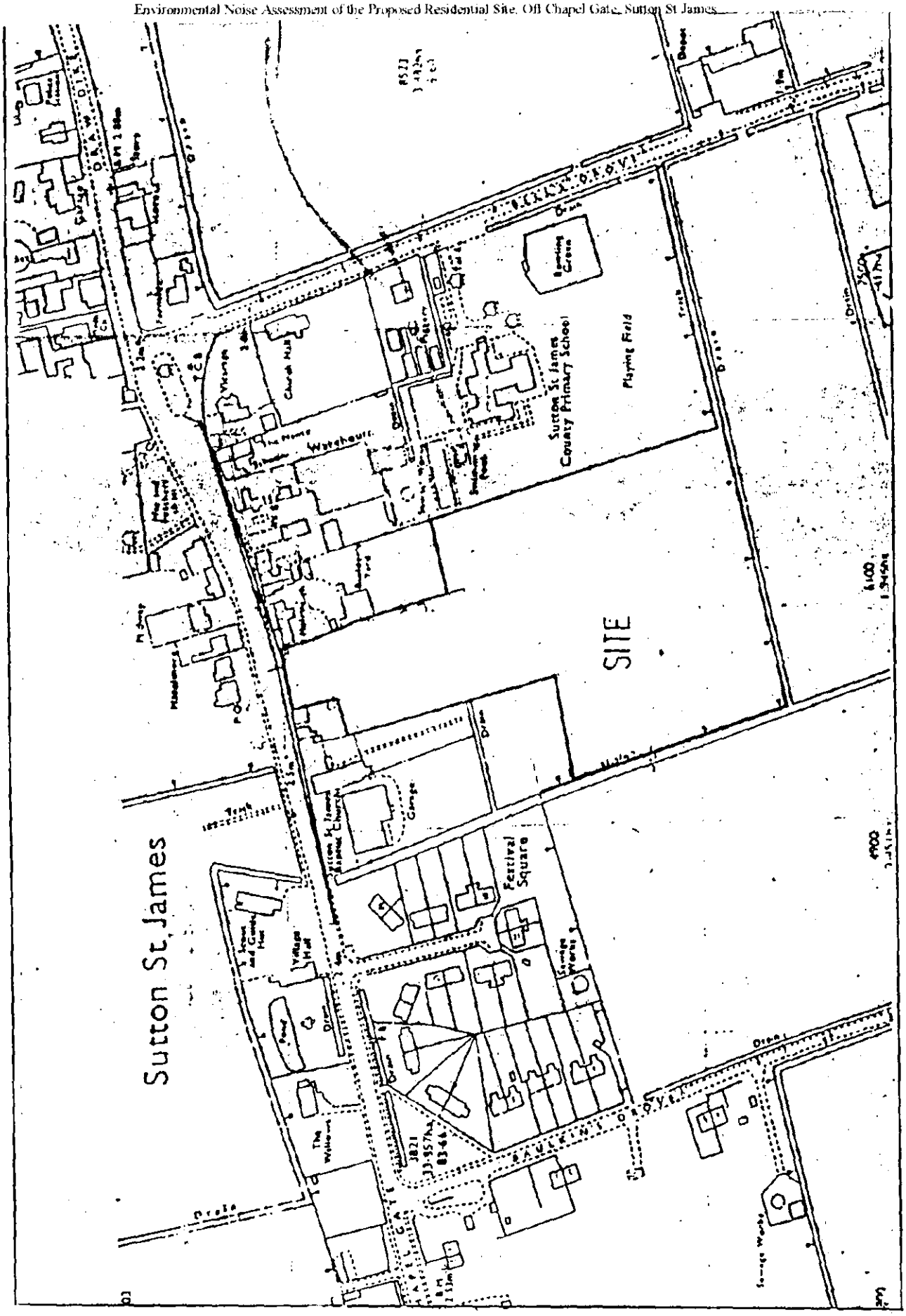



**FIGURE 1 - LOCATION OF PROPOSED RESIDENTIAL DEVELOPMENT OFF CHAPEL GATE, SUTTON ST JAMES.**

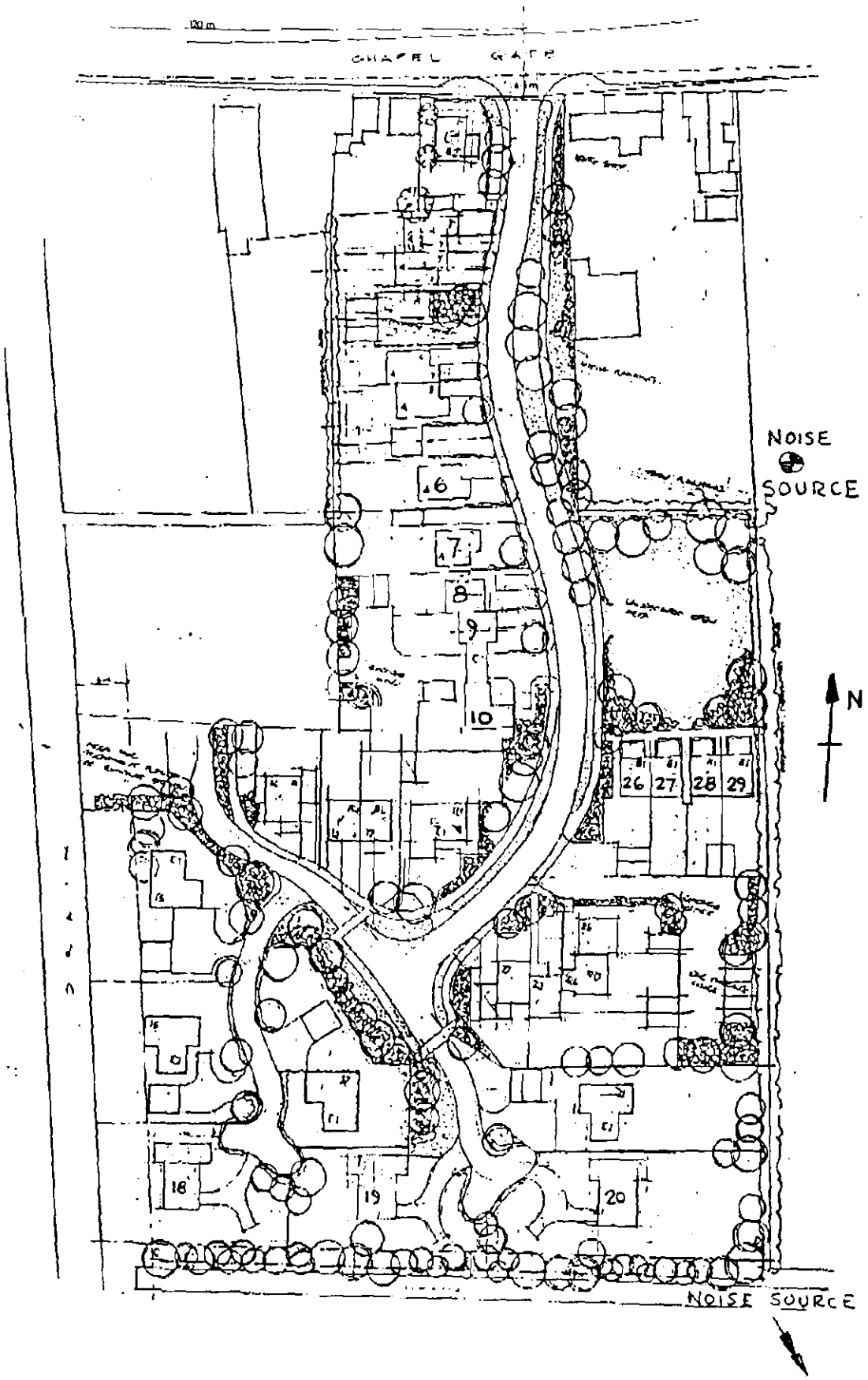



**FIGURE 2 - SITE LAYOUT.**

# PLANNING AMENDMENT

For office use only
Application No. H20/0996/94/3
Date Registered 26 FEB 1999
Case Officer SR

1. Please complete in block letters
**NAME AND ADDRESS OF APPLICANT**
KINGS QUALITY HOMES
HOUBEACH MANOR
FLEET ROAD, HOUBEACH LINCS
PE12 7AX.
Tel. No.

**NAME AND ADDRESS OF AGENT**
(if form completed by agent)
MOULTON DESIGN
63 EAST COBGATE
MOULTON, SPALDING LINCS PE12 6QJ
Tel. No 01406 373307 (Contact) ALAN J. FINCH

Please complete in block letters
**FULL POSTAL ADDRESS OF THE APPLICATION SITE**
RESIDENTIAL DEVELOPMENT - NEEDHAM DRIVE, SUTTON ST. JAMES.

Please complete
**APPLICATION No.**
This amendment **cannot be considered** unless the relevant reference is stated
H20/0996/94

OFFICE COPY

Building Regulation reference relating to same development (if any)
N/A.

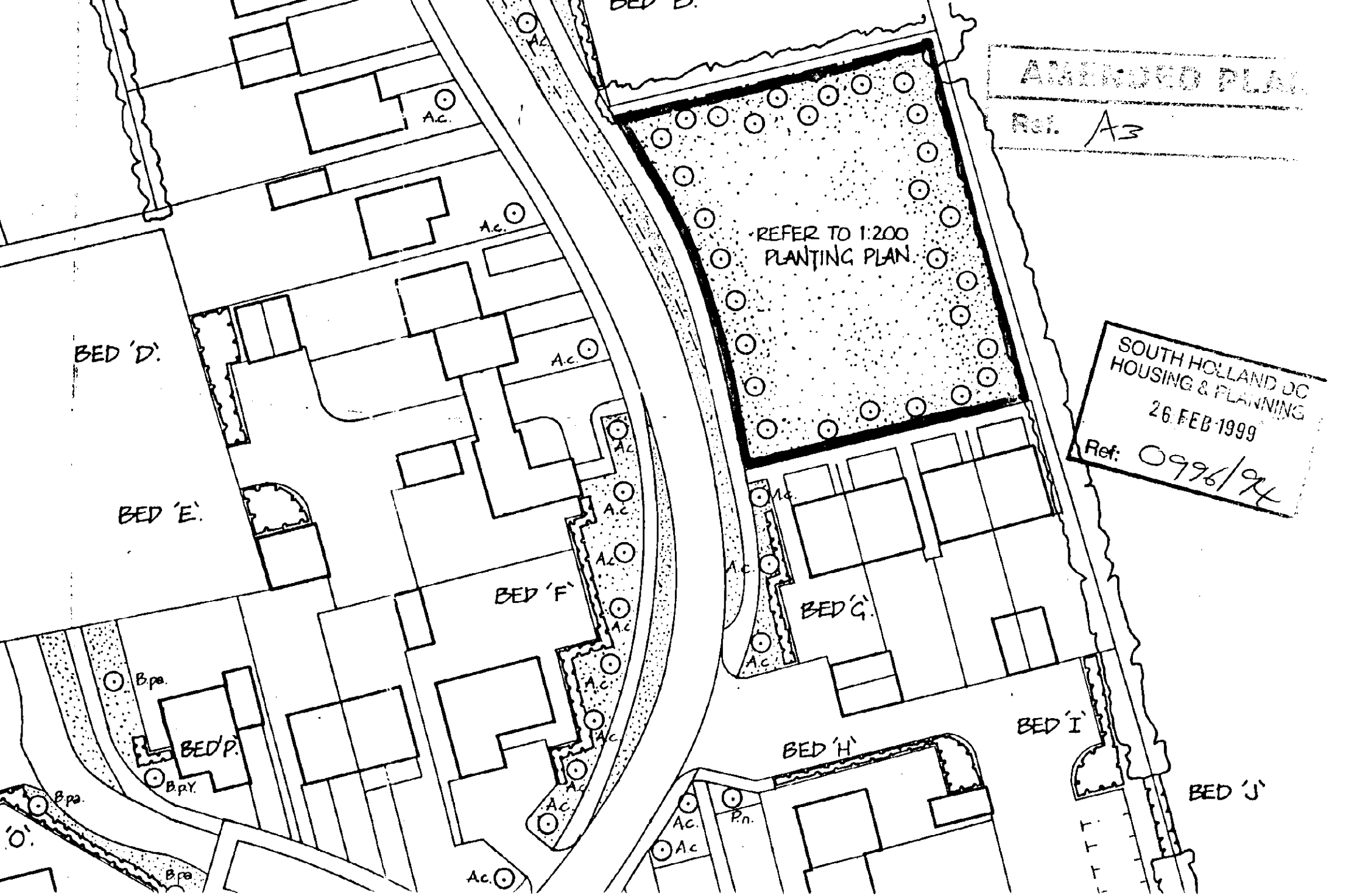
2. Please tick **one** box only

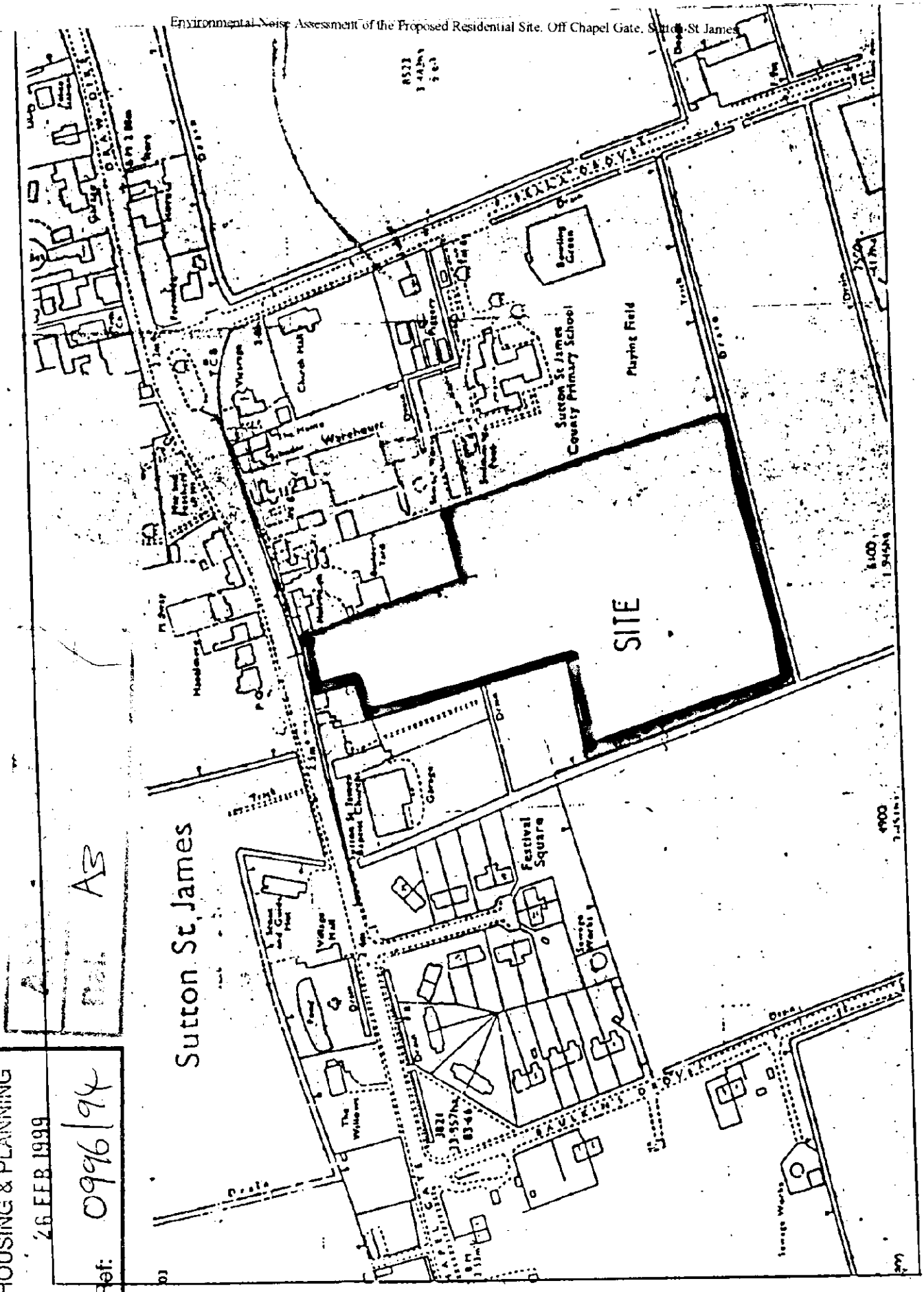
| A | | B |
|---|---|---|
| *Amendment is proposed where permission already granted* If yes, submit two forms and two plans. | ✓ | *Amendment is to a proposal currently being considered* If yes, submit four forms and four plans. |

Please complete
I attach the necessary plans and request that the changes described below be accepted as an amendment. I understand that the Council may require a fresh application, together with fee if appropriate. If the amendment relates to a current application, I agree to an extension of the terminal date.
Signed ..... Alan J. Finch ..... Date ... 24.2.99 .....

| | |
|---|---|
| 3. Please complete in block letters **FULL DESCRIPTION OF DEVELOPMENT IN ORIGINAL APPLICATION** | RESIDENTIAL DEVELOPMENT. |
| State details of amendments proposed (Give a full detailed list of the changes, and also mark these clearly on the accompanying plans. *Only the changes listed here will be considered.*) | AMENDMENT TO LANDSCAPING PROPOSAL - OMIT TODDLERS PLAY SPACE FROM PUBLIC OPEN SPACE. (PLEASE REFER TO ACCOMPANYING LETTER) |
| State drawing no's of the current submission | LOCATION PLAN; EXTRACT FROM LANDSCAPING PLAN |
| Has this amendment been requested by the Council? (If so, state Officer dealing with the application) | YES / NO |
| Describe any part of the original development which is excluded by virtue of the amendment, and state any alteration to plot numbers | NONE |

Has a similar amendment been submitted under Building Regulations? Yes / No


BED 'D'.
BED 'E'.
BED 'F'
BED 'G'.
BED 'H'
BED 'I'
BED 'J'
BED 'P'.
REFER TO 1:200
PLANTING PLAN.
A.c.
B.pa.
B.pY.
P.n.
AMENDED PLAN
Ref. A3
SOUTH HOLLAND DC
HOUSING & PLANNING
26 FEB 1999
Ref: 0996/94




SOUTH HOLLAND DC
HOUSING & PLANNING
26 FEB 1999
Ref: 0996/94
Rec. A3

FIGURE 1 - LOCATION OF PROPOSED RESIDENTIAL DEVELOPMENT OFF CHAPEL GATE, SUTTON ST JAMES.

**SALLY WALTHAM**
BA (Hons) F.C.I.H.
Director of Housing & Planning Services

Housing and Planning
Services Department,
Council Offices,
Priory Road,
Spalding,
Lincolnshire. PE11 2XE

Telephone: (01775) 761161
Fax: (01775) 710772

SOUTH HOLLAND DISTRICT COUNCIL
HOUSING & PLANNING SERVICES DEPARTMENT

Application no: H20/0996/94

Original Applicant:
Kings Quality Homes
Holbeach Manor
Fleet Road
Holbeach
Spalding, Lincs

Original Agent:
G R Merchant
Unit 3
12A Park Road
Holbeach
Spalding Lincs

Description: Residential development

Location: Off Chapelgate
Sutton St James
Spalding
Lincs

Amendment: Amendment to landscaping proposal - omit toddlers play space from public open space

26-MAR-99

Dear Sir/Madam

TOWN AND COUNTRY PLANNING ACT 1990
**NOTICE OF ACCEPTANCE OF AMENDMENT**

The amended details submitted in respect of the above proposal have now been considered and there are no objections to the amendment being implemented to the extent described above.

Note: This Notice does not convey any approval under the Building Regulations and you may need to make a new submission.

Yours faithfully

Director of Housing and Planning Services

Moulton Design
63 East Cobgate
Moulton
Spalding
Lincs PE12 6QJ

## AMENDMENT RECORD SHEET - POST DECISION

### Admin

**Validation:**

**Inadequate/Inappropriate** ☐

**Clarification/Details required:**

**Appears valid** ☑ N/A

**Registered** ..... 16/3

## DC Procedural Assessment

**Is the information given correct?** **Yes/~~No~~** (If No, state above what details are needed)

**Is it an amendment in principle?** **Immaterial/~~Needs new app~~**

**Confirmed:** ..... 5/3/97

**Give a revised description if the details accepted are different to the submission:**

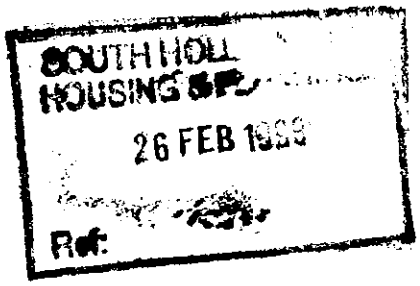
**Acceptance issued:** 26/3/97

# Moulton Design

Planning & Architecture

Ref.

Director of Housing & Planning Services
South Holland District Council
Priory Road
Spalding
Lincs
PE11 2XE




24th February 1999

Dear Sirs

**H02 / 0996 / 94 - Residential Development, Needham Drive, Sutton St. James**
**Kings Quality Homes**

I submit for your approval a planning amendment with regard to the above development.

This amendment seeks to omit the toddler's play space originally proposed to the public open space within this development. This request has been prompted by letters of objection from residents received by both the developers and the Local Authority.
It is therefore considered appropriate in this particular instance for the play area to be omitted from the scheme.

Yours faithfully

Alan J. Finch

**Alan J. Finch**

63 East Cob Gate, Moulton, Spalding, Lincolnshire. PE12 6QJ
Tel / Fax 01406 373307 Principal : Alan J.Finch

**MRS SALLY WALTHAM** BA (Hons) F.C.I.H. Director of Housing & Planning Services

Housing & Planning Services Department
Council Offices.
Priory Road. Spalding.
Lincolnshire. PE11 2XE

Telephone: (01775) 761161
Fax: (01775) 710772

SOUTH HOLLAND DISTRICT COUNCIL
HOUSING & PLANNING SERVICES DEPARTMENT

Application no: H20/0996/94

Applicant: Kings Quality Homes
Holbeach Manor
Fleet Road
Holbeach
Spalding, Lincs

Agent: G R Merchant
Unit 3
12A Park Road
Holbeach
Spalding Lincs

Description: Residential development

Location: Off Chapelgate Sutton St James
Spalding Lincs

Type: FULL

13-DEC-95

Dear Sir/Madam,

PLANNING APPLICATION

The above application for planning permission has now been considered, together with your comments, and it has been decided that permission should be granted in this case.

The full details, including any conditions which may have been imposed, can be seen by inspecting the register of applications which is available in this Department during normal office hours.

Yours faithfully
Mrs S A Waltham
Director of Housing and Planning Services

Copy sent to:-

A M Johnson
Johnson & Son
Sutton St James
Spalding
Lincs. PE12 0EE

SOUTH HOLLAND DC
HOUSING & PLANNING
0 9 MAY 1995
Ref: 0996/94

# ENVIRONMENTAL NOISE ASSESSMENT OF THE PROPOSED RESIDENTIAL DEVELOPMENT, OFF CHAPEL GATE, AT SUTTON ST. JAMES

CLIENT: Kings Quality Homes Ltd
Holbeach Manor
Fleet Road
Holbeach PE12 7AX

AMENDED PLAN
Ref.

AGENT: Mr G R Merchant
Unit 3, Wrights Mews
12A Park Road
Holbeach PE12 7EE

REPORT No: RAP/J64/4289

AUTHOR: R A Pettitt, CEng, MIMechE, MIOA, FIDiagE.

DATE: 20th April 1995

ACOUSTIC ASSOCIATES (PETERBOROUGH)
34 Ashcroft Gardens, Peterborough, PE1 5LP. Tel/Fax 01733 896346

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## 1 OBJECTIVES

To re-assess the noise aspects relating to a proposed residential development, off Chapel Gate, Sutton St. James near Spalding. The assessment was based on the site layout shown in drawing K/SSJ/1 by G R Merchant, dated Aug 1994. The noise data used was that measured during a previous assessment carried out in 1992, and reported in Reference 2.

## 2 CONCLUSIONS

2.1 The existing noise levels at the proposed housing site at Sutton St. James, caused by adjacent grain drying fans, are likely to give rise to complaints from the residents of the proposed new dwellings closest to the fans at the north-east and south of the site. This is based on an assessment carried out to British Standard BS 4142 : 1990.

2.2 Comparing the site noise levels with the Noise Exposure Categories (NEC) given in Planning Policy Guidance PPG 24, shows that the site meets NEC A during the daytime and NEC B at night.

2.3 Implementing noise control measures to the grain drying fans at source (see recommendations) will result in an acceptable noise situation with respect to BS 4142 : 1990.

2.4 If the fans are not treated at source, then acceptable levels, to BS 4142, cannot be obtained at the first floor level of the dwellings nearest to the fans during the nighttime.

2.5 However, a combination of barriers at the site boundaries and acoustic ventilators will result in an acceptable noise level inside the bedrooms of the dwellings. This approach will also result in acceptable noise levels for both the outside and inside of the dwellings during the daytime.

2.6 Building bungalows at the site positions facing the fans (dwellings 4 - 10 inclusive, and 17, 19 and 20), together with 3.0 metre high barriers will also provide an acceptable situation.

2.7 The acoustic barriers may be of any impervious materials, including brick, close boarded fencing, earth bunds or a combination of these.

## 3 RECOMMENDATIONS

3.1 Ideally, the noise from the grain drying fans should be treated at source, as shown below:

a) An Acoustic Splitter should be fitted to the intake opening of the grain drying fan to the north-east. The splitter should provide the following minimum Insertion Loss values, which are typical of a proprietary acoustic splitter, 1 metre long with 25% open area. (Note, the Insertion Loss at 63 and 125 Hz are the critical values)

| Octave Band (Hz) | 63 | 125 | 250 | 500 | 1K | 2K | 4K | 8K |
|---|---|---|---|---|---|---|---|---|
| Insertion Loss dB | 5 | 7 | 16 | 31 | 38 | 39 | 34 | 25 |

This type of acoustic splitter should not affect the performance of the fan, but this should be confirmed with the supplier at the time of the detail design/selection of the splitter.

b) An acoustic fence should be built between the fan houses to the south of the site, or, the northern opening doors on the fan houses should be kept shut.

3.2 If the fan noise cannot be treated at source, then the following options should be considered for **dwellings 4 - 10, 26 - 29, 17, 19 and 20**:

a) Acoustic barriers (3m high) should be built along the N-E and southern boundaries of the site, and the bedrooms facing the fans should have acoustic ventilators (see Figure 5) fitted to enable the windows to remain closed.

Or,

b) Acoustic barriers (4.3m high) should be built along the N-E and southern boundaries

Or,

c) Alternatively, consideration should be given to the building of bungalows in these positions.

## 4 BACKGROUND

A residential building development is planned at a site in Sutton St James, off Chapel Gate (see Figure 1). Concern had been expressed about the noise from near-by grain drying fans, one to the north-east, and three to the south of the site. Work had previously been carried out, in 1989, by a Noise Consultancy (SRL) who measured the noise levels associated with the grain drying fans and recommended methods of reducing the noise (Reference 1).

In 1992 a review of the previous assessment was carried out, by Acoustic Associates (Peterborough), which included additional noise measurements being carried out. This enabled recommendations to be made that would ensure an acceptable situation, from the noise aspect, for the residents of the proposed new dwellings (Reference 2).

The layout of the site has recently been revised, reference drawing K/SSJ/1, by G.R. Merchant, dated August 1994. This latest site layout shows the dwellings to be further away from the problem noise sources, than on previous site layouts. Therefore, a re-assessment of the noise related aspects of the site were required, the results of which are documented in this report.

## 5. NOISE ASSESSMENT

### 5.1 Noise Measurement Positions

The noise levels used in this report are those previously measured, and were documented in Reference 2. No additional noise measurements were taken for this re-assessment.

The positions at which the noise was previously measured are shown below:

Site Positions (See Figures 1,2 and 3)

1: At north-east of site at rear of Needham bungalow.

2: At north-east of site, 11 metre from boundary

3: At south-east corner of site

Adjacent to Fans (See reference 2)

A: At the intake to the north-east fan enclosure

B: 2 metres from the outside of the brick enclosure around north-east fan

C: At 2 metres from the north facing fan intake on the middle of the 3 fans to the south of the site. (With doors open and closed)

The microphone was positioned 1.5 metres above the ground for the noise measurements, which were carried out on Friday 24th July 1992 between 09.30 and 11.00am. It was a dry sunny day, with a wind speed which varied between 0.4 and 2 m/s, from the north west.

5.2 Measured Noise Levels

Unless otherwise stated, all the noise levels quoted in this report are in dB(A) re 20 uPa.

The results of the noise tests, with the grain drying fans operating, are summarised in Table 1, with the full results given in Appendix 2, and Reference 2.

| Microphone Position | Noise Level | |
|---|---|---|
| | $L_{Aeq}$* | $L_{A90}$* |
| (1)At N-E of site, rear of Needhams bungalow | 52 | |
| (2)At N-E corner of site | 56 | |
| (3) At S-E corner of site | 43 | |
| BACKGROUND NOISE AT SITE (DAYTIME) | 42 | 39 |
| (A) At intake to north-east fan enclosure | 93 | |
| (B) 2m from the outside of n-east fan enclosure | 66 | |
| (C) 2m from the south fan intake: Doors open | 86 | |
| Doors Closed | 75 | |

Table 1 - Average Noise Levels ($L_{Aeq}$) Measured At The Site.

On the day that the tests were carried out, the wind would have been providing some attenuation of the fan noise to the south of the site, when measured at position 3. However, it is unlikely to be greater than 2 dB attenuation.

Measurements of the background noise ($L_{A90}$) were not taken during the night, however, measurements carried out by Mr John Chapman of the SHDC, on 13th May 1992 between 9 - 10pm showed that the background noise could drop to 26 dB(A). This low level of background noise is as expected, based on measurements carried out by Acoustic Associates (Peterborough) at similar locations.

The noise levels at the nearest properties to the fans, as shown on the latest site layout, have been calculated from the original noise measurements and are listed in Table 2. These levels could occur during the day or nighttime.

* See Appendix 1 for glossary of terms.

| Location | Noise Level $L_{Aeq}$ |
|---|---|
| Plot 6 (N-E corner of site) | 48 |
| Plots 28/29 (N-E corner of site) | 48 |
| Plot 20 (S-E corner of site) | <43 |

Table 2 - Calculated Noise Levels ($L_{Aeq}$) At The Proposed Dwellings Closest To The Fans

5.3 Standards For Acceptable Noise Levels On The Site

a) PPG 24

To assist with deciding what is likely to be an acceptable level of noise, the Department of the Environment has published a Planning Policy Guidance: Planning and Noise (PPG 24, see Reference 3). This introduces the concept of Noise Exposure Categories (NEC). The noise levels corresponding to the NEC's relate to different forms of traffic noise, for daytime and nighttime periods. Commercial and industrial noise should only be included when it is not dominant. Local planning authorities should have regard to the advice in the appropriate NEC, as shown in Table 3.

| NEC | |
|---|---|
| A | Noise need not be considered as a determining factor in granting planning permission, although the noise level at the the high end of the category should not be regarded as a desirable level. |
| B | Noise should be taken into account when determining planning applications and, where, appropriate, conditions imposed to ensure an adequate level of protection against noise. |
| C | Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise. |
| D | Planning permission should normally be refused |

Table 3 - PPG 24 NOISE EXPOSURE CATEGORIES (NEC)

The noise levels corresponding to the Noise Exposure Categories, for mixed sources (i.e. traffic combined with commercial/industrial noise sources), are given in Table 4.

| Noise Levels Corresponding To The Noise Exposure Categories For New Dwellings $L_{Aeq}$ | | | | |
|---|---|---|---|---|
| | Noise Exposure Category (NEC) | | | |
| Mixed Noise Sources | A | B | C | D |
| 07.00 - 23.00 hrs | <55 | 55 - 63 | 63 - 72 | >72 |
| 23.00 - 07.00 hrs | <45 | 45 - 57 | 57 - 66 | >66 |

Table 4 - PPG 24 NOISE LEVELS CORRESPONDING TO NEC's

b) British Standard BS 4142 : 1990

The likelihood of noise complaints occurring is usually assessed using a method for "Rating industrial noise affecting mixed residential and industrial areas" - British Standard BS 4142 : 1990 (Reference 4). This Standard uses the difference between the Rating Level of a specific noise source ($L_{Aeq}$) and the background noise level ($L_{A90}$) as a guide to whether complaints are likely to occur. A difference of around +10 dB or higher indicates that complaints are likely. A difference of around +5 dB is of marginal significance. At a difference below +5 dB, the lower the value the less likelihood that complaints will occur. BS 4142 deals with exterior noise levels, rather than the noise inside buildings.

c) Internal Noise.

Recommended noise levels, due to external noise sources, have been established for the interiors of dwellings. These are documented, in "Sound Insulation and Noise Reduction For Buildings" - British Standard BS 8233 : 1987 (Reference 5), to be as follows:

Bedrooms: $L_{Aeq}$ = 30 to 40 dB(A)
Living Areas: $L_{Aeq}$ = 40 to 45 dB(A)

In addition, "Sound Control For Homes" (Reference 6) recommends the following noise levels:

Bedrooms: $L_{Aeq}$ <35 dB(A)
Living Areas: $L_{Aeq}$ <40 dB(A)

If "good" standards are required, then Reference 6 states that 5 dB should be subtracted from the above levels.

5.4 Compliance With Recommended Noise Levels

When applying BS 4142 the noise levels ($L_{Aeq}$) from the Specific Noise sources (fans), measured in the gardens of the proposed dwellings should not exceed the background noise ($L_{A90}$) by more than 5 dB. Therefore, the maximum noise levels ($L_{Aeq}$) on the site should not exceed the following values:

| Daytime | Nighttime |
|---|---|
| 44 dB(A) | 31 dB(A) |

The corresponding noise levels for NEC A of PPG 24 are <55 dB(A) and <45 dB(A) for daytime and nighttime respectively.

Meeting the requirements of BS 4142 is more difficult to achieve than complying with PPG 24. Noise control measures will have to be implemented to comply with the requirements of BS 4142. Strictly speaking, BS 4142 should not be used for situations where the background noise is very low, ie, below 30 dB(A). For the nighttime period, it is considered that the interior noise is the most important since people sleep indoors.

To obtain the Rating Level of a specific noise source BS 4142 states that 5 dB should be added to the measured $L_{Aeq}$ if the noise contains any characteristics which are likely to attract attention, eg, whines, bangs etc. However, the noise from a grain dryer fan did not contain any distinguishable characteristics likely to draw attention to it, therefore, there is no need to add 5 dB to the measured specific noise level to obtain the Noise Rating Level.

It can be seen from Table 2 that the noise levels at the dwellings nearest to the N-E fans are in excess of the BS 4142 target levels during both the day and nighttime periods. In fact, a 17 dB(A) reduction (i.e. 48dB(A) - 31 dB(A)) is required to meet the target at the dwellings adjacent to the N-E of the site, during the nighttime period.

## 6 NOISE REDUCTION

Noise can be reduced at any/all of the following areas:

a) At the source (eg., reduce the fan noise)
b) The noise path (eg., barriers between the source and the receiver)
c) At the receiver (eg., treat the dwellings)

Fundamentally, it is best to reduce the noise at source. However, this is not always possible.

### 6.1 For Dwellings on N-E Corner Of Site (Dwellings No 4-10, and 26-29)

Dwellings 4-10 and 26-29 (see G R Merchant site Plan K/SSJ/1, dated Aug 1994) face the grain dryer fan to the N-E of the site. The noise assessment was based on the nearest (worst case) dwellings to the fans i.e., No 6 and Nos 28/29. The grain dryer fan was located within a brick housing on land belonging to Mr Johnson. The intake to the fan was through a 2m x 2.7m opening in the west wall of the housing. This opening was enclosed by a brick wall to help attenuate the noise. The noise escaping from the opening of the housing could be attenuated by fitting an acoustic splitter in the hole of the wall, (Note, an acoustic louvre could also be used but these usually generate more back pressure). The average velocity of the air flowing through the 2m x 2.7m opening was 2.5 m/s. The effect of fitting an acoustic splitter is shown in table 5, and the related calculations are shown in Appendix 2. It can be seen that the fitting of a splitter will solve the noise problem.

| Condition | | External Noise Level Due To Specific Noise From Fans-dB(A) | |
|---|---|---|---|
| | | Dwelling No. | |
| | | 6 | 28/29 |
| a) Existing (from measured data) | | 48 | 48 |
| b) Treatment to fans | First Floor | 30 | 29 |
| | Ground Floor | 30 | 29 |

Table 5. Predicted Noise Levels With Splitter Fitted to Fan

If the fan noise is not treated at source by the fitting of a splitter, then barriers and/or treatment to the dwellings could be considered. An acoustic barrier/fence could be erected along the N-E corner of the site, see Figure 2. The effect of using a barrier is shown in Table 6.

| Condition | | External Noise Level Due To Specific Noise From Fans-dB(A) | |
|---|---|---|---|
| | | Dwelling No. | |
| | | 6 | 28/29 |
| a) Existing (from measured data) | | 48 | 48 |
| b) 3 metre barrier | First Floor | 47 | 47 |
| | Ground Floor | 38 | 38 |
| c) 4.3 metre barrier | First Floor | 41 | 41 |
| | Ground Floor | 35 | 35 |

Table 6. Predicted Noise Levels With Noise Barrier

It can be seen from Table 6 that the use of acoustic barriers will meet the requirements of BS 4142 at the ground floor level, during the daytime with either a 3 m or a 4.3 m high barrier. However, at the first floor level, the nighttime requirements will not be met with either of the proposed barrier heights. At nighttime people are usually asleep inside the dwellings. The external noise can enter a room through windows, ventilators, walls, roof and doors. However, in most cases, the windows provide the main path, especially when a window is open for ventilation purposes. PPG 24 gives a guide to the noise reductions through windows, as shown in Table 7. It can be seen that a partially open window only provides 10 dB(A) of noise reduction. However, ventilation can be provided with an acoustically treated ventilator (See figure 5 for details of Passivent), which enables the window to be kept closed.

| | Minimum Noise Reduction dB(A) |
|---|---|
| Partially Open Window | 10 |
| Single Glazed | 27 |
| Double Glazed | 32 |
| Passivent 80dB Ventilator | 43 |

Table 7. Noise Reduction Through Windows/Ventilators

The noise levels inside the bedrooms, due to the fan noise, assuming that a window is partially open for ventilation purposes is shown in Table 8. It can be seen that an acceptable noise level can be obtained inside the bedrooms with either, a splitter fitted to the fan, a 4.3 metre high barrier, or 3 metre barrier with Passivent (type 80dB) and windows closed.

| Condition | Window Open/closed | Noise in first floor bedroom - dB(A) |
|---|---|---|
| No noise reducing features | open | 38 |
| Splitter fitted to fan | open | 20 |
| 3 m high barrier | open | 37 |
| 4.3 m high barrier | open | 31 |
| 3 m barrier, plus Passivent | closed | 20 |

Table 8. Noise Levels Inside The Bedrooms.

Since the problem associated with noise relates to the first floor level, another option would be to use a 3 metre barrier, and build bungalows on plots 4 - 10 and 26 - 29. This would result in a external noise level of 38 dB(A) and a corresponding internal level, with windows open, of 28 dB(A). This would provide an acceptable situation. The bungalows would provide a barrier for the houses positioned behind them.

6.2 Dwellings on S-E Corner Of Site (Dwelling Nos 17, 19 and 20)

The source of noise was a fan to the south of the site, with a north facing opening. The effect of placing a barrier in front of the opening was evaluated by closing the doors, this reduced the noise at 2 metres from the fan intake by 11 dB(A). A similar noise reduction could be achieved by erecting an acoustic fence between the fan housings (see Figure 4). However, if the owner of fans does not want to allow the fan noise to be reduced on his site, barriers can be used on the residential site. It is proposed that the required noise reductions are obtained by using a 4.3 metre high barrier at the southern boundary of the site (See Figure 3). This will avoid line of sight for both the ground and first floor levels of the dwellings. The effect of using a barrier is shown in Table 9, and the related calculations are shown in Appendix 2. It will be seen that the barrier arrangement is less effective at the first floor level than at the ground floor level. Again, one method of overcoming this problem would be to build bungalows at positions 17, 19, and 20.

| Condition | | External Noise Level Due To Specific Noise From Fans-dB(A) |
|---|---|---|
| | | Dwelling No 20 |
| a) Existing (from measured data) | | <43 |
| b) Treatment to fans | First Floor | <33 |
| | Ground Floor | <33 |
| c) 3.0 metre barrier | First Floor | <41 |
| | Ground Floor | <32 |
| c) 4.3 metre barrier | First Floor | <38 |
| | Ground Floor | <30 |

Table 9. Predicted Noise Levels With Noise Reduction, At Dwelling No 20

The noise levels inside the bedrooms, due to the fan noise, assuming that a window is partially open for ventilation purposes is shown in Table 10. It can be seen that an acceptable noise level can be obtained inside the bedrooms with either type of noise reduction.

| Condition | Window Open/closed | Noise in first floor bedroom - dB(A) |
|---|---|---|
| No noise reducing features | open | <33 |
| Fan treatment | open | <23 |
| 3 m high barrier | open | <31 |
| 4.3 m high barrier | open | <28 |
| 3 m barrier, plus Passivent | closed | <20 |

Table 10. Noise Levels Inside The Bedrooms.

## 6.3 Assessment to BS 4142 : 1990

With the fan noise reduced at source the BS 4142 Assessment Levels, i.e., differences between the Noise Rating and the background noise levels would indicate that noise complaints are not likely to occur, as shown in Table 11.

| Period Of The Day | Assessment Levels To BS 4142 | | |
|---|---|---|---|
| | Dwelling No. | | |
| | 6 | 28/29 | 20 |
| a) Daytime | -9 | -10 | <-6 |
| b) Nighttime | +4 | +3 | <+7 |

Table 11. Assessment Levels (BS 4142) With Fan Noise Reduced At Source

If barriers are used on the southern and N-E boundaries, then the predicted Assessment Levels, to BS 4142, would be as shown in Table 12.

| Period Of The Day | Floor of Building | Barrier | Assessment Levels To BS 4142 | | |
|---|---|---|---|---|---|
| | | | Dwelling No. | | |
| | | | 6 | 28/29 | 20 |
| a) Daytime | First Floor | 3 m | +8 | +8 | <+2 |
| | Ground Floor | | -1 | -1 | <-7 |
| b) Nighttime | First Floor | | +21 | +21 | <+15 |
| | Ground Floor | | +12 | +12 | <+6 |
| c) Daytime | First Floor | 4.3 m | +2 | +2 | <-1 |
| | Ground Floor | | -4 | -4 | <-9 |
| d) Nighttime | First Floor | | +15 | +15 | <+12 |
| | Ground Floor | | +9 | +9 | <+4 |

Table 12. Predicted Assessment Levels (BS 4142) With Barriers

## REFERENCES

1. Land To Rear Of Needham House Sutton St James
Hickman, T J, Report C/7456/407/1 dated 28th February 1989.

2. Noise Investigation Carried Out At Sutton St James Housing Site.
Pettitt, R A, Report RAP/J64/2636, dated 28th July 1992.

3. Planning Policy Guidance: Planning and Noise PPG 24, September 1994.
HMSO ISBN 0 11 752924 9

4. British Standard, Method for Rating industrial noise affecting mixed residential and industrial areas. BS 4142 : 1990

5. British Standard, Sound Insulation and Noise Reduction For Buildings.
BS 8233 : 1987.

6. Sound Control For Homes, Published by the Building Research Establishment and Construction Industry Research and Information Association, 1993
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## APPENDIX 1

### Glossary Of Terms

$L_{Aeq}$ The value of the A-weighted sound pressure level in decibels (dB(A)) of a continuous steady sound that with-in a specified time interval, has the same mean-square sound pressure as a sound that varies with time.

$L_{A90}$ The value of the A-weighted sound pressure level in decibels which is exceeded for 90% of a given time interval. The $L_{A90}$ is often used as a measure of "background" noise.

**Acoustic Fence** - an impervious barrier of wood, brick, concrete, etc, which does not have any holes/gaps which will allow noise to pass through. For the fences specified in this report, the surface mass of the fence should not be less than $5kg/m^2$.

## APPENDIX 2

## TEST RESULTS AND CALCULATIONS

.1 Noise measurements carried out on 24th July 1992 (Reference 2)

| Microphone Position | Octave Band Centre Frequency (Hz) | | | | | | | | | Noise Level | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1K | 2K | 4K | 8K | 16K | $L_{Aeq}$ | $L_{A90}$ |
| (1)At N-E of site Rear of Needhams bungalow | 32 | 41 | 38 | 44 | 47 | 44 | 43 | 42 | -- | 52 | |
| (2)At N-E of site | 37 | 43 | 44 | 50 | 53 | 47 | 42 | 33 | -- | 56 | |
| (3) At S-E corner of site | 31 | 36 | 34 | 34 | 34 | 33 | 29 | 15 | -- | 43 | |
| BACKGROUND NOISE | 32 | 35 | 35 | 33 | 33 | 33 | 29 | 17 | -- | 42 | 39 |
| (A) At intake to N-E fan enclosure | 60 | 78 | 84 | 87 | 89 | 86 | 83 | 76 | -- | 93 | |
| (B) 2m from the outside of N-E fan enclosure. | 40 | 58 | 61 | 60 | 60 | 55 | 49 | 40 | -- | 66 | |
| (C) 2m from the south fan intake: | | | | | | | | | | | |
| Doors open | 67 | 73 | 77 | 82 | 82 | 77 | 70 | 61 | -- | 86 | |
| Doors closed | 64 | 66 | 67 | 70 | 70 | 65 | 56 | 46 | -- | 75 | |

Table 13 - Measured Noise Levels ($L_{Aeq}$)

.2 Noise Predictions - Dwellings 6 & 28/29

The position of the dwellings on the new site layout are further away from the fan than the original noise measurement positions (Positions 1 and 2). However, the noise levels at the new positions can be calculated. Therefore, the noise level at dwelling No 6, due to the fan noise, will be:

$L_{Aeq}$ at dwelling No 6 = 52 - 20.log(60/37) = 48 dB(A)

And,

$L_{Aeq}$ at dwellings No 28/29 = 56 - 20.log(60/25) = 48 dB(A).

The background noise was contributing to the low frequency measurements of fan noise at positions 1 and 2, therefore, to obtain the contribution of the fans alone the background noise was subtracted from the measured levels, as shown in Table 14.

| Microphone Position | Noise Level - dB(A) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Octave Band Centre Frequency (Hz) | | | | | | | | | Overall | |
| | 63 | 125 | 250 | 500 | 1K | 2K | 4K | 8K | 16K | $L_{Aeq}$ | $L_{A90}$ |
| **Dwelling 6** | | | | | | | | | | | |
| Contribution of fan | -- | 36 | 31 | 40 | 43 | 40 | 39 | 38 | -- | 48 | |
| Splitter Insertion Loss (Note 1) | 5 | 7 | 16 | 31 | 38 | 39 | 34 | 25 | -- | | |
| Fan contribution with splitter | -- | 29 | 15 | 9 | 5 | 1 | 5 | 13 | -- | 30 | |
| **Dwellings 28/29** | | | | | | | | | | | |
| Contribution of fan | 27 | 34 | 35 | 42 | 45 | 39 | 34 | 25 | -- | 48 | |
| Splitter Insertion Loss (Note 1) | 5 | 7 | 16 | 31 | 38 | 39 | 34 | 25 | -- | | |
| Fan contribution with splitter | 22 | 27 | 19 | 11 | 7 | -- | -- | -- | -- | 29 | |

Table 14 - Predicted Noise Levels At Dwellings 6 and 28/29. With Acoustic Splitter Unit Fitted To Fan

Note 1. The insertion loss data is for a typical proprietary acoustic splitter, approx. 1m long with 25% open airways.

As an alternative to reducing the fan noise at source, barriers could be used, as shown in Figure 2. The effect of either a 3 m or 4.3 metre barrier is shown in Table 15, for dwelling No 6. Dwellings 28/29 will be similarly affected.

| Microphone Position | Noise Level - dB(A) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Octave Band Centre Frequency (Hz) | | | | | | | | | Overall | |
| | 63 | 125 | 250 | 500 | 1K | 2K | 4K | 8K | 16K | $L_{Aeq}$ | $L_{A90}$ |
| **Dwelling 6** Contribution of fan | | 36 | 31 | 40 | 43 | 40 | 39 | 38 | -- | 48 | |
| Insertion Loss with 4.3m barrier on N-E Boundary | 8 | 8 | 9 | 10 | 13 | 15 | 18 | 18 | -- | | |
| | | | GROUND FLOOR | | | | | | | | |
| Fan contribution, with 4.3m barrier | | 28 | 22 | 30 | 30 | 25 | 21 | 20 | -- | 35 | |
| Insertion Loss with 4.3m barrier on N-E Boundary | 5 | 6 | 6 | 7 | 7 | 7 | 7 | 7 | -- | | |
| | | | FIRST FLOOR | | | | | | | | |
| Fan contribution, with 4.3m barrier | | 30 | 25 | 33 | 36 | 33 | 32 | 31 | -- | 41 | |
| | | | | | | | | | | | |
| Insertion Loss with 3m barrier on N-E Boundary | 6 | 7 | 7 | 8 | 9 | 10 | 10 | 10 | -- | | |
| | | | GROUND FLOOR | | | | | | | | |
| Fan contribution, with 3m barrier | | 29 | 24 | 32 | 32 | 30 | 29 | 28 | -- | 38 | |
| Insertion Loss with 3m barrier on N-E Boundary | 4 | 3 | 3 | 2 | 1 | 1 | 0 | 0 | 0 | | |
| | | | FIRST FLOOR | | | | | | | | |
| Fan contribution, with 3m barrier | | 33 | 28 | 38 | 42 | 39 | 39 | 38 | -- | 47 | |

Table 15 - Predicted Noise Levels At Dwelling No 6, With Barrier.

.3 Noise Predictions - Dwelling No. 20.

The noise measured at position 3 was dominated by the background noise, but, the wind was in a direction that would result in approximately 2 dB attenuation of the fan noise. Therefore, it is assumed that the noise measured at position 3 was all due to the fans, i.e., the worst case situation.

Attenuating the fans, by closing the doors that open to the north would result in the predicted noise levels shown in Table 16. Opening the south facing doors on the fan housings will provide all of the air requirements for the fan units. Alternatively, the attenuation could be achieved by building a 2 metre high acoustic fence between the fan housings to the south, as shown on Figure 4. However, if the owner of

the land does not wish to adopt this approach, an acoustic barrier could be sited along the southern boundary (See Figure 3). This is more effective in reducing noise at the ground floor level (eg, in the gardens) than at the first floor level, as can be seen from Table 17.

| Microphone Position | Noise Level - dB(A) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Octave Band Centre Frequency (Hz) | | | | | | | | | Overall | |
| | 63 | 125 | 250 | 500 | 1K | 2K | 4K | 8K | 16K | $L_{Aeq}$ | $L_{A90}$ |
| **Dwelling 20** Contribution of fan | 31 | 36 | 34 | 34 | 34 | 33 | 29 | 15 | -- | <43 | |
| Fan treatment (Closing North Facing openings) | 3 | 7 | 10 | 12 | 12 | 12 | 14 | 15 | -- | | |
| Fan contribution with treatment. | 28 | 29 | 24 | 22 | 22 | 21 | 17 | -- | -- | <33 | |

Table 16- Predicted Noise Levels At Dwelling No 20, With Fan Doors Closed

| Microphone Position | Noise Level - dB(A) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Octave Band Centre Frequency (Hz) | | | | | | | | | Overall | |
| | 63 | 125 | 250 | 500 | 1K | 2K | 4K | 8K | 16K | $L_{Aeq}$ | $L_{A90}$ |
| **Dwelling 20** Contribution of fan | 31 | 36 | 34 | 34 | 34 | 33 | 29 | 15 | -- | <43 | |
| Insertion Loss with 4.3m barrier on south Boundary | 9 | 10 | 12 | 14 | 17 | 20 | 20 | 20 | -- | | |
| | | | | GROUND | FLOOR | | | | | | |
| Fan contribution, with 4.3m barrier | 22 | 26 | 22 | 20 | 17 | 13 | 9 | -- | -- | <30 | |
| Insertion Loss with 4.3m barrier on south Boundary | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | -- | | |
| | | | | FIRST | FLOOR | | | | | | |
| Fan contribution, with 4.3m barrier | 26 | 31 | 29 | 29 | 29 | 28 | 24 | -- | -- | <38 | |
| | | | | | | | | | | | |
| Insertion Loss with 3m barrier on south Boundary | 7 | 8 | 9 | 10 | 12 | 14 | 16 | 16 | -- | | |
| | | | | GROUND | FLOOR | | | | | | |
| Fan contribution, with 3m barrier | 24 | 28 | 25 | 24 | 22 | 19 | 13 | -- | -- | <32 | |
| Insertion Loss with 3m barrier on south Boundary | 3 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | | |
| | | | | FIRST | FLOOR | | | | | | |
| Fan contribution, with 3m barrier | 28 | 33 | 32 | 33 | 34 | 33 | 29 | 15 | -- | <41 | |

Table 17 - Predicted Noise Levels At Dwelling No 20, With Barrier.