



PARKMAN

PARKMAN

www.parkman.co.uk

Land off Pontefract Road, Barnsley

www.parkman.co.uk

Flood Risk Assessment

www.parkman.co.uk

May 2003

LAND OFF PONTEFRACT ROAD

BARNESLEY

Flood Risk Assessment

Harrow Estates Ltd

Report Ref: 1002366/R/01

REPORT CONTROL SHEET

PROJECT NAME: Land off Pontefract Rd, Barnsley
PROJECT TITLE: Flood Risk Assessment
REPORT NUMBER: 1002366/R/01

VERSION	DETAIL	PREPARED BY	CHECKED BY	APPROVED BY
A	Draft Issue for EA discussion	H Keeble	A Storey	A Storey
B	Final	H Keeble	A Storey	A Storey

CONTENTS

	Page No
1. INTRODUCTION	1
2. SITE DESCRIPTIONS & PHOTOGRAPHS	2
3. FLOOD RISK	3
4. DESIGN PARAMETERS	4
5. DESIGN FLOOD LEVEL & SLAB LEVELS	5
6. CONSIDERATION	7
7. DISCUSSION & CONCLUSIONS	8
 APPENDIX A - ENVIRONMENT AGENCY	
APPENDIX B - TOPOGRAPHIC SURVEY	
APPENDIX C - COMPENSATORY FLOODPLAIN PROPOSALS	

1. INTRODUCTION

- 1.1 The proposed development site lies to the west of Pontefract Rd (B6273), Barnsley.
- 1.2 According to the Environment Agency's (EA's) indicative floodplain map for the area, the site is located within the fluvial floodplain of Knoll Beck.
- 1.3 It is the policy of the EA to object to any proposals for development within the indicative floodplain on the grounds of flood risk.
- 1.4 Harrow Estates plc have commissioned Parkman Ltd to undertake a Flood Risk Assessment to determine the likely extent of flooding at the proposed development site. This Assessment addresses the EA's concerns, relating to flood risk, as identified in their letter dated 2nd April 2003. A copy of the EA's letter is included in Appendix A.
- 1.5 In accordance with the requirements of PPG 25 "Development and Flood Risk" proposals for development of the site must take account of the actual risk of flooding. This risk of flooding can be determined by undertaking a Flood Risk Assessment that is appropriate to the scale and nature of the development.
- 1.6 Knoll Beck is part of the River Dearne Catchment. Flood risk for the proposed residential development has been addressed by constructing a short hydraulic model of Knoll Beck alongside the development, using HEC-RAS river analysis software. The purpose of this analysis is to quantify the likely depth and area of flooding at the site during the design storm event with a 1% annual probability of occurrence.
- 1.7 A topographic survey of the site is attached in Appendix B.

2. SITE DESCRIPTION AND PHOTOGRAPHS

- 2.1 The proposed development site is located off Pontefract Road near Brampton, Barnsley. The site has been previously developed by commercial/ industrial properties. All previous buildings have since been demolished leaving only the hardstandings, which cover approximately 50-60% of the site.
- 2.2 According to the EA's indicative floodplain map the development site is partially located within the fluvial floodplain. This indicative floodplain represents the area that would be susceptible to fluvial flooding from Knoll Beck. A copy of the Agency's correspondence is provided in appendix A.
- 2.4 Knoll Beck flows along the southern boundary of the site in an easterly direction. The beck enters the site via a 3m wide x 1.5m deep corrugated steel arch culvert beneath Wath Road. The beck then flows in open channel before exiting the site via a 3m wide x 2m deep corrugated steel arch culvert. Further downstream the watercourse passes through a nature reserve before joining the River Dearne.
- 2.5 The nature reserve comprises a number of ponds, which would appear to have formed through mining settlement in the area. It is unclear whether Knoll Beck feeds any of these ponds.
- 2.5 The topographic survey of the site has been based upon a local grid and datum. Existing ground levels across the proposed development vary between 98.2m and 101.2m above this datum.

3. FLOOD RISK

- 3.1 There are no historical records of the development site having ever flooded.
- 3.2 However, in accordance with the requirements of PPG25, the EA have requested that hydraulic modelling be used to accurately define the extent and depth of flooding at the site.
- 3.3 To satisfy the EA with regard to fluvial flood risk a limited hydraulic model of Knoll Beck watercourse has been constructed using HEC-RAS software.

4. DESIGN PARAMETERS

4.1 River Survey

4.1.1 A river survey has been undertaken to define cross-sections of the river channels. This survey also detailed key features such as the culverts upstream and downstream of the site that may cause restrictions to flow during storm events.

4.1.2 Cross-sections from these surveys were used to construct a hydraulic model of the watercourse reach alongside the proposed development.

4.2 Design Flow Rates

4.2.1 The design flow rate for the watercourse was calculated using the Flood Estimation Handbook (FEH).

4.2.2 Design flow rates have been determined using a pooled group analysis of the Knoll Beck.

4.2.3 The design flow rate of Knoll Beck, coinciding with a 1% annual probability of occurrence is $19.5\text{m}^3/\text{s}$; this includes an allowance of 15% for climate change.

4.2 Hydraulic Modelling

4.2.1 A limited model of the watercourse has been constructed using HEC-RAS modelling software. The modelled length commences downstream of Wath Rd culvert and ends just downstream of Pontefract Rd Culvert

5. DESIGN FLOOD LEVEL AND SLAB LEVELS

- 5.1 The HEC-RAS river model was used to determine the maximum flood levels for a design flood event with 1% annual probability of occurrence.
- 5.2 Table 5.1 below provides the Q_{100} flood levels at each of the modelled cross sections (see appendix B for cross section positions) and the corresponding adjacent ground levels:

Table 5.1 Predicted Depth of Flooding

Cross-section (See Dwg No HE015/T00)	Average Ground Level (m AD) ¹	Design Q_{100} Flood Level (m AD)	Depth of Flooding (m)
A	100.34	99.6	0
B	99.2	99.3	0.1
C	98.2	99.2	1.0

- 5.3 Ground levels within the development site range from 98.2m at the Pontefract Road (east) entrance to 101.2m above datum at the Wath Road (west) entrance. Examination of the predicted flood levels shows that the eastern half of the site lies below the maximum predicted flood level of between 99.2m and 99.3m. The extent of the floodplain is illustrated on drawing no 1002366/A/001 in Appendix C
- 5.4 It is proposed not to develop the area immediately adjacent to the Pontefract Road entrance where the depth of potential flooding is approximately 1.0m.
- 5.5 It is also proposed to maintain an 11m wide margin adjacent to the top of the watercourse bank.
- 5.6 Taking into account the above development constraints the amount of floodplain that would be potentially lost to development would be 3000m³.
- 5.7 To compensate for the potential loss of this floodplain it is proposed to provide additional storage areas within the 11m wide margin and the area immediately adjacent to Pontefract Rd. These areas are illustrated on drawing 1002366/A/001. The table below provides further information:

Zone	Spill Level (m) (If Applicable)	Bed Level (m)	Storage Volume (M ³)
A	97.80	96.80	200
B	98.20	97.20	450
C	98.50	97.50	400
D	98.90	97.80	375
E	Interconnected to A	98.10	1050
F	Interconnected to A	98.30	535
TOTAL (M ³)			3010

Notes:

- Zones A and B are inter-connected
- Zones C and D are also inter-connected
- Zones E and F are linked to area A
- Zones E and F are linked via a twin 225 diameter culvert
- Drain bed levels cascade from F to E to A
- Level for level flood compensation is provided
- River bank/spill is maintained
- River spill is 3m wide
- Areas to drain should be drained either by using flapped gates or by checking permeability

5.8 It is important to note that bank levels are retained to ensure that the additional storage areas operate at the same time that the compensated floodplain areas operate.

5.9 Slab levels for the development will need set 600mm above the design flood level to a minimum level of 99.8m above the site datum.

6. CONSIDERATION

6.1 Climate Change

6.1.1 The effects of climate change have been taken into consideration by increasing the FEH derived flow by 15%.

6.1.2 It is considered that this provides sufficient allowance to compensate for the effects of climate change throughout the design life of the development.

6.2 Emergency Access

6.2.1 The level of both entrances are elevated above the flood level. On this basis both entrances are not susceptible to flooding and will not prevent emergency access to and from the site.

6.3 Surface Water Run-off

6.3.1 The site was previously developed and is currently 50-60% impermeable. It is proposed to develop the site with residential properties. Such sites generally result in an impermeable area representing between 30 and 50% of the total area. Because an 11m wide landscaped margin is to be provided, it is considered that the level of impermeability will fall towards the lower end of this range. Development of the site will therefore result in reduced surface water discharge to the watercourse and hence surface water attenuation should not be a requirement.

7. DISCUSSION AND CONCLUSIONS

- 7.1 Flood risk for the residential development off Pontefract Road, Barnsley has been considered in general accordance with PPG25 "Development and Flood Risk". According to the EA's indicative floodplain map, the development site lies partly within the fluvial floodplain of Knoll Beck.
- 7.2 There are no historical records of the development site having ever flooded.
- 7.3 A HEC-RAS model was constructed and used to determine the maximum flood levels for a design flood event with 1% annual probability of occurrence.
- 7.4 The design flow rate was determined using a pooled group analysis of using Flood Estimation Handbook (FEH) techniques.
- 7.5 The Q_{100} design flood level for the site at Pontefract Road is between 99.2m and 99.6m above the site datum. Existing ground levels across the proposed development site vary between 100.3m and 98.3m above site datum. This results in the eastern half the site falling within floodplain. Other than at the east boundary, the average depth of the flooding is only 100 mm.
- 7.6 The potential loss of floodplain due to the proposed development calculates to be 3000m³. This will be compensated by additional storage located within the 11m wide landscaped margin and at the east end of the site. This will enable full residential use of the remaining site area.
- 7.7 The effects of climate change have been taken into consideration for the assessment of flood risk.
- 7.8 Both site entrances are sufficiently elevated to provide emergency access to and from the site
- 7.9 Slab levels for the development will need to be set 600mm above the design flood level to a minimum level of 99.8m above site datum.
- 7.10 Due to the reduced impermeability surface water attenuation should not be required.



ENVIRONMENT
AGENCY

Our ref: SE40SW039SJC
Your ref: ea24012003/LM/TW

Date: 2 April 2003

*sarah.clarke@environment
-agency.gov.uk*

Louis McLoughlin
Harrow Estates plc
3 Bridgewater Court
Barsbank Lane
Lymm
Cheshire
WA13 0ER

RECEIVED

BY:

Dear Sir

PONTEFRACT ROAD, BARNESLEY

Further to your letter dated 24 January 2003 regarding the above I apologise for the delay in my response. I visited the site on Friday before I felt I could give a considered response to your letter.

As you are aware the site is shown on the Agencies indicative, see attached plan. All sites within the Indicative flood plain should have a flood risk assessment submitted as part of a planning application. This information is requested with particular regard to PPG 25 and the sequential flood risk assessments required in Appendix F of the aforementioned document.

Further to my site visit on 28 March 2003 in my opinion part of the site is vulnerable to flooding therefore a full flood risk assessment must be submitted with any planning application. I would suggest that the first step of the flood risk assessment should include a model of the site to determine the 1 in 100 year flood plain a suitably qualified engineer would normally undertake this. Unfortunately the Agency has no information on the site to help with the FRA.

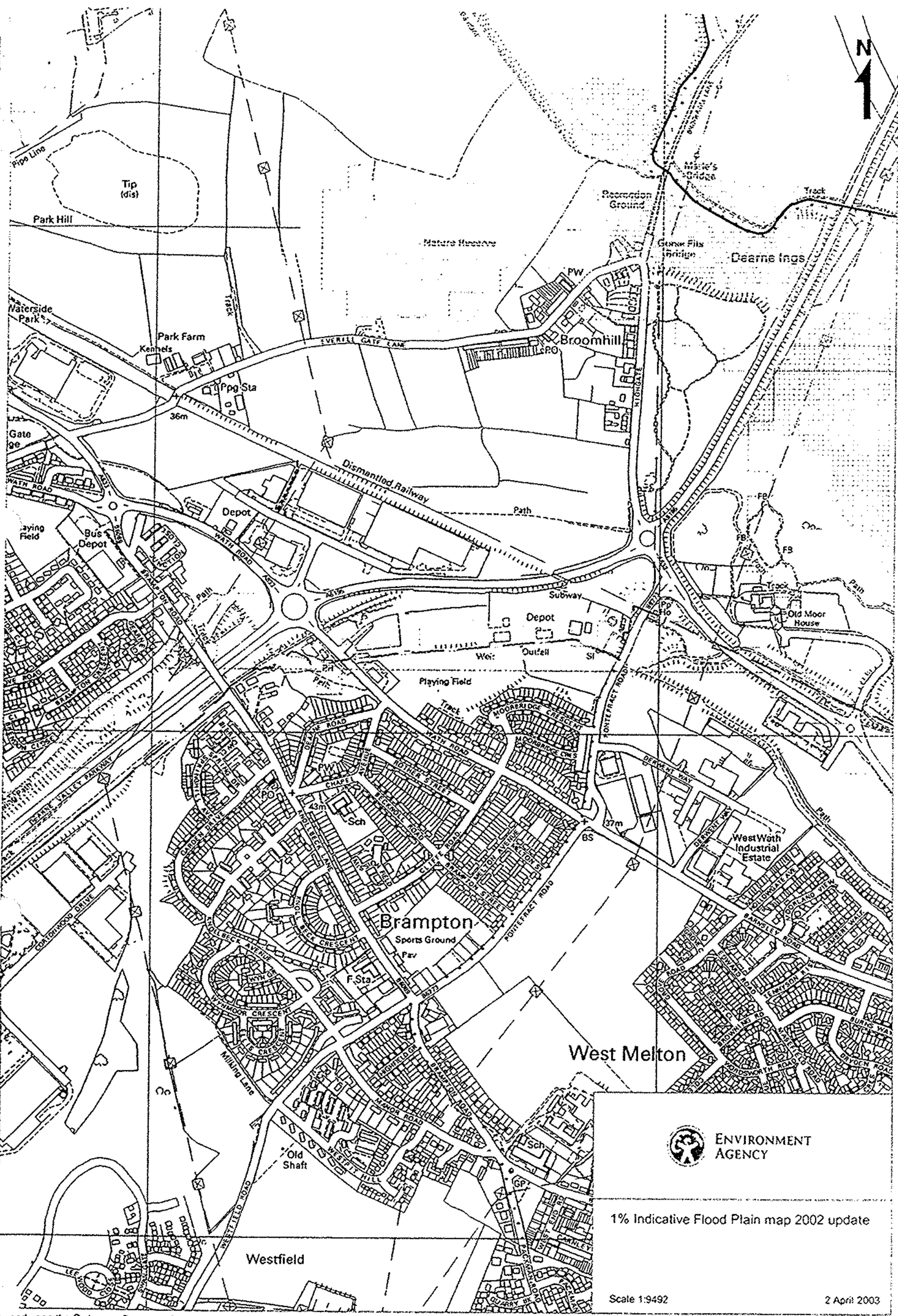
Please do not hesitate to contact me if you have any queries regarding this letter.

Yours faithfully

SARAH CLARKE
Development Control Engineer

Direct dial tel. 0113 213 4763
Fax. 0113 213 4609

07582) 15555
CL5555

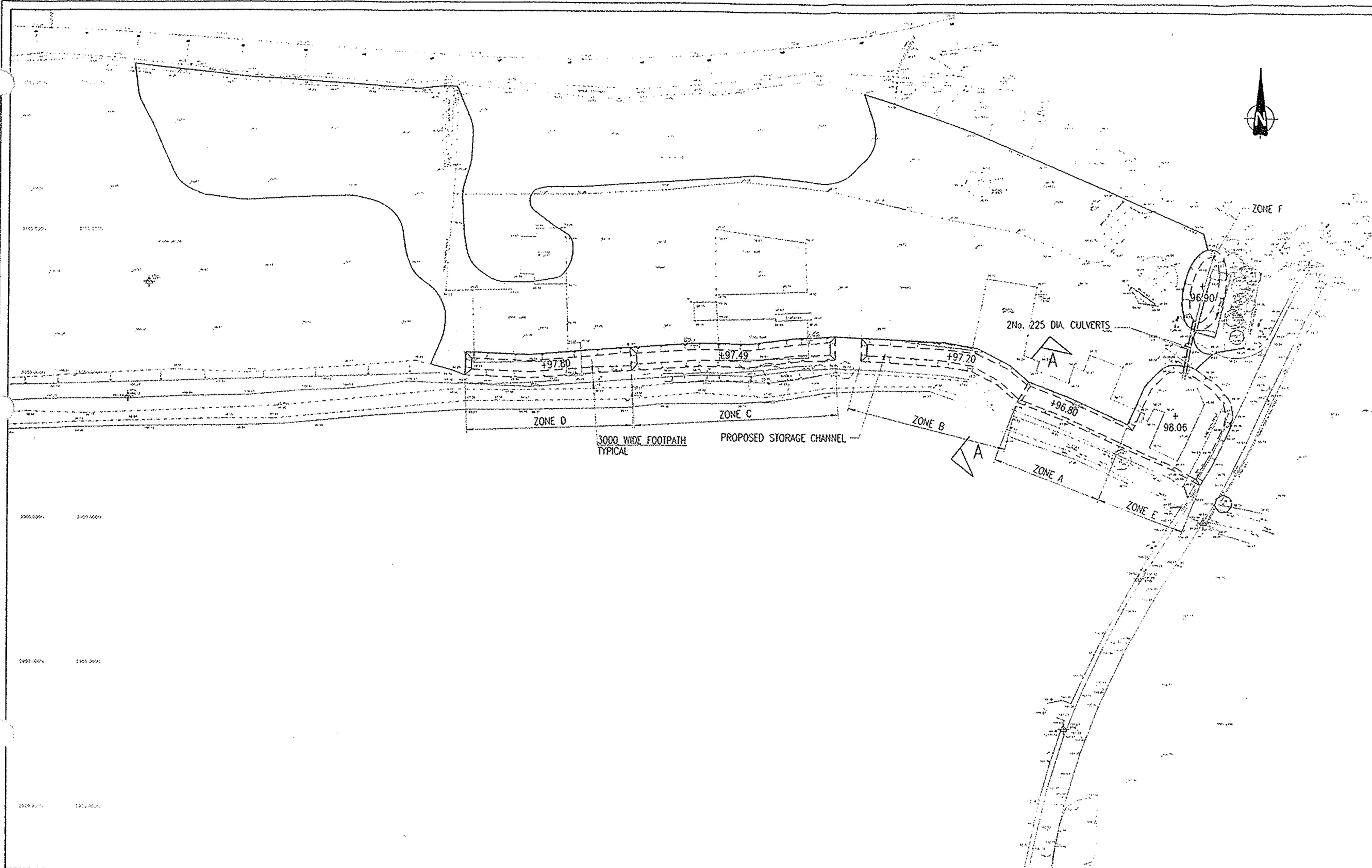


ENVIRONMENT AGENCY

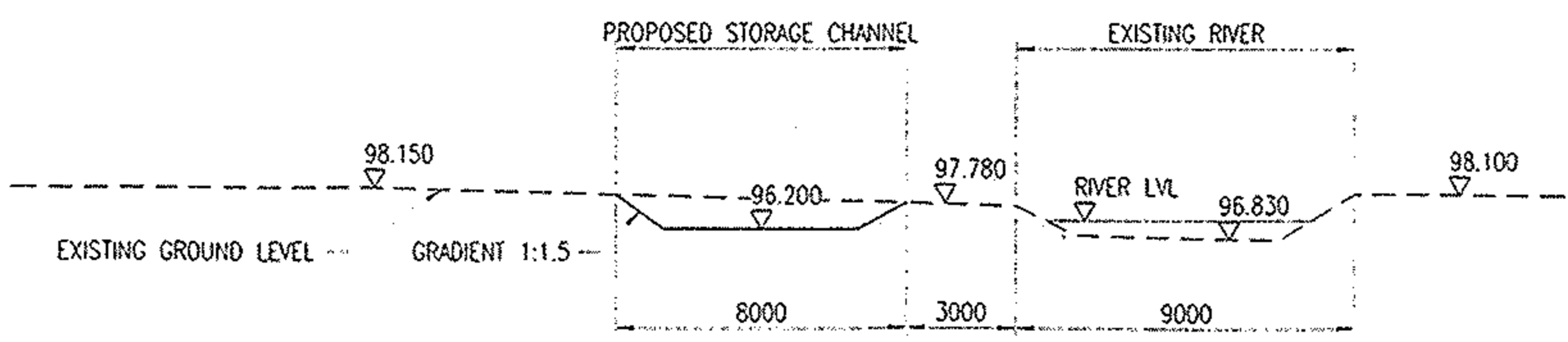
1% Indicative Flood Plain map 2002 update

Scale 1:9492

2 April 2003



- NOTES**
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
 2. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS NOTED OTHERWISE.
 3. PROPOSED STORAGE CHANNEL EMBANKMENTS TO BE 1 IN 1.5.
 4. EXISTING BANK LEVELS TO BE MAINTAINED.



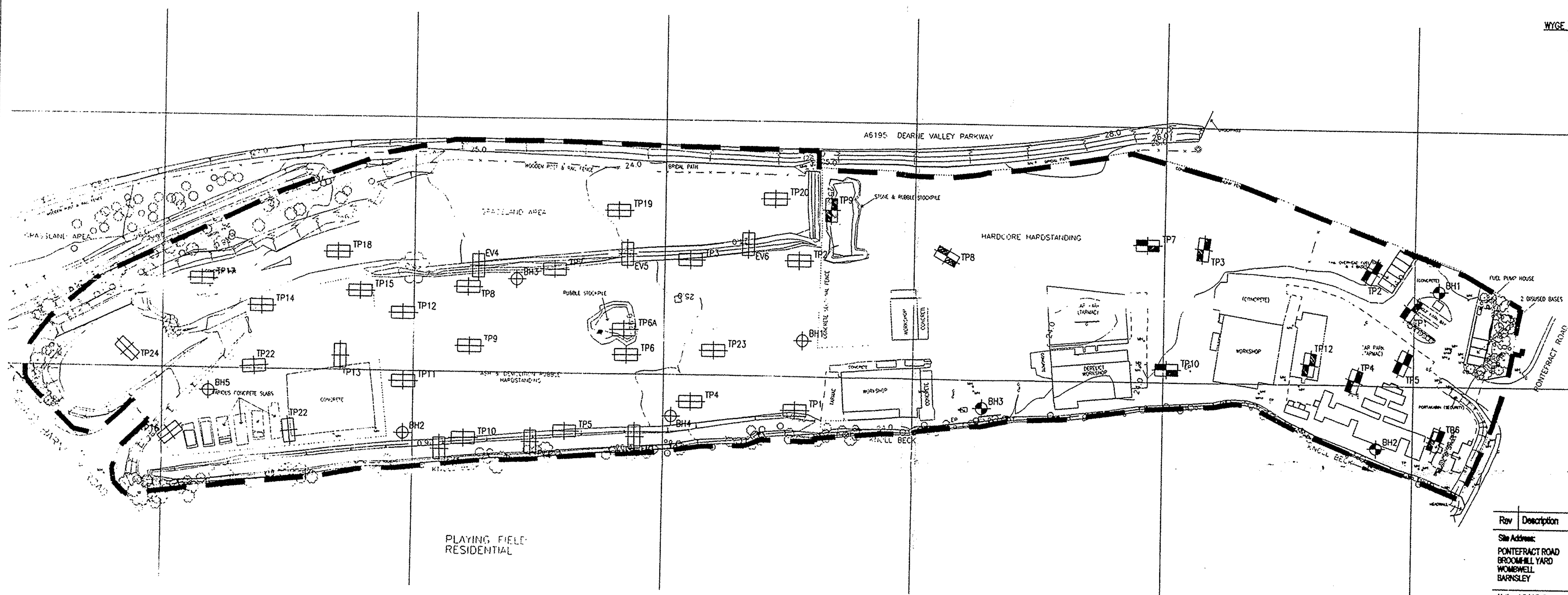
Version	A	First issue	Amendment	CRP 09.05.03 Originated by and date	AS 09.05.03 Checked by and date	AS 09.05.03 Approved by and date
Client	HARROW ESTATES PLC					
Project	PONTEFRACT ROAD, BARNSELEY					
Drawing Title	COMPENSATORY STORAGE FOR LOSS OF FLOODPLAIN AT PONTEFRACT ROAD					
Purpose	FOR APPROVAL	Draft	Scale	1:1000 & 1:200		
Issuing Office	LIVERPOOL	Issue	Drawing Number	1002366/A/001		Version
Telephone	0151 242 7777					





DO NOT SCALE. Contractor to check all dimensions and report any omissions or errors

- KEY**
- WYGE SITE BOUNDARY
 - APPROX. LOCATION OF SITE BOUNDARY
 - WYGE SITE INVESTIGATION AUGUST 1999 (WESTERN AREA)
 - TP1 LOCATION OF TRIAL PIT
 - BH1 LOCATION OF BOREHOLE
 - WYGE SITE INVESTIGATION JANUARY 2001 (EASTERN AREA)
 - TP LOCATION OF TRIAL PIT
 - BH LOCATION OF BOREHOLE



Rev	Description	By	Chk	App	Date

Site Address:
 PONTFRACT ROAD
 BROOMHILL YARD
 WOMBWELL
 BARNSELEY

National Grid Reference:
 441085 402226

Area of Site:
 Hectares: 5.99
 Acres: 14.02

Client:
 HARROW ESTATES plc.

Arndale Court
 Headingley
 Leeds
 LS6 2UJ

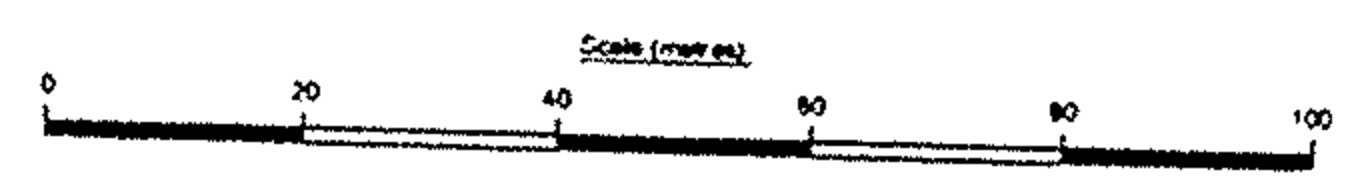
Tel: 0113 278 7111
 Fax: 0113 275 0623
 e-mail:
 leeds@wyg.com



Environmental
 Civil Structural Mechanical Electrical Process Rail Traffic Environmental Project Management
 Project: E2946

BROOMHILL YARD
 WOMBWELL

Drawing Title:
 PREVIOUS SITE INVESTIGATIONS PLAN



Scale at A2	Drawn By	Date	Checked By	Date	Approved By	Date
1:1,250	SG	02/03	SG	02/03	SG	02/03
Project No.	Office	Type	Drawing No.	Revision		
E2946	4104	ENV	E2946/03			