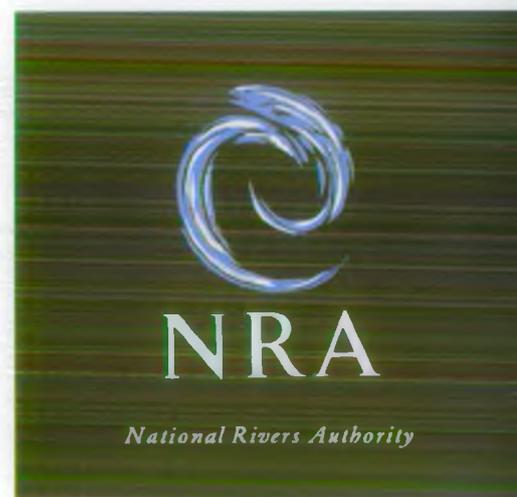


# Flood Defence Levels of Service - Stage 2

Annex D: Growth Index

Robert Gould Consultants

R&D Note 127



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Environment Agency  
Information Centre  
Head Office  
Class No .....  
Accession No ..A.W.X.I.....

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## INTRODUCTION

This Annex is one of five which, together, provide a description of a method for applying a flood defence levels of service strategy. This overall system is described in the main report which contains references to the other annexes as appropriate. It is understood that the recommended system will comprise an assessment of current land use within defined floodplain areas and recommendation of suitable target standards of protection for that land use. The achievement or otherwise of this target standard will be assessed by monitoring of actual and likely flooding occurrences and an assessment of the integrity of flood defence assets.

However the target standard that is recommended may not be suitable for new or more intensive land uses which might develop in the future. The NRA regions are frequently faced with developers seeking planning permission for building within floodplain areas and it has been suggested that a Growth Index be developed which would indicate how any current or future changes may lead to pressure to improve the level of service provided.

## APPROACH

The aim of this section of the study is to develop and test a method to derive the potential pressure for changes in the flood defence levels of service being provided. This is to be referred to as the growth index.

Five key stages were involved. These are :

- 1 Identification of the study area.
- 2 Establishing planning selection criteria.
- 3 Preparation of maps.
- 4 Issuing of letters and maps.
- 5 Collation and analysis of results.

### Stage 1 and Stage 3

The study area comprises the land included within the maximum known extent of flooding. This had been earlier identified by the land use assessors in conjunction with NRA operations staff for the various lengths of river chosen for the study area. In addition the study area itself is broken up into sub areas which fall within the planning remit of various District and Borough authorities. Maps showing floodplain boundaries for each local authority were prepared at 1 : 25,000.

## Stage 2

It was considered necessary to introduce a size criterion to sieve the significant applications and designated sites. A minimum size of one hectare was adopted below which planning applications and designations were to be disregarded. This area is consistent with that suggested by Anglian region in their proposed land use assessment technique, to avoid the region having to provide flood defence for every isolated property. Other criteria were considered, and it was decided that the information to be gathered for each identified site would include :

- \* Location.
- \* Planning application number.
- \* Brief description of proposal.
- \* Site area.
- \* Date of application, determination and appeal if any.

In addition to this, information was sought on those areas designated for future development. Such areas are normally identified in the local plan for the area and cover a range of land uses (recreational, industrial, housing etc).

## Stage 4

The various local authorities were then contacted by means of a carefully worded letter, to which was attached a map of the study area and prepared proformas (see appendix D.1) They were to return these to the consultants.

## Stage 5

~~The responses received from the various authorities were then collated and analysed.~~

TABLE D.1  
SUMMARY OF RESPONSES

River System	Local Authority	Planning Application Sites	Designated Development Sites in Local Plans
Little Ouse	East Cambridgeshire District	Six sites are identified by the Local Authority but it is unlikely that any have a site area greater than one hectare.	Infill development within village of Little Ouse. Outside village restrictive policies apply.
Waveney	Breckland District Council	No sites identified.	No sites identified
	Mid Suffolk District Council	Seven sites are identified :  <ul style="list-style-type: none"> <li>. Extension of Golf Course.</li> <li>. 3 residential proposals.</li> <li>. 2 sand and gravel extraction operations.</li> <li>. Construction of By pass.</li> </ul>	Weybread Lake : water based recreation with associated shoreline facilities.
	St Edmundsbury Borough Council	No sites identified.	No sites identified.
	South Norfolk District Council	1 sand and gravel application (extension of existing workings).  1 residential proposal (16 dwelling units).	Large scale retail provision
	Forest Heath District Council	No sites identified.	No sites identified.
	King's Lynn and West Norfolk	2 x 11kv overhead power lines.  2 other applications which are under one hectare in area.	No sites identified.
Afon Cefni River Spen	Isle of Anglesey	No sites identified.	No sites identified.
	Kirklees Metropolitan	Three sites identified :  <ul style="list-style-type: none"> <li>Outline applications - food/non-food retail development, diner and petrol station</li> <li>Outline application - Class A1 retail, car parking, petrol station, restaurant</li> <li>Outline application - Class B2 new production, factory, laboratory, offices</li> </ul>	Two large scale industrial/warehouse sites (9ha)  Lower Spen Valley Park (Recreational)  River flows through other employment zones
Afon Erch	Dwyfor District Council	No sites identified	No sites identified

**3 RESULTS**

The results of findings in the pilot areas are presented in table D.1. It must be noted that although the pilot areas represent a cross section of land uses, the results form a limited base from which to extrapolate across the whole of England and Wales.

The results indicate only a limited amount of current or future development is likely within the floodplain areas.

**Table D.2 : LIST OF LOCAL AUTHORITIES CONTACTED AND RESPONSE TIME**

River System	County Council	Council	Letter Issued	Date of Response	Response Time (Weeks)	
Little Ouse	Cambridgeshire	East Cambridge District	7.3.90	5.4.90	4	
Waveney	Suffolk	Forest Heath District	5.3.90	16.3.90	2	
		Mid Suffolk District	5.3.90	2.4.90	4	
		St Edmundsbury Borough	5.3.90	2.4.90	4	
		Waveney District	5.3.90	Awaiting		
		Norfolk	Breckland District	5.3.90	9.3.90	1
			Kings Lynn and Norfolk Borough	5.3.90	13.3.90	2
			South Norfolk District	5.3.90	29.3.90	3
Upper Wharf	North Yorkshire	Craven District	12.3.90	Awaiting		
Spen	West Yorkshire	Kirklees Metropolitan	12.3.90	4.5.90	8	
Afon Erch	Gwynedd	Dwyfor District	9.4.90	27.4.90	7	
Elwy	Clwyd	Colwyn District	9.4.90	10.4.90	5	
Afon Cefni	Gwynedd	Ynys Mon-Isle of Anglesey	9.4.90	12.4.90	5	
Dysynni	Gwynedd	Meirionnyold District	9.4.90	Awaiting		

**NOTE:**

No local authorities were contacted re the Steeping River as no floodplain area could be identified.

## 4 COMMENTS ON METHOD FOR DATA COLLECTION

### 4.1 Introduction

The approach detailed for gathering the information on planning aspects is considered sound and is the most efficient available. However, there are several points arising from applying this approach. In order to elicit a full and speedy response from the various local authorities contacted it was felt important to provide the information to them in a readily understood form. This requires significant time inputs to prepare suitable maps at an adequate scale, particularly as rivers often form boundaries between local planning authorities.

Contrary to expectations and perhaps because of the time input in map preparation, the response from local authorities was very encouraging, approaching 100 per cent. Response time varied as indicated in table D.2 opposite but averaged four weeks. However this good response may be somewhat distorted from that found nationally for a number of reasons. Firstly the majority of the rivers in the pilot areas are of a rural nature, with only the River Spen being truly urban. In such areas and particularly with the land studied being the floodplain, there is a general presumption against development and thus few applications were identified. Secondly, the Councils may have viewed provision of this information for the study to be to their own long term benefit. Other authorities may have different views if development pressure in their area is greater.

In general the time input required by each local authority to identify the sites required will vary according to their method of storing and retrieving information. One of the local authorities contacted, South Norfolk District Council, commented that the identification of three sites was "time consuming and labour intensive". This confirms a similar situation found in earlier work for Thames region. In this work a number of District Councils were contacted for details of planning permission for relatively recent developments in floodplain areas. Responses were quickest when only a few sites were requested and thus only limited time and resources were required. However, a number of other authorities required the consultants to personally visit them to go through records themselves as the Councils did not have sufficient staff available.

### 4.2 Information Provided

The returns from the various local authorities contacted showed that little eligible development has taken place or is proposed in most of the study areas. This is a product both of the nature of the study area, the fact that it is a floodplain, and the selection criteria imposed for identification of sites.

The use of a minimum site area of one hectare excludes less significant developments such as house extensions and garages. It does however mean that some valuable information may be lost such as infill development, which is common in rural areas, but on sites often less than one hectare. In addition applications for change of use may not be identified, nor might the cumulative effect of a number of small developments which collectively may exceed the one hectare minimum.

The information collected on major land designations is useful as it identifies land areas considered by the local authority as appropriate for development. Such designations shown on the local plan or proposal map for the area may involve a change of use or intensification of an existing land use. The designations are usually expressed in terms of broad land allocations with little or no information on the number of buildings or other structures actually to be built. In some cases general densities envisaged by councils may be provided. This limited information is a weakness which potentially limits its usefulness.

#### 4.3 Assessment and Use of Data

Once the data have been collated, the main areas for future development can be highlighted within a local or regional context and those applying to particular watercourses identified.

The original intention was to try to apply the Growth Index classification suggested by Anglian Region in their supplementary notes of March 1989, as indicated below :

Growth Index	Problem Severity	Interpretation Guide
1	No problem	Surplus capacity available for at least 10 years
2	Only minor problems	Surplus capacity absorbed between 5-10 years
3	Some problems	Surplus capacity absorbed between 2-5 years. Objections to planning applications
4	Significant problems	Forecast growth in next 2 years will cause level of service deficiencies. Strong objections to planning applications
5	Substantial problems	Development restrictions in force or highly desirable to prevent unacceptable levels of service deteriorating further

However, it became apparent that trying to apply this classification imposed several problems. The most significant was the lack of detailed information available from local authorities. In addition, a more formal connection to the LOS currently provided is necessary to identify what surplus capacity there is for development before pressure may be imposed for an improvement in LOS.

Therefore, an alternative method has been developed which takes into account the current land use assessment and banding as indicated in Annex B.

#### 4.4 Growth Index Assessment

The nature of developments proposed in each LOS reach were identified and calculated in terms of their additional contribution to the House Equivalents present within a reach.

The contribution from outstanding planning applications either unimplemented or undetermined was classified separately from that for designated development sites. The value in House Equivalents for the presence of each factor is shown in table D3, with the allocation to land use bands shown in table D4. Once calculated, these scores can be added to that already assessed for current land use and the totals compared against the target ranges for each land use band. Each band is associated with a target standard of flood protection thought acceptable for the interests that are present. The more urbanised reaches enjoying higher target standards of protection.

**Table D.3 : House Equivalent Values Used to Classify Properties**

Land Use Factor	Unit	House Equivalents HE/Unit
House	Total Number	1.0
Garden/Allotments	Total Number	0.2
NRP - Distribution	Total Number	40.2
NRP - Manufacturing	Total Number	64.6
NRP - Other	Total Number	5.3
C Roads	Total Number	2.4
B Roads	Total Number	5.7
A Roads (Non Trunk)	Total Number	14.3
A Roads (Trunk)	Total Number	28.6
M. Way	Total Number	57.3
Railway	Total Number	57.3
Forestry and Scrub	100 Ha	0
Extensive Pasture	100 Ha	1.3
Intensive Pasture	100 Ha	3.0
Extensive Arable	100 Ha	6.9
Intensive Arable	100 Ha	40.2
Formal Parks	Total Number	0.6
Golf Courses	Total Number	0.6
Playing Fields	Total Number	0.1
Special Parks	Total Number	8.5

Table D4 : Allocation of Total HE's per km for Each reach to Land Use Bands.

Land Use Band	Nature	HE/KM (one bank assessment only)
A	Urban	50+
B		25-49.99
C		5-24.99
D		1.25-4.99
E	Rural	less than 1.25

Table D5 : Growth Index

Growth Index	Pressure for Change	Description
0		No development proposed.
1		No change in target LOS or actual LOS provision from proposed development.
2		Local plan designated development raises the land use band classification.
3		Local plan designated development plus outstanding planning applications raises the land use band classification.
4		Planning applications raises the land use band classification.
5	High	Applying land use changes from planning applications to LOS predictive scoring indicates a change of adequacy of service provision to inadequate.

If the new scores result in a change in land use band, a higher target-level of service will apply. The immediacy of this change can be inferred from the growth index, as indicated in table D.5 above. Over time the designated development areas may become the subject of planning applications and the growth index will increase reflecting the timing of likely development.

In addition to the potential change in overall average land use and thus pressure for provision of a higher level of service, it is possible that development may affect the adequacy of the current service provision without necessarily altering the overall target standard of flood protection. As information becomes available on flood return period envelopes it will be necessary to identify the likely return period at which the development would be affected to see whether this would alter the predicure LOS scoring system as detailed in Annex C. The result may be that a currently adequate level of service would become inadequate for the new range of interests present. It is recommended that only development which is the subject of planning applications be included in such an assessment as it is impractical to consider changes to maintenance practices as a result of development which is by no means certain and in any case is unlikely to be undertaken in the short term.

Worked examples and the results for the pilot study area follow and include some modifications to data gathering that are thought appropriate.

#### 4.5 Modifications to Data Gathering

In order to apply this methodology it is necessary to know more precisely the details of likely changes in land use. Rather than specify a minimum size criteria, it is considered more appropriate to specify a list of eligible development on which details are required. For planning applications information on the following should be requested :

- \* All new houses, both infill and out of village sites including numbers of properties regardless of plot area.
- \* All new business properties and an indication of the nature of the business, again regardless of plot area.
- \* All new amenity interests, golf courses, playing fields etc.
- \* Change of use in the following cases :
  - Agricultural buildings converted to houses (and number).
  - Agricultural buildings to other businesses eg small workshops (number of business and nature).
  - Conversion of industrial sites to houses (and number).
  - Conversion of industrial sites to other business uses including new nature and number of businesses.

Extensions to existing houses, business properties or operations, or the extension of amenity facilities need not be identified.

For designated development sites, details of the nature of development should be required. If this is housing, then an indication of the number of houses, and if business use, the nature and number of businesses, should be sought. Such information is often not available and the following assumptions are recommended.

For areas designated as housing assume 30 HE's per hectare which equates to a house and garden of 0.04 Ha site area.

For areas designated as industrial development, assume 100 HE's per hectare which equates to 2.5 Non Residential Property (distribution) businesses with site area of approximately 0.4 Ha.

### Worked Examples

1. Reach details - Customer interests present = 22 HE/km  
 Land use band = C  
 Reach length = 5 km  
 No planning applications outstanding.  
 Designated development site - industrial use 1 Ha.

Land use band after development is calculated as follows :

HE's contributed by development	= 1 Ha site x 100 HE's per Ha = 100 HE's
Reach length	= 5 km
HE's per km	= 20
add actual current land use HE/km	= 22
Total HE/km	= 42
Potential new land use band	= B

Growth Index Classification as per schedule D5 = 2

2. Reach details - Customer interests present = 35 HE/km  
 Land use band = B  
 Reach length = 4.6 km

No designated development - sites

Potential HE's contributed from outstanding planning permission	= 14.2
(2 x NRP other + 3 houses + gardens)	= 3.1 HE/km
Add actual current land use HE/km	= 35
Total use HE/km	= 38.1
Potential new land use band	= B
Growth Index	= No change

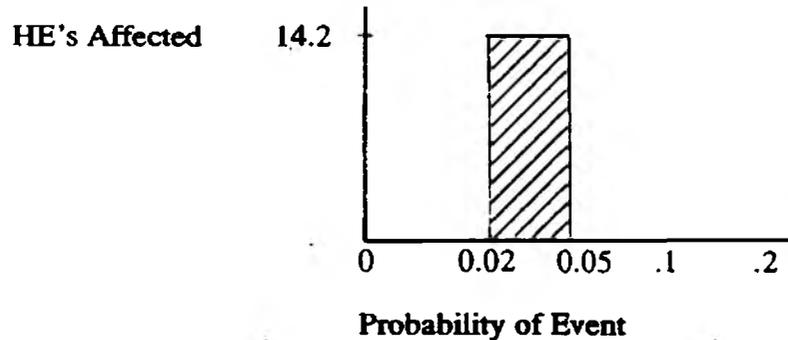
But also consider any effect on adequacy of service provision.

Current adequacy of service provision

Reactive	= 0.6 HE/km = Adequate
Predictive	= 0.95 HE/km = Adequate

The new properties will be built such that they are unaffected by events up to say a one in twenty year return period but are affected by events of greater magnitude.

Additional contribution to predictive score is expressed graphically as



Area under graph = HE's likely to be affected by flooding per year

$$\begin{aligned} &= 0.43 \\ \text{Reach length} &= 4.6 \\ \text{HE/km} &= 0.09 \end{aligned}$$

This score is added to the current predictive score of 0.95 HE/km

$$= 1.04 \text{ HE/km}$$

This is outside the recommended target Los and the reach would be classified as inadequate.

$$\text{Growth Index} = 5$$

#### 4.6 Application of Results to Pilot Study Areas

Eligible development was identified in only five of the reaches in the study area as per table D.1. The results are as follows :

Table D6 : Results of Applying Growth Index Method to Pilot Study River Lengths

River Name	Reach (Left or right)	Current Land Use Band	Planning Applications	Local Plan Designated Development Areas
Waveney	9 right	C	None	1 Recreational Site adds 0.8 HE/km. No change to land use band  <b>Growth Index = 1</b>
Waveney	13 left	C	Estimate 20 houses plus gardens. Adds 4.6 HE/km to score. No change in land use banding	1 Retail outlet adds 1.0 HE/km to the score. No change in land use band  No change in land use band from combined planning applications or local plans  <b>Growth Index = 1</b>
Spen	1 right	A	None	2.5 Ha industrial development area adds 250 HE/km to score. No change in land use band  <b>Growth Index = 1</b>
Spen	1 left	A	None	1.5 Ha industrial development area adds 150 HE/km to score. No change in land use band  <b>Growth Index = 1</b>

## 5 IMPLICATIONS OF METHOD FOR DATA GATHERING AND RESOURCE REQUIREMENTS

In order to fully integrate an assessment of development potential in an area and thus the likely pressure for changes in the level of service provision, it was considered appropriate to adopt the same House Equivalent method of classification as recommended for the land use assessment (see Annex B). This is likely to increase the number of planning applications and designated development sites that are likely to be eligible for inclusion in the assessment. The disadvantage of this enhanced inclusion of planning information would be that it requires greater time input by local authorities to identify those areas of eligible development, and thus some resistance may be encountered.

It is unlikely that significant development will occur in band D and E reaches. Such reaches are usually rural or located in national parks and often in areas where there is a presumption against new development. Therefore it is recommended that information need only be sought for those reaches classified as band A, B or C. Even in these situations the potential development needs to be on a significant scale before it affects either the land use band classification or the adequacy of service provision.

## CONCLUSION

The limited sample provided by the pilot areas indicate that relatively little development is likely within the floodplains, and this factor may explain the good level of response obtained from the local planning authorities. However, the use of a one hectare minimum cut-off may have excluded much data of potential significance.

It is concluded that the originally proposed method can be modified to ensure that the growth index gives a better indication of the likely pressure to improve Los position as a result of more intensive land uses. This modified approach is only likely to lead to growth indices of significance in the higher land use bands (A, B and C). Under both the original and new methods, a substantial and ongoing demand would be placed either on NRA staff or local authority employees. It is likely that this demand may be unacceptably high for both organisations.

The NRA Anglian regions attitude to development in Flood risk areas is detailed in the copy of their leaflet "Development in Flood Risk Areas" included as Appendix D2.

Under such a policy the need for a growth index to highlight areas where there may be pressure for change in the levels of service provision may be counter productive if the NRA are seen to be taking future developments into account when defining appropriate levels of service. Speculative proposals for development may be made which are only justifiable following NRA expenditure on flood protection for some future land use. This provision of windfall gains to developers is one of the key factors in determining the need for a LOS assessment method based on current land use and not some future potential land use.

## 7 RECOMMENDATIONS

The potential benefit of applying a growth index to the determination of how existing levels of service may be inappropriate for new or more intensive land use does not justify the demand for resources of the NRA as well as potentially of local authorities. The consultants believe that the most cost effective approach for dealing with possible developments in the floodplain is to actively pursue the policy outlined in the NRA Anglian region leaflet included as Appendix D2. Any development that does actually occur in the floodplain will be identified in the continual validation of the land use assessment phases. To get a broad planning overview of the few areas where significant development may occur would be best accomplished by maintaining formal and informal links with local authorities by the NRA's own planning and development control staff.

**APPENDIX D.1**

- **Standard Letter Sent to Local Authorities**
- **Proforma Re Planning Applications**
- **Proforma Re designated Development Sites**

The National Rivers Authority has commissioned us to undertake an assignment to develop a management system to assess and monitor its flood defence strategy. The system is likely to be based around land use on the relatively simple presumption that urban land justifies a higher standard of protection than agricultural land.

You will appreciate, however, that land use is not constant overall. The changes tend to be small but in some areas quite dramatic changes can occur within a relatively short period where this occurs, the NRA may have to make improvements to its standards of flood defence. Therefore, as part of this study, we wish to develop a method for taking such planned changes into account which will contribute to the better management of the rivers and benefit the whole community.

We would be grateful if you could help us in this assignment which will look at a small study area of floodplan land. We require information to identify, within this area, sites which :

- have unimplemented valid planning permission (outline or detail);
- are the subject of a pending application;
- are the subject of a pending appeal;
- are designated for development in an approved or draft Local Plan.

Attached is a plan showing the extend of floodplan land which is within both the study boundary and your authority area. Other authorities are being contacted to give us complete coverage of the floodplans in our study areas. Only sites which exceed one hectare in are need to be considered. For your assistance two schedules are also attached :

- Schedule 1 covers the first three points referred to above;
- Schedule 2 is for designated development land.

It is envisaged that the identified sites could be annotated on the plan provided and the details cross-referenced with the schedules. If there are any significant sites on or near the outside periphery of the study area, please include them in the schedules and plan.

Your assistance in this matter would be greatly appreciated. In view of the timescale set by the NRA we have programmed to have this information collected within one month of the date of this letter. If you have any difficulties with this, or require further information and assistance, please do not hesitate to call either myself or Mr. R. Keg.

May I take this opportunity to thank you in advance for your assistance with this work.

Yours sincerely,

Clive Harridge  
For and on behalf of  
LAURENCE GOULD CONSULTANTS LIMITED

Enc

*Schedule 1 : Planning Applications*

Site No.	Application No.	Brief Description of Proposal	Site Area (if available) ha	Date of :		
				Approval	Appeal	Application

**Designated Development Sites In Local Plans**

<i>Site No.</i>	<i>Area (ha)</i>	<i>Proposed Allocation</i>

**APPENDIX D.2**

**NRA ANGLIAN REGION PUBLICATION**

**"DEVELOPMENT IN FLOOD RISK AREAS"**

## The Government View

*"The Secretaries of State and the Minister wish to emphasise the importance of ensuring that, where flood protection considerations arise, they are always taken into account in determining planning applications. Development permitted without regard to flood protection problems can lead to danger to life, damage to property and wasteful expenditure of public resources on remedial works whether on the development site or elsewhere."*

Circular 17/82

## Guardians of the Water Environment

The National Rivers Authority is a public body whose task it is to protect and improve the water environment in England and Wales, and provide protection against flooding from rivers and the sea.

Flood defence is vitally important to the Anglian region which is low lying and where nearly 20 per cent of the area is below high tide level. It also has one of the most vulnerable coastlines in Britain which is constantly at risk from the threat of a North Sea "surge" similar to the one which devastated the region in 1953.

The NRA is responsible for

- \* maintaining main rivers and carrying out any necessary improvement works;
- \* flood protection from rivers;
- \* maintaining and providing sea defences;
- \* protection from sea flooding in estuaries;
- \* land drainage.

These activities are co-ordinated through a regional headquarters at Peterborough in Cambridgeshire and carried out through operational areas based on three main centres - Lincoln, Brampton near Huntingdon and Ipswich.

## Development Matters

For further information about the contents of this leaflet please contact the PLANNING ENGINEER for the appropriate area:

NORTHERN - Harvey Street,  
Lincoln LN1 1TF  
Tel: 0522 513100

CENTRAL - Bromholme Lane, Brampton,  
Huntingdon PE18 8NE  
Tel: 0480 414581

EASTERN - Cobham Road,  
Ipswich IP3 9JE  
Tel: 0473 727712

## DEVELOPMENT IN FLOOD RISK AREAS



National Rivers Authority  
Anglian Region

## Our Policy

The Anglian region of the National Rivers Authority is against the development of homes, factories and businesses on land which is at risk of flooding, or where it could affect other areas.

There are four main reasons for this:

- it poses a serious threat to life and property in the development
- it reduces the storage efficiency of the land which helps to ease the impact of flooding – the flood plain
- it increases the amount of water draining into watercourses and the speed with which it runs off the land;
- it puts increasing pressure on other nearby areas which can be liable to flooding.

The NRA is asked for its views on all applications which have implications for flood defence and land drainage, and can recommend that the proposals which the developer has put forward are either adopted or rejected. However the decision as to whether or not any development takes place in such high risk areas is the responsibility of the local planning authority, the district council.

This leaflet sets out the policy which has been adopted by the Anglian region of the NRA for responding to such applications so that applicants are aware of it and of the general advice which we provide to the district councils in our area.

The aim of the policy is threefold:

- to make sure that land and existing developments are not subjected to an increased risk of flooding as a result of new developments;
- to make sure new developments are not at risk from flooding which could endanger life and damage property;
- to make sure that any work which is needed to reduce the risk of flooding is paid for by the developer and not the public.

## Priorities

Lack of money means we can only undertake flood defence schemes which are of the highest priority, those designed to protect life and property. Others, such as projects which would enable new development to take place, have the lowest priority and will not be carried out unless the developer pays for them.

## Objections

When we object to a new development it is usually because:

- it has a level of flood protection which is below the standard which we have set;
- it will lead to flooding either on the site or elsewhere.

In either case there is a possibility of the development creating a hazard to life or property.

## Flood Plain

Where the proposed development is in the floodplain we will usually have one of two main objections to it:

- it will obstruct the flow of water in the floodplain;
- it will take up storage space within the floodplain and increase the risk of flooding.

Where the flow of water is likely to be obstructed we will seek to ensure that the planning application is refused.

Where the storage space is an issue we will recommend refusal of the planning application unless the developer can show conclusively that he has been able to provide for additional storage capacity on the site.

Additional comments on other related matters such as minimum ground or floor levels may be made.

In addition to planning permission developers are reminded that NRA Byelaw consent may be required.

## Other Flood Risk Areas

If the existing standard of flood protection is below the appropriate standard for such a development we recommend that the developer enters into an agreement with us or the planning authority to provide the necessary flood protection work. If this is not done we strongly urge the district council to refuse the application.

This approach may also be adopted:

- for a major development in an area where there is only existing minor development for which the current standard is appropriate;
- where a major change of use is proposed (eg residential development on an old industrial site).

## Affecting Others

Where the development could increase the risk of flooding to other people and property, for example through run off of water from the site, we strongly recommend that the application should be refused unless the developer enters into an agreement with us or the planning authority to do the necessary flood protection work.

## Improvement Works

In some areas where development is proposed we may have already identified a need to improve the flood protection. In these cases we will recommend:

small developments – refusal because the application is premature;

large developments – refusal unless the developer is prepared to enter into an agreement with us to carry out the improvement work.

## Flood Protection Areas

Certain areas of land are designated as washlands, areas which are used for flood water storage. These are regarded as critical areas for flood defence work and development will be vigorously opposed.

The NRA is committed to seeking the co-operation and support of the planning authorities in the region in discouraging the development of land which is at risk of flooding.