The Mitfords
Basingstoke Road
Three Mile Cross
Reading
RG7 1AT

Tel: 01189 884923

Fax: 01189 888378

Email: office@woolfbond.co.uk

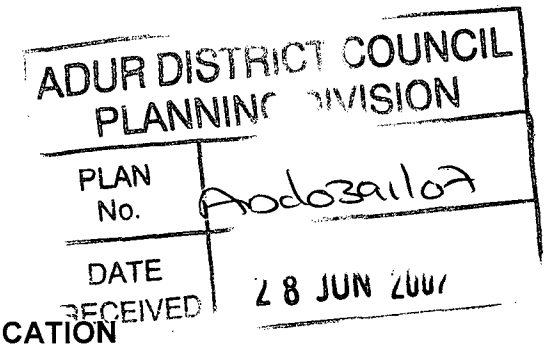
Woolf Bond Planning
Chartered Town Planning Consultants

Our ref: DB/cafm/2729

Email: d.bond@woolfbond.co.uk

27th June 2007

Ms Jo Morin
Development Control Planning Officer
Adur District Council
Civic Centre
Ham Road
Shoreham-by-Sea
BN43 6PR



Dear Ms Morin,

RE: SUBMISSION OF DETAILED PLANNING APPLICATION
412 BRIGHTON ROAD, SHOREHAM-BY-SEA, BN4 5DR

I refer to the above and to our past discussions concerning the above site and now enclose, on behalf of my clients Nigel Lawrence Partnerships, a detailed planning application for redevelopment of this land to include demolition of the existing petrol filling station and the erection of a part three storey and part four storey development containing nine flats with associated parking.

Attached to this letter are four copies of each of the following documents, as requested by the Local Planning Authority:

1. Application forms and notices
2. Planning, Design and Access Statement (June 2007)
3. Road Safety Audit (Stage 1) (March 2007)
4. Environmental Assessment and Quantitative Risk Assessment (April 2006)
5. Noise Report (May 2005)
6. Site Location Plan (Plan WBP1)
7. Site Layout and Elevation Plans (x5) and Land Survey Plan
8. Application Fee

Due to the location of the application site within the Shoreham-by-Sea Conservation Area, I also enclose four copies of the relevant application forms for Conservation Area Consent to demolish the existing petrol filling station, to include four further sets of the plans included with the main application.

Principals J. C. Woolf MA DipTP MRTPI D. C. B. Bond BA MRTPI
Associates M. Chrystal Dip TP MRTPI S. C. Brown BSc Dip TP MRTPI

Woolf Bond Planning LLP (trading as Woolf Bond Planning) is a Limited Liability partnership
Registered in England. Registered Office: The Mitfords, Basingstoke Road, Three Mile Cross, Reading RG7 1AT. Partnership Registration No. OC309100

Background

You will recall that an initial Sketch Proposal Plan (no. 2339/03) for the development of the application site was produced to initiate discussions with the Local Planning Authority in advance of a detailed planning application submission. The Sketch Proposal Plan and Survey Plan (no. 15614A/1) were sent to the Development Control Officer at Adur District Council Planning Department at an early stage.

Following submission of these plans, discussions were held between Woolf Bond Planning LLP and the Development Control Officer during which the general prospects of the proposed development were discussed. A number of action points arose from these discussions which have subsequently been addressed by the application proposal.

ADUR DISTRICT COUNCIL
PLANNING DIVISION
PLAN No. Ac/0391/07
DATE RECEIVED 28 JUN 2007

Site and Surroundings

The application site is situated in the south western part of Shoreham Town Centre, within the urban area. It extends to approximately 0.087 hectares and is irregular in shape. It currently comprises a petrol filling station and includes a concrete forecourt and pump canopy as well as a services building located to the rear.

The site fronts on to the A259 Brighton Road to the south, from which access to the site would be afforded, beyond which lies the Sussex Yacht Club with associated jetties, riverside warehousing buildings etc. These units in turn front onto Shoreham Harbour. It is currently surfaced in hardstanding and slopes to the south towards the River Adur, located at a distance of 30 metres. The site lies at an elevation of 4 metres.

The site fronts directly onto the main Brighton Road. The surrounding area is characterised by residential and commercial properties. Immediately to the west of the site is situated a relatively modern, two storey development comprising retail uses and possible office space.

The eastern boundary of the site adjoins a row of Victorian two storey residential dwellings which open directly onto the footpath of Brighton Road.

To the rear of the site there is a substantial level change formed by a concrete retaining wall approximately 4 metres in height. Beyond this lies another row of two storey dwellings.

Opposite the site, on the southern side of Brighton Road, are situated large riverside warehouse buildings and the Sussex Yacht Club, which in turn front on to Shoreham Harbour.

The site is located within the Shoreham-by-Sea Conservation Area which is both commercial and residential in character. However, the existing buildings and surrounding area do not make any positive contribution to the character of the area and are therefore not worthy of preservation. There are no other significant landscapes or trees within the site area.

Whilst visually a part of the garage forecourt, a row of seven car parking spaces situated along the western boundary of the site are not in control of the applicant yet have a right of access over the forecourt.

Proposed Development

The principle of residential redevelopment of this site has now been established and confirmed as entirely appropriate and acceptable through discussions held with the Local Authority Planning Officers. This is subject to a number of detailed issues that have now been addressed in the design of this scheme, having regard to the location of the site adjacent to the busy, polluted and noisy Brighton Road, the Conservation Area status of the site and general planning principles.

The proposed building is positioned parallel with the site frontage from its eastern boundary before turning through approximately 45 degrees to accommodate the vehicle access and parking layout on the western side of the site. The building is set back slightly from the back of the footpath with a boundary wall and railings as well as a narrow landscape strip.

The eastern portion of the building, where it abuts the adjoining terrace of housing, is three storeys in height, with the upper level provided in a mansard roof structure. The remainder of the building is of four storeys with the uppermost level again being formed by a mansard roof.

Access to the building and the various flats is via two communal stair cores, both of which have their access doors located on to Brighton Road, at the front of the building at the suggestion of the Local Authority and their desire to create an attractive and active street frontage, in particular at ground floor level, similar to the remainder of this part of the Brighton Road frontage.

Dual-aspect apartments have been provided in order to avoid single aspect only units onto the busy Brighton Road.

Ground Floor

The ground floor contains undercroft access to the car parking area and car parking spaces as well as waste bin storage, access stairs to the upper floors and now includes two one-bedroom flats fronting onto Brighton Road, again at the suggestion of the Local Authority and their desire to create an attractive and active street frontage.

First Floor

The first floor contains the lower level of two two-bedroom duplex apartments together with two further two-bedroom flats.

Second Floor

The second floor contains the upper portions of the duplex apartments together with two further two-bedroom flats.

Third Floor

The third floor contains a two-bedroom flat with a roof terrace.

The accompanying Planning, Design and Access Statement (June 2007) sets out *further details of the proposed scheme, to include design, access and landscaping* details.

For all the reasons set out in this letter it is considered that planning permission for this application should be granted.

I trust the above is clear. Please do not hesitate to contact me should you wish to discuss any matters arising. I look forward to receiving receipt of registration of both planning applications in due course.

Yours sincerely,



pp. Douglas Bond BA (Hons) MRTPI

Encls

cc. Grant Murray – Cornwall Garage Group Ltd
Nigel Berney – Nigel Lawrence Partnerships

ADUR
DISTRICT COUNCIL

Form Ref. No. 471554

Application For Planning Permission

TOWN AND COUNTRY PLANNING ACT, 1990

4 copies of this form required, together with plans and appropriate fee.
All measurements are to be given in metric.
If site relates to Lancing or Sompting, please submit 5 copies.

FOR OFFICIAL USE ONLY	
Appl. No	A/0038/08
Date Received	28 JUN 2008
Fee	2385
Rem. List	

Applicant's Details

Title		Address	c/o Agent
Forenames			
Surname or Company/ Organisation	Cornwall Garage Group Ltd		c/o Agent
Telephone		Postcode	
Email			
Do you have an agent?	Yes		

Agent's Details

Title	Mr	Address	Woolf Bond Planning LLP
Forenames	Douglas		The Mitfords
Surname	Bond		Basingstoke Road
			Three Mile Cross
Telephone	01189 884923		Reading
Email Address	office@woolfbond.co.uk	Postcode	RG7 1AT

Application Type

(a) Full planning permission (including changes of use) ✓

(b) Outline planning permission

If 'Yes', state those matters to which this application relates (tick where appropriate)

- (i) Layout ☐
- (ii) Scale ☐
- (iii) External Appearance ☐
- (iv) The means of access ☐
- (v) Landscaping of the site ☐

(c) Renewal of a temporary permission

If 'Yes', state the Date

and Permission Application

and the Condition Number

(d) Permission for retention of building or continuance of use without complying with a condition imposed on a planning permission

If 'Yes', state the Date

and Permission Application

and the Condition Number

(e) Permission to develop land without complying with a condition imposed on a planning permission

If 'Yes', state the Date

and Permission Application

and the Condition Number

Land Details

Full address or location of the land to which this application relates

412 Brighton Road, Shoreham-by-Sea, BN4 5DR

Does the applicant own or control any adjoining land? No

If 'Yes', this land must be edged blue on the location plan

Area of site (Hectares) 0.09

Dimensions of the application site and distances from the new buildings to boundaries must be clearly indicated on plans

Proposal Details

For Residential Developments, please enter the number of units (flats, bungalows, houses)
- for a Change of Use that REDUCES the number of units, please enter a negative(-) number. 9

Description of proposed development: Redevelopment to include demolition of the existing petrol filling station and the erection of a part three storey and part four storey development containing nine flats with associated parking

(If residential development, state type if known, e.g. houses, bungalows, flats)

State whether the proposal involved:-

(i) New building(s) or structure(s) Yes

(ii) Alteration or extension of building(s) No

(iii) Construction of a new *vehicular* access to a highway No

Construction of a new *pedestrian* access to a highway No

(iv) Alteration of an existing *vehicular* access to a highway Yes

Alteration of an existing *pedestrian* access to a highway Yes

(v) Closure of existing access Yes

(vi) Change of use only No

Is there to be any 'furniture' placed on a street/highway? No

Use of Land

Particulars of **Use** of Building or Land: Please State

Present use: Petrol Filling Station

If vacant, the last use: N/A

Additional Information

(a) Is the application for industrial, office warehousing, storage, shopping, commercial purposes or places of public assembly? No

(b) Is the application for the winning or working of minerals? No

(c) Is the application for an agricultural dwelling or building? No

(d) Does the proposed development involve the demolition of any residential units? No

If 'Yes', how many units? _____ Please indicate their position on plans

(e) Does the proposed development involve the felling of any trees? No If 'Yes', indicate their position on plans

(f) Does the proposed development involve any public right of way within the site? No If 'Yes', indicate their position on plans

(g) Does the proposed development involve demolition or alteration of a building or Special Architectural or Historic interest or demolition within a Conservation Area? Yes

If 'Yes', a separate application for **Listed Building Consent** or **Conservation Area Consent** may be necessary

(h) (i) How will surface water be disposed of? To the existing system

(ii) How will foul sewage be disposed of? To the existing system (e.g. mains, cesspit, etc.)

(i) Is there to be any 'furniture' placed on the street/highway? No

Process Description

Additional information required in respect of applications for Industrial, Office, Warehousing, Storage, Shopping, Rest and Nursing Homes, Commercial Purposes or Places of Public Assembly.

In the case of industrial development, give a description of the processes to be carried on and of the end products, and the type of plant or machinery to be installed. Please relate your answer to the 'Floor Areas & Uses' section.

Details of Proposal

Is the proposal related to an existing use on or near the site? _____

If 'Yes', please explain the relationship _____

Is this a proposal to replace existing premises in this area or elsewhere which have become obsolete, inadequate or otherwise unsatisfactory? ☐

If 'Yes', please give details including gross floor area of such premises and state your intentions in respect of those premises.

Details of Floor Areas and Uses - please specify in square metres

	Existing Floor Space or use (if any)	**Proposed New Floor Space or use**	**Total Floor Space** (Allow for any space lost)
What is the amount of industrial floor space?			
What is the amount of office floor space?			
What is the amount of retail floor space?			
What is the amount of storage or warehousing floor space?			
Other Use 1 (please specify)			
Other Use 2 (please specify)			
TOTALS			

Other Uses 1 or Comments/Information

Details of Staff	**Office**		**Industrial**		**Other**	
	Male	Female	Male	Female	Male	Female
(i) **Number of staff in existing premises on the site**						
(ii) **How many new staff will be employed on the site as a result of the development?**						
(iii) **If you propose to transfer staff from other premises, please give details of the numbers involved***						

*and details of the premises affected.

Premises Details

In the case of restaurants, hotels, public houses, theatres, cinemas, meeting halls, Rest and Nursing homes, etc., please specify:

Type of Business

Public floor space (Total)

Seating capacity

Bar floor area (sq.m)

Single bedrooms

Double bedrooms

Parking & Traffic

What provisions have been made for parking, loading and unloading of vehicles within the curtilage on the site?

State number of car spaces

and Lorry spaces

What is the estimated vehicular traffic flow to the site during a normal working day?
Please include all vehicles

Separately specify those used by employees driving to work:

Waste

What is the nature of disposal of any trade effluents or trade refuse?

What is the volume of any trade effluents or trade refuse?

and the proposed means of disposal of any trade effluents or trade refuse?

Will the proposed use involve the use or storage of any hazardous substances?

If 'Yes', please indicate

Plans

List of drawings and plans submitted as part of the application - indicate drawing numbers and scales.
4 sets of all drawings are required.
Additional copies in respect of major applications will assist in determination of such applications.
All measurements are to be given in metric (89/617 EEC Directive).

Plan / Drawing	Number	Scale
Ground and First Floor Plan	2339/04/P3	1:100
Second and Third Floor Plan	2339/05/P2	1:100
Site Plans	2339/06/P2	1:200
Elevations View A and View C	2339/07/P3	1:100
Elevations View B and View D	2339/08/P3	1:100
Land Survey	15614A/1	1:100
Site Location Plan	WBP1	1:1250

Fees

If a fee is submitted, please give the amount £2,385.00 Calculated Fee £2,385.00

I/WE APPLY FOR PLANNING PERMISSION AS DETAILED ABOVE ☑ Tick to agree to this statement.

Signed: [redacted] Cornwall Garage Group Ltd

On behalf of: (Insert applicant's name if signed by agent) 27.06.07

Certificate

Certificate under Section 65 of the Town and Country Planning Act 1990 (Article 7 of the T & CP (General Development Procedure) Order 1995. **N.B.** A signed certificate MUST accompany this application. If the applicant is the sole owner (a) the following certificate should be completed and signed.
'Owner' means a person having a freehold interest or tenancy the unexpired term of which was not less than 7 years

~~Certificate A~~ SEE CERTIFICATE B & NOTICE 1 ATTACHED.

~~I certify that~~:
~~on the day 21 days before the date of the accompanying application nobody, except the applicant, was the owner of any part of the land to which the application relates.~~
None of the land to which the application relates is or is part of an agricultural holding.

Do you agree to these statements? Yes

~~OR~~

[ ] given requisite notice to every person other than [ ] who, on the day 21 days before the date of the application was a tenant of an agricultural holding on all or part of the land to which the application relates, as follows

Name of Tenant	Address at which Notice was served	Date on which Notice was served

Do you agree to these statements? [ ]

Signed: ..... Date: .....

On behalf of:

Certificate B

I certify that:

The applicant has given the requisite notice to everyone else who, on the day 21 days before the date of the accompanying application were owners of any part of the land to which the application relates, as listed below

Owner's Name	Address at which notice was served	Date on which notice was served
Halifax Estate Agents	4/6 East Street Shoreham-by-Sea West Sussex BN43 5ZE	27/06/2007

None of the land to which the application relates is, or is part of, an agricultural holding.

~~OR~~

~~given the requisite notice to every person other than self who, on the day 21 days before the date of the was a tenant of an agricultural holding on all or part of the land to which the relates, as follows:~~

~~Tenant's Name~~	~~Address at which notice was served~~	~~Date on which notice was served~~

Signed: [redacted] Date: 27.06.07

(On behalf of): Cornwall Garage Group Ltd

ADUR
DISTRICT COUNCIL

[redacted]

Form Ref. No. 490132

Notice Of Application For Planning Permission
NOTICE NO.1

Town and Country Planning (General Development Procedure) Order 1995

This form is to give notice of Application of Planning Permission, to be published in a newspaper or to be served on an owner or a tenant

Proposed development at

Address	412 Brighton Road
	Shoreham-by-Sea
Postcode	BN4 5DR

Is the land to which the application / appeal relates to part of, or wholly, an agricultural holding? No

I give notice that

Title	
Forenames	
Surname	Cornwall Garage Group Ltd

is applying to the ADUR DISTRICT COUNCIL for planning permission to (description of the proposed development)

Redevelopment to include demolition of the existing petrol filling station and the erection of a part three storey and part four storey development containing nine flats with associated parking.

Anyone owner of the land or tenant who wishes to make representations about this application should write to the Council at: Development Control, Civic Centre, Ham Road, Shoreham-by-Sea, West Sussex BN43 6PR

by 18/07/2007

"owner" means a person having a freehold interest or a leasehold interest the unexpired term of which is not less than 7 years, or, in the case of development consisting of the winning or working of minerals, a person entitled to an interest in a mineral in the land (other than oil, gas, coal, gold or silver).

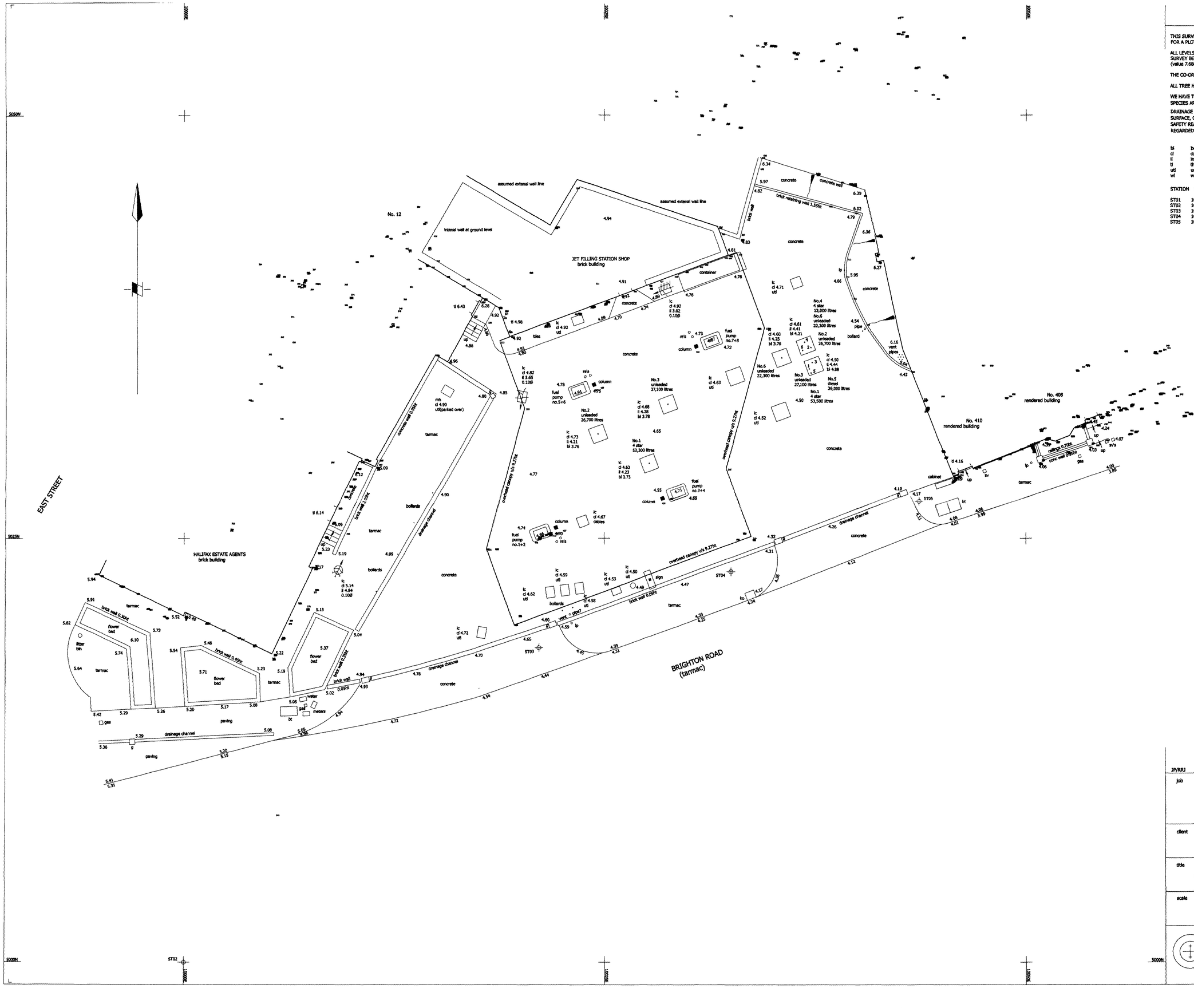
"tenant" means a tenant of an agricultural holding any part of which is comprised in the land.

Signed: [redacted] Date: 27.06.07

On behalf of: Cornwall Garage Group Ltd

Statement of owners' rights:
The grant of planning permission does not affect owners' rights to retain or dispose of their property, unless there is some provision to the contrary in an agreement or in a lease.

Statement of agricultural tenants' rights:
The grant of planning permission for non-agricultural development may affect agricultural tenants' security of tenure.



Notes

THIS SURVEY HAS BEEN PREPARED WITH A SCALING ACCURACY FOR A PLOT AT A SCALE OF 1/200

ALL LEVELS ARE IN METRES AND ARE RELATED TO AN ORDNANCE SURVEY BENCH MARK LOCATED ON ST MARYS CHURCH (value 7.68m)

THE CO-ORDINATE GRID IS BASED ON ASSUMED VALUES

ALL TREE HEIGHTS AND SPREADS ARE APPROXIMATE

WE HAVE TRIED TO IDENTIFY TREE TYPES, HOWEVER IF TREE SPECIES ARE CRITICAL SPECIALIST ADVICE SHOULD BE GAINED.

DRAINAGE PIPE SIZES HAVE BEEN MEASURED FROM THE SURFACE, CHAMBER ACCESS HAS NOT BEEN GAINED FOR SAFETY REASONS, THERFORE SIZES SHOULD BE REGARDED AS APPROXIMATE

bl	bed level
cl	cover level
il	invert level
tl	threshold level
utl	unable to lift
wl	water level

STATION	EASTINGS	NORTHINGS	LEVEL	TYPE
ST01	10060.418	5021.991	4.040	PIN
ST02	10000.000	5000.000	5.307	PIN
ST03	10021.134	5018.547	4.570	PIN
ST04	10032.548	5023.031	4.369	PIN
ST05	10043.682	5027.194	4.146	PIN

PLANNING SIGN

PLAN No. Arc/03/1/07

DATE RECEIVED 28 JUN 2007

JP/RRJ © ON CENTRE SURVEYS LTD. 2005 ACAD

job

JET FILLING STATION
412 BRIGHTON ROAD
SHOREHAM BY SEA
BN4 5DR

client

HIVES ARCHITECTS

title	dwg no.
LAND SURVEY	15614A/1
scale	date
1/100	06/01/05

ON CENTRE SURVEYS LTD.
LAND & BUILDING SURVEYORS
GEODETIC ENGINEERS
Satchwell Granary, New Street, Leamington Spa CV31 1HP
TEL: 01926 336239 FAX: 01926 316606
E-MAIL: info@oncentre.co.uk
A member of The Survey Association



Front Elevation (View B) to Brighton Road



Rear Elevation (View D)

PLANNING
PLAN No. A0c1039/107
DATE RECEIVED 28 JUN 2007

Client

Cornwall Garage Group

Job title

Proposed Redevelopment
412 Brighton Road
Shoreham

Drawing title

Elevations
View B and View D

Scale	Date	Drawn
1 : 100	20.04.05.	cbassil

HIVES ARCHITECTS

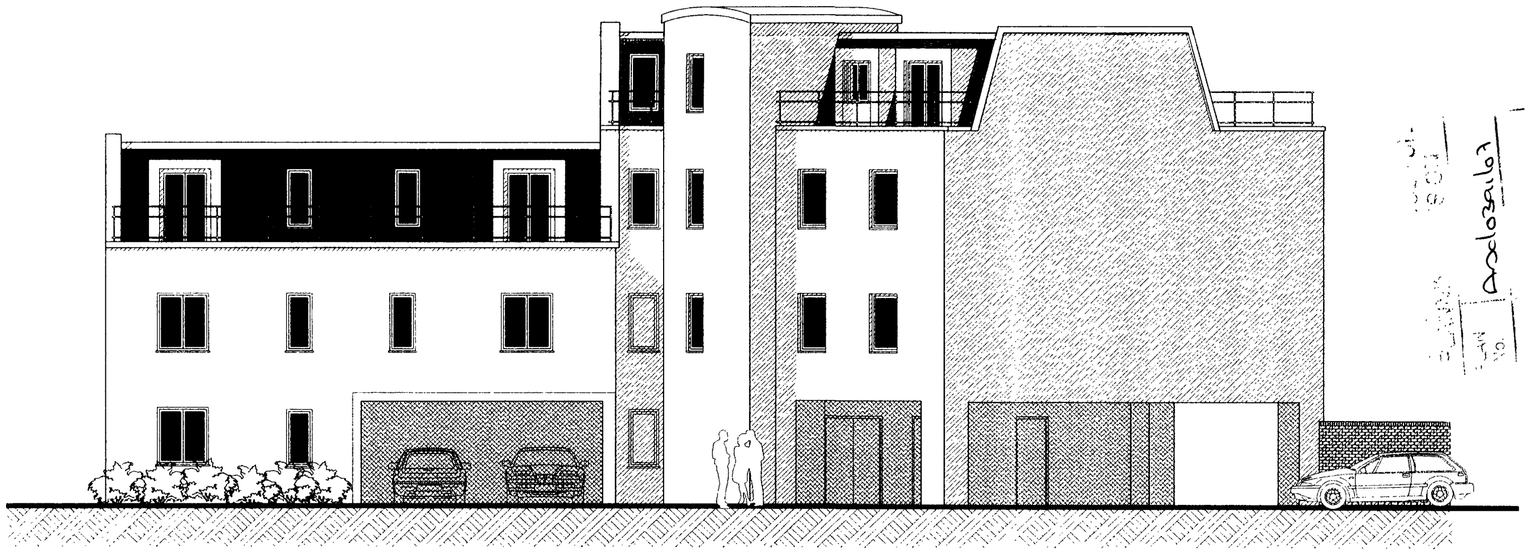
Chartered Architects; Town Planners
46 Queens Road, Reading
RG1 4AU

Tel: 0118 958 7331 Fax: 0118 939 4119

2339	08	P3



Front Elevation (View A) to Brighton Road



Rear Elevation (View C)

RECEIVED
18 JUN 2007

Client

Cornwall Garage Group

Job title

Proposed Redevelopment
412 Brighton Road
Shoreham

Drawing title

Elevations
View A and View C

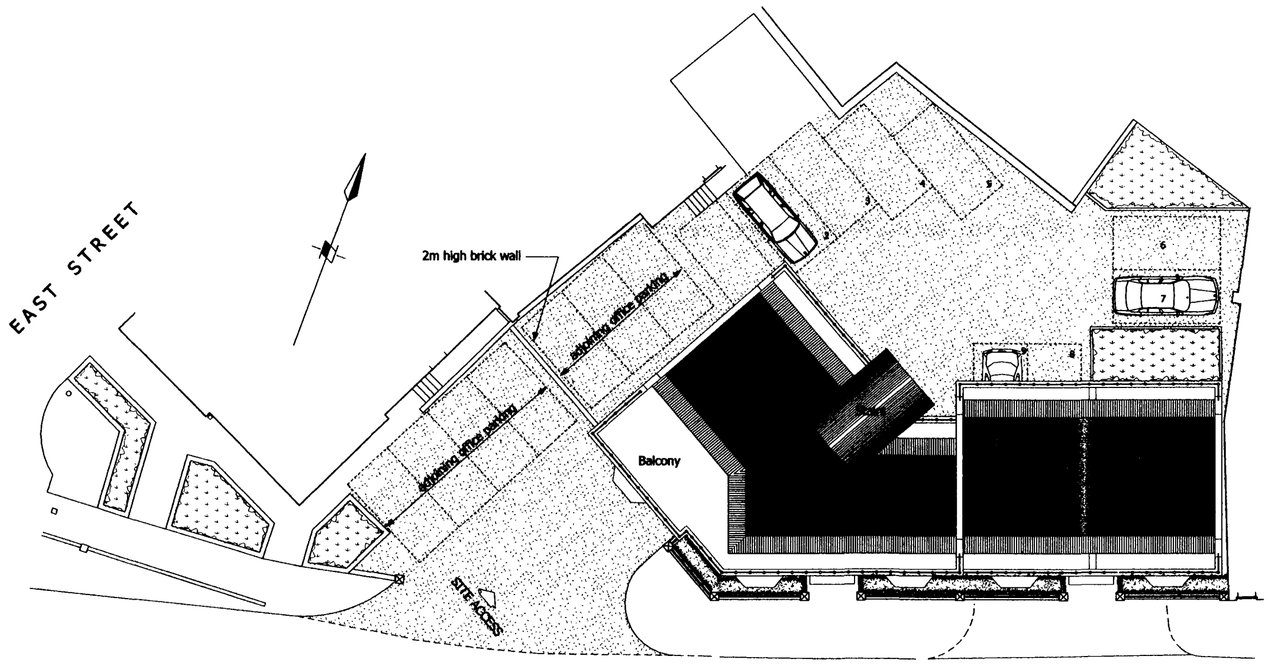
Scale	Date	Drawn
1 : 100	20.04.05.	cbassil

HIVES ARCHITECTS

Chartered Architects; Town Planners
46 Queens Road, Reading
RG1 4AU

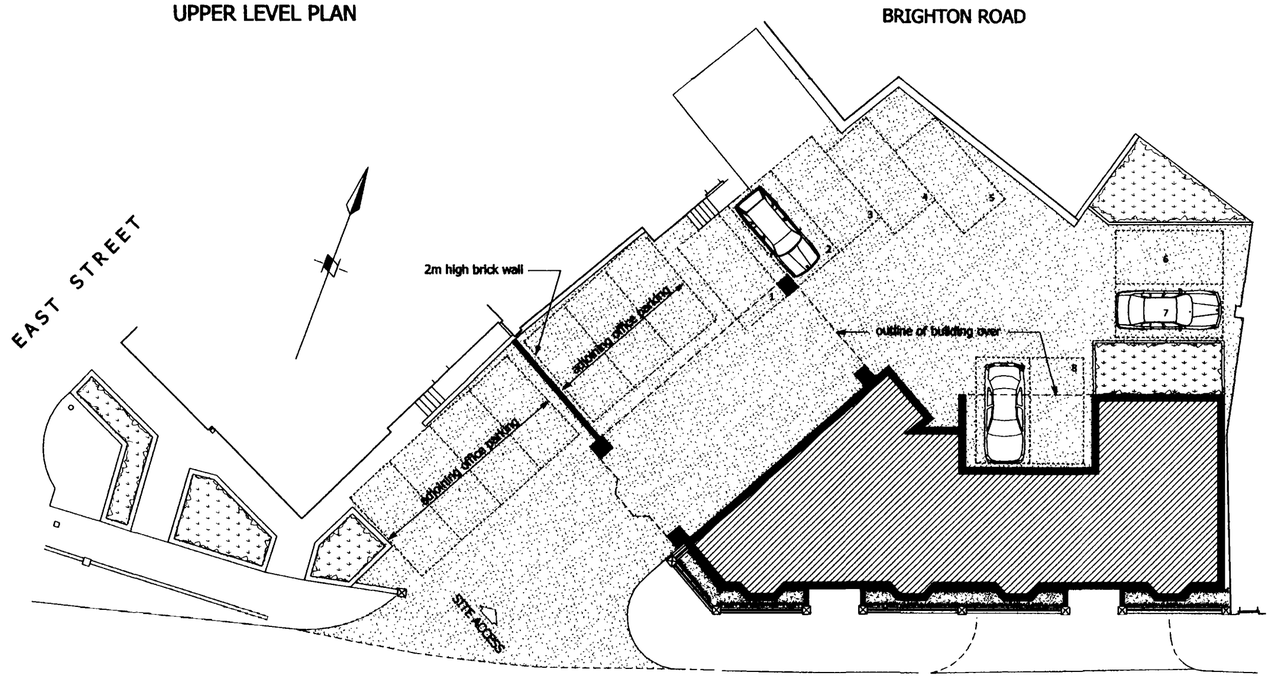
Tel: 0118 958 7331 Fax: 0118 939 4119

2339	07	P3



UPPER LEVEL PLAN

BRIGHTON ROAD



GROUND LEVEL PLAN

BRIGHTON ROAD

Received
18 JUN 2007
PLAN NO.
DATE

Client
Cornwall Garage Group

Job title

Proposed Redevelopment
412 Brighton Road
Shoreham

Drawing title

Site Plans

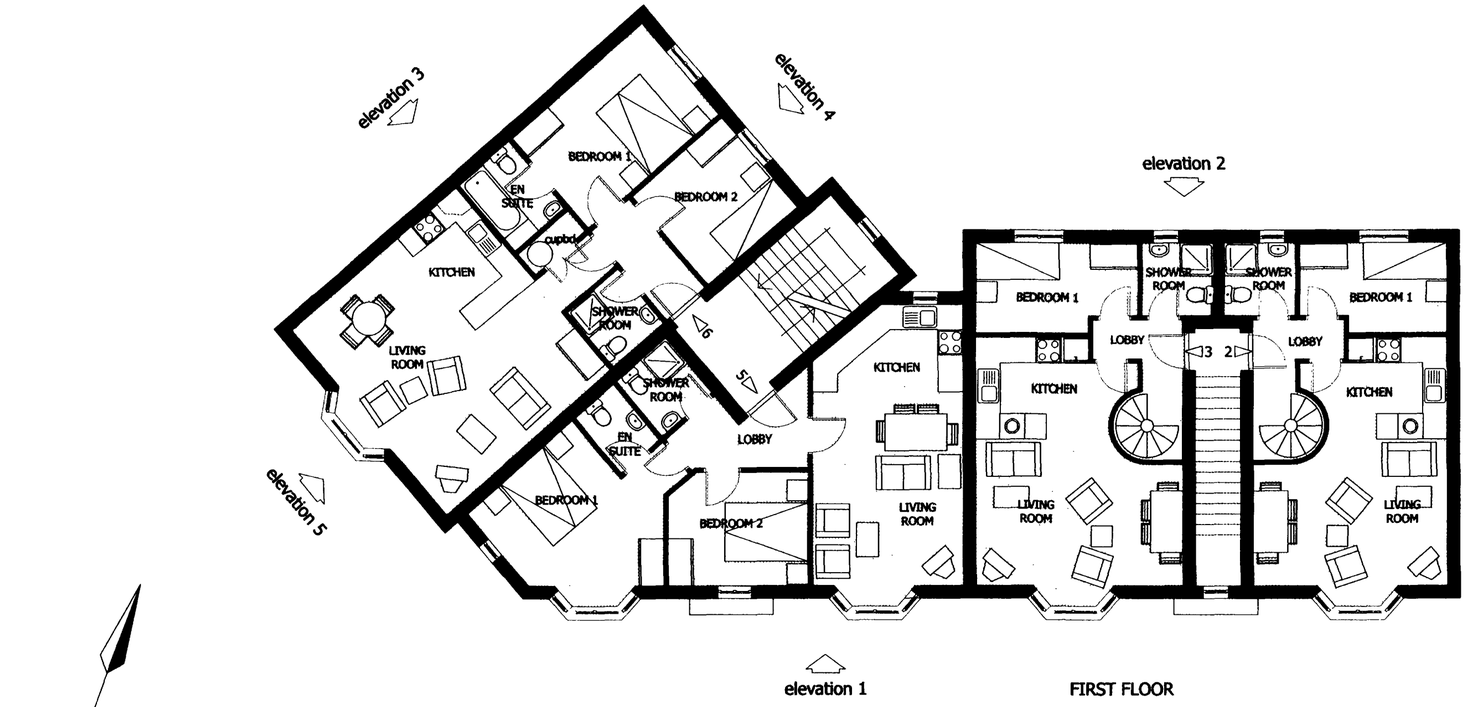
Scale	Date	Drawn
1 : 200	19.01.05.	cbassil

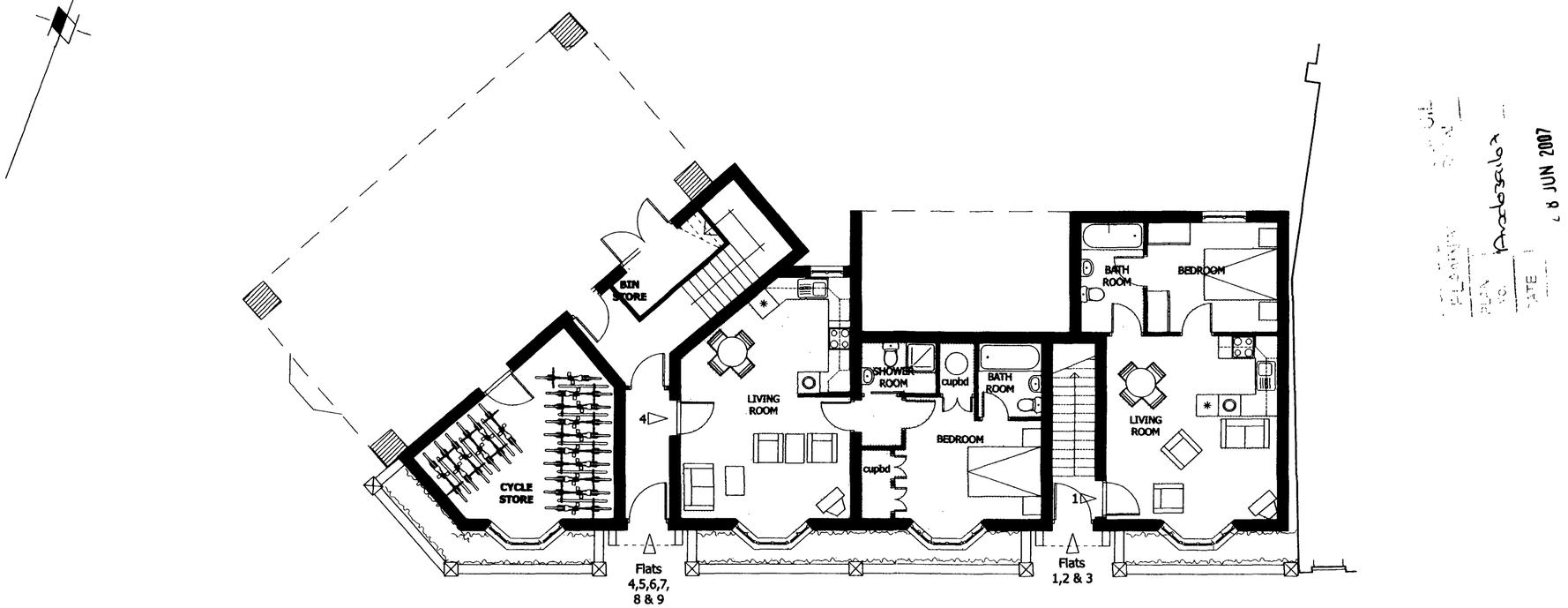
HIVES ARCHITECTS

Chartered Architects; Town Planners
43 South Street, Reading
RG1 4QU

Tel: 0118 959 7331 Fax: 0118 939 4119

2339	06	P2





8 JUN 2007

Client

Cornwall garage Group

Job title

Proposed Redevelopment
412 Brighton road
Shoreham

Drawing title

Ground Floor and
First Floor Plan

Scale	Date	Drawn
1 : 100	14.03.05.	cbassil

HIVES ARCHITECTS

Chartered Architects; Town Planners
48 Queen's Road, Reading
RG1 4BD

Tel: 0118 958 7331 Fax: 0118 939 4119

2339	04	P3



Client

Cornwall garage Group

Job title

Proposed Redevelopment
412 Brighton road
Shoreham

Drawing title

Second Floor and
Third Floor Plan

Scale	Date	Drawn
1 : 100	14.03.05.	cbassil

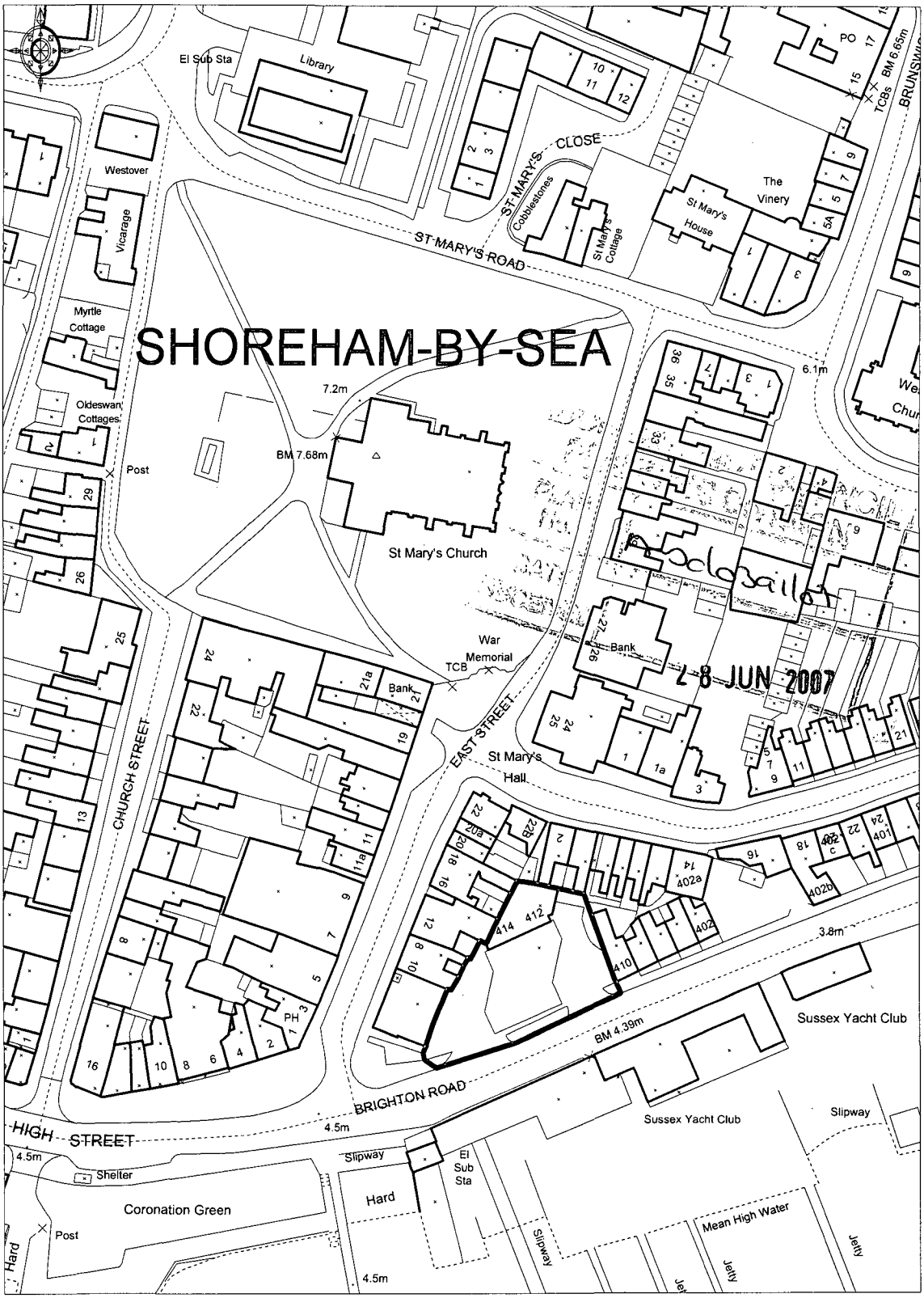
HIVES ARCHITECTS

Chartered Architects; Town Planners
48 Queen's Road, Reading
RG1 4BD

Tel: 0118 958 7331 Fax: 0118 939 4119

2339 05 P2

Plan WBP1 - Site Location Plan



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Ordnance Survey

Woolf Bond Planning
Chartered Town Planning Consultants

N

East Street

St Mary's Hall

SITE

Brighton Road

Sussex Yacht Club

High Street

Mean High Water

One way

PH

2.4 x 70m visibility splay

2.4 x 50m existing visibility splay

Proposed kerb build-out

REPRODUCED FROM ORDNANCE SURVEY R BY THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE. © CROWN COPYRIGHT. ALL RIGHTS RESERVED. LICENCE NUMBER 100018308.

ADUR DISTRICT COUNCIL
PLANNING DIVISION
PLAN No. Ad0039/07
DATE 28 JUN 200

REV		DR	CH	APP	DATE

JOB TITLE: Brighton Road Shoreham

CLIENT: Nigel Lawrence Partnership

DRAWING TITLE: Proposed Site Access with Kerb Build-Out

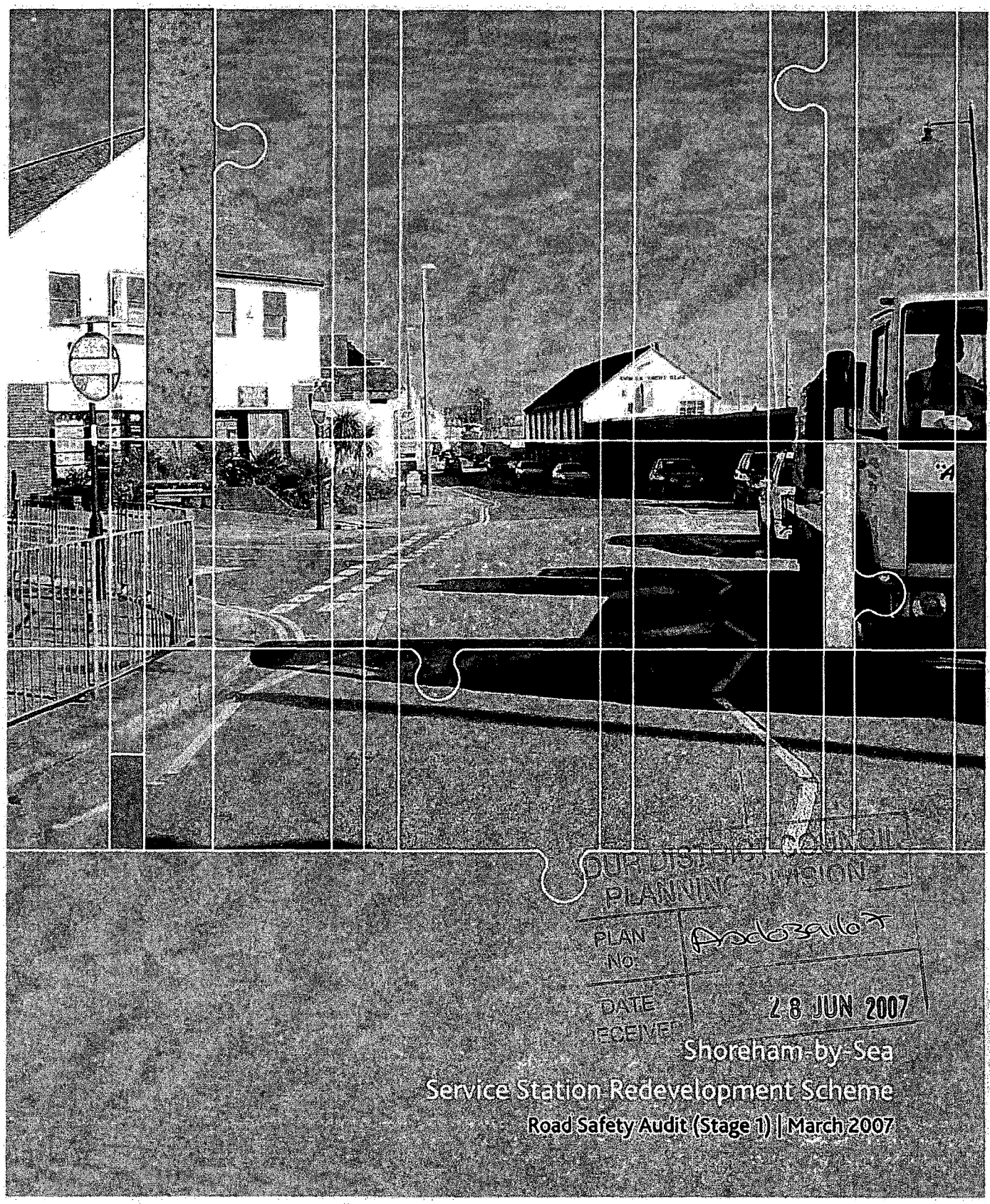
DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DATE	SCALES @ A3 SIZE	ISSUE STATUS
MJC	MJC	SEG		26/02/07	1:500	PRELIMINARY

CAPITA SYMONDS
Sundial House, 63 Cheap Street,
NEWBURY RG14 5DH
Tel: +44 (0)1635 524700 Fax: +44 (0)1635 529222

DRAWING NUMBER: CS/022134/01

REV.

NOTE THE PROPERTY OF THIS DRAWING AND DESIGN IS VESTED IN CAPITA SYMONDS LIMITED AND MUST NOT BE COPIED OR REPRODUCED IN ANY WAY WITHOUT THEIR WRITTEN CONSENT



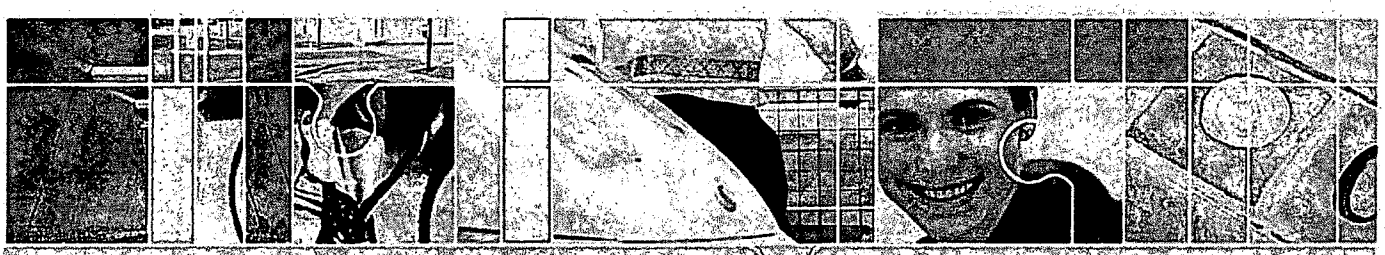
Shoreham-by-Sea

Service Station Redevelopment Scheme

Road Safety Audit (Stage 1) | March 2007

CAPITA SYMONDS

successful people, projects and performance



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Client: Capita Symonds (Newbury Office)

Issue Date: March 2007

Shoreham-by-Sea Service Station Redevelopment Scheme

Road Safety Audit (Stage 1)

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Issue Record

Rev	Date	Description/Comments	Author/Prepared by:	Approved for issue by:

CAPITA SYMONDS

Shoreham-by-Sea

Service Station Redevelopment Scheme

Road Safety Audit (Stage 1)

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Figure 1 – Reference Plan

1. Introduction

A Stage 1 Road Safety Audit for the Shoreham-by-Sea Service Station Redevelopment Scheme, was commissioned by Capita Symonds (Newbury Office) in their email dated 13th October 2006

A Road Safety Audit is defined in Standard HD 19/03 as "The evaluation of Highway Improvement Schemes during design and at the end of construction (preferably before the scheme is open to traffic) to identify potential road safety problems that may affect any users of the highway and to suggest measures to eliminate or mitigate those problems. The audit process includes the accident monitoring of Highway Improvement Schemes to identify any road safety problems that may occur after opening."

The procedures and practices associated with Road Safety Audits are set out in Standard HD 19/03 and the IHT Guidelines for the Safety Audit of Highways. The main procedural and practice features recommended in these documents include:

- Road Safety Audits should be undertaken at pre-set times in a schemes planning and implementation;
- Road Safety Audits should be performed by a team which is independent of the design team;
- The Audit Team should have specialist expertise in the fields of Road Safety Engineering and Accident Investigation and Prevention;
- Road Safety Audits should be carried out with the purpose of identifying design and/or construction features which should be modified in the interests of road safety and should seek to provide constructive recommendations as to how any design or construction difficulties can be resolved; and
- The Audit should be carried out on the basis of the information supplied to the Audit Team and should only address matters that have an adverse bearing on road safety in the context of the chosen design, with no attempt to comment on the justification or appropriateness of the chosen scheme.

In addition to the above features, Standard HD19/03 includes a model illustrating the recommended layout of the report document.

In view of the above points, no responsibility for the design or construction of the scheme can be accepted by the Auditors.

2. Road Safety Audit Team

The Audit Team consisted of:

P J Gasston MIHIE (Team Leader)
Principal Road Safety Engineer, Capita Symonds

H Kear MIHIE
Road Safety Engineer, Capita Symonds

The Audit was undertaken after a site visit, detailed examination of the submitted documents and a team meeting.

3. Scope of Road Safety Audit

3.1. This Audit reviews, from the Road Safety aspect, the proposed Shoreham-by-Sea Service Station Redevelopment Scheme including its interfaces with contiguous lengths of road and abutting side roads. The proposals are shown on the documents listed in the section entitled "Information Forming the Basis of the Audit" and broadly consists of:

(a) Redevelopment of a Service Station to provide access and egress onto Brighton Road.

3.2 No departures or relaxations from standard have been declared.

3.3 No design speed has been declared, although the Audit Team are aware that the redevelopment is within an existing street lit urban environment which is subject to a 30 mph speed limit.

3.4 The site was visited during the afternoon of Wednesday 1st November 2006. The weather was clear and the road surface was dry.

4. Information Forming the Basis of the Audit

This Road Safety Audit was undertaken on the proposals detailed in the following drawings:

Drawing Nos

2339/06/P2	Proposed Redevelopment 412 Brighton Road Sketch Proposals Plans and Elevations Hives Architects (Scales 1:500)
2	Shoreham Service Station Environmental Assessment Surrounding Land Use Plan SLR Consulting (Scales 1:500)

5. Declaration

We confirm that this Road Safety Audit has been undertaken on the documents listed in the section entitled "Information Forming the Basis of the Audit" in accordance with the recommended procedures and represents an independent assessment of the road safety implications at this stage of this scheme's design.

No member of the Road Safety Audit team has been involved in scheme design.

Audit Team Leader

P Gasston MIHIE
Principal Road Safety Engineer
Capita Symonds
Ty Gwent
Lake View
Llantarnam Park
Cwmbran
NP44 3HR

..... Signed

..... Date

Audit Team Member

H Kear MIHIE
Road Safety Engineer
Capita Symonds
Ty Gwent
Lake View
Llantarnam Park
Cwmbran
NP44 3HR

6. Site Specific Comments and Recommendations

For the location of the points raised in this section, see the Reference Plan (Figure 1).

6.1 Problem

Visibility to the west from the proposed access/egress is restricted by vehicles waiting at the junction of East Street with Brighton Road and the existing horizontal alignment towards High Street. Vehicles waiting to turn onto Brighton Road from East Street will block the visibility of drivers exiting the proposed development and this may result in a collision with an eastbound vehicle.

Recommendations

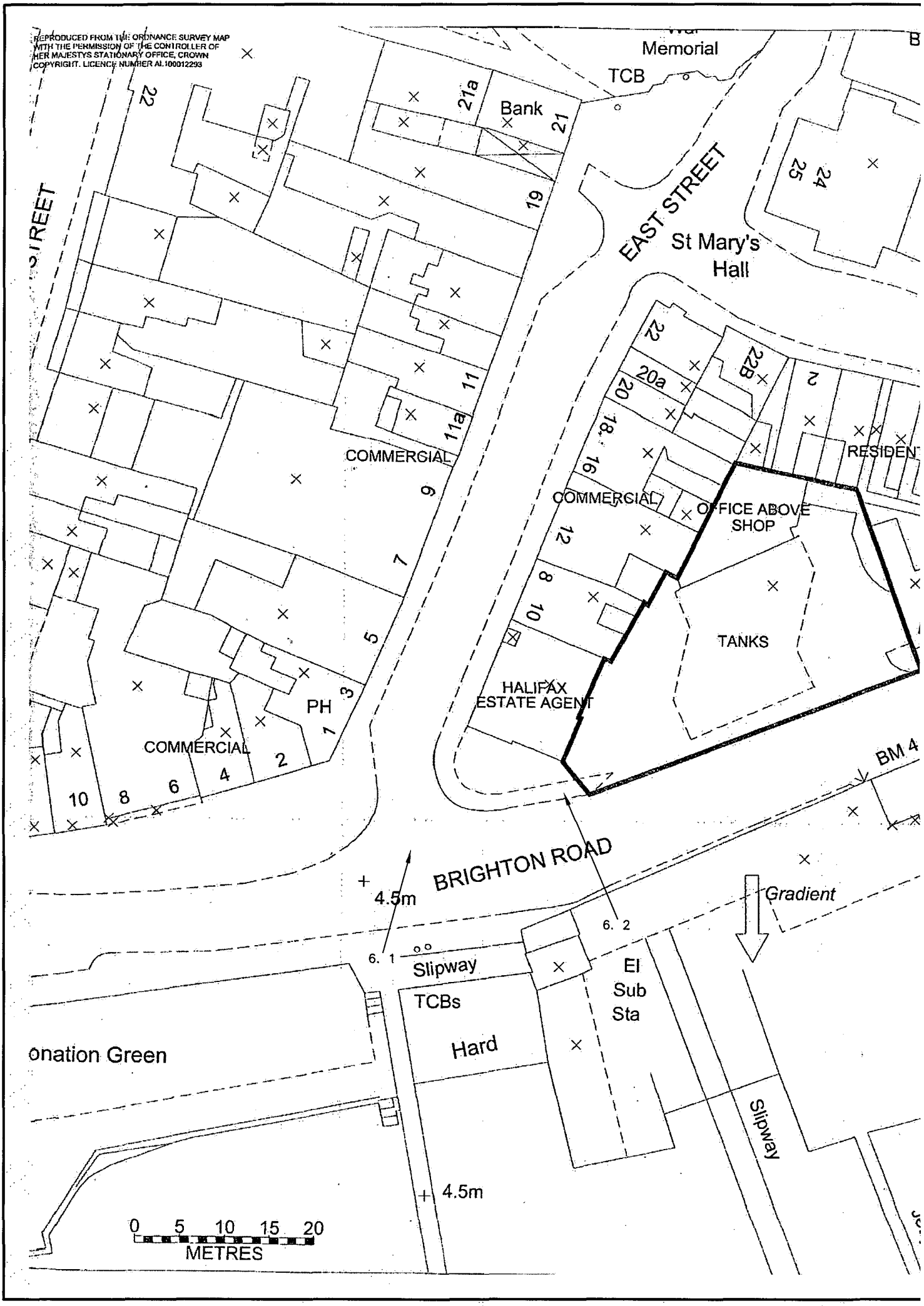
Westbound visibility for drivers would be improved if the proposed access/egress was moved to the more easterly of the existing accesses. If this is not possible, then the kerbline between the proposed access/egress and East Street could be built out into Brighton Road to improve drivers' visibility. If neither of these options is possible, then a length of existing high friction surfacing could be extended through to the proposed access/egress to assist eastbound drivers in slowing and stopping.

6.2 Problem

There are existing brick planters to the western side of the existing access/egress which appear to be retained in the proposed layout. The plants currently contained in these planters also restrict visibility to the west and this may exacerbate the problem identified in Problem 6.1.

Recommendation

If these planters are retained, cut back the existing foliage to ensure a clear visibility envelope.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ENVIRONMENTAL ASSESSMENT
AND
QUANTITATIVE RISK ASSESSMENT REPORT

SHOREHAM SERVICE STATION
412 BRIGHTON ROAD,
SHOREHAM BY SEA,
WEST SUSSEX
BN43 5DR

SLR Job No. 402/0620/00005/01

Prepared for:

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2 Norfolk Court
Norfolk Road
Rickmansworth
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WD3 1LA

ADUR DISTRICT COUNCIL
PLANNIN[illegible]SION
PLAN No. Ad/0341/07
DATE RECEIVED 28 JUN 2007

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April 2006

Distribution: 1 Copy in PDF Format — Cornwall Motor Group
1 Copy — SLR Consulting Limited

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Appendix A: Investigation Methodology
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EXECUTIVE SUMMARY

SLR Consulting Limited (SLR) was initially retained by Cornwall Motor Group in May 2005 to undertake an environmental assessment at Shoreham Service Station, 412 Brighton Road, Shoreham by Sea, BN43 5DR. The purpose of the investigation was to identify the presence of subsurface hydrocarbons from previous and present site usage.

SLR has subsequently been retained in March 2006 by Cornwall Motor Group to undertake supplemental investigations at the site. This report builds on a report prepared by SLR in May 2005 and presents the results of the supplemental investigation and a Quantitative Risk Assessment (QRA) for the site.

The site is located in an urban area. It is fully operational with four pump islands and six underground fuel storage tanks located in the centre of the forecourt. The shop is in the Northern area of the site with an air-pump to the east.

Three boreholes were advanced to a maximum depth of 5m bgl by SLR on the 10th May 2005. A further four boreholes were advanced to a maximum depth of 6m bgl by SLR on the 15th March 2006.

The ground conditions comprised of reinforced concrete over made ground to 2.3m depth (BH5), overlying sandy gravely clay or clayey gravel, interpreted to be Head Deposits, to 3.7m depth (BH6). This was underlain by Chalk bedrock to the maximum drilled depth of 6m, except in BH7 organic clay was identified to 6m depth. BH1 met refusal at 1.5m in clayey gravels.

Visual and olfactory observations of hydrocarbons were recorded in boreholes BH2, BH3 and BH5. Organic vapours were recorded in six of the boreholes (low measurements in BH4), with a maximum reading of 910ppm in BH5 at a depth of 2.0mbgl.

Low DRO concentrations were recorded in soil samples from BHs 5 (0.5-1.0m), 6 and 7, whilst moderate concentrations were recorded in BHs 1, 2 and 4. High concentrations were recorded in BHs 3 and 5 (2.0m). Low PRO and BTEX concentrations were recorded in all samples. A slightly elevated benzo(a)pyrene (BaP) concentration was recorded in BH1. Other samples recorded low BaP concentrations. No elevated metal concentrations were recorded in the soil samples.

Groundwater was encountered at 2.06m to 5.48m below ground level in March 2006. The flow direction is likely to be towards the south (the field measurements in March 2006 are inconclusive in this respect) towards the River Adur, and is likely to be affected by tidal fluctuations. No phase separated hydrocarbons were encountered in any of the monitoring wells.

Laboratory analysis of groundwater samples in March 2006 recorded high concentrations of petrol in BH5 (12.8 mg/l) and low concentrations of petrol in BHs 2 and 3. Previous monitoring of groundwater from BHs 2 and 3 in May 2005 recorded higher concentrations of petrol and diesel in these wells than those recorded in March 2006. Trace BTEX and MTBE were recorded in samples from BHs 2, 3 and 5, with the highest concentrations recorded in BH5.

Completion of a Quantitative Risk Assessment has indicated that the site would need to be subject to remediation to render it suitable for residential redevelopment.

A review of the potential remediation options would suggest that a combination of source removal (tank and impacted soil/groundwater excavation) coupled with measures to break potential pollutant linkages (e.g. inclusion of appropriate hydrocarbon membranes within the new residential buildings has been recommended as the most effective technical and commercial solution at this site.

Completion of the remediation works to the appropriate standard and subject to Planning Authority approval should mean the site can be rendered suitable for residential redevelopment.

1.0 INTRODUCTION

SLR Consulting Limited (SLR) was retained by Cornwall Motor Group to undertake an environmental assessment at Shoreham Service Station, 412 Brighton Road, Shoreham-by-Sea, West Sussex, BN43 5DR. The purpose of the investigation was to identify the presence of subsurface hydrocarbons from previous and present site usage, with a view to submitting a planning application for redevelopment of the site.

The intrusive investigation undertaken on site concentrated on areas that were hydrologically down gradient of former and existing potential contaminant sources e.g. underground tanks and pump dispensers and adjacent to potential sensitive off site receptors where site conditions allowed.

The programme of works included the following:

- Contacting the Petroleum Officer local for the site;
- Performing a full underground services and fuel system trace;
- Advancing seven boreholes to a maximum depth of 6m in two stages of work;
- Completing six boreholes as permanent 50mm diameter monitoring well to monitor gas and groundwater conditions;
- Field screening soil samples for hydrocarbon vapours, and;
- Retaining and analysing representative soil and groundwater samples for petroleum indicators.

This report summarises the background information of the site and presents the results of the field and laboratory programmes conducted in May 2005 and March 2006 by SLR. Field and laboratory methodologies used during the investigation are presented in Appendix A. Appendix C presents borehole logs with monitoring well installation details and Appendix D presents the analytical chemistry results. Historical maps are included in Appendix E.

2.0 BACKGROUND INFORMATION

The following table describes the background details of the property, and has been reported previously[1]. The site location is illustrated on Drawing 1, surrounding land-use on Drawing 2 and a layout of underground services at the site on Drawing 3. The locations of the boreholes drilled are also illustrated on Drawing 3 and photographs of the site are appended as Drawing 4.

TABLE 1: BACKGROUND INFORMATION

		SLR Ref: 402.0620.00005
Client	Cornwall Motor Group	
Purpose of SI	Environmental Condition Survey prior to planning for redevelopment.	
Report Date	May 2006	
Desk Study	Undertaken. Landmark Envirocheck, Historical maps, Geology. Information on file.	
SI Strategy	Concentrated on areas hydrologically down gradient of former and or existing potential petroleum sources e.g. underground tanks and pump dispensers with supplemental boreholes drilled to provide further coverage where safe working distances allowed.	
Service Trace	Undertaken: On File, included as Drawing 3.	
Current Usage	Operational Filling Station, Car Vac, Air and Water facilities, Shop: Approximately 500m^2 site area Site is surfaced in hardstanding.	
Station Facilities	Six underground tanks, located in centre of forecourt, Four pump islands and interceptor: Tank 1: LRP, 53,300 Litres to pumps 1-4 Tank 2: Unleaded, 26,700 Litres to pumps 5-6 Tank 3: Unleaded, 27,100 Litres to pumps 7-8 Tank 4: LRP, 13,000 Litres to pumps 7-8 Tank 5: Diesel, 36,000 Litres to pumps 3-4 Tank 6: Unleaded, 22,300 Litres to pumps 1-2 & 5-6	
Surrounding Land Use	North	Two storey Retail and residential properties
	East	Two storey Retail and residential properties
	South	Brighton Road, Sussex Yacht Club beyond
	West	Retail and residential properties
Site History	1873-1879	The site is developed and is occupied by residential/ commercial properties. It is bordered by 'Lower Road' to the South, 'East Street' to the West and 'New Road' to the North. To the South, approximately 30m, a large premises occupying an approximate area of 75m sq exists, thought to be that of a Shipbuilding Yard. 30m to the South the River Adur is situated which flows to the East to directly join the sea. 200m to the West another Shipbuilding Yard is situated. Approximately 250m to the North a Railway line exists running East to West. 100m to the East exists a Mud Shoreline which stretches 100m from the Road to the River. 150m to the Northeast 'Steyning Union Workhouse' is illustrated. Surrounding land to the North, East and West generally comprises residential/ commercial properties, Schools and a Church (50m North).
	1898	There are no significant changes to the site. The surrounding area has undergone limited development 200m to the Northeast with the building of an infirmary and chapel replacing allotment gardens.

[1] Phase 1 Desk Study and Conceptual Site Model, Shoreham S/S, letter report to Adur District Council, dated 11th April 2005

		SLR Ref: 402.0620.00005
Site History	1912	There are no significant changes to the site. A wharf is marked up directly to the East of the shipbuilder's yard, approximately 100m from the site. There has been some minor redevelopment to the infirmary with buildings having been demolished. It is now marked as children's homes.
	1930-1933	There are no significant changes to the site or surrounding area. A toll bridge 30m to the Southwest has been constructed over the River linking land to the south. The land on the other side of the river has undergone development.
	1952	The site remains unchanged. The surrounding area has undergone limited significant change. 'Lower Road' has been renamed 'Brighton Road'. 'Shoreham Harbour' is marked up 100m to the East.
	1964-1969	The site remains unchanged. An existing adjacent building 20m to the Southwest is now marked as a 'Garage' – probably car work shop. The shipbuilder's yard to the South is now 'Sussex Yacht Club'. The shipbuilder's yard to the West has been replaced with residential properties.
	1974-1984	The site remains unchanged. There is little significant change to the surrounding area with some limited redevelopment.
Geography	Gradient	Site slopes to the south towards River Adur, located at a distance of 30m.
	Elevation	Approx 4m Above Ordnance Datum.
	Surface Water	30m to the South (River Adur and Shoreham Harbour, both tidal)
Geology and Hydrogeology	Ground Conditions	Made Ground over Head deposits, overlying up to 10m of Woolwich and Reading Beds with Cretaceous Upper Chalk below (BGS Sheet 318/333 Brighton and Worthing 1:50,000).
	Aquifer	Minor Aquifer (Woolwich and Reading Beds) over Major Aquifer (Chalk).
	Abstractions	None within a 1km radius (Landmark Envirocheck).
PRELIMINARY CONCEPTUAL SITE MODEL		
Sources	Current Petroleum Fuel storage and distribution infrastructure below ground in forecourt. Possible previous historical petroleum and oil storage beneath adjacent garage to the west. No identified historical contaminative uses on site.	
Pathways	Localised water migration through granular fill. Localised migration through service ducts. Lateral groundwater migration through the Head deposits to towards River Adur. Vapour migration of soil gas to properties. Possible Vertical Migration to Chalk if head is thin. Direct contact of future site users with soils if unsurfaced areas present.	
Receptors	Future site users. Current Site Staff and Users. Occupants of surrounding buildings. Underlying Chalk Aquifer (Thick Head deposits and Woolwich and Reading Beds will Mitigate risk). River Adur 30m to south.	
Assessment	**MEDIUM to HIGH RISK**	
POTENTIAL CONTAMINANTS		
Current Site Use	Petroleum Hydrocarbons; Petrol, Diesel, BTEX, MTBE	
Previous Site Use	None identified.	
Adjacent Land Uses	Former Garage workshop adjacent to the west: Petroleum Hydrocarbons; Petrol, Diesel, BTEX.	

3.0 RESULTS OF THE ASSESSMENT

3.1 General

SLR Consulting Ltd has conducted intrusive site investigations at the site in May 2005 and March 2006. The scope of investigation included the following:

- Contacting the petroleum officer to inform him of the proposed site investigation;
- Instructing Ground Restoration Limited to conduct a full underground services and fuel system trace;
- Drilling three boreholes (BHs 1-3) using a hollow stem auger drilling rig, supplied and operated by Tor Drilling Ltd, to a maximum depth of 5m bgl by SLR on the 10th May 2005. The objective being to reach the groundwater table beneath the site and hence determine the extent of soil and groundwater contamination;
- Drilling four boreholes (BHs 4-7) using solid stem auger drilling rig, supplied and operated by ESL, to a maximum depth of 6m by SLR on the 15th March 2006. The objective being to reach the groundwater table beneath the site and hence more accurately determine the extent of soil and groundwater contamination
- Sampling and logging the soil strata for visual and olfactory indications of petroleum hydrocarbons, polyaromatic hydrocarbons, heavy/phytotoxic metals, soil type, grain size and strength using classification defined in BS5930;
- Completion of boreholes BHs 2 to 7 as permanent 50mm diameter groundwater monitoring wells;
- Field screening sixty seven soil samples for hydrocarbon vapours; and;
- Retaining and analysing sixteen soil samples and eight groundwater samples (BH2 and BH4 were sampled on two occasions) for petroleum indicators: BTEX (Benzene, Toluene, Ethyl benzene and Xylenes), MTBE (Methyl Tertiary Butyl Ether), and DRO (Diesel Range Organics) with hydrocarbon matching and PRO (Petrol Range Organics) or TPH Working Group Determination, speciated PAHs (Polyaromatic Hydrocarbons) and heavy/phytotoxic metals.

The results of the assessment are described in Sections 3.2, 3.3 and 3.4 with the field and laboratory methodologies included in Appendix A. Borehole logs are included in Appendix C and analytical test data in Appendix D.

3.2 Soil

3.2.1 Borehole Locations

SLR advanced seven boreholes, positioned as follows:

- BH1: located south east of tank farm close to the site boundary.
- BH2: located south of the tank farm close to the site boundary.
- BH3: Located south west of tank farm adjacent to pumps 1/2.
- BH4: Located east of the tanks and close to the site boundary (close to adjacent residential properties).

- BH5: Located mid way along the southern site boundary (between BHs 2 and 3).
- BH6: Located to the west of the tanks and close to the site boundary (close to adjacent building society and shops/residential properties).
- BH7: Located in the south west corner of the site.

The borehole positioning generally reflected locations that were either in close proximity to, or downgradient of, the fuel system (tanks, pump islands and fuel lines) relate to the site topography or adjacent to potential off site receptors.

3.2.2 Stratigraphy

The ground conditions comprised of reinforced concrete over made ground to 2.3m depth (BH5), overlying sandy gravely clay or clayey gravel, interpreted to be Head Deposits, to 3.7m depth (BH6). This was underlain by Chalk bedrock to the maximum drilled depth of 6m, except in BH7 organic clay was identified to 6m depth. BH1 met refusal at 1.5m in clayey gravels.

3.2.3 Field Observations

Sixty seven screening tests were undertaken on the soil with sixteen representative samples retained for laboratory analysis. The results of the field screening tests are summarised in Table 2.

TABLE 2: SUMMARY OF FIELD OBSERVATIONS

BH Label	Completion Depth (m)	Indications of Hydrocarbons	Maximum Field Screening Test Result (ppmTOV)[1]
BH1	1.5	None observed	50 @ 1m
BH2	5.0	Grey Staining, and hydrocarbon odour below 4m	295 @ 5m
BH3	4.0	Hydrocarbon odour below 3m	550 @ 3-4m*
BH4	6.0	None observed	15 @1.5m
BH5	6.0	Grey/black discoloration with moderate hydrocarbon odour	910 @ 2m
BH6	6.0	None observed	145 @ 1.5m
BH7	6.0	None observed	70 @ 4.5m

[1]Readings in parts per million Total Organic Volatiles, measured using a GMI Gasurveyor calibrated to pentane
*Due to poor recovery the soils from 3-4 m was obtained from auger drill as a composite sample.

Visual and olfactory observations of hydrocarbons were recorded in borehole BH2, BH3 and BH5. Organic vapours were recorded in six of the boreholes (low measurements in BH4), with a maximum reading of 910ppm in BH5 at a depth of 2.0m below ground level.

3.2.4 Analytical Chemistry Results

Sixteen soil samples were collected from the shallow soils and submitted to Alcontrol Geochem of Chester for analysis for petroleum indicators, PAHs and heavy/phytotoxic metals. The results of which are shown in Tables 3 and 4.

TABLE 3: ANALYTICAL CHEMISTRY RESULTS – HYDROCARBONS

BH Label	BH1	BH2	BH3	BH4	BH5	BH5	BH6	BH6	BH7
Depth (m)	**1.5**	**5.0**	**3-4**	**1.0**	**0.5-1**	**2.0**	**1.5**	**3.5**	**1.5**
DRO	250	270	1800	100*	46*	1500*	3.1*	1.2*	310*
PRO	0.01	10	13	<0.1	<0.1	41*	<0.1	<0.1	<0.1
Benzene	<0.01	0.02	0.02	<0.01	<0.01	0.07	<0.01	<0.01	<0.01
Toluene	<0.01	<0.01	0.07	<0.01	<0.01	0.64	<0.01	<0.01	<0.01
Ethyl benzene	<0.01	0.05	0.15	<0.01	<0.01	0.89	<0.01	<0.01	<0.01
Total Xylene	0.01	0.2	0.70	<0.01	<0.01	4.4	<0.01	<0.01	<0.01
MTBE	<0.01	0.31	0.44	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	2.1	0.22	0.27	1.3	0.4	-	0.02	-	0.3
Total speciated PAH	26	2.8	4	15	5.2	-	0.8	-	6.2

All concentrations are measured in milligrams per kilogram (mg/kg), rounded to two significant figures
DRO - Diesel Range Organics
PRO – Petrol Range Organics
MTBE - Methyl Tertiary-Butyl Ether
* Calculated from TPHCWG analysis

TABLE 3: ANALYTICAL CHEMISTRY RESULTS – METALS

Sample Identity	BH4	BH5	BH6	BH7	CLEA Soil Guideline Value
Depth (m)	**1.0**	**0.5-1.0**	**1.5**	**1.5**	
Boron Water Soluble	2	1	<1	<1	-
Arsenic	2	2	2	<1	20
Barium	67	150	180	27	-
Beryllium	<1	<1	<1	<1	-
Cadmium	<1	<1	<1	<1	1
Chromium	19	26	31	44	130
Copper	25	80	100	10	-
Lead	110	89	100	14	450
Mercury	<1	<1	<1	<1	8
Nickel	14	11	13	12	50
Selenium	<3	<3	<3	<3	35
Vanadium	24	22	26	21	-
Zinc	77	82	100	30	-

All concentrations are measured in milligrams per kilogram (mg/kg), rounded to two significant figures

Low DRO concentrations were recorded in BHs 5 (0.5-1.0m), 6 and 7, whilst medium concentrations were recorded in BHs 1, 2 and 4. High concentrations were recorded in BHs 3 and 5 (2.0m), located to the south of the forecourt. Low PRO and BTEX concentrations were recorded in all samples.

Elevated (>1mg/kg) benzo (a) pyrene (BaP) concentration was recorded in BH1 and BH4. Other samples recorded low BaP concentrations.

No elevated metal concentrations were recorded in the soil samples.

3.3 Groundwater

3.3.1 Regional Hydrogeology

The site is located approximately 25-30m north of the River Adur, the river level (at low tide) is located approximately 3m to 4m below ground level.

The underlying chalk is classified as a major aquifer with soils of high leaching potential. The site is not located within a groundwater source protection zone. There are no licensed groundwater abstractions within 1km of the site (Landmark Envirocheck).

3.3.2 Groundwater Monitoring Data

Monitoring wells were installed in six boreholes (BHs 2-7). Groundwater monitoring data is presented in Table 4.

TABLE 4: GROUNDWATER MONITORING DATA

Well No	Screened Interval (m)	Ground Surface Elevation	Groundwater Depth (m)[1]	Groundwater Elevation (mATBM)	PSH[2] (mm)	Well Headspace (ppmTOV)[3]
BH2	2.5-5.0	10.06	3.75	6.31	nil	2600
BH3	1.0-5.0	10.44	2.06	8.38	nil	85
BH4	1.0-6.0	10.00	4.16	5.84	nil	0
BH5	1.0-6.0	10.13	4.25	5.88	nil	2700
BH6	1.0-6.0	10.49	4.32	6.17	nil	230
BH7	3.0-6.0	10.60	5.48	5.12	nil	5

Note: groundwater level measurements for BHs 2 and 3 relate to March 2006, the levels recorded in these wells in May 2005 were 4.37m and 1.91m below ground level, respectively. The March 2006 levels in these wells have not been used within the hydraulic gradient assessment as they relate to a different temporary datum.

[1] Depths are below grade measurements

[2] Phase Separated Hydrocarbons

[3] parts per million Total Organic Volatiles, measured using a GMI Gasurveyor calibrated to pentane

Groundwater was encountered at 2.06m to 5.48m below ground level in March 2006. The wells were purged and samples obtained for chemical analysis from all the boreholes at the end of the site investigation. The high variation indicates the presence of low and variable permeability strata.

The hydraulic gradient is likely to be towards the south (the field measurements in March 2006 are inconclusive in this respect) towards the River Adur, and is likely to be affected by tidal fluctuations. No phase separated hydrocarbons were encountered in any of the monitoring wells.

3.3.3 Analytical Chemistry Results

Two groundwater samples were obtained from borehole BH2 and BH3 in May 2005, and were submitted to Alcontrol Geochem of Chester, for analysis for petroleum indicators. The two existing wells (BH's 2 and 3) were sampled along with the four new wells in March 2006. The samples were analysed for BTEX, MTBE, PRO and DRO concentrations, the results of which are shown in Table 5.

TABLE 5: ANALYTICAL CHEMISTRY RESULTS – GROUNDWATER

BH Label	BH2		BH3		BH4	BH5	BH6	BH7
Date	May 05	Mar 06	May 05	Mar 06	Mar 06	Mar 06	Mar 06	Mar 06
DRO	0.50	<0.01	21	0.20	<0.01	0.02	0.02	<0.01
PRO	3.3	0.50	12	0.30	<0.01	13	<0.01	<0.01
Benzene	<0.01	<0.01	0.02	<0.01	<0.01	1.0	<0.01	<0.01
Toluene	<0.01	<0.01	0.08	<0.01	<0.01	0.9	<0.01	<0.01
Ethyl benzene	<0.01	<0.01	0.11	<0.01	<0.01	1.1	<0.01	<0.01
Total xylenes	0.03	0.02	0.50	0.02	<0.01	3.6	<0.01	<0.01
MTBE	0.10	0.10	0.40	<0.01	<0.01	0.50	<0.01	0.02

All concentrations are measured in milligrams per litre (mg/l).

Laboratory analysis of groundwater samples in March 2006 recorded high concentrations of petrol in BH5 (13mg/l) and low concentrations of petrol in BHs 2 and 3. Previous monitoring of groundwater from BHs 2 and 3 in May 2005 recorded higher concentrations of petrol and diesel in these wells than those recorded in March 2006.

Trace to low BTEX and MTBE concentrations were recorded in samples from BHs 2, 3 and 5, with the highest concentrations recorded in BH5.

4.0 QUANTITATIVE RISK ASSESSMENT

In order to determine whether there is an actual or potential risk to human health SLR concluded that a simple site-specific Quantitative Risk Assessment (QRA) would be undertaken.

4.1 Summary of Conceptual Site Model

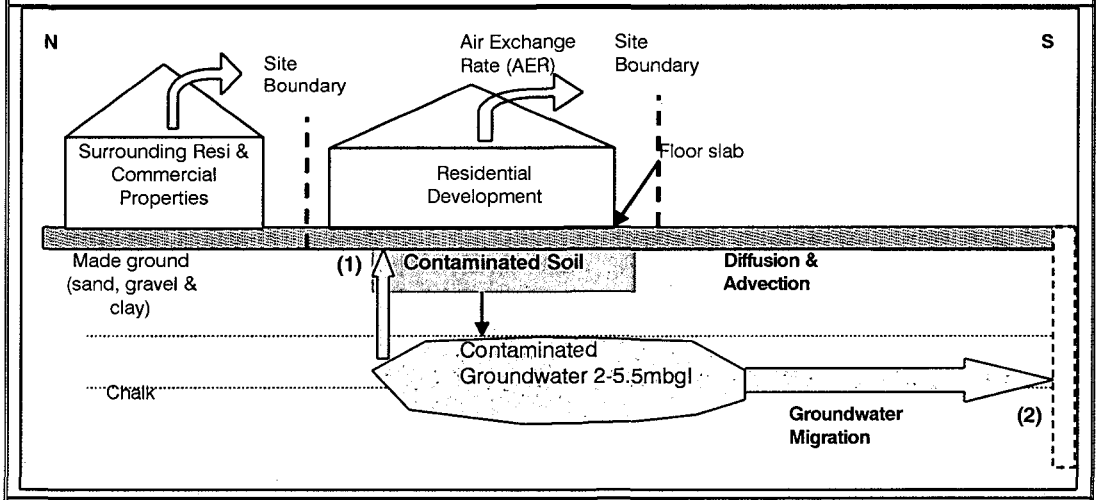
Based upon the simple conceptual model outlined in Section 2 the significant potential linkages appear to be:

1. Hydrocarbons in soil and shallow groundwater causing elevated petroleum vapours in indoor air of future on-site residents (the direct ingestion pathway is not considered due to the likely total coverage by hard standing and a lack of garden space associated with a residential redevelopment comprising flats)

2. Hydrocarbons in groundwater migrating off-site and causing potential exceedance of environmental quality standards in the nearby River Adur (30m to south).

Based on the above, Figure 1 illustrates the completed source – pathway – target linkage for the site, regarding its potential future development as residential flats.

Figure 1:Conceptual Site Model – Shoreham PFS Site



Pollutant Linkages

(1) Impacted soil and groundwater to indoor air of future on-site residential property

(2) Impacted groundwater migration offsite to River Adur at 30m south.

4.2 Quantitative Risk Assessment Modelling Results

4.2.1 Calculated Groundwater Guideline Values

A detailed site specific quantitative risk assessment was undertaken for the following contaminants which are anticipated to be present in the soil and groundwater beneath a petrol filling station:

- PRO (including constituent TPHCWG fractions).
- DRO (including constituent TPHCWG fractions).
- BTEX compounds.
- MTBE.

A site specific RBCA risk assessment was conducted for potential future on-site residents and groundwater migration to the River Adur at 30m south. A summary of the results of the quantitative risk assessment are summarised in the Table below; the proposed risk based targets (soil/groundwater guideline values, S/GGVs) are identified in the first column.

TABLE 6: RESULTS OF THE QUANTITATIVE RISK ASSESSMENT

(1) SOIL – INDOOR AIR – ON-SITE RESIDENTIAL					
Contaminant	**SGV (mg/kg)**	**EPC (mg/kg)**	**EPC Type**	**No. over SGV**	**Pass/Fail**
DRO	310*	1800	Max	**1**	**Fail**
PRO	126	13	Max	0	Pass
Benzene	1.0	0.07	Max	0	Pass
Toluene	81	0.64	Max	0	Pass
Ethylbenzene	271	0.89	Max	0	Pass
Xylenes	86	4.4	Max	0	Pass
MTBE	975	0.44	Max	0	Pass
TPH 6 C aliphatics	>290	1.2	Max	0	Pass
TPH >6-8 C aliphatics	>150	7.2	Max	0	Pass
TPH >8-10 C aliphatics	>85	6.4	Max	0	Pass
TPH >10-12 C aliphatics	>52	4.4	Max	0	Pass
TPH C >12-C16 aliphatics	>23	8.9	UCL	0	Pass
TPH C >16-C21 aliphatics	N/A	34	UCL	0	Pass
TPH C >21-C34 aliphatics	N/A	650	UCL	0	Pass
TPH C >8-10 C aromatics	79	15	Max	0	Pass
TPH C >10-12 C aromatics	>380	6.6	Max	0	Pass
TPH C >12-C16 aromatics	>180	1.9	UCL	0	Pass
TPH C >16-C21 aromatics	N/A	13	UCL	0	Pass
TPH C >21-C35 aromatics	N/A	180	UCL	0	Pass
Benzo(a)pyrene	>23	2.1	Max	0	Pass
Naphthalene	34	0.84	Max	0	Pass
Overall Hazard Index for Petroleum Hydrocarbons = 0.38					

Notes:
1) SGV – Soil guideline value
2) GGV – Groundwater guideline value
3) EPC – Exposure Point Concentration
4) Fail – Concentrations recorded that exceed the SGV or GGV
5) * SGV or GGV calculated using the hazard quotient.
6) N/A - No inhalation reference concentrations available as CoC is non volatile

(1) GROUNDWATER – INDOOR AIR – ON-SITE RESIDENTIAL					
Contaminant	**GGV (mg/l)**	**EPC (mg/l)**	**EPC Type**	**No. over SGV**	**Pass/Fail**
DRO	0.011	0.200	Max	**3**	**Fail**
PRO	72	12.8	Max	0	Pass
Benzene	1.1	1.000	Max	0	Pass
Toluene	78	0.9	Max	0	Pass
Ethylbenzene	>170	1.1	Max	0	Pass
Xylenes	96	3.6	Max	0	Pass
MTBE	3700	0.5	Max	0	Pass
TPH 6 C aliphatics	20	1.4	Max	0	Pass
TPH >6-8 C aliphatics	>5.4	1.3	Max	0	Pass
TPH >8-10 C aliphatics	0.45	1.2	Max	**1**	**Fail**
TPH >10-12 C aliphatics	0.29	0.18	Max	0	Pass
TPH C >12-C16 aliphatics	0.068	0.010	Max	0	Pass
TPH C >16-C21 aliphatics	N/A	0.010	Max	0	Pass
TPH C >21-C34 aliphatics	N/A	0.22	Max	0	Pass
TPH C >8-10 C aromatics	15	6.5	Max	0	Pass
TPH C >10-12 C aromatics	>25	0.27	Max	0	Pass
TPH C >12-C16 aromatics	>5.8	0.02	Max	0	Pass
TPH C >16-C21 aromatics	N/A	0.010	Max	0	Pass
TPH C >21-C35 aromatics	N/A	0.020	Max	0	Pass
Overall Hazard Index for Petroleum hydrocarbons = 5.0					

(2) GROUNDWATER – MIGRATION – CONTROLLED WATERS					
Contaminant	**GGV (mg/l)**	**EPC (mg/l)**	**EPC Type**	**No. over SGV**	**Pass/Fail**
DRO	3.2×10^{14}*	0.20	Max	0	Pass
PRO	4.0	12.8	Max	**1**	**Fail**
Benzene	2.1	1.0	Max	0	Pass
Toluene	450	0.9	Max	0	Pass
Ethylbenzene	9.9	1.1	Max	0	Pass
Xylenes	3.4	3.6	Max	**1**	**Fail**
MTBE	0.96	0.5	Max	0	Pass
TPH 6 C aliphatics	4.2	1.4	Max	0	Pass
TPH >6-8 C aliphatics	>5.4	1.3	Max	0	Pass
TPH >8-10 C aliphatics	24000	1.2	Max	0	Pass
TPH >10-12 C aliphatics	3.2×10^{14}*	0.18	Max	0	Pass
TPH C >12-C16 aliphatics	1.6×10^{70}*	0.010	Max	0	Pass
TPH C >16-C21 aliphatics	5×10^{99}*	0.010	Max	0	Pass
TPH C >21-C34 aliphatics	5×10^{99}*	0.22	Max	0	Pass
TPH C >8-10 C aromatics	6.2	6.5	Max	**1**	**Fail**
TPH C >10-12 C aromatics	9.4	0.27	Max	0	Pass
TPH C >12-C16 aromatics	>5.8	0.02	Max	0	Pass
TPH C >16-C21 aromatics	>0.65	0.010	Max	0	Pass
TPH C >21-C35 aromatics	7.3×10^{9}*	0.020	Max	0	Pass
Overall Hazard Index for Petroleum hydrocarbons = 3.6					

Notes:

1) SGV – Soil guideline value
2) GGV – Groundwater guideline value
3) EPC – Exposure Point Concentration
4) Fail – Concentrations recorded that exceed the SGV or GGV
5) * SGV or GGV calculated using the hazard quotient.
6) N/A - No inhalation reference concentrations available as CoC is non volatile

5.0 CONCLUSIONS

5.1 Discussion

This investigation concentrated on finding the most likely sources of petrol/diesel contamination; boreholes were located close to and directly down slope, of the existing pump dispensers and underground storage tanks and the filling station forecourt. Soil analyses were targeted at samples with both high and anomalous field screening test readings, judged from visual/olfactory evidence.

The investigation encountered a mixture of weathered petrol-based hydrocarbons in the shallow chalk deposits and associated shallow groundwater along the southern boundary of the site (BHs 2, 3 and 5), and heavy end diesel range hydrocarbons in soil to the south and west of the forecourt (BHs 3 and 5 and to a lesser extent, BH7); this was characterised as lube oil in soil samples from BH3. The impacted soil was present at depths of 1.5 to 5.0m, within the head and chalk deposits.

The source of the fuel release appears to be related to the current fuel tanks and lines located in the centre of the forecourt, and a former garage workshop located on the western side of the site. The 2005 investigation indicated that petrol appeared to have migrated towards the southern site boundary (BH2). The absence of significant levels of BTEX and MTBE recorded in these groundwater samples is consistent with a 10+ years old source; these hydrocarbons will typically biodegrade over that period. Significantly lower levels of petrol range organics (PRO) were detected in BH2 and BH3 in March 2006, compared to concentrations encountered in May 2005.

Elevated levels of PRO, indicative of a recent release of petrol, were detected in BH5, located directly to the south of the south-east pump island, in March 2006. This sample contained significant concentrations of BTEX compounds and MTBE. The absence of these contaminants in groundwater samples from BH2 and BH3, short distances to the east and west, respectively, indicates that this release of fuel is localised and related to the nearby pump island or another up gradient source in the forecourt area.

Groundwater samples from BH4 on the eastern boundary, BH6 in the northwest corner of the site and BH7 in the south western corner contained negligible or non-detectable levels of petroleum hydrocarbons thus indicating an absence of risk to the adjacent residential and commercial properties.

In order to confirm whether the site is suitable for future residential development, a site-specific QRA was undertaken using the RBCA model (version 1.3b). The results concluded the following:

- On-site concentrations of C_{8-10} aliphatic hydrocarbons exceed the Groundwater Guidance Values (GGVs) for the 'groundwater to indoor air pathway' for on-site residential receptors and the overall Hazard Index for this indoor air pathway, considering soil and groundwater, moderately exceeds unity (HI = 5.4)
- The predicted groundwater concentrations of xylenes and C_{8-10} aromatic hydrocarbons exceeded saltwater environmental quality standards[2] for salt water at 30m (distance to estuarine River Adur) and the overall Hazard Index for

[2] Saltwater 'maximum allowable concentrations' (MACs), where available. Where compound-specific MACs are not available the risk assessment used the health-based or drinking water standard multiplied by an arbitrary factor of 10.

this off-site migration pathway to controlled waters moderately exceeded unity (HI = 3.6).

Soil and groundwater concentrations of petroleum hydrocarbons may therefore pose a potential health risk to future on-site residents and a slight risk to groundwater quality in the nearby River Adur.

It is considered that the presence of the shallow hydrocarbons encountered during the investigation may affect the future redevelopment of the site. If the site were re-developed for alternative usage, comprehensive remediation would probably be needed to satisfy planning and subsequent funding issues.

5.2 Recommendations

Given the results of the investigation, an evaluation of the potential remedial options has been undertaken.

Should the Site remain as a petrol filling station, the levels of hydrocarbons pose a slight theoretical risk to the groundwater and River Adur. It is unlikely that regulators would require engineered remediation, although a programme of annual groundwater monitoring is recommended.

Should the Site be redeveloped for alternative use, it is considered that the primary purpose of the remedial works will be to break the potential pollutant linkages associated with:

1. Potential dermal, inhalation and ingestion risks to construction staff during the proposed redevelopment.

2. Potential vapour risks to adjacent properties (buildings), although these have been modelled as low.

3. Potential vapour risks associated with future residential occupants.

4. Potential groundwater migration risks with the primary receptor being the River Adur.

To break the above potential linkages the following remedial solutions evaluation has been considered:

REMEDIAL OPTIONS APPLICABILITY MATRIX

Remediation Option	Applicable substances		
	VOCs (BTEX)	MTBE	Non-halogenated hydrocarbons (fuel/oil)
Civil engineering methods			
Containment / barriers	✓	✓	✓
Biological methods			
Natural attenuation	✓	?	✓
Biosparging	✓	?	✓
Chemical methods			
Chemical oxidation	✓	✓	✓
Physical methods			
Vacuum extraction	✓	✓	✓
Air sparging	✓	X	✓
Permeable reactive barriers	✓	✓	✓
Pump and treat	✓	✓	✓
Excavation	✓	✓	✓

From the above review, it is clear that a number of potential options exist for this site, but based on an assessment of the most practical solution, a solution based on source removal combined with pathway blockage is considered the most appropriate. This option provides a high level of assurance that the hydrocarbons have been adequately addressed, whilst also reflecting the need to assess the most appropriate remediation solution within a commercial context.

This solution would involve:

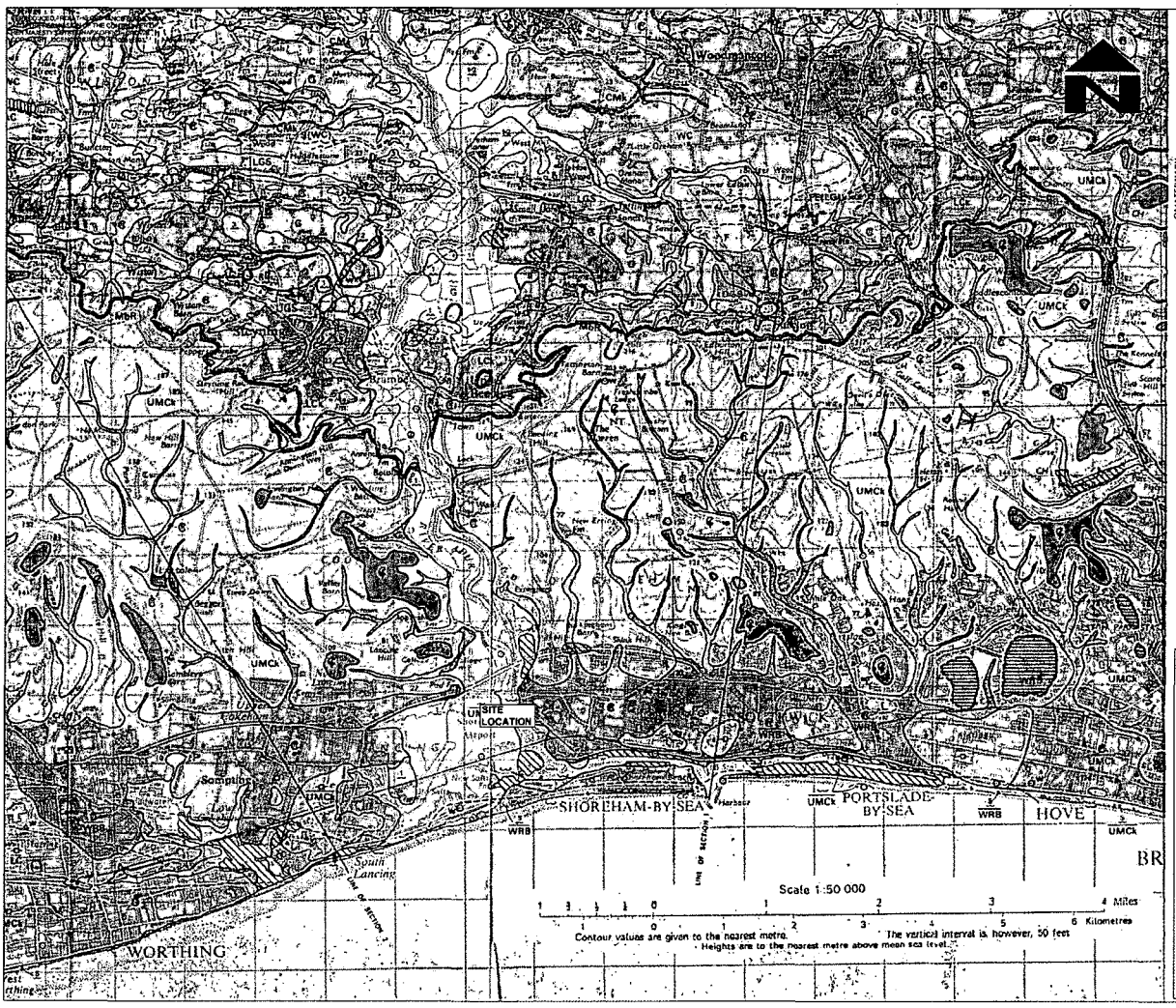
- Removal of the buried tanks and associated pipework.
- Excavation of visually impacted soils and groundwater to a depth and extent which preserves the structural integrity of the surrounding properties. The views of a structural engineer should be sought in this regard.
- Sampling of the base and edges of the excavation to provide verification of what levels of impact, if any, remain.
- Provision of suitable backfill.
- Incorporation of a proprietary hydrocarbon membrane (e.g. 1mm thick Visqueen GX Geomembrane (hc) or similar, installed to the manufacturer's instructions) above a suitable underfloor venting layer.
- Re-modelling of any remaining hydrocarbons, which can not be removed due to safety (building integrity) concerns. The model would re-assess the long term risks to the environment using DQRA.
- Preparation of a close out verification report detailing the remediation works undertaken.

Post remediation, no further precautions with respect to soil/groundwater impact are likely to be required, although the installation of new water supply pipes may need to recognise the potential for the presence of low concentrations of petroleum hydrocarbons (below any health threat) to remain at the site.

Assuming that the above works, along with others that may become apparent as the project proceeds, are completed to the appropriate standard and to the satisfaction of the Planning Authority, it is considered that there is no reason why this site can not be rendered suitable for residential redevelopment.

6.0 LIMITATIONS

The information reported herein is based on the interpretation of data collected during the limited subsurface investigation, pertaining specifically to common petroleum derivatives. The evaluation and conclusions do not preclude the existence of variation of conditions between test holes or the existence of other chemical compounds. Hence, this report should be used for informational purposes only and should not be construed as a comprehensive characterisation of all site conditions. This report is for the exclusive use of Cornwall Motor Group and its exclusive agents; no warranties or guarantees are expressed or should be inferred by any third party.



NOTES

QUATERNARY

- Alluvium
- First to Third River Terrace Deposits, as numbered
- River Terrace Deposits, undifferentiated
- Marine Beach Deposits
- Marine and Estuarine Alluvium
- Storm Gravel Beach Deposits
- Raised Beach Deposits
- Head
- Head Gravel
- Older Head
- Clay with Flints
- Brickearth

- Gently inclined strata
- Inclined strata, dip in degrees
- General or regional dip of strata
- Geological boundary, Drift
- Geological boundary, Solid
- Fault at surface, ornament indicates downthrow side
- Broken lines denote uncertainty
- Borehole
- Borehole, exact site uncertain
- Water well or borehole
- Landslip
- Area of foundered strata
- Made ground

Revision	Issue Date	Issued By	Comments
0	MAY 05	JP	

CORNWALL MOTOR GROUP

Site	SHOREHAM SERVICE STATION
Project	ENVIRONMENTAL ASSESSMENT
Drawing	**Geological Extract**
Date	MAY 2005
Drawing No.	1
Scale	1:50,000
Paper Size: ISO A3	48 620,005 - SHOSSenasGEO_0 402/SNN

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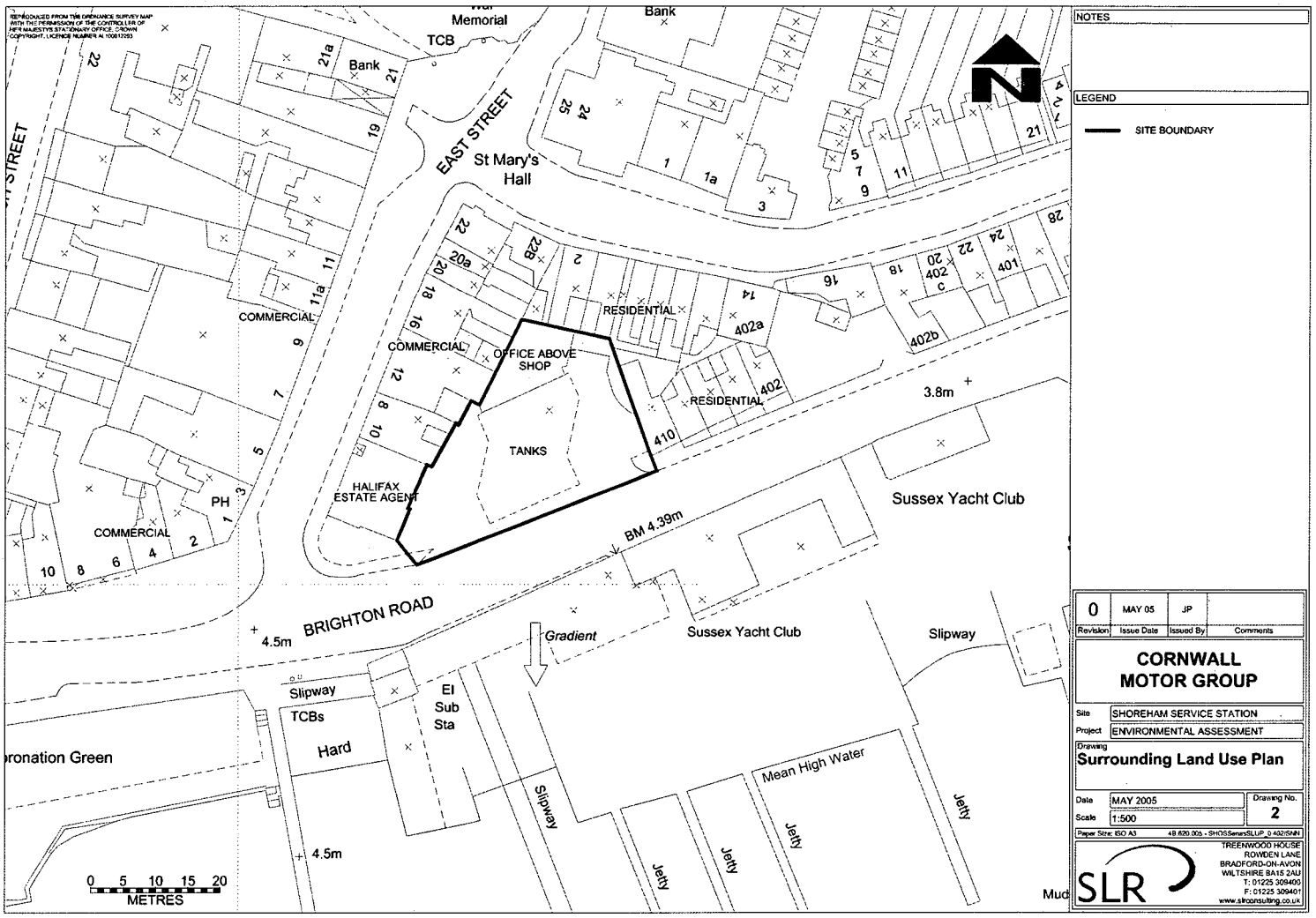
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Memorial
TCB
Bank
EAST STREET
St Mary's Hall
COMMERCIAL
RESIDENTIAL
OFFICE ABOVE SHOP
TANKS
HALIFAX ESTATE AGENT
PH
Sussex Yacht Club
BM 4.39m
3.8m
4.5m
BRIGHTON ROAD
Gradient
Slipway
TCBs
Hard
El Sub Sta
Mean High Water
Jetty
Coronation Green
0 5 10 15 20
METRES
NOTES
LEGEND
SITE BOUNDARY
0 MAY 05 JP
Revision Issue Date Issued By Comments
CORNWALL MOTOR GROUP
Site SHOREHAM SERVICE STATION
Project ENVIRONMENTAL ASSESSMENT
Drawing Surrounding Land Use Plan
Date MAY 2005
Drawing No. 2
Scale 1:500
Paper Size: ISO A3
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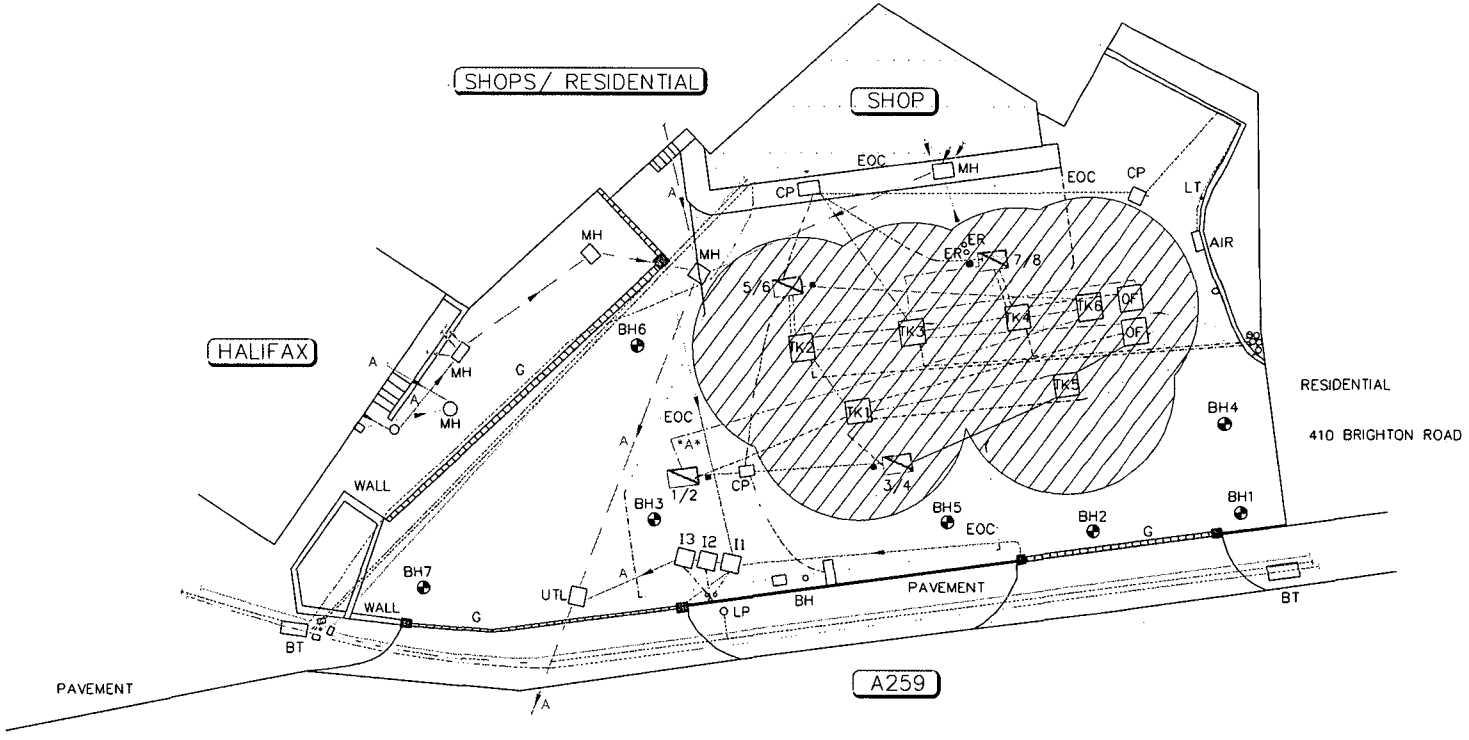
NOTES:

ALL DRAINS ASSUMED VIA INVERTS.
BT ASSUMED.
WATER ASSUMED PLASTIC (UNABLE TO TRACE).
CANOPY HEIGHT 4.5 MTS.
INTERCEPTORS: TYPE BRICK - DEPTH 1.9MTS.

*TRACE OF SUCTION LINE FOR TANK 6 TO PUMP 1 & 2 STOPPED MIDWAY THROUGH.
LINE WAS ASSUMED FROM THAT POINT.*



SCALE
0 5 10 15 20
METRES

NOTES:

THE METHOD USED TO CONSTRUCT THE BASE PLAN WAS BY TAPED OFFSETS FROM BUILDINGS.
THE ACCURACY OF THE DRAWING IN SOME AREAS CAN NOT BE GUARANTEED.
THIS DRAWING HAS BEEN PRODUCED TO SHOW SITE SERVICES, FOR THE SAFE LOCATION OF GROUND INVESTIGATION BOREHOLES.
IT IS NOT INTENDED FOR ANY OTHER PURPOSE I.E. CONSTRUCTIONAL ACTIVITIES.
ANY AMENDMENTS TO THE SITE LAYOUT AFTER THE ISSUE OF THIS DRAWING, MAKES THIS DRAWING INVALID.
ONLY POINTS DESIGNATED (PDP) SHOULD BE USED FOR DRILLING.
POSITION OF SERVICES EXTERNAL TO BUT CROSSING THE SITE CAN NOT BE GUARANTEED.
THIS DRAWING IS NOT TO BE USED UNLESS IN CONJUNCTION WITH ALL UTILITY DRAWINGS.

KEY

	PUMP
	MANHOLE
	CANOPY STANCHION
	BUILDING
	CANOPY OUTLINE (E.O.C)
	FUEL LINE - LRP
	FUEL LINE - UNLEADED
	FUEL LINE - SUPERGREEN
	FUEL LINE - DIESEL
	TANK GAUGE LINE
	ELECTRICITY CABLE
	TELECOM CABLE
	WATER SUPPLY PIPE
	FOUL WATER DRAIN
	SURFACE WATER DRAIN
	UNIDENTIFIED
	END OF TRACE
	BOREHOLE LOCATION

ABBREVIATIONS

A	ASSUMED
BT	BRITISH TELECOM
CP	CABLE OR CMS PIT
D	DRAIN
DWP	DRAINWATER PIPE
EP	ELECTRICITY POLE OR PYLON
EOC	EDGE OF CANOPY
FH	FIRE HYDRANT
G	GULLY
GV	GAS VALVE
LP	LAMP POST
LT	LIGHT
MH	MANHOLE
O/F	OFFSET FILL
RE	RODDING EYE
SC	SECURITY CAMERA
TP	TELEGRAPH POLE
U/I	UNIDENTIFIED
UTL	UNABLE TO LIFT
VAC	VACUUM
V/C	VALVE CHAMBER
V/R	VAPOUR RECOVERY
WM	WATER METER

Revision	Issue Date	Issued By	Comments
0	MAY 05	JP	

CORNWALL MOTOR GROUP

Site: SHOREHAM SERVICE STATION
Project: ENVIRONMENTAL ASSESSMENT
Drawing: **Underground Services & Borehole Location Plan**
Date: MAY 2006
Drawing No.: 3
Scale: 1:200
Paper Size: ISO A3 4B.620.005 - SHOSSenasBHLP_0 402/SNN

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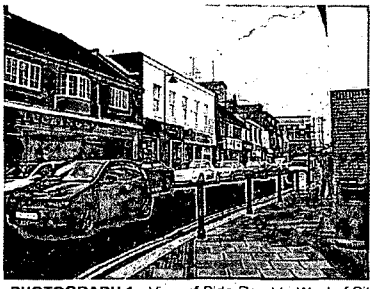


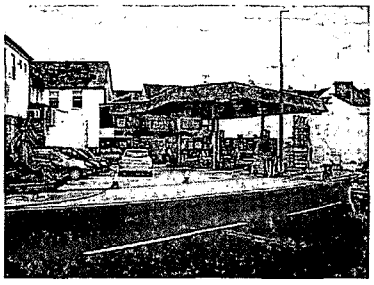
PHOTOGRAPH 1 - View of Side Road to West of Site Showing Retail Properties



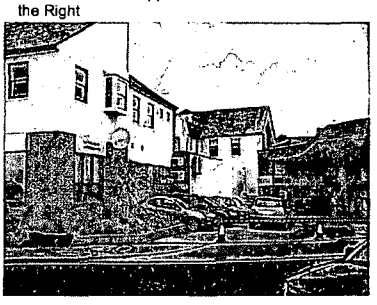
PHOTOGRAPH 2 - View of Brighton Road Looking East. Yacht Club Opposite to South Visible to the Right



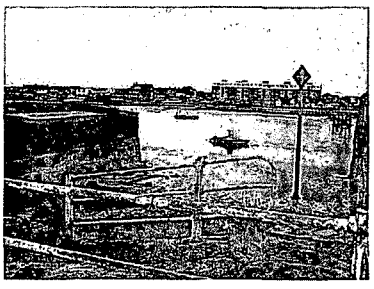
PHOTOGRAPH 3 - View of Brighton Road Looking West



PHOTOGRAPH 4 - View of Site Looking NE. The Tanks are Located Beneath the Forecourt



PHOTOGRAPH 5 - View of Site & Adjacent Estate Agents, Previously used as a Garage



PHOTOGRAPH 6 - View of River Adur Looking South from Brighton Road

Revision	Issue Date	Issue By	Comments
0	MAY 05	JP	

CORNWALL MOTOR GROUP

Site: SHOREHAM SERVICE STATION

Project: ENVIRONMENTAL ASSESSMENT

Drawing: **Site Photographs**

Date: MAY 2005 | Drawing No: 4

Scale: -

Paper Size: ISO A3 | 48.620.003.SHOSSenesPHO_0.402/SNN

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APPENDIX A - METHODOLOGY

BOREHOLES

The boreholes were advanced using a rotary drilling rig. Boreholes were positioned to delineate, as efficiently as possible, any hydrocarbon impacted soil and groundwater. Three boreholes were drilled to a maximum depth of 5.0m in May 2005 by SLR, two boreholes (BH2 and 3) were completed as 50mm diameter groundwater monitoring wells. A further set of boreholes (BH4-7) were drilled in March 2006 to a maximum depth of 6.0m. All of these boreholes were completed as 50mm diameter groundwater monitoring wells.

SOIL SAMPLING AND FIELD SCREENING

Soil stratum was generally described in accordance with BS 5930, but visual and olfactory indications of hydrocarbon contamination were also included. At appropriate intervals defined by the site engineer, soil samples were collected and screened for the presence of volatile vapours. A 250ml jar was half filled with soil, covered with aluminium foil for approximately 10 minutes, the foil punctured and the headspace analysed. A GMI Gasurveyor, calibrated against pentane was used to measure the hydrocarbon vapour concentrations. Results are given in parts per million Total Organic Vapour (ppmTOV), pentane equivalence. The test is dependent on temperature and soil type but independent of field personnel.

MONITORING WELL INSTALLATION

Slotted PVC monitoring wells were installed in six boreholes to provide a means of obtaining groundwater samples and monitoring soil vapours. Well screens were positioned to intercept standing water levels, and the annulus between blank casing and the borehole was sealed with bentonite. Each hole was capped off with a stopcock cover set in concrete.

LABORATORY ANALYSES

Soil samples were selected for analysis to target high TOV screening results. Sixteen soil and eight groundwater samples were retained for laboratory analysis for Diesel Range Organics and Petrol Range Organics, PAHs and heavy/phytotoxic metals by accredited laboratories.

No preservatives were required for the analysis undertaken and samples were collected in glass amber screw-top jars and clear glass 40ml headspace vials supplied by the laboratory. All samples were kept in refrigerated conditions and transported under full chain of custody documentation.

APPENDIX B:

Standard Methodology for Quantitative Risk Assessments at Petrol Filling Stations (PFS)

Background

In the UK, a wide range of computer models are available to aid in the calculation of soil guideline values (SGVs), with the most common being CLEA, RBCA, BP-Risc and RiscHuman. In general all perform reasonably well[i], although as one might expect all have slightly different functionality and calculation characteristics.

SLR's standard approach to human health and controlled waters risk assessment is based upon the CLEA and EA[ii] methodologies and uses the computer programme RBCA Tool Kit for Chemical Releases[iii], Version 1.3b, which runs within Microsoft Excel XP™. We have selected this model since it is well known, relatively simple and flexible. It also covers all the general pollutant linkages, thus precluding the need to use a number of different models.

Key modifications have been made where we have tailored the RBCA model to mirror parameters used in CLR10[iv], the EA guidance[v], [vi] and the three recent CLEA briefing notes[vii]. Site-specific information is then used to determine the remaining parameters including soil type, contaminant source zone geometry, depth to groundwater, and hydraulic properties of the soils.

Contaminants of Concern (CoC)

SLR has selected a generic list of the most common contaminants likely be encountered at petrol filling station sites, according to the CLEA guidance[viii] and standard industry practice.

These are:

- Oil/fuel hydrocarbons;
    - Petrol range organics (namely a mix of C4 to C12 aliphatic and aromatic hydrocarbons; termed total petroleum hydrocarbons – petrol range organics or TPH PRO); and
    - Diesel range organics (namely a mix of C10 to C40 aliphatic and aromatic hydrocarbons; termed total petroleum hydrocarbons – diesel range or TPH DRO).

Or, when available;

    - Total Petroleum Hydrocarbons, banded according to TPHCWG guidance into aliphatic hydrocarbons bands C5-6, C6-8, C8-10, C10-12, C12-16, C16-21 and C21-35, and aromatic hydrocarbon bands C6-8, C8-10, C10-12, C12-16, C16-21 and C21-35.

- Aromatic hydrocarbons (BTEX) which are found in petrol;
    - Benzene;
    - Toluene;
    - Ethylbenzene;

- Xylene;

- The oxygenate methyl t-butyl ether (MTBE) which is found in petrol.

Exposure Scenarios, Model Assumptions and Transport Models

SLR's approach assumes:

For simulating groundwater migration, the Domenico equation with first order decay will be used, which assumes biodegradation is occurring within the saturated zone.

According to the recent CLEA Briefing Note 2, the Johnson and Ettinger vapour model is the recommended approach to assess vapour migration; this has been selected as the default transport model within RBCA.

Other assumptions used in the model are that the contaminate source is located directly beneath the site building, a continuous infinite source is present and partitioning of organic contaminants is between three phases only (soil, water and soil vapour) and assumes no residual phase (NAPL) is present.

As discussed above, the RBCA software utilises the Johnson and Ettinger vapour migration model to asses the risks of vapour inhalation. This model is an approximation of the vertical migration of vapour from a subsurface source, into a building or open space overlying the contaminant source zone. The model does not assess the lateral migration of vapours towards an off site receptor via shallow soils or groundwater.

For offsite vapour inhalation risks, the only plausible exposure pathway is via off-site migration of contaminated groundwater from the contaminated source zone to beneath the adjacent offsite receptor.

In order to assess the potential vapour risk to adjacent offsite residential receptors, SLR has modelled this pathway by assuming a residential property directly overlying the groundwater source zone, in order to derive a set of groundwater guideline values (GGVs) for vapour inhalation for a residential receptor. The RBCA model is then used to calculate the predicted groundwater concentration beneath the identified off-site receptor, which is then compared directly to the derived GGV for this pathway.

Quantification of Risk, Determination of Soil and Groundwater Guideline Values

CLR 10 defines the Soil Guideline Value (SGV) as:

'...the concentration of a contaminant in soil where the estimated average daily exposure for the critical receptor in each standard land-use equals the relevant health criteria value.'

This is described by the relationship **ADE / HCV = 1.**

Where; **ADE** is the calculated average daily exposure to a chemical from soil.

HCV is the relevant health criteria value (referred to as the TDSI for threshold contaminants or Index Dose for non-threshold contaminants in CLEA, or as the Reference Dose in RBCA)

The value of unity is referred to as the **Hazard Quotient (HQ),** where the HQ is greater than 1, there is a potential for unacceptable adverse health effects to occur, and further action is required.

The SGVs or Groundwater Guideline Values (GGVs) are calculated in RBCA in 'backwards mode' by back calculating the relevant exposure equations using an HQ of 1.

Consequently, when the SGV or GGV is exceeded by the recorded site concentrations, the corresponding HQ will be greater than 1, and there is a potential for unacceptable adverse health effects to occur

The RBCA software incorporates a chemical database comprising physical, chemical and toxicological parameters. When calculating the SGVs and GGVs the RBCA software predicts the theoretical maximum solubility and soil saturation for each contaminant, if the SGVs or GGVs are greater than the solubility or saturation values, RBCA considers that no risk is present and returns a value of >sat (greater than the saturation limit) or >sol (greater than the solubility limit).

If any of the recorded site exposure point concentrations (EPCs) exceed the predicted solubility or saturation values, SLR has recalculated the SGV or GGV by running the model in 'forward mode' to derive a hazard quotient for the exposure pathway of interest. This is done by dividing the RBCA models predicted exposure concentration by the relevant reference dose or reference concentration. The site maximum concentration (EPC) is then divided by the calculated hazard quotient to derive the site specific SGV or GGV. This is generally performed on contaminants with very low solubility values such as the C8-C16 aliphatic hydrocarbons, and longer chain aromatic hydrocarbons.

Exposure Parameters

- The critical health receptor for a commercial use is selected as a female adult, in accordance with CLR 10. The subject age range is 16 to 59 years old, and body weight 68.5kg, works in the petrol station office or shop for a complete working life of 43 years, and is a full time employee, at work 230 days a year, 8.5 hours a day. The work is centred on the typical office work patterns as described in CLR 10, with 5.5 hours spent in passive respiration, and 2.0 hours in active respiration.

- The critical health receptor for residential use is a female child, age range 0-6 years and mean body weight over the period of 14kg. The subject is present within the exposed residential building 365 days per year for on average 20.67 hours per day, of which an average 18 hours are spent in passive respiration and 2.67 hours in active respiration. The assumption within the CLEA model that the child is not exposed to indoor air or dust during half of its first year has been ignored; this will give rise to a slightly more conservative SGV.

The adult and child respiration volume has been calculated using the data in CLR 10, based on active and passive respiration rates and we have included the total indoor respiration volumes (passive and active) together, and assessed each exposure pathway against the total indoor respiration volume.

A summary of the exposure parameters in RBCA and the input source references are presented in the Table 1 below:

TABLE 1: EXPOSURE PARAMETERS			
EXPOSURE PARAMETERS (Commercial Worker)			
Parameter	**Value**	**Unit**	**Reference**
Averaging Time	43	years	CLR 10
Body Weight	68.5	kg	CLR 10 female aged 16-59
Exposure Duration	43	yr	CLR 10 commercial use
Exposure Frequency	230	Days / year	CLR 10 commercial use
Soil Ingestion Rate	40	mg/day	CLR 10
Daily Respiration Volume	4.72	m3/day	CLR 10, total indoor for a commercial female, from Table 4.13 and eqs. 5.6 & 5.7
EXPOSURE PARAMETERS (Off-Site Receptor: Female Child Aged 0-6 Years)			
Parameter	**Value**	**Unit**	**Reference**
Averaging Time	6	years	CLR 10
Body Weight	14	kg	CLR 10 female aged 0-6
Exposure Duration	6	yr	CLR 10 residential use
Exposure Frequency	365	Days / year	CLR 10 residential use
Soil Ingestion Rate	100	mg/day	CLR 10
Daily Respiration Volume	4.17	m3/day	CLR 10, total indoor for a residential child, from Table 4.13 and eqs. 5.6 & 5.7

Chemical and Toxicity Data

The chemical fate and transport data used in the model algorithms are taken from the draft EA fate and transport guidance[5] for BTEX contaminants. The data for PRO and DRO are taken from the TPHCWG guidance[ix], weighted towards the aromatic bands for PRO and aliphatic bands for DRO, following the proposed UK approach[x]. Where analysis for TPHCWG speciated bands are available, the data uses the reported TPHCWG values.

In order to achieve compatibility between the CLEA and RBCA methodology, UK toxicity index doses (IDs) and tolerable daily intakes (TDI's) have been converted to inhalation reference concentrations using receptor body weight, and active and passive respiration rates reported in CLR 10 to calculate daily respiration volumes. By multiplying the TDI or ID by the daily respiration volume, a receptor specific inhalation reference concentration can be derived to be input into the RBCA model for each CoC.

A summary of the index doses / tolerable daily intakes and derived inhalation reference concentrations for each CoC are presented in the following Table 2 overleaf:

TABLE 2: TOXICITY DATA			
Chemicals of Concern	**CLEA (TDI or ID); or RBCA (RfD) (ug/kg/bw/day)**	**RBCA Input Reference Concentration (mg/m3)**	**Reference**
COMMERCIAL RECEPTOR			
Benzene	0.91	0.013	CLEA Tox Report 11
Ethylbenzene	170	2.47	CLEA Tox Report 17
Toluene	74	1.07	CLEA Tox Report 14
Xylene (mixed isomers)	63	0.91	CLEA Tox Report 19
Methyl t-Butyl ether*	-	10.7	RBCA database
TPH – PRO*	200	1.65	TPHCWG Vol 4 - C7-8 Aromatics
TPH – DRO*	100	4.15	TPHCWG Vol 4 - C10-12 Aliphatics
TPH- Aliphatic C_{5-6}	5000	76	TPHCWG Vol 5 Table 2
TPH- Aliphatic C_{6-8}	5000	76	TPHCWG Vol 5 Table 2
TPH- Aliphatic C_{8-10}	100	4.15	TPHCWG Vol 5 Table 2
TPH- Aliphatic C_{10-12}	100	4.15	TPHCWG Vol 5 Table 2
TPH- Aliphatic C_{12-16}	100	4.15	TPHCWG Vol 5 Table 2
TPH- Aliphatic C_{16-21}	2000	NA	TPHCWG Vol 5 Table 2
TPH- Aliphatic C_{21-35}	2000	NA	TPHCWG Vol 5 Table 2
TPH- Aromatic C_{6-8}	200	1.65	TPHCWG Vol 5 Table 2
TPH- Aromatic C_{8-10}	40	0.83	TPHCWG Vol 5 Table 2
TPH- Aromatic C_{10-12}	40	0.83	TPHCWG Vol 5 Table 2
TPH- Aromatic C_{12-16}	40	0.83	TPHCWG Vol 5 Table 2
TPH- Aromatic C_{16-21}	30	NA	TPHCWG Vol 5 Table 2
TPH- Aromatic C_{21-35}	30	NA	TPHCWG Vol 5 Table 2
RESIDENTIAL RECEPTOR			
Benzene	0.91	0.0031	CLEA Tox Report 11
Ethylbenzene	170	0.59	CLEA Tox Report 17
Toluene	74	0.26	CLEA Tox Report 14
Xylene (mixed isomers)	63	0.22	CLEA Tox Report 19
Methyl t-Butyl ether*	-	3.1	RBCA database
TPH – PRO*	200	0.4	TPHCWG Vol 4 - C7-8 Aromatics
TPH – DRO*	100	1.0	TPHCWG Vol 4 - C10-12 Aliphatics
TPH- Aliphatic C_{5-6}	5000	18.3	TPHCWG Vol 5 Table 2
TPH- Aliphatic C_{6-8}	5000	18.3	TPHCWG Vol 5 Table 2
TPH- Aliphatic C_{8-10}	100	1.0	TPHCWG Vol 5 Table 2
TPH- Aliphatic C_{10-12}	100	1.0	TPHCWG Vol 5 Table 2
TPH- Aliphatic C_{12-16}	100	1.0	TPHCWG Vol 5 Table 2
TPH- Aliphatic C_{16-21}	2000	NA	TPHCWG Vol 5 Table 2
TPH- Aliphatic C_{21-35}	2000	NA	TPHCWG Vol 5 Table 2
TPH- Aromatic C_{6-8}	200	0.4	TPHCWG Vol 5 Table 2
TPH- Aromatic C_{8-10}	40	0.2	TPHCWG Vol 5 Table 2
TPH- Aromatic C_{10-12}	40	0.2	TPHCWG Vol 5 Table 2
TPH- Aromatic C_{12-16}	40	0.2	TPHCWG Vol 5 Table 2
TPH- Aromatic C_{16-21}	30	NA	TPHCWG Vol 5 Table 2
TPH- Aromatic C_{21-35}	30	NA	TPHCWG Vol 5 Table 2
• No UK TDI's or IDs are available for the TPHCWG banded CoCs, so RBCA database values for Inhalation Reference Concentrations (RBCA assumes 20m^3 daily respiration volume and 70kg adult) have been adjusted to reflect UK land use specific receptors			

Soil Parameters

The soils parameters are based on a combination of literature and site specific data. Factors such as the geometry of the source zone, fraction of organic carbon and depth to groundwater are based on field and laboratory data.

Soil properties are based on the default properties in Table 3 of CLEA briefing note 2, with the soil type selected from the nearest approximation described by the field logs and PSD analysis. Where the source zone and underlying geology is directly in bedrock, and the CLEA default parameters are not considered to be representative, the input parameter will be sourced from a combination of the BGS Aquifer Properties Manual[xi] and Landsim database[xii].

The net infiltration rate is based on published UK regional rainfall data[xiii] selected for the appropriate region of the site, with an assumed 5% net infiltration of total rainfall due to the presence of extensive hardstanding and forecourt canopies on PFS sites.

A summary of the soil input parameters in RBCA and the input source references are presented in following Table 3:

TABLE 3: SOIL PARAMETERS

Parameter	Value	Unit	Reference
Source Zone Geometry			
Depth to water bearing unit	4.0	m	Field data
Depth to top of affected soils	2.0	m	Field data
Depth to base of affected soils	3.5	m	Field data
Affected soil area	250	m^2	Estimated from field data
Length of affected soil area parallel to assumed wind direction	-	m	n/a
Soil Properties	**BH logs indicate mixed lithology (made ground, sand, clay, and putty chalk therefore LOAM soil type selected**		
Total Porosity	0.51	-	CLEA Briefing Note 2; Table 3
Volumetric water content	0.15	-	CLEA Briefing Note 2; Table 3
Volumetric air content	0.36	-	CLEA Briefing Note 2; Table 3
Dry bulk density	1.6	g/cm^3	CLEA Briefing Note 2; Table 3
Hydraulic conductivity	1.5×10^{-3}	cm/s	CLEA Briefing Note 2; Table 3
Vapour permeability	1.3×10^{-12}	m^2	Based on equations 1-3, Appendix 3, CLEA Briefing Note 2
Fraction of Organic Carbon	0.006	-	Average site value in unsaturated zone
pH	7.0	-	RBCA default
Net infiltration rate	-	mm/yr	n/a

Groundwater Parameters and Target Concentrations

The groundwater parameters are based on a combination of literature and site specific data. Factors such as the geometry of the groundwater plume, fraction of organic carbon and hydraulic gradient are based on field and laboratory data.

Rising head tests will be undertaken to determine site specific values for hydraulic conductivity, supported with literature values based on field observations.

RBCA defaults will be used for dispersivity, which is based on the pathway distance to the receptor.

A summary of the groundwater input parameters in RBCA and the input source references are presented in the following Table 4 below:

TABLE 4: GROUNDWATER PARAMETERS:

Parameter	Value	Unit	Reference
Hydraulic Conductivity	1.0	m/d	Selected from literature as representative value for chalk
Hydraulic Gradient	0.02	-	Field data
Effective Porosity	0.05	-	Selected from literature as representative value for chalk
Plume Width	10	m	Field data
Plume Thickness	1.5	m	Field data
Fraction of Organic Carbon	0.0006	-	Average site value in saturated zone
pH	7.0	-	RBCA default
Dispersivity	Site Specific	m	RBCA default-Proportion of pathway length

CoC specific target concentrations have been chosen from the relevant UK Drinking Water Standards (DWS) or Environmental Quality Standards (EQS), which have been updated as the Maximum Contaminant Levels (MCLs) within the RBCA database. These are summarised in Table 5:

TABLE 5: WATER QUALITY STANDARDS:

Chemicals of concern	Saltwater EQS (MAC, mg/l)	Reference[xiv]
Benzene	0.3	Saltwater EQS (MAC)
Toluene	0.4	Saltwater EQS (MAC)
Ethylbenzene	0.4	Saltwater EQS (MAC)
Xylene (mixed isomers)	0.3	Saltwater EQS (MAC)
MTBE	0.15	Taste threshold EA[xv] x 10
TPH - DRO	0.5	EQS x10
TPH - PRO	0.5	EQS x10

Air Parameters

The air parameters used are based on CLR 10 reported values and RBCA defaults. These are only used in outdoor air exposure scenarios. The values are presented Table 6 below:

TABLE 6: AIR PARAMETERS

Parameter	Value	Unit	Reference
Air Mixing Zone Height (commercial)	0.8115	m	CLR 10 Female adult (1/2 body height)
Air Mixing Zone Height (residential)	0.47	m	CLR 10 Female child (1/2 body height)
Ambient Air Velocity in Mixing Zone	3.0	m/sec	CLR 10 UK average
Arial Particulate Emission Flux	-	g/m2/s	n/a

Building Parameters

The building properties are based on the default properties in Appendix 1 of CLEA briefing note 3, for an office building type. Some of the parameters have been altered to be more representative of a typical petrol filling station shop or kiosk building, which is assumed to have no basement structures, and is built on a ground bearing slab.

A summary of the building input parameters in RBCA and the input source references are summarised in the following Table 7:

TABLE 7: SHOP BUILDING PARAMETERS

Parameter	Value	Unit	Reference
Building height	3	m	Typical height of generic PFS shop
Building Foundation Area	80	m2	Typical area of generic PFS shop
Building Foundation Perimeter	36	m	Typical perimeter of generic PFS shop
Building air exchange rate	2.7 x10-4	1 / s	CLEA Briefing note 3 (1 change / hour)
Foundation Slab Thickness	0.15	m	CLEA Briefing note 3
Foundation Crack Fraction	0.0009	-	CLEA Briefing note 3, Appendix 1 (calculated for site parameters)
Indoor/Outdoor Pressure Differential	4.5	Pa	CLEA Briefing note 3, Appendix 1 (office)

The building properties for the off-site residential receptor are based on property dimensions of the adjacent residential housing and the default properties in Appendix 1 of CLEA Briefing Note 3, for a typical two-storey house which is assumed to have no basement structures, and is built on a ground bearing slab.

A summary of the building input parameters in RBCA and the input source references are summarised in the following Table 8.

TABLE 8: RESIDENTIAL BUILDING PARAMETERS

Parameter	Value	Unit	Reference
Building height	4.8	m	Height of generic 2-storey house CLEA Brief note 3
Building Foundation Area	40.96	m2	Area of generic 2-storey house CLEA Brief note 3
Building Foundation Perimeter	25.6	m	Perimeter of generic 2-storey house CLEA Brief note 3
Building air exchange rate	1.16×10^{-4}	1 / s	CLEA Briefing note 3 (0.5 change / hour)
Foundation Slab Thickness	0.15	m	CLEA Briefing note 3
Foundation Crack Fraction	0.00124	-	CLEA Briefing note 3, Appendix 1 (house)
Indoor/Outdoor Pressure Differential	3.0	Pa	CLEA Briefing note 3, Appendix 1 (house)

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TOWN AND COUNTRY PLANNING ACT 1990 (AS AMENDED)

ADC DISTRICT COUNCIL
PLANNING DIVISION
PLAN No. A/ADC/0341/07
DATE RECEIVED 28 JUN 2007

412 BRIGHTON ROAD, SHOREHAM-BY-SEA

PROPOSED DEVELOPMENT:

Demolition of existing petrol filling station and the erection of a part three storey and part four storey development containing nine flats with associated parking

APPLICATION BY CORNWALL GARAGES LIMITED

SUPPORTING PLANNING, DESIGN AND ACCESS STATEMENT

PREPARED BY:

WOOLF BOND PLANNING LLP
CHARTERED TOWN PLANNING CONSULTANTS

WBP Reference: 3729/04

JUNE 2007

Woolf Bond Planning
Chartered Town Planning Consultants

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6. SUMMARY 31

1. INTRODUCTION

1.1. This Statement has been prepared on behalf of Cornwall Garages Ltd in support of a detailed planning application for the redevelopment of 412 Brighton Road, Shoreham to include the demolition of the existing petrol filling stations and the erection of a part three storey and part four storey development containing nine flats with associated parking.

1.2. An initial Sketch Proposal Plan (no. 2339/03) for the development of the application site was produced to initiate discussions with the Local Planning Authority in advance of a detailed planning application submission. The Sketch Proposal Plan and Survey Plan (no. 15614A/1) were sent to the Development Control Officer at Adur District Council Planning Department at an early stage.

1.3. Following submission of these plans, discussions were held between Woolf Bond Planning LLP and the Development Control Officer during which the general prospects of the proposed development were discussed. A number of action points arose from these discussions which have subsequently been addressed by the application proposal.

1.4. This Statement provides an overview of the proposed scheme and sets out the justification for the development as proposed.

1.5. The application site extends to approximately 0.087 hectares and is irregular in shape. It comprises a petrol filling station with associated development and is surrounded by commercial development to the west and residential dwellings to the north and east. The site fronts on to Brighton Road to the south, beyond which lies the Sussex Yacht Club with associated jetties, riverside warehousing

buildings etc. These units in turn front onto Shoreham Harbour. The site is edged in red on plan WBP1 attached. The detailed layout of the proposed scheme is shown on Plan no's. 2339/06/P2, 2339/04/P3 and 2339/05/P2 prepared by Hives Architects.

1.6. This Statement is set out as follows:

Section 1	Introduction
Section 2	Site Context
Section 3	The Consultation Process
Section 4	Planning Policy
Section 5	Description of the Application Proposal
Section 6	Summary

1.7. Additional material has been prepared and is submitted in support of the proposed application scheme as follows:

- Proposed Layout, Elevation and Floor Plans prepared by Hives Architects.
- Stage 1 Road Safety Audit prepared by Capita Symonds (dated March 2007).
- Environmental Assessment and Quantitative Risk Assessment Report prepared by SLR Consulting Ltd (dated April 2006).
- Noise Report prepared by AES Analytical and Environmental Services (dated May 2005).

1.8. The supporting Environmental Assessment and Quantitative Risk Assessment Report, prepared by SLR Consulting Ltd, indicates that the site would need to be subject to remediation to render it suitable for residential redevelopment.

1.9. This Planning, Design and Access Statement sets out the context of the site, the evaluation process that has led to the proposed layout and the issues to be considered in the determination of the proposals.

2. SITE CONTEXT

Site Location

2.1. The application site comprises a petrol filling station and associated development situated in the south western part of Shoreham Town Centre, within the urban area. The site fronts directly on to the A259 Brighton Road, the main trunk road and transport corridor in the southern section of the town, which runs parallel to Shoreham Harbour. The location of the site, having regard to its wider context within Adur District, is shown on Plan WBP1.

2.2. The location of the site within close proximity to Shoreham Town Centre and fronting directly onto the A259, in addition to its status as previously developed land (PDL), makes it a sustainable location for new residential development. The site is well related to a good range of local services and facilities. A variety of retail properties including banks, building societies and shops lie immediately to the west and north of the site, beyond which lie further services and facilties including a post office, library, church, police station and other shops. The railway station lies approximately 300 metres to the north east of the site.

Site Characteristics

2.3. Both a site analysis and a contextual appraisal of the surrounding area have been undertaken, with the findings used to inform the layout and design of the application proposal.

2.4. The application site is currently in use as a petrol filling station and includes a concrete forecourt and pump canopy as well as a services building located to the rear.

2.5. Whilst visually a part of the garage forecourt, a row of seven car parking spaces situated along the western boundary of the site are not in control of the applicant yet have a right of access over the forecourt.

2.6. The site is irregular in shape and extends to approximately 0.087 hectares. It is currently surfaced in hardstanding and slopes to the south towards the River Adur, located at a distance of 30 metres. The site lies at an elevation of 4 metres.

2.7. The site fronts directly onto the main Brighton Road. The surrounding area is characterised by residential and commercial properties.

2.8. Immediately to the west of the site is situated a relatively modern, two storey development comprising retail uses and possible office space.

2.9. The eastern boundary of the site adjoins a row of Victorian two storey residential dwellings which open directly onto the footpath of Brighton Road.

2.10. To the rear of the site there is a substantial level change formed by a concrete retaining wall approximately 4 metres in height. Beyond this lies another row of two storey dwellings.

2.11. Opposite the site, on the southern side of Brighton Road, are situated large riverside warehouse buildings and the Sussex Yacht Club, which in turn front on to Shoreham Harbour.

2.12. The site is located within the Shoreham-by-Sea Conservation Area which is both commercial and residential in character. However, the existing buildings and surrounding area do not make any positive contribution to the character of the area and are therefore not worthy of preservation. There are no other significant landscapes or trees within the site area.

2.13. Given its current use, it is proposed that vehicular access to the site could be obtained from both eastern and western ends of the road frontage. However, due to the location of the proposed new parking spaces to the rear of the site, as well as the existing row of seven spaces along the western boundary, access to the site will be via the existing western service station access.

2.14. In considering the proposals for redevelopment of the site, the Conservation Area status requires that any proposal should preserve or enhance the appearance and character of the area.

2.15. Analysis of the site suggests that there are no elements of the existing built form worthy of preservation.

2.16. The immediate character of the area is dominated by a noisy road frontage to the main A259 Brighton Road.

2.17. The principle character of the buildings in the area is of narrow frontage plots with strong Victorian characteristics.

2.18. Buildings to the east are two storeys in height but with accommodation within their roof voids. The modern commercial building to the west, when combined with a rising ground level, is equivalent to the height of four domestic storeys.

2.19. The site is south facing. At ground floor level the outlook is onto a noisy road and the facades of storage/warehouse buildings. Within the upper storeys, and with angled orientation of part of the building, there will be increasing views over Shoreham Harbour.

2.20. Locating bedrooms, where possible, to the rear of the building will be advantageous in terms of reduced noise disturbance.

2.21. The provision of windows and front doors on the street frontage would avoid an impersonal/hostile appearance at street level.

Site Opportunities and Constraints

2.22. On the basis of the evaluation, a number of development constraints and opportunities have been identified and taken into account in the scheme design. These are as follows:

Identified Site Constraints

- Noise (in relation to traffic on A259 Brighton Road)
- Contamination
- Air pollution
- Situated within a Conservation Area
- Juxtaposition with adjacent land uses in terms of visual amenity (especially residential development)

Identified Site Opportunities

- Improvements to contamination and air pollution

- Loss of an unattractive site on the Brighton Road frontage.
- Efficient yet sensitive use of previously developed land (PDL)
- Opportunity to contribute to 'The Shoreham Renaissance Project' and the regeneration of Shoreham-By-Sea.
- Enhanced frontage development onto Brighton Road
- More appropriate land use within a Conservation Area
- Loss of commercial land use adjacent to residential development
- Enhancing neighbouring residential occupiers environment in terms of noise, visual amenity, general activity levels etc
- Creating residential development with attractive views over Shoreham Harbour

2.23. Both the opportunities and constraints to providing for development on the application site are addressed in detail below.

3. THE CONSULTATION PROCESS

Background

3.1. The applicant's intention is to provide for a development that creates a sense of place and responds to the character of the area with an appropriate layout and design which is supported by local residents, Council Members, Planning Officers and other interested parties. Accordingly, the application proposal has been subject to detailed discussion with the Officers of the Local Planning Authority.

3.2. Pre-application discussions with the Local Planning Authority are identified in government guidance PPS1 'Delivering Sustainable Development' (2005) at paragraph 12 as critically important, benefiting both developers and Local Planning Authorities in ensuring a better mutual understanding of objectives and the site constraints that exist. It is identified that during the course of such discussions, proposals can be adapted to ensure that they better reflect community aspirations and that applications are complete and address all the relevant issues. This has been a fundamental component of the emerging proposals for the site which have evolved following a number of meetings/discussions with the Council.

3.3. Details of the consultation process are summarised below.

Pre-application Discussions

3.4. Pre-application discussions with the Local Planning Authority began in early 2005.

3.5. At this time, an initial Sketch Proposal Plan (no. 2339/03) and Survey Plan (no. 15614/A/1) for development of the site were sent to Adur District Council Planning Department for initial comments.

3.6. Following submission of these plans, discussions took place between Woolf Bond Planning LLP and the Development Control Officer (Ms Jo Morin) during which the general prospects of the proposed development were discussed.

3.7. It was established that the principle of a residential development scheme on this site will be acceptable to the LPA, subject to a number of detailed issues that needed to be addressed having regard to the location of the site adjacent to the busy, polluted and noisy Brighton Road, the Conservation Area status of the site and general planning principles.

3.8. A number of action points/parameters arose from the pre-application discussions with the Local Planning Authority. These include:

- **Air quality** – high levels of nitro dioxide emissions have been monitored in this area which exceed recommended levels. The area has therefore been identified as an Air Quality Management Area and as part of this exercise the Local Authority will be looking at ways of reducing emissions.
- **Noise** – the site is related to the busy A259 trunk road. The Local Authority requires a noise assessment to accompany any planning application for the redevelopment of this site with appropriate mitigation measures highlighted. A noise report has subsequently been commissioned. Mitigation measures can be incorporated into the design and layout of the building to deal with this issue.
- **Contamination** – owing to the petrol filling use of the site a contamination report will need to be submitted with the application to clarify the nature of

any contamination and mitigation measures. A contamination report has subsequently been commissioned.

- **Highways** – in terms of access the Highways Authority would prefer the access to be either located towards the centre of the site and at a right angle to the road to improve visibility to the east or use the existing access crossover. In terms of car parking the Highway Authority have accepted in principle one parking space per dwelling unit, together with one cycle space per bedroom.
- **Massing** – the LPA indicated a preference for a two-storey building with accommodation in the roof, together with traditional gable end roofs and a two-storey eaves line. The area is characterised by narrow frontages and the scheme would need to respect this, at least in elevational form, rather than producing a single block which would conflict with the 'rhythm' of buildings that currently characterise the area and particularly the Brighton Road frontage.
- **Design** – the Local Authority would not require a pastiche of the strong Victorian characteristics of this part of the Conservation Area but could accept a more modern, even contemporary style of building designed within the parameters/guidelines of Victorian vernacular.
- **Layout** – a residential scheme without any amenity space or balconies would be acceptable but the Local Authority raised concerns about the lack of accommodation on the ground floor fronting Brighton Road (currently comprising undercroft parking spaces nos. 9 to 13). It is considered that this would create a hostile environment within the site itself, together with a dead frontage onto the Brighton Road at street level. The Planning Officer would like to see at least front doors, cycle provision and a degree of accommodation/activity along the ground floor at this point. In addition, the apartments should also have a dual aspect, thereby avoiding the need to be solely reliant upon an outlook over the A259 Brighton Road.

- **S106 Issues** – the site will fall below the Local Authority's affordable housing thresholds. In terms of other potential contributions, there will be a sustainable transport contribution (to be ascertained at the application stage) as well as a possible contribution towards urban art although the relatively small scale nature of the scheme may preclude this.

3.9. The above points set out the initial steer from the Local Planning Authority concerning the general composition, form, layout and early design parameters to be adopted in the planning of this site.

3.10. These comments have been considered and addressed, resulting in the detailed proposal as shown on plan no's. 2339/06/P2, 2339/04/P3 and 2339/05/P2 prepared by Hives Architects.

3.11. Following production of the detailed plans, it was agreed with the Local Authority that Woolf Bond Planning LLP would engage them in further pre-application discussions in relation to the design and scale of the building, the internal layout etc.

3.12. Accordingly, a letter was sent to Ms Jo. Morin (Local Authority Planning Officer) from Woolf Bond Planning LLP, dated 5th May 2005, setting out the detailed proposals for the site, the intention to commission both a Noise Survey/Report and Contamination Report to accompany any application, and enclosing the detailed proposal plans. The design solutions/mitigation measures incorporated into the detailed proposals, in response to the action points/parameters arising from the previous pre-application discussion, are also set out in this letter.

3.13. A detailed description of the proposed scheme, including the design solutions/mitigation measures, is provided in section 5 below.

Summary

3.14. The above summary of events sets out the background to the application proposal, demonstrating how the scheme has emerged from various assessments, involvement, evaluation and design processes. Accordingly, the application proposal represents a bespoke design-led solution to maximising the development potential of the application site, resulting in an entirely appropriate form of redevelopment which responds in an appropriate manner to the issues raised by the Local Authority during various discussions over the past two years.

3.15. The scheme as now designed seeks to maximise the potential of the site and provides for a form of redevelopment that contributes to the regeneration, whilst at the same time respecting the character, of the surrounding area. In response to the comments arising from the pre-application discussions with the Local Authority, the revised scheme provides:

- A contribution towards the regeneration of Shoreham-By-Sea in accordance with The Shoreham Renaissance Project.
- A residential use on this site which will improve the air quality of the area by removing the petrol filling use of the site and consequent petrol vapours and emissions from the stopping and starting of vehicles.
- A continuation of the residential development which fronts onto Brighton Road and characterises this area.
- Decontamination of the site.
- A more appropriate and suitable development which better respects the surrounding area and its Conservation Area status.

3.16. Subject to the issues of noise and contamination, there appears to be no real issue precluding the redevelopment of this site for residential purposes.

4. PLANNING POLICY

4.1. This section summarises the planning policy position against which the proposal is considered at section 5 of this statement below.

4.2. For the purposes of Section 38(6) of the Planning and Compulsory Purchase Act 2004, the development plan against which the application will be considered, comprises both the adopted West Sussex Structure Plan (October 2004) and the adopted Adur District Local Plan (1996).

4.3. The adopted Local Plan was prepared to be in conformity with the earlier approved 1993 West Sussex Structure Plan which covered the period 1991 to 2006. This document has subsequently been reviewed and replaced by the current adopted Structure Plan (2004) which covers the longer term period 2001 to 2016.

4.4. Supplementary planning guidance (SPGs) and other material considerations include the Shoreham Renaissance Strategy and Masterplan (published March 2006).

National Policy Guidance

4.5. Good design is important for all development types in all locations. This means a variety of PPGs and PPSs may be relevant for any one application. This section draws together some of the most important design-related statements found throughout national policy and guidance and these are set out below:

- Planning Policy Statement 1 (Delivering Sustainable Development)
- Planning Policy Statement 3 (Housing)

- 'By Design – Urban Design in the Planning System: Towards Better Practice' (published in 2000) ODPM/CABE.

Planning Policy Statement 1

4.6. PPS1 sets out the Government's objectives for the planning system. This includes a section on the importance of design and seeks positive consideration of design issues stating that:

> **"Good design is indivisible from good planning."**
> (Paragraph 33 of PPS 1)

4.7. It further states that:

> **"Design which is inappropriate in its context or which fails to take opportunities to improve the character and quality of an area should not be accepted."**
> (Paragraph 34 of PPS 1)

Planning Policy Statement 3

4.8. PPS3 sets out the national planning policy context for residential development. The guidance states that:

> **"Good design is fundamental to the development of high quality new housing, which contributes to the creation of sustainable, mixed communities."**
> (Paragraph 12 of PPS 3)

> **"Design which is inappropriate in its context, or which fails to take the opportunities available for improving the character and quality of an area and the way it functions, should not be accepted."**
> (Paragraph 13 of PPS 3)

By Design

> **"By Design 'provides sound, practical advice to help implement the Government's commitment to good design....and is drawn up around a limited number of simple but compelling principles."**
> (Foreword to By Design ODPM, CABE 2000)

4.9. The joint ODPM/CABE publication 'By Design – Urban Design In The Planning System: Towards Better Practice' (published in 2000) sets out the following seven design objectives:

- Character - Planning should promote character in townscape and landscape by responding to and reinforcing locally distinctive patterns of development, landscape and culture.

- Continuity and enclosure - Planning should promote continuity of street frontages and enclosure of space by development which clearly defines private and public areas.

- Quality of the public realm - Planning should promote public spaces and routes that are attractive, safe, uncluttered and work effectively for all in society, including disabled and elderly people.

- Ease of movement - Planning should promote accessibility and local permeability by making places that connect with each other and are easy to move through, putting people before traffic and integrating land uses and transport.

- Legibility - Planning should promote legibility through development that provides recognisable routes, intersections and landmarks to help people and their way around.

- Adaptability - Planning should promote adaptability through development that can respond to changing social, technological and economic conditions.

- Diversity - A place with variety and choice

Adopted Adur District Local Plan (adopted 1996)

4.10. The current adopted Adur District Local Plan (1996) covers the period 1996 to 2006 and was prepared in accordance with the provisions of the West Sussex Structure Plan. Under the provisions of the Planning and Compulsory Purchase Act 2004, the Local Authority is currently preparing its Local Development Framework which will eventually replace the adopted Local Plan. According to the Act, the adopted Local Plan can be 'saved' for a period of up to three years until such time as it is replaced by the Local Development Framework.

4.11. The adopted Local Plan sets out the planning policies and aims for the District during the period to 2006. The relevant policies of the Plan in relation to the proposed application for the redevelopment of 412 Brighton Road are set out below.

Housing

4.12. The housing policies of the adopted Local Plan in meeting the strategic housing requirement for the District are set out in Chapter 9.

4.13. Paragraph 9.5 of the Local Plan sets out the Structure Plan requirement for the provision of a total of 1,700 new dwellings in the District during the Plan period.

4.14. Paragraph 9.6 notes that the provision of land for residential development comprises existing commitments, specific allocations of land for new housing and an allowance for the completion of dwellings on sites likely to come forward on land not previously identified for housing during the Plan period.

Housing Allocation

4.15. The application site is not specifically allocated for development under the provisions of Policy AH1 of the adopted Local Plan. It is, however, identified as being situated within the built up urban area.

4.16. Paragraphs 9.10 – 9.12 and Policy AH2 of the adopted Local Plan refer to the development of unidentified sites, most of which come forward as a result of infilling, redevelopment, conversion or change of use. Such development will generally be encouraged providing the land is not subject to any other proposal or reserved for any other purpose in the Local Plan.

4.17. Any such proposals will be expected to be designed so that its appearance, character and scale create a pleasant place in which to live and is in keeping with and enhances the existing local environment. It must also respect the existing natural features of the site and should not have an unneighbourly effect on existing dwellings by reason of unacceptable loss of privacy, amenity etc. Similarly, adequate standards of residential amenity for the new dwellings should be incorporated. Finally, access arrangements to the public highway and on-site parking arrangements should be suitable and acceptable.

Design

4.18. Paragraph 9.30 and Policy AH5 of the adopted Local Plan recognise the increasing need in the District for additional small dwelling units to accommodate an increasing number of households. There will therefore be a presumption in favour of the supply of smaller dwellings units suitable for small households. However, in implementing this policy, the Local Authority will have regard to the desirability of a mix of dwelling types both within the development and the locality.

4.19. Policies AB3 and AB4 of the adopted Local Plan set out the requirements in relation to development within a Conservation Area. Policy AB3 provides that planning permission will not be granted for development which will generate a level of traffic flow, or other activity, likely to adversely affect the character of the Conservation Area.

4.20. Policy AB4 requires new development within Conservation Areas to be of a high standard of design and construction materials so as to preserve or enhance its character and appearance. Whilst new developments should not copy precisely the design, materials and layout of the principal buildings and features within a Conservation Area, the basic principles which contribute to the character of each location should be incorporated in new schemes in order to maintain the area's character.

4.21. Policy AB4 also recognises that not all buildings in Conservation Areas contribute positively to their character. In exceptional circumstances it may be considered that redevelopment of a particular building may enhance a Conservation Area.

Transport

4.22. Transport policy is set out in Chapter 8 of the adopted Local Plan. This requires, inter alia, at paragraphs 8.8 (2) and 8.22 and Policy AT1, support for improvements to and approved traffic management measures on the main A259 coastal road between Shoreham-by-Sea and the East Sussex boundary (the main road onto which the subject site fronts). Any significant development proposals will be expected to incorporate appropriate access and highway improvements in order to serve traffic generated by the proposed development.

Landscaping

4.23. Paragraph 7.52 and Policy AB27 of the adopted Local Plan recognise the importance of both hard and soft landscaping in the assimilation of new development into its surroundings. Such landscaping schemes enhance the quality of the environment and, wherever possible, should be designed to incorporate existing features of the site.

Shoreham Renaissance Strategy

4.24. The Shoreham Renaissance Strategy was published in March 2006 and was, in part, prepared to inform the preparation of Adur District's LDF. Included in the main objectives of the Strategy are the intentions to regenerate key sites with high quality, sustainable and sensitive development as well as to create new residential accommodation of the highest architectural quality.

4.25. Another main aim of the Renaissance Strategy includes developing a sustainable community by increasing the amount of residential accommodation within the town centre.

Evaluation

4.26. The emerging scheme must ensure that it meets the requirements of the adopted Local Plan, as well as contributing to the aims and objectives of the Shoreham Renaissance Strategy. Essentially the documents require the scheme to represent an appropriate and high quality redevelopment which secures a satisfactory relationship with neighbouring land uses and designations. This context has had a significant influence on the form of the proposed development and how it manifests itself on the site and relates to neighbouring properties and the Conservation Area.

5. DESCRIPTION OF THE APPLICATION PROPOSAL

Introduction

5.1. The previous sections of this statement have set out the context of the site and the considerations that have informed the preparation of the detailed planning application.

5.2. The details of the application scheme are set out below, along with the appropriateness and acceptability of the scheme in planning, design and access terms, all of which provide the justification and acceptability for the scheme as now proposed, including in relation to, inter alia, the planning policy requirements summarised in Section 4 above.

Background

5.3. As set out in Section 3 above, the design and layout of the detailed application scheme, proposing the redevelopment of 412 Brighton Road, Shoreham to include the demolition of the existing garage and the erection of a part three storey and part four storey development containing nine flats with associated parking, is a result of constructive discussions held with Local Authority Planning Officers.

Principle of Development

5.4. The principle of residential redevelopment of this site has now been established and confirmed as entirely appropriate and acceptable through discussions held with the Local Authority Planning Officers. This is subject to a number of detailed issues that have now been addressed in the design of this scheme, having regard

to the location of the site adjacent to the busy, polluted and noisy Brighton Road, the Conservation Area status of the site and general planning principles.

Character and Relationship with Surrounding Area

5.5. The scheme provides for the development of 9 no. flats served via the existing access from Brighton Road to the west. The scheme is to be set within a landscaped setting.

5.6. The scheme creates an appropriate development which reflects the character of the area, creating a sense of place.

5.7. Building heights, style, form, bulk and massing reflects the character of the surrounding area, providing an identity for the development. The visual appearance of the building is intended to reflect some of the appearance and forms of the adjoining terraces, particularly in terms of the use multi-storey bay windows. The sense of place is further enhanced through the use of high quality architecture. Each front entrance door has a strong visual appearance in terms of its porch and surrounding. The upper floors of both sections of the proposed building incorporate mansard roofs with roof terraces guarded by railings with a contemporary appearance.

5.8. A plan schedule is attached and includes details of elevations, storey heights and street scenes.

Layout

5.9. Plan nos. 2339/06/P2, 2339/04/P3 and 2339/05/02 show the detailed site layout of the proposed scheme.

5.10. The proposed building is positioned parallel with the site frontage from its eastern boundary before turning through approximately 45 degrees to accommodate the vehicle access and parking layout on the western side of the site. The building is set back slightly from the back of the footpath with a boundary wall and railings as well as a narrow landscape strip.

5.11. The eastern portion of the building, where it abuts the adjoining terrace of housing, is three storeys in height, with the upper level provided in a mansard roof structure. The remainder of the building is of four storeys with the uppermost level again being formed by a mansard roof.

5.12. Access to the building and the various flats is via two communal stair cores, both of which have their access doors located on to Brighton Road, at the front of the building at the suggestion of the Local Authority and their desire to create an attractive and active street frontage, in particular at ground floor level, similar to the remainder of this part of the Brighton Road frontage.

5.13. The accommodation within the proposed building is shown in detail on Plan nos. 2339/04/P3 and 2339/05/02 and will be provided as set out below. It can be noted from these floor plans that dual-aspect apartments have been provided in order to avoid single aspect only units onto the busy Brighton Road.

Ground Floor

5.14. The ground floor contains undercroft access to the car parking area and car parking spaces as well as waste bin storage, access stairs to the upper floors and now includes two one-bedroom flats fronting onto Brighton Road, again at the suggestion of the Local Authority and their desire to create an attractive and active street frontage.

First Floor

5.15. The first floor contains the lower level of two two-bedroom duplex apartments together with two further two-bedroom flats.

Second Floor

5.16. The second floor contains the upper portions of the duplex apartments together with two further two-bedroom flats.

Third Floor

5.17. The third floor contains a two-bedroom flat with a roof terrace.

Principles of Design

5.18. Plan nos. 2330/07/P3 and 2339/08/P3 show the proposed street elevations of the scheme.

5.19. The scale of the building is designed to make a strong and positive statement on a site that is otherwise dominated by road and traffic movement. However, its scale is intended to respect the surrounding area.

5.20. In respect of massing, the eastern wing of the building is designed as two-storey unit, plus a mansard roof. This reflects and respects the scale and form of the adjoining terrace to the east of the site (nos. 408 and 410 Brighton Road). The remainder of the building then steps up to three-storeys in height with a mansard roof, which reflects and compliments the scale of the commercial buildings to the west of the site.

5.21. The building is set back slightly from the footpath. This retains a strong street line but gives the ability to provide a setting and buffer from private to public space.

5.22. The building is angled back at the access point to reflect the layout of parking and maneuvering space at the western end of the site. This also gives the opportunity to exploit other views towards Shoreham Harbour, as well as ensuring that the proposed scheme does not over-dominate the street scene at this point as it will be difficult to perceive, if at all, from the street level.

5.23. The building is designed to exploit the southerly aspect of the site and the potential views from upper levels over the harbour. It is intended as a modern, contemporary building and this would be reinforced in the detailing of the various elements.

5.24. The introduction of traditional forms in the building such as the bay windows and entrance porches, window alignment detailing, varying eaves and ridge heights, as well as varying plot widths, are all intended to positively reflect the general Victorian character of the area and the surrounding buildings and the predominant characteristic of frontage residential properties in this Conservation Area.

5.25. Lead or similar cladding at roof level together with coloured render to walling are intended as reinforcement of the building as a part of the local character.

5.26. The set back at the upper floor is exploited for the whole building to create roof terracing for outside amenity space.

5.27. Two independent stair cores serve the building and a wide variety of flat arrangements and sizes are possible as a result of the building geometry.

5.28. Secure bin storage has been provided together with conveniently located and secure on-site accommodation for bicycles.

Access

5.29. Vehicular access to the site will be via the existing western service station access point from the main A259 Brighton Road.

5.30. Although the Highways Authority would have preferred the access to be located towards the centre of the site and at a right angle to the road, in order to improve visibility to the east, it was agreed that this would create layout problems and preclude the optimum redevelopment of the site. With this in mind, the Highways Authority has not objected to the proposed access point at the existing western crossover, partly because the proposal will result in a less intensive use of the same.

5.31. Due to the position of the access on the western side of the site, parking is located to the rear of the site and along the western boundary. Parking is provided to the levels previously advised and agreed by the Planning Authority (9 no. car parking spaces at 1 space per dwelling). It is noted that some of the parking spaces on site do not form part of the development and are under the control, for parking use, of a third party.

5.32. A fully undercroft car parking area has been omitted from the scheme, thereby avoiding any unsatisfactory on-site environment.

Landscaping

5.33. The external areas of the proposed development are primarily hard landscaped for vehicle circulation and parking. Soft landscaping is provided in the corners of

the site, as a buffer to habitable rooms and as a buffer between the building and the public highway.

Sustainability

5.34. As far as reasonably practicable, sound sustainable practices in relation to energy efficiency will be employed throughout this development. These practices will include the efficient use of land, good layout design to minimise energy and water useage whilst maximising solar gain through building orientation (avoiding north facing habitable rooms and overshadowing by trees and buildings), good design generally to stimulate social contact and community spirit, flexibility and adaptability in design, making use of resources for speedy and quality construction, the promotion of energy efficient measures in dwellings and the utilisation of local and recyclable materials.

Air Quality

5.35. It is acknowledged that a residential use on this site could improve the air quality of the surrounding area. The current petrol filling station use with petrol vapours, together with the stopping and starting of vehicles on the site at present, can only add to emissions produced by traffic on the main A259 Brighton Road. Removal of this land use and its replacement by a residential development will improve this particular matter.

Noise

5.36. The site is clearly related to the busy A259 Brighton Road and noise is therefore a potential issue in relation to the redevelopment of this site. However, the area is characterised by residential development fronting onto this busy section of road and mitigation measures have been incorporated into the design and layout of the

building so that noise does not represent a determinative constraint on the redevelopment of the site. For example, the building is set back and angled away from the road, with a landscape buffer between the public and private space.

Contamination

5.37. Completion of a Quantitative Risk Assessment (Report by SLR Consulting Ltd dated April 2006) has indicated that the site would need to be subject to remediation to render it suitable for residential redevelopment. These works can be carried out prior to the residential development and secured by condition.

6. SUMMARY

6.1. The detailed application represents a high quality, comprehensive and well-designed development scheme in a sustainable location within walking distance of local services and facilities, which respects the character of the site and its surrounding environment, as well as maximising its redevelopment potential.

6.2. The proposal provides for the removal of a land use and buildings that are out of keeping with the Conservation Area. By comparison to the existing incongruous break created by the petrol filling station in an otherwise built-up frontage along this section of Brighton Road, the proposed scheme represents a replacement building which still reflects the character of the area and which will preserve and enhance the character and appearance of the Conservation Area. In addition, it will strengthen, enhance and retain the visual interest and vitality of the street frontage along Brighton Road.

6.3. The proposals have been carefully and sensitively considered to address the planning and physical constraints imposed on this site. They encompass a traditional architectural style which is appropriate for this location and sympathetic to the scale of surrounding buildings. The scheme echoes in form the materials and existing architecture of the area and is sited to make best use of its aspect and potential outlook. In this way, good residential layout and design practice have been achieved and therefore a 'sense of place' has been created.

6.4. The application has been subject to pre-application discussions with Local Authority Planning Officers, which has resulted in a number of changes to the initial scheme, responding to the changes sought. The submitted scheme is the

end result of the pre-application consultation, with the scheme having evolved and changed throughout this process. National and local policies for residential development and the detailed layout comments by the planning officer have been addressed to ensure that this scheme is appropriate for the site.

6.5. The layout, design, siting, form, bulk and massing of the application scheme as submitted accord with development plan policy, providing for an appropriate and acceptable form of development.

6.6. The form, scale, massing and volume of the proposed development represent a design-led bespoke response to the development potential of the site, having regard to the character of the surrounding area and its Conservation Area status.

6.7. The internal layout of the scheme provides for suitable access widths, manoeuvring and turning space to allow for the site to be accessed and serviced in accordance with relevant standards/requirements.

6.8. For the reasons set out and summarised above, the application should be supported and planning permission should be granted.

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ADUR DISTRICT COUNCIL
PLANNING DIVISION

PLAN No.	Ansc/0391/07
DATE RECEIVED	28 JUN 2007

Woolf Bond Planning

Road traffic noise assessment for proposed residential development Brighton Road, Shoreham

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This report is not to be used for contractual or engineering purposes unless the front cover sheet is signed where indicated by both the originator of the report and the approver and the report is designated 'Final' on the cover sheet.

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Road traffic noise assessment for proposed residential development, Brighton Road, Shoreham

1. Introduction

The acoustics section of AES, part of the Northumbrian Water Group, was requested by Woolf Bond Planning on behalf of clients to undertake an assessment of road traffic noise affecting a proposed residential development site at Brighton Road, Shoreham.

A noise measurement survey was carried out on 10 May 2005 during which road traffic noise was measured at three locations.

The results of the survey have been assessed by reference to current Government planning guidance, and other national standards and guidance documents. This report explains the survey and assessments and discusses outline recommendations for noise mitigation measures.

Acoustic terminology is described in Appendix 1.

2. Site description

Figure 1 shows the site location in the centre of Shoreham to the north of the A259 Brighton Road.

Figure 2 shows the existing site and surroundings. Brighton Road is the A259, which is a major highway and coast route linking Brighton and Worthing. The site is currently a petrol filling station.

There is existing residential development to the east of the site.

The site is proposed for residential development on four floors as shown in Figure 3.

The frontage of the adjoining residential development is followed for the façade facing Brighton Road.

3. Basis of assessment

3.1

Planning Policy Guidance Note PPG24 *Planning and Noise*[1] gives the official government advice to planning authorities for dealing with noise aspects of planning. For road traffic, aircraft and railways, noise exposure categories are recommended for new residential development near existing noise sources. For road traffic noise the free field noise levels corresponding to the noise exposure categories for new dwellings, in terms of $L_{Aeq,T}$, are given in the following table:

	NOISE EXPOSURE CATEGORY			
NOISE SOURCE	**A**	**B**	**C**	**D**
Road Traffic				
07:00 - 23:00	<55	55 - 63	63 - 72	>72
23:00 - 07:00	<45	45 - 57	57 - 66	>66

Category A represents the circumstances in which noise is unlikely to be a determining factor, while Category D relates to the situation in which development should normally be refused. Categories B and C deal with situations where noise mitigation measures may make development acceptable.

3.2
The World Health Organisation Environmental Health Criteria 12 *Noise*[2] advises a bedroom noise level of less than 35 dB L_{Aeq} to preserve the restorative process of sleep. General daytime outdoor noise levels of less than 55 dB L_{Aeq} are desirable to prevent any significant community annoyance. The World Health Organisation has published a revised document in 2000[3]. For dwellings, recommended guideline values inside bedrooms are 30 dB L_{Aeq} for steady state continuous noise. At night-time, outdoor noise should not exceed 45 dB L_{Aeq} so that people may sleep with bedroom windows open. Daytime noise levels should not exceed 50 dB L_{Aeq} to prevent the majority of people from being moderately annoyed or 55 dB L_{Aeq} to prevent the majority of people being seriously annoyed.

3.3
The application of WHO guidelines to UK planning has been questioned in a 1998 report[4] by the Department of the Environment, Transport and the Regions. It states that WHO guidelines do not have any official status in the UK and that perhaps their main weakness is that they fail to consider the practicality of actually being able to achieve any of the stated guideline values. Further to this it states that exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached.

3.4
PPG24 states that the 1987 version of British Standard BS 8233 *Sound Insulation and Noise Reduction for Buildings*[5] provides guidance on suitable internal noise levels for dwellings. These are 30 dB to 40 dB $L_{Aeq,T}$ for bedrooms and 40 dB to 45 dB $L_{Aeq,T}$ for living areas.

3.5
BS 8233 was revised in 1999[6]. It states criteria for continuous noise of 30 dB to 35 dB $L_{Aeq,T}$ for bedrooms and 30 dB to 40 dB $L_{Aeq,T}$ for living rooms. In gardens and on balconies etc, it is desirable that the steady noise level does not exceed 50 dB $L_{Aeq,T}$ and 55 dB $L_{Aeq,T}$ should be regarded as the upper limit.

3.6
Contact was made with Adur District Council before the noise survey. Assessment methodology was discussed with Ed Hele of the Environmental Health Department.

4. Noise measurements

A noise measurement survey was carried out on Tuesday 10 May 2005 at three locations as shown on figures 2 and 3. Noise from vehicles using the petrol station and noise from site investigation drilling was excluded from the measurements.

Positions 1 and 2 were located next to the site boundary and position 2 was in a central position unaffected by extraneous noise. The positions were chosen to represent the position of the façade of the proposed buildings facing Brighton Road.

Noise measurements were made with the shortened procedure of Calculation of Road Traffic Noise [7], and the results are shown in table 1.

The weather during the survey was dry and sunny with a light northerly wind.

A precision sound level meter was used for the measurements, as listed in Appendix 2. The equipment was calibrated before and after use and no deviations were recorded. A check on interference from electromagnetic fields was made by short circuiting the input to the sound level meters. The reading was less than 10 dB, which would not affect any of the measured noise levels.

All measurements were made with the microphone at a height of 1.2 m above the ground.

5. Discussion

PPG24 requires the daytime (07:00 to 23:00) and night-time (23:00 to 07:00) freefield period $L_{Aeq,T}$ noise levels to be determined at ground floor level.

Table 1 shows the calculated noise levels. Position 3 is most representative of the location of the proposed buildings. Positions 1 had to be located closer to the road and position 2 was more remote and near a road junction.

The noise level at position 3 was:

71 dBLAeq$_{(16\ hour)}$

Night time noise can be determined by using data from a 24 hour survey undertaken at a nearby site on the A259 in Shoreham. The difference between daytime LAeq$_{(16\ hour)}$ and night time LAeq$_{(8\ hour)}$ was 5.2 dB. Applying this value to the site in question gives the following noise exposure.

Daytime LAeq$_{(16\ hour)}$ = 71 dB.

Night time LAeq$_{(8\ hour)}$ = 66 dB.

This is Noise Exposure Category C of PPG24 for both day and night time.

The external noise levels at each floor of the development have been calculated taking account of height and the barrier effect for top windows which are set back from the Brighton Road frontage.

The noise levels are given below.

	Daytime dB $L_{Aeq,16hour}$	Night time dB $L_{Aeq,8hour}$
Ground	71	66
First	70	65
Second	70	65
Second set back	63	58
Third set back	60	55

PPG24 states that standard thermal (narrow air gap) double glazing provides an attenuation to road traffic noise of 30 dB from free field levels for typical dwellings.

The internal noise levels with standard thermal narrow air gap glazing are therefore as follows:

	Daytime dB $L_{Aeq,16hour}$	Night time dB $L_{Aeq,8hour}$
Ground	41	36
First	40	35
Second	40	35
Second set back	33	28
Third set back	30	25

For this location a suitable night time noise level of 30 dBLAeq$_{(8\ hour)}$ would be appropriate with a higher level during the daytime of 35 dBLAeq$_{(16\ hour)}$. This is achieved for the second set back and third set back floors.

An additional attenuation of up to 6 dB is required for the ground first and second floors.

A sound level difference of up to 35 dB could be achieved with 8/6/6 glazing. 10/12/4 would achieve an extra 7 dB.

The minimum glazing to achieve daytime 35 dBLAeq(16 hour) and night time 30 dBLAeq(8 hour) is given below.

	Daytime dB $L_{Aeq,16hour}$	Night time dB $L_{Aeq,8hour}$
Ground	10/12/4	10/12/4
First	8/6/6	8/6/6
Second	8/6/6	8/6/6
Second set back	4/6/4	4/6/4
Third set back	4/6/4	4/6/4

Acceptable internal noise levels should be achieved in living rooms and bedrooms with a view of Brighton Road with this specification of windows when closed. Where windows have to be closed to achieve acceptable internal noise levels, additional means of ventilation should be provided.

Some of the rooms are double aspect with windows on both sides of the development so that ventilation can be achieved from an open window on the quiet side away from Brighton Road. Rooms which only have a window facing Brighton Road should have acoustic ventilators or a whole house ventilation system.

6. Summary

6.1. The acoustics section of AES, formerly Wimtec/National Britannia has evaluated the impact of road traffic noise on a proposed residential development at Brighton Road, Shoreham.

6.2. Daytime noise measurements were made at three positions representative of the façade of the proposed development.

6.3. Night time noise levels have been obtained from a 24 hour survey of a nearby site at Shoreham next to the A259 Brighton road.

6.4. The development is noise exposure category C of PPG 24 where mitigation measures could make the development acceptable.

6.5. Acceptable internal noise levels can be achieved in all habitable rooms with a view of Brighton Road with double glazing as specified when closed.

6.6. An additional means of ventilation should be provided for these rooms so that windows can remain closed if desired.

6.7. Acoustic ventilators or a whole house ventilation system is recommended.

7. References

1. DEPARTMENT OF THE ENVIRONMENT, Planning Policy Guidance Note PPG24, *Planning and Noise*, HMSO, London, September 1994.

2. WORLD HEALTH ORGANISATION, *Environmental Health Criteria 12: Noise*, World Health Organisation, Geneva, 1980.

3. WORLD HEALTH ORGANISATION, *Guidelines for community noise*, World Health Organisation, Geneva, 2000.

4. DEPARTMENT OF THE ENVIRONMENT, TRANSPORT AND THE REGIONS, *Health effect based noise assessment methods: a review and feasibility study*, HMSO, London, September 1998

5. BRITISH STANDARDS INSTITUTION, BS 8233, *Sound insulation and noise reduction in buildings*, British Standards Institution, London, 1987.

6. BRITISH STANDARDS INSTITUTION, BS 8233, *Sound insulation and noise reduction in buildings*, British Standards Institution, London, 1999.

7. DEPARTMENT OF TRANSPORT, *Calculation of Road Traffic Noise*, HMSO, London, 1988.

Table 1

Noise measurement results

Time	Position	L_{A90}	L_{A10}	L_{Aeq}	L_{Amax}
10.05	1	64.3	80.3	77.2	92.2
10.22	2	62.8	74.3	71.0	82.1
10.33	3	67.3	77.8	76.7	82.0
11.05	1	68.3	80.3	77.2	91.5
11.22	2	64.8	74.3	71.3	84.1
11.33	3	68.8	75.8	73.3	85.9
12.05	1	68.3	79.8	76.3	89.9
12.22	2	64.3	75.3	72.0	88.9
12.33	3	68.3	76.8	74.3	84.7

Position 1

Façade LA10 (3 hour) = 80.1 dB Free field LA10 (3 hour) = 77.6 dB

LA10 (18 hour) = 76.6 dB

LAeq(16 hour) = 74.6 dB

Position 2

Façade LA10 (3 hour) = 74.6 dB Free field LA10 (3 hour) = 72.1 dB

LA10 (18 hour) = 71.1 dB

LAeq(16 hour) = 69.1 dB

Position 3

Façade LA10 (3 hour) = 76.8 dB Free field LA10 (3 hour) = 74.3 dB

LA10 (18 hour) = 73.3 dB

LAeq(16 hour) = 71.3 dB

(Correction for LA10 (3 hour) to LA10 (18 hour) taken from CRTN [7]

Correction for LA10 (18 hour) to LAeq(16 hour) taken from PPG24 [1])

Figure 1
Site location

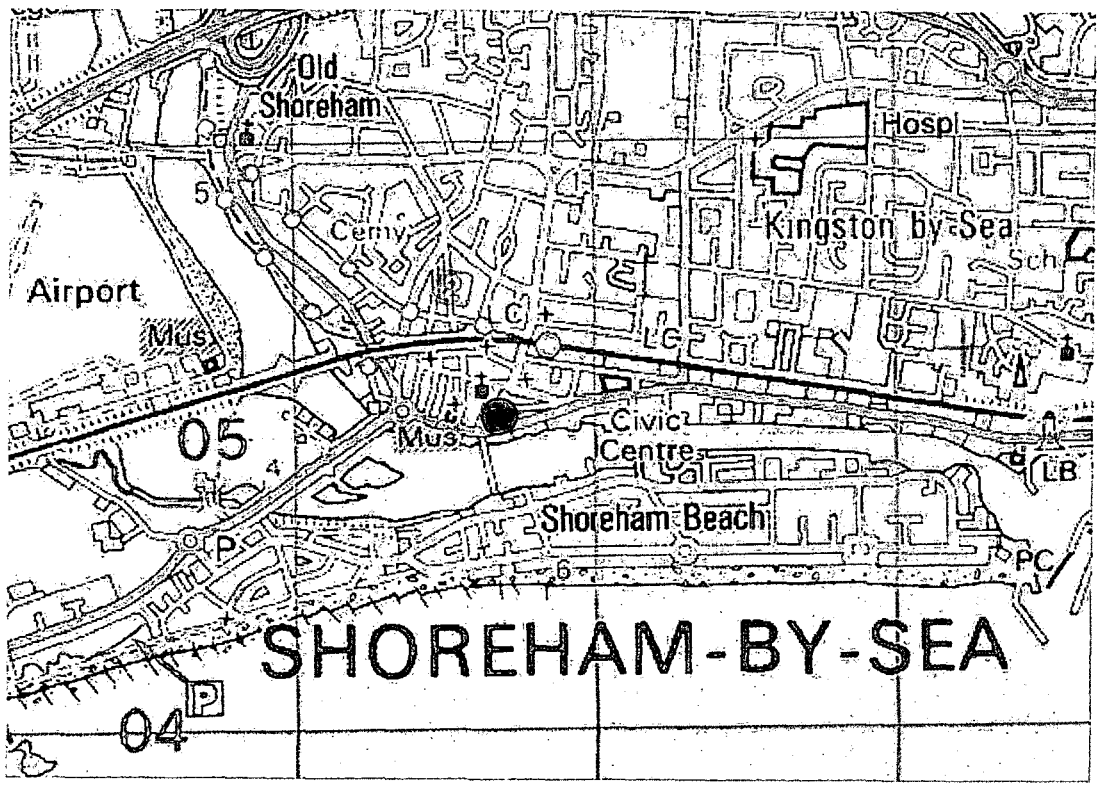


Figure 2
Existing site layout

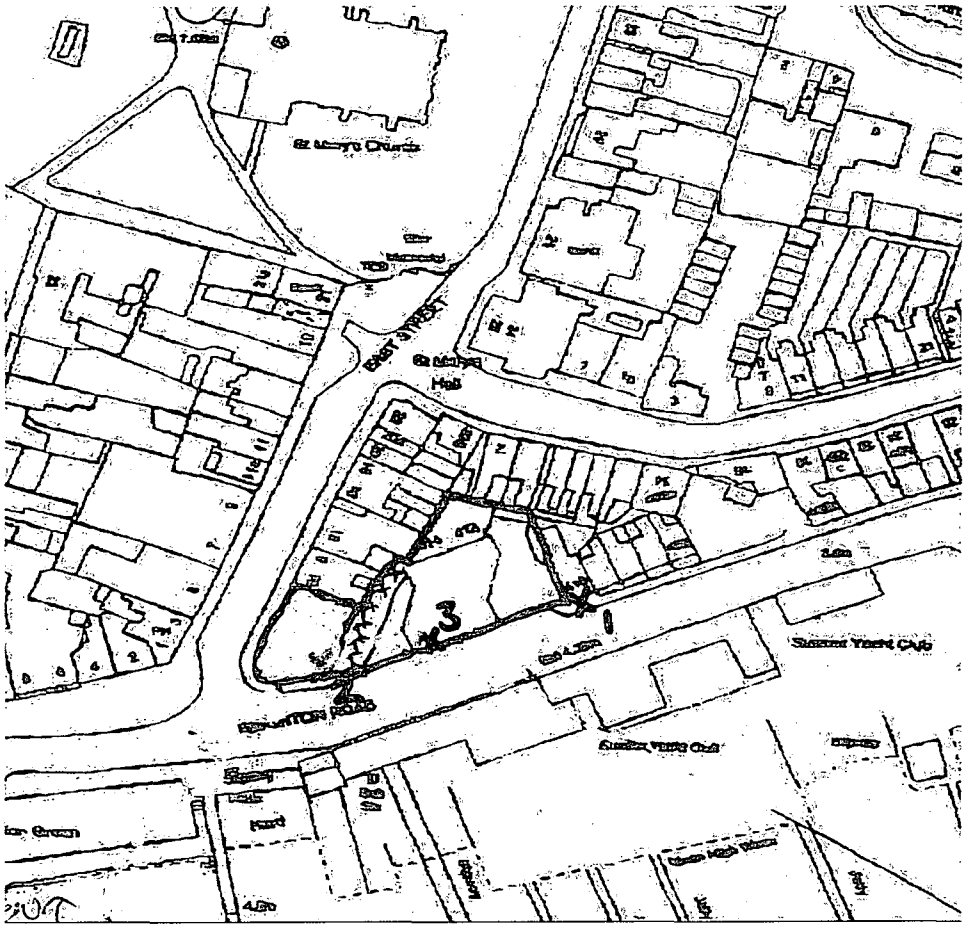
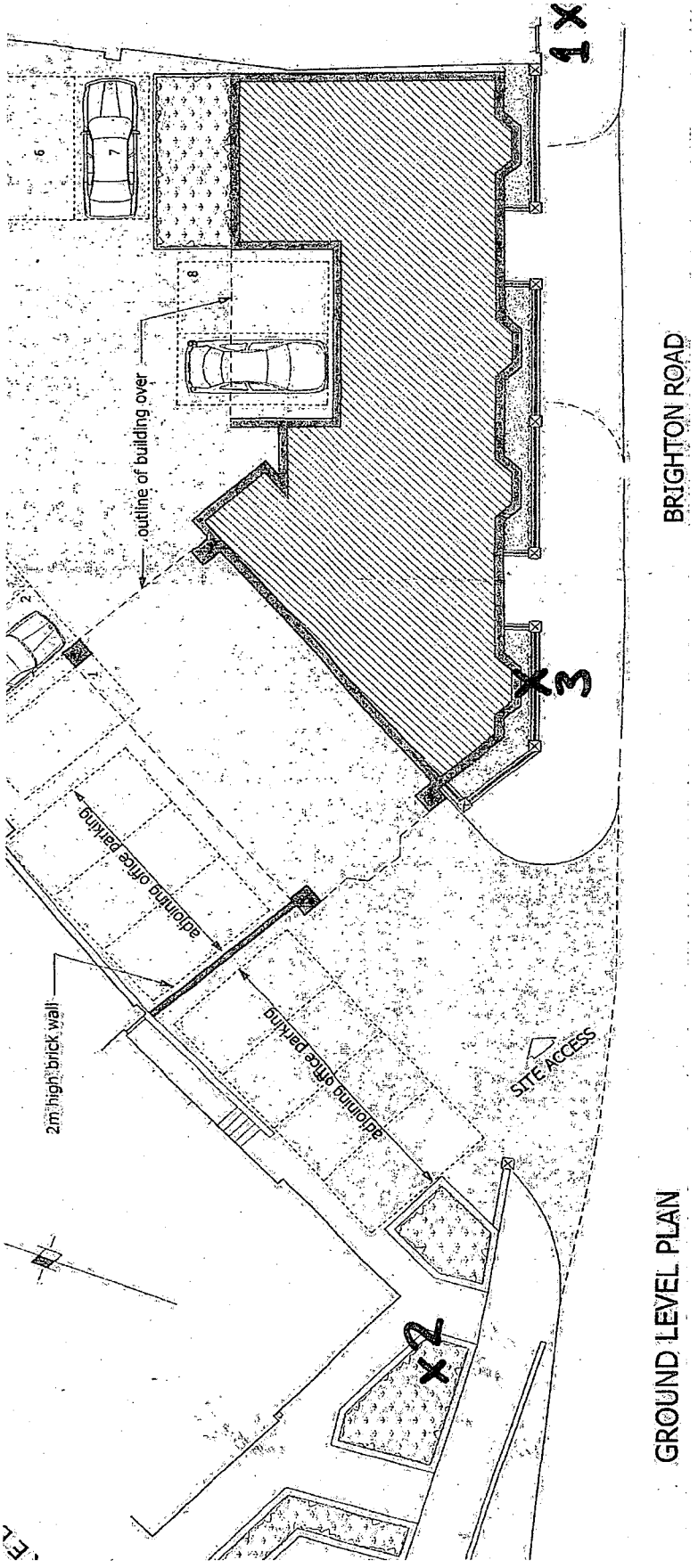


Figure 3
Proposed development layout



Appendix 1
Acoustic terminology

1. Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level, based on pressure measurement. As the pressures to which the human ear responds can range from 20 mPa to 200 Pa, a linear measurement of sound levels would involve very large numbers. To avoid this, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$$L_p = 20 \log (p/p_0)$$

where L_p = sound pressure level in dB; p = rms sound pressure level; and p_0 = reference sound pressure (20 mPa).

2. Sound Level (L_{pA})

Sound level is the value measured with a sound level meter which incorporates frequency weighting networks. These attenuate the signal at some frequencies and amplify it at others. Sound levels measured with the A-weighting network are expressed in dB(A). The A-weighting network approximately corresponds to the frequency response of the human ear.

3. Sound Power Level (L_W)

The sound power level of a source is an absolute measure of the sound output, but it cannot be measured directly. It is usually calculated from a sound pressure level and the distance from the source at which that sound pressure level is measured. For sound radiating uniformly and hemispherically from a point source on a flat reflecting surface, the equation is:

$$L_W = L_p + 20 \log r + 8$$

where L_W = sound power level in dB re 10^{-12} W; and L_p = sound pressure level in dB re 20 mPa at a distance r metres from the source.

4. Equivalent Continuous Sound Level (L_{Aeq})

Sound levels invariably fluctuate. A summation can be made of the sound energy in the fluctuating sound and a steady level of the same total energy calculated. This steady level is termed the equivalent continuous sound level. L_{Aeq} can be determined over any time period, which is indicated as $L_{Aeq,T}$ where T is the time period (eg. $L_{Aeq,1hour}$, $L_{Aeq,12hour}$, etc).

In mathematical terms, L_{Aeq} is given by:

$$L_{Aeq} = 10 \log \left\{ \frac{1}{T} \int_{t=0}^{t=T} \left(\frac{p_A(t)}{p_0} \right)^2 dt \right\}$$

where L_{Aeq} = equivalent continuous sound level in dB over a time period T; $p_A(t)$ = instantaneous sound pressure in Pa varying with time t; and p_0 = reference sound pressure (20 mPa).

5. Background Noise ($L_{A90,T}$)

Background noise is the noise level exceeded for 90% of the time over the specified period T. It is the basic noise level in a locality and does not include the effects of short duration noise.

6. Ambient Noise ($L_{Aeq,T}$)

Ambient noise is a measure of the average noise level over the specified time period T and include contributions of all noise sources.

7. Maximum Noise (L_{Amax})

This is the highest A-weighted sound pressure level recorded by the sound level meter during the measurement period.

8. Level Exceeded for 10% of the Time ($L_{A10,T}$)

This is a measure of the higher noise levels to which a locality is exposed during time T. The noise produced from road traffic is generally expressed in terms of $L_{A10,18hour}$.

Appendix 2
List of equipment used

	AES REFERENCE
Brüel & Kjaer sound level meter, type 2231	4004
Brüel & Kjaer ½" pre-polarised microphone, type 4155	4005
Brüel & Kjaer acoustic calibrator, type 4230	4006