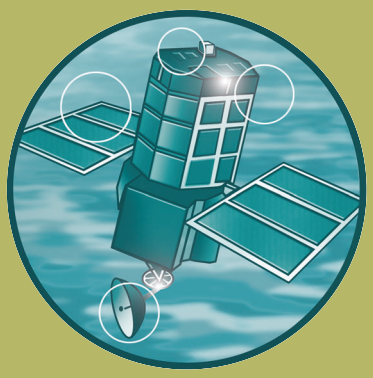
Joint Defra/EA Flood and Coastal Erosion Risk Management R&D Programme

Development of economic appraisal methods for flood management and coastal erosion protection

Data sources and assumptions statement

R&D Project Record FD2014/PR2



Environment Agency

defra
Department for Environment Food and Rural Affairs

Defra/EA Research Project FD2014 and FD2018
Data sources and assumptions behind FHRC Multi-Coloured Manual CD of flood damage and loss data

The attached Table gives a 'blow by blow' list of the assumptions behind the data collected in the Multicoloured Manual. As such it serves as a context to that volume, and in some respects a 'health warning'.

If there are some generalisations about this table, then these are as follows:

1. Much of the data is collated from case studies, and the normal limitations apply (representativeness, applicability elsewhere, etc). This particularly applies to non-residential properties (Chapter 5) and emergency costs (Chapter 6).
2. Some of the data sets rely heavily on secondary sources of data (e.g. the residential flood damage data – Chapter 4) and involve a synthesis of this data.
3. Some data areas are liable to change in the future (e.g. the data sets on agricultural impacts of floods and flood) but the basic assumptions are liable to remain the same as here.
4. In some areas the data we have is acknowledged to be poor (e.g. some areas of non-residential properties (Chapter 5)), and we have been as honest as possible about their limitations.
5. The most important differences between the data sets as described here and those needed for a "Sugden" analysis appear to be the lack of VAT on the prices used to compile the Multicoloured Manual datasets. This is a trivial difference and one that it would be easy to correct.
6. In addition, however, it should be noted that all the Multicoloured Manual data described the national ***economic*** impacts of floods and coastal erosion, not the ***financial*** impacts on those affected.

We hope that these comments and the accompanying Table are useful.

Edmund Penning-Rowsell
Flood Hazard Research Centre
Middlesex University
April 2006

Index of Multi-Coloured Handbook and Manual Chapters and data categories

Chapter 4
Sector: Residential properties

Data items	Principal data sources	Primary assumptions	Secondary assumptions	Comments
Property types and floor plans	▪ Fieldwork observation ▪ Building surveyors ▪ Architects' manuals	That all properties can be represented by these (average) measured sizes	Age is the major determinant of property dimensions, other than property type (semi; detached; etc)	The averages have not been determined by sampling and statistical averaging
The numbers of the different inventory items	▪ Market research firm data on ownership patterns ▪ Family Expenditure Survey ▪ Common sense (i.e. one boiler per dwelling)	▪ The quantity and quality of items is related to the social class of the occupants and the type of property involved. Some judgements made here.		See Box 4.1 (Penning-Rowsell et al, 2003: 47).
Inventory item value	▪ Catalogues (IKEA; Argos, etc) ▪ Guides (Which? reports, etc)	▪ The value of items are related to their inferred quality ▪ VAT is excluded	▪ The quantity and quality of items is related to the social class of the occupants and the type of property involved. Some judgements made here.	
Inventory item depreciation/Average Remaining Value (ARV)	The same as for the number of inventory items, above	▪ ARV = 50% for the majority of household items ▪ Only items new on the market within the last 5 years have higher ARV values (e.g. DVD players)	▪ Some 'old' items may have low ARV values	▪ This is a major assumption affecting the value of flood losses. ▪ A financial database would have different values
Inventory/Building fabric item susceptibility	▪ Data and information from Ark and similar salvage/repair firms ▪ Fieldwork and case examples going back many years ▪ Some common sense applied	▪ Susceptibility gauged as a % of depreciated value, factored by flood depth ▪ Basic flood duration < 12 hours ▪ The costs of salvage are not included (removal; storage; etc) [Some	▪ Damage mechanisms exclude the structural failure of walls, etc ▪ Only ground floors considered	It is this variable that gives the shape to the depth/damage curves (this and the stored height of items). See Box 4.3 for Inventory item susceptibility assumptions (in Penning-Rowsell et al, 2003: 49).

Data items	Principal data sources	Primary assumptions	Secondary assumptions	Comments
		storage costs are included in clean-up costs]		See Box 4.2 for Building fabric susceptibility assumptions (in Penning-Rowsell et al, 2003:48-49)
Building fabric repair items	Professional building surveyors employed especially for this task	Repair is to pre-flood condition or better. Costs are not differentiated by quality which is deemed to be standard. No ARV concept used	▪ Little structural failure is likely; some failure of doors and windows ▪ Only ground floors considered	Some betterment is unavoidable (i.e. the whole room redecorated/replastered etc. when part is flood damaged) 50% of the redecoration costs have been taken to represent an average true cost of flood damage. Labour costs remain the same irrespective of material costs.
Building fabric repair item cost	Professional building surveyors employed specially for this task	▪ VAT is excluded		
Long duration flood impacts	Professional building surveyors employed specially for this task	Repair is to pre-flood condition or better. No ARV concept used	▪ Little structural failure is likely; some failure of doors and windows ▪ Only ground floors considered	
Clean-up costs	▪ Data and information from Ark and similar salvage/repair firms	▪ VAT is excluded	Average costs based on actual damage experiences and costs, exclusive of VAT are used.	See table 4.4 and 4.5 (Penning-Rowsell et al, 2003).
Damages in curtilage	Professional building surveyors employed specially for this task	▪ VAT is excluded		This data goes back a long way (to 1977) and may not be very reliable.
Extra damage for London	Professional building surveyors employed specially for this task	▪ VAT is excluded ▪ The costs are averaged and do not reflect regional variation. An increase of 20% is recommended for London.		This data goes back a long way (to 1977) and may not be very reliable.
Damage reducing effects of warnings	Social surveys of flood victims	▪ People were asked what they could/had moved ▪ The value of what they moved was taken from the inventory valuations,	VAT is excluded	This is a complex piece of research, and the full set of assumptions cannot be encapsulated here.

Data items	Principal data sources	Primary assumptions	Secondary assumptions	Comments
		above ▪ See the main warnings report for the full range of assumptions		
Extra effects of sea water damage	Professional building surveyors employed specially for this task	Repair is to pre-flood condition or better. No ARV concept used		

Chapter 5:
Sector: Non-residential properties

Data items	Principal data sources	Primary assumptions	Secondary assumptions	Comments
Property types	Field surveys or the EA's National Property Dataset (NPD)	The type of NRP is not well differentiated in the NPD, which relies on the Focus codes.		
Sample of properties to be the subject of the 'Head Office' surveys	Numbers of NRP properties on the indicative floodplain and the new floodplain outline	Our sample needs to match the properties at risk		This had to be done in two stages, which were different, owing to the new floodplain data becoming available in 2004. The differences are small.
Building fabric and structure value and susceptibility	'Head Office' surveys of 85 companies with properties located in floodplain areas	VAT is excluded. No depreciation taken: re-build cost data sought	That this information is accurately obtainable from a one-off 2 hours meeting	No warnings allowed for in the base data. Upper and lower bounds obtained for sensitivity analysis
Stock value and susceptibility and vertical distribution	'Head Office' surveys of 85 companies with properties located in floodplain areas	VAT excluded. No depreciation taken: replacement values sought	As above	No warnings allowed for in the base data. Upper and lower bounds obtained for sensitivity analysis
Moveable equipment value and susceptibility and vertical distribution	'Head Office' surveys of 85 companies with properties located in floodplain areas	VAT is excluded. Depreciated values taken	As above	No warnings allowed for in the base data. Upper and lower bounds obtained for sensitivity analysis
Services value and susceptibility and vertical distribution	'Head Office' surveys of 85 companies with properties located in floodplain areas	VAT is excluded. Depreciated values taken	As above	
Fixtures and fittings and susceptibility and vertical distribution	'Head Office' surveys of 85 companies with properties located in floodplain areas	VAT is excluded. Depreciated values taken	As above	No warnings allowed for in the base data. Upper and lower bounds obtained for sensitivity analysis
Effect of warnings on loss reduction	'Head Office' surveys of 85 companies with properties located in floodplain areas	That NRP property owners would do what they say they could do!	As above	Not much good data here.
Effect of sea water	'Head Office' surveys of 85 companies with properties	That extra damage would be caused	As above	Not much good data here.

Data items	Principal data sources	Primary assumptions	Secondary assumptions	Comments
	located in floodplain areas			
Disruption caused by flooding	'Head Office' surveys of 85 companies with properties located in floodplain areas	That this can be measured in days of lost activity.	As above	Quite a lot of information on > 22 types of NRP.
Loss of production/trade	'Head Office' surveys of 85 companies with properties located in floodplain areas	Only loss of value added included	As above	Only sparse good data here; interviewees found this very difficult. The evidence is that not much damage would be saved.
Weighted annual average damage by standard of protection	Several dozen case studies (undertaken by John Chatterton)	That these are reasonably representative of floodplains in England and Wales		
Property ground floor area	Field survey for a particular scheme or a complex pri9cedure via rateable value	That this is at all accurate without field checks.		This remains a problem area

Chapter 6
Sector: Other flood losses

(a) Traffic and rail disruption

Data items	Principal data sources	Primary assumptions	Secondary assumptions	Comments
Road disruption: traffic volumes	Origin and destination surveys or field surveys or local authority data	That the road in question matches the data that is obtainable		
Road traffic: extent of resource and delay costs	Traffic models; alternative route paths; origin and destination surveys; speed-flow equations (DoT)	▪ Fuel taxes are excluded from the DoT values. ▪ That this type of disruption can be accurately modelled.	That speed and cost are correlated.	This is a very difficult area. Fuel taxes are excluded from the DoT values.
Road traffic: value of resource and delay costs	DoT data			Roads are important 'first victims' of floods, but this approach to assessing values seems rather abstract.
Rail traffic: flows	The number of passengers affected by the break in a rail link caused by a flood: data from rail franchisees and/or Network Rail			Rail tracks are, in fact, rarely flooded, but the Autumn 2000 event saw widespread disruption.
Rail traffic: extent of compensation costs	Standard compensation payment systems (Network Rail)			

(a) Emergency costs and utility costs

Data items	Principal data sources	Primary assumptions	Secondary assumptions/issues	Comments
Emergency costs of flood events	Bellwin claims; Severe Weather Payment claims; case studies (North	Only marginal costs allowed (e.g. overtime payments)	The secondary effects are not measured: overtime done by police staff given	Some fuel tax items could not be excluded

	Yorkshire); Environment Agency costs		non-flood duties because staff are on flood duties	
Utility outages in flood events	Case studies (South Wales)	Only marginal costs allowed (e.g. overtime payments)	Some repair and replacement items are not really marginal: e.g. the relocation of electricity transmission opines	This data is only for extreme events and therefore is of less use than most MCM data.

Chapter 7.
Sector: Erosion benefits (properties)[1]

Data items	Principal data sources	Primary assumptions	Secondary assumptions	Comments
Land use/property affected	Field surveys			Need to survey properties some way back from the erosion line, as these will benefit from the delay caused by scheme implementation.
Erosion contours	Historical records of erosion rates	Erosion rates in the past are a guide to the rates that would occur ion the future		Need to decide the time period over which historical records are used.
Erosion probability profiles	Historical records of erosion rates	Erosion rates in the past are a guide to the rates that would occur ion the future	Some safety margin is usual; Defra advise 2 years' worth of erosion	PAG spreadsheets employ this method.
Property values	Local estate agents; regional statistical summaries; Land Registry database	The values should assume no erosion risk		Inflated prices for properties with "sea views" should be avoided.
Scheme life	The scheme's design			Erosion rates are assumed to recommence/continue after this time period

[1] Open land, recreation resources, and agricultural land are treated in the same way as for flood alleviation benefits

Chapter 8
Sector: Recreational benefits

Data items	Principal data sources	Primary assumptions	Secondary assumptions	Comments
Data on: • access • types of use: - informal or - specialised e.g. boating, golf courses • types of visitor: - local, - day or - staying	• Site visits • Local authority lists of community activities and clubs • Local authority information on local tourism/recreation	• Current access is important and may be affected by erosion • Specialist uses may require separate/special assessment and yield higher values • Local, day and staying visitors may yield different values and may require different survey strategies: on site or residents survey • Current use/users only, not new/increased uses and users are evaluated by the methods	Sources can produce reliable and accurate information on uses and visitors as these can vary over time e.g. from year to year	
Adult visit numbers per year WTP beneficiaries	• Secondary source data e.g. car parks numbers, visits to a related site, tourism and specialised facilities managers (see Table 8.1) • Manual counts of visits conducted as part of a CV survey • Infra-red or other counter data for site • Number of adult residents in the catchment area for resource for WTP beneficiaries	• Visit number data can represent the total exposure of the resource to recreators • Only adult visits can be valued: children's visits are excluded • WTP beneficiaries can be identified (given that non-use as well as use value may be involved).	• Secondary source data can be converted to accurately represent site use • Count data are accurate and technical and human failures can be avoided • Counter data can be converted to adult visits via manual calibration counts • Missing count data (manual or infra-red) can be extrapolated	This is a particularly difficult area. Secondary source data are generally patchy and limited. Data collection on site via counters or manual counts is difficult and expensive to mount. Such data collection needs to be arranged well in advance and to cover a substantial period of time if excessive extrapolation from short term counts is to be avoided.
Data on seasonality	• Data on year round	• Seasonality measured	• It is possible to	Seasonal variations in visiting are very

Data items	Principal data sources	Primary assumptions	Secondary assumptions	Comments
of visits where only short term count or other data on visits are available for the site	visits at comparable locations, tourist attractions or wildlife sites (Appendix 8.4)	at other types of location will reflect that of visits to resource being valued	extrapolate from short term data to yield an annual visit figure	different for different types of site and sources of year round data are limited
Value of Enjoyment (VOE) per adult visit	• Some data/values derived from previous surveys • Site specific data from a survey on site and/or in residents' homes on VOE under varying conditions	• VOE measures the loss and the gain in utility from changes in the resource with and without FCERM interventions	• Respondents can answer VOE questions and surveys yield sensible VOE averages • Those who participate and answer VOE questions are representative of users • Survey scenarios are neutral and can accurately represent changes etc • VOE measures only the use value under varying conditions • VOE survey methods avoid 'biases' common in CV method applications	Some data are available from past surveys but VOE values vary from site to site in ways that cannot as yet be systematically explained. Therefore applying this data to new/comparable sites and scenarios is problematic. Designing and conducting CV surveys (both VOE/WTP) is a particularly difficult and demanding application of the survey method requiring well trained and supervised interviewers and care and expertise in survey and questionnaire design and analysis.
WTP values per visit/per annum	• Limited data/values derived from previous surveys • Site specific WTP data from a survey on site and/or a survey of beneficiaries in their homes	• WTP measures the change in utility with changes in the resource with FCERM interventions	• Respondents can answer WTP questions and surveys yield sensible WTP averages • Those who participate and answer WTP questions are representative of beneficiaries • Survey scenarios are neutral and can accurately represent changes etc • WTP surveys which	Limited WTP data are available from surveys Above comments on survey methods apply to WTP surveys

Data items	Principal data sources	Primary assumptions	Secondary assumptions	Comments
			cover use and non-use values can avoid double counting values (e.g. property loss values) counted in other ways • WTP values are not 'biased' by payment vehicle e.g. taxes, entry fees and other features of WTP survey methods	
With VOE, the numbers transferring to different sites	• Data on average gains and losses in VOE from previous surveys are adjusted to take account of transfer visits • VOE surveys include questions on changes in visit frequency and transfer to alternative sites under varying conditions	• That people can judge on the basis of survey scenarios, whether or not they would rather move than stay at the site with erosion and with the scheme options	• People have sufficient information about alternative sites	• This is on of the trickiest aspects of the VOE approach
The VOE values for these different sites	• Data on average gains and losses in VOE from previous surveys are adjusted to take account of transfer visits and VOE at alternative sites and the differences in costs associated with a visit to the alternative site compared with the current site. • VOE surveys include questions to elicit this information	• That people can judge their VOE and visiting costs at the alternative site		This is a particularly demanding task for survey respondents and one of the trickiest aspects of the VOE approach

Data items	Principal data sources	Primary assumptions	Secondary assumptions	Comments
Survey information on characteristics, behaviour, attitudes and preferences of respondents so that the validity of the VOE/WTP values can be tested.	• Questions in VOE/WTP surveys	• Visitor/residents characteristics, behaviour, attitudes and preferences are factors that may explain WTP or VOE valuations		In most cases, these factors have only explained a small proportion of the variance in the VOE/WTP values offered by individuals in surveys.

Chapter 9
Sector: Agricultural Benefits

(a) Secondary source (strategic) assessments

Data items and data types	Principal data sources	Primary assumptions	Secondary assumptions	Comments
Land area affected by surface flooding and/or waterlogging: Ha of 'benefit area' subject to surface flooding and waterlogging over which flood defence works exert influence	EA and IDB maps of floodplain and flood event records and river water levels. Aerial and other photographs Other records	Benefit area adequately defines area of potential benefit. Benefits directly linked to flooding and waterlogging regimes in this area	May include areas linked to extensive tributary systems, and downstream effects. Could include lowland areas potentially affected by highland carriers	Critical assumption defining boundary of benefit assessment. Varies according to magnitude of event and as a consequence of factors such as changes in catchment hydrology and climate. Possible treatment as special case if of strategic or social importance
Flood defence and land drainage infrastructure and related costs: Types of infrastructure eg embankments, pumping stations, drainage networks, field drains: design specifications and unit costs	EA/IDB/contractor records and cost estimates for capital, operations and maintenance works	Designs and costs vary according to standards of service and local conditions. Vat is excluded	Possible economies of scale Relationship between capital costs and operating costs Systems are maintained	Considerable variation in costs according to design standards. Possible additional costs to 'engineer' environmental gain into flood defence projects
Flooding regimes; Aerial extent of	EA and IDB maps of floodplain and flood event records and river water levels.	Flood regimes are a major determinant of land use type, productivity and economic performance.	Changes in flood regime are associated with changes in land use and management. Changes in flood and water	Under the prevailing agric policy regime, there is likely to be little call for enhanced protection for agriculture, rather assessment of justification for

Data items and data types	Principal data sources	Primary assumptions	Secondary assumptions	Comments
flooding by return periods, seasonality, duration, depths	Aerial and other photographs Other records Modelling/flood routing Other records	Flooding affects land use options and damage to crops Seasonality and duration are critical	level regimes linked to Defra appraisal scenarios	retaining or possibly reducing existing standards (the latter including implications for environmental options).
River/water course levels : River/ditch water levels at various recording frequencies	EA/IDB level records Hydraulic/hydrological modelling	River/ditch levels determine standards of service for 'free' and artificially drained soils, less so for heavy undrained soils	Influence of river/ditch reduces with distance	Important element of standards of service, affected by capital works and maintenance programmes
Soil-water regimes (field water levels) Field water levels at various recording frequencies	Limited data sources, usually linked to research/habitat management sites	Soil water conditions critical determinant of land use options and productivity	Artificial drainage needed in heavy soils. Changes in flood and water level regimes linked to Defra appraisal scenarios	Mainly determined by farmer/land and water management decisions
Agricultural Land Classification (ALC) and soil types Grades 1 through to 4 Soil Series/associations	ALC map maintained by Defra (statutory) National Soils map: 1:250,000	ALC grade broadly linked to land use types: 1 intensive arable through 4 grassland Soils map indicates land use suitability and management prescriptions	General correlation between ALC and Soils type at broad scale	Correlation likely to weaken due to reductions in agricultural support. Some grade 1 land may suit wetland habitat creation Some land may be of strategic importance
Land prices £/ha sale prices by grade and tenure Rental values, £/ha Quantities sold/let	Defra, RICS and land agents: Farm management pocketbooks (eg Nix, ABC, SAC),	Land prices can be used to estimate value of benefit stream from agricultural land where assumed permanent loss of total output	Adjustments made to remove agricultural subsidies assoc with single payments and agri-environment	Evidence suggests tenuous link between land prices and value of future benefit stream from agric production
Major land uses	CEH land cover maps	Land use types indicate	Higher value land use	Generally good correlation between

Data items and data types	Principal data sources	Primary assumptions	Secondary assumptions	Comments
Types: horticulture, intensive/extensive arable, intensive/extensive grassland Other: recreation/woodland	Aerial photos Agric Census results Reconnaissance Field Observations Agricultural advisors Historical land use	value-added from agricultural production: strongly associated with estimates of agricultural benefits	requires higher standards of flood defence and land drainage. Heavier wetter soils mainly down to grass	land use type and flood/drainage condition in farmed areas. Bio fuels could be important future option
Farming systems physical/technical data: Dominant farm types and sizes, cropping patterns, livestock types, crop and livestock yields, stocking rates, irrigation, employment 'alternative' farming'	Regional Farm Business Management Surveys, Farming press Agric Census results, Farm management pocketbooks (eg Nix, ABC, SAC), EU (NUTS) sources, CAMS	Typical farming systems can be drawn up to represent major types of benefit scenarios. They are an important part of the narrative of land use	Agricultural Benefits are defined at the farm scale, aggregated to the scale of a benefit area	Important to identify and explain past and likely future trends in farming systems, especially during period of policy and structural adjustment. For long term projects should consider technology change (and yields)
Farming systems data – financial and economic data: prices (*see agric commodity prices below), gross margins, fixed costs, net margins	Regional Farm Business Management Surveys, Farm management pocketbooks (eg Nix, ABC, SAC) EU (NUTS)	Farming systems are an important unit of assessment for the estimation of agricultural benefits. Gross margins and net margins are the appropriate units of accounting, as per Defra guidance.	Critical links with farmer motivation and behaviour	Important to identify trends in farming systems, especially during period of policy and structural adjustment
Agricultural commodity prices	Defra Agric Stats Market reports Farm business surveys and	Mean annual price series, excluding subsidies (simplified post 2005)	Defined within prevailing policy regime (currently post 2005 CAP reform).	For long term projects should consider plausible commodity price changes

Data items and data types	Principal data sources	Primary assumptions	Secondary assumptions	Comments
Farm gate prices for crop and livestock products	management books Research/modelled predictions/forecasts (Defra/EU)	Follow Defra guidance		
Take –up rate of potential benefits Rate of change of farming practices	Research literature on uptake of drainage benefits, uptake of environment options	Uptake varies according to a mix of drivers, farmer motivation and perceived benefit	If farmers perceive benefit they will change behaviour, including env. options	Considerably uncertainty at the moment about farmer responses to policy change
Environmental aspects: habitats Presence of or potential for SSSI/protected habitats Incentives	English Nature/Natural England Designations, NGOs including FWAG, RSPB	Flooding and soil water regimes vary according to environmental objectives.	Regime requirements for protected habitats need to be prescribed	Likely to be an important driver of flood defence in floodplains
Agri-environment options Existing or potential Environmental stewardship options. Payment regimes Management agreements	Defra Regional Development Service Defra publications Farm management pocketbooks Evaluation studies NE, FWAG and others	Agri-environment options may require different standards of flood defence. Env benefits included in benefit assessment	Scope for designing flood/waterlogging compatible with environmental options	Important element of an integrated approach to flood risk management in rural areas. Env and ecosystem benefits should be included in options appraisal. This needs further attention.
Runoff control/storage interventions Type, scale of control measures	EA/Defra/IDBS CFMPs	Water retention/storage impacts on land use and farming practice	Catchment scale issues	Important element of integrated approach, especially re WFD and links to diffuse pollution
Agro-climatic conditions	Defra and Met office sources	Required for field drainage and water level design	Local variation is not critical	Potential impacts of climate change

Data items and data types	Principal data sources	Primary assumptions	Secondary assumptions	Comments
Rainfall, temperature, agro climatic zone				

(b) Field/farm survey based assessments

Data items and types	Principal data sources	Primary assumptions	Secondary assumptions	Comments
Secondary data sources as above				
Farm level data Farm size, proportion of farm in benefit area, topography, major soil types, and agro-climate. Cropping pattern (crops by area) Livestock types, numbers, ages, systems. Tenure, Farmer age Number of family and hired workers Major changes in farm circumstances and practice over past five years Current development proposals Environmental	Secondary farm business management sources as above. Farmer interview survey. Local sources: advisors, farm secretaries, land agents, farmer groups/associations	Insights into past trends and observations of present provide basis for future predictions. Possible classification in 'less favoured area'	Farm/farmer level factors are critical in shaping agricultural and related benefits.	Rapidly changing policy environment may mean past is not good basis for predicting future

Data items and types	Principal data sources	Primary assumptions	Secondary assumptions	Comments
stewardship Participation/eligibility				
Field level data /blocks of fields with similar characteristics Field size (ha), soil type, slope tenure, location, drainage type/system and condition, evidence of flooding/waterlogging, field boundary and ditch conditions, compliance requirements, eg field boundaries	As above, corroborated by farmer interview, and field observation	Field level characteristics define type and extent of potential change COGAP compliance may apply at field level	Possible to aggregate fields/ blocks of land at the farm level into 'management units'	Useful for identifying hydraulic cells with similar flood regimes. Note compliance requirements
Grassland Grassland site class, Grass type, risk of surface damage Nitrogen use (kgN/ha), Grass conservation. Stock types and performance, Grazing season	As above, corroborated by farmer interview, and field observation	Farming practices provide basis for benefit assessment	Changes in practices provide basis for assessing likely change in benefits	Changing technologies and policy environment may mean past is not good basis for predicting future
Arable Crop type, crop yield (t/ha),	As above, corroborated by farmer interview and field observation	Farming practices provide basis for benefit assessment	Changes in practices provide basis for assessing likely change in benefits	Changing technologies and policy environment may mean past is not good basis for predicting future

Data items and types	Principal data sources	Primary assumptions	Secondary assumptions	Comments
Crop rotations. (				
Farm level financial data Gross margins, fixed costs and net margins: Fixed costs assumptions; labour, machinery, buildings: will any changes in flood defence affect 'fixed costs' such as labour machinery, buildings, use of contractors	As above, corroborated by farmer interview, mainly using typical prices and cost estimates.	Major changes in farming practice and land use will affect the fixed costs structure of the farm business. Implications of single payment regimes, agri-environment schemes and	Permanent changes in flood defence likely to affect net margins at farm level Apply Defra guidance	Significant changes are occurring in the structure and management of farms, associated with for example changes in policy, markets and technology, with implications for benefit assessment

PB 12146

Nobel House
17 Smith Square
London SW1P 3JR

www.defra.gov.uk