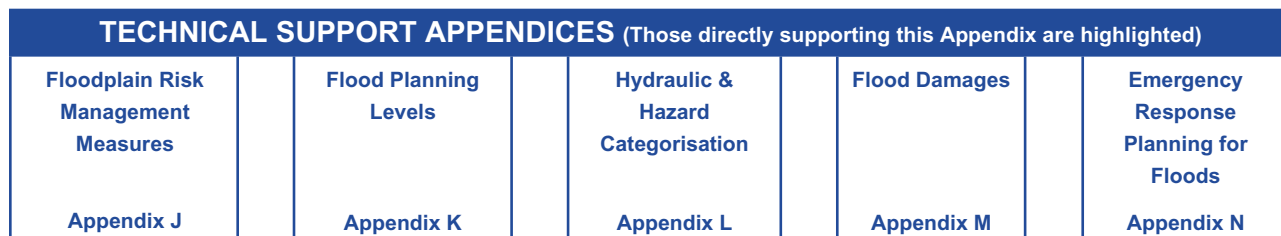
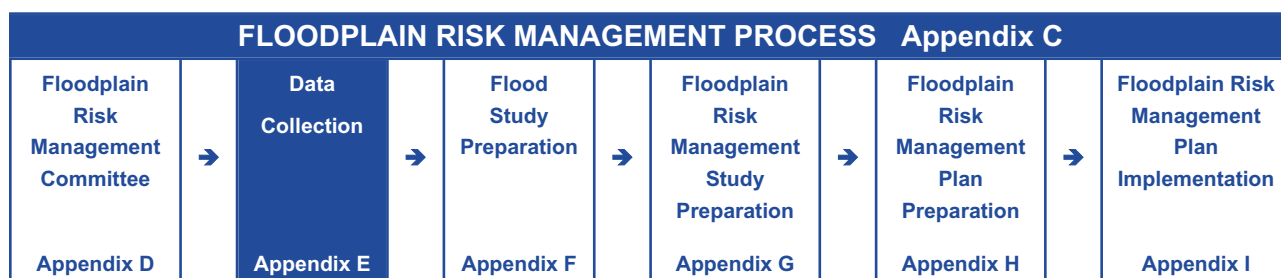


APPENDIX E DATA COLLECTION



E1 Introduction

Data collection along with investigations under the floodplain risk management process provides the basis for robust and informed decision making by the committee and council. It highlights the available background information and associated data gaps that may need to be filled as part of investigations.

Data collection is a key step of the floodplain risk management process, though it is generally undertaken as part of both the flood study and management study, as without appropriate data these studies cannot be effectively completed.

Data collection is not an end in itself. Data is required to enable preparation of properly informed flood studies, management studies and plans.

E2 Initial Considerations

Prior to commencing any studies and data collection the management committee need to consider the:

- overall objectives of the floodplain risk management process, outlined in Section C3;
- known community information sources, concerns or aspirations in relation to floodplain risk management and any associated constraints on potential management measures; and

- the objectives of the step being undertaken, as discussed in Sections F3, G3 and H2.

This knowledge enables the committee to determine the data necessary for studies and associated decision making.

E3 Objectives

The objective of data collection is to clearly define the data currently available and that necessary for studies (see Section E4). Where relevant information exists this should be collated and referenced in investigations. Where information gaps exist, studies should be initiated to collect this, where necessary.

E4 Necessary Data

Data to be collated, or estimated, where relevant should include:

- historic flood and land use data and past reports, flood behaviour in general, major flow paths, peak flood levels, flood damage, flow velocities, rate of rise of flood waters, travel time, the effects on the community of flooding to different heights including road closures, isolation and the need to evacuate, etc;
- rainfall records and projections of future rainfall characteristics;
- topography and the geology of area, including soil types (for example, acid

- sulfate soils) and rates of erosion and deposition;
- current floodplain risk management measures, their effectiveness and deficiencies, including environmental disturbance and impacts on water quality;
- current and potential future land use and development trends within the catchment including available land and future demand for different types of development (see Section E5.1);
- information on current flood related zonings and development controls;
- current levels of community and individual flood readiness;
- likely community disruption caused by flooding;
- groundwater and local recharge areas;
- aquatic and terrestrial flora and fauna surveys and habitat information, especially on threatened species, endangered populations and ecological communities (see Section E5.2);
- areas of Aboriginal and historical cultural significance (Section E5.3); and
- Relevant climate change data (see Section E6).

The floodplain risk management committee should establish its objectives in this area, be aware of the need for information and instigate appropriate studies as early as practical to enable consideration of the associated constraints in developing management options.

E5 Complementary Studies and Plans

There is a range of complementary studies (land use, cultural and environmental) that can provide valuable background information for consideration in floodplain risk management decision making.

The associated information may impact on decision making or may highlight additional issues that need consideration or potential opportunities for environmental enhancement. It is important that these issues are considered for compatibility in deriving and assessing floodplain risk management measures.

Land use and social and environmental impacts cannot be considered in isolation as they are

highly interactive. The long term balancing of these is the most appropriate optimal solution. Studies and other data may exist and should be collated as part of data collection and be considered and referenced in the management study.

Where this information does not exist and it is seen as central to effective and robust decision making consideration should be given to deriving it in the management study.

Key data gaps can be considered in scoping the management study. These additional investigations may be limited to highlighting the area where potential constraints may exist that need consideration in management options, the relative significance of the issue (will it effect option viability or simply be a design constraint) and the need for, and preliminary scope of, future investigations, if necessary.

Without effective consideration of these potential constraints non-viable options may be recommended or adopted.

E5.1 Land Use Planning Studies

An important consideration in the management study is the desired or likely mix of future land use, future growth areas and associated supply and demand issues, in consideration of regional as well as local factors.

Management studies provide an ideal opportunity to assess the long term future direction of the study area, its exposure to flood hazard, the cumulative impacts of development strategies and associated limits and conditions to manage development.

This is particularly important where land is unzoned, land use planning has not been previously determined, or changes to land use are being considered. Management studies can aid decision making by providing information on:

- the flood hazard on the land;
- cumulative impacts of development on flooding;
- impacts of flooding on potential development; and
- information on appropriate development limits, types, and associated supporting development conditions.

Studies also involve examining flood risk in existing development areas. This may highlight opportunities or issues that need consideration if areas are to be redeveloped.

Council may already have a great deal of relevant land use information to provide the basis for the assessment of the flood risk to both existing and future development. This may include:

- information on existing land uses;
- information on existing zonings which may provide some future direction for development;
- information on existing and past development controls;
- strategic studies for long term development of the study area;
- the long term future demands for land, which may be highlighted by population growth and development trends (residential, commercial and industrial);
- the availability of land to satisfy the associated needs, both within and outside the floodplain. This may include a combination of land currently zoned for the particular use, and other land that council may consider has potential to meet these future needs; and
- the location of existing urban infrastructure services, and any excess capacity therein. For example, excess capacity of infrastructure (water, sewer and roads) serving a flood-prone area may well justify additional risk management measures. The cost of these measures may be offset by the savings in not having to provide additional infrastructure elsewhere.

Use of this information in managing future flood risk is discussed in Section G6.

E5.2 Environmental Studies and Plans

The natural attributes of floodplains are very important to both the NSW economy and the natural environment. Clearing for agriculture, urban development and flood mitigation, drainage and irrigation works has extensively modified the environment of most floodplains.

Depending on the characteristics of the environment where the management study is being undertaken, analysis of the riverine

and floodplain environment, including the identification of key habitat areas and the importance of a natural flooding regime to surrounding areas, needs to be considered.

The environmental characteristics of the floodplain needs to be considered in most management studies, especially in areas where there are flood-dependent ecosystems such as freshwater wetlands or river red gum forests, or in areas with acid sulfate soils.

These considerations should ensure compatibility of floodplain management measures to the relevant environmental issues.

There may be a range of relevant data already available that need to be considered in management studies. Native vegetation and water management planning undertaken by CMAs and DIPNR need to be considered through reference to both. Other key data sources are indicated in Sections E5.2.1 to E5.2.5 with other potential sources listed below:

- state of the environment reporting;
- environmental impacts statements for other purposes in the local area;
- flora and fauna studies and information;
- aerial photography and land use maps;
- stormwater management plans;
- estuary management plans; and
- specific environmental investigations.

E5.2.1 Catchment Management Plans or Interim Environmental Objectives

Catchment management plans prepared by CMBs or interim environmental objectives developed through the water reform process provide agreed catchment objectives that need to be considered in assessing management options.

E5.2.2 Stream Processes

Consideration should be given to potential changes resulting from proposed works and their impact on stream processes. Stream straightening, widening and vegetation removal can affect stream processes outside the extent of works.

For example, stream widening and straightening results in increased downstream velocities due

to reduced energy losses through the altered section and associated decreased flow times. This impacts on the downstream stream bed level and bank stability through increased erosion rates. Localised scouring can further affect channel equilibrium. In addition, alteration of the stream grade can initiate the migration of headcuts in an upstream direction. This in turn leads to increased bed and bank instability and extensive upstream erosion and downstream sedimentation.

Preliminary investigations based upon inspection of catchments, similar areas and experience with similar soil and vegetation types may provide a basis for making decisions upon the significance of the issue to a management option in a particular location.

E5.2.3 Environmental Studies

Floodplain environments provide important habitat for a range of flora and fauna species with the importance of the riparian zone being well understood. It provides corridors, refuge, shelter and shade for fauna species and contributes organic matter essential for healthy floodplain ecosystems. Riparian vegetation can also act as a filter and reduce nutrient inputs to water bodies from adjoining agricultural areas.

Traditionally, riparian zone ecosystems have not been well conserved. Extensive clearing for agriculture, subsequent invasion by exotic plant species and fragmentation and isolation of functional stands, have comprised the ecological integrity of floodplain vegetation communities and dependent fauna species.

Floodplain risk management studies should include an assessment of the condition and diversity of riparian vegetation, with particular reference to the likelihood of an area supporting threatened species, populations or ecological communities listed in the Threatened Species Conservation Act 1995 or Fisheries Management Act 1994 (discussed in Section E5.2.4). This is particularly important in areas where flood modification measures are proposed, an assessment of the impact of the proposed measure on ecological communities and aquatic ecosystems should be undertaken.

It is also important to ensure that information collected during environmental studies is used to determine where environmental restoration

and enhancement projects may be undertaken, as discussed in Appendix J.

There is a range of government legislation and policies that cover these activities and all should be sourced to ensure comprehensive coverage of this issue.

E5.2.4 Threatened Species

The Threatened Species Conservation Act (TSC Act) provides for the preparation of Recovery Plans and Threat Abatement Plans by DEC. The Fisheries Management Act provides for the preparation of Habitat Protection Plans for threatened fish species. Recovery and habitat protection plans will be prepared for endangered and vulnerable species, populations or ecological communities under these Acts. Similarly, threat abatement plans are prepared for “key threatening processes” listed in the TSC Act. Information about any plans existing or being prepared under the TSC Act relevant to the area covered by the floodplain risk management plan may be obtained from the relevant DEC office.

E5.2.5 Acid Sulfate Soils

Acid sulfate soils have been identified as a significant issue on coastal floodplains. DIPNR has produced risk maps that identify the location of these soils. These soils, if exposed to air, can become extremely acidic due to the oxidation of pyrite materials. The Acid Sulfate Soils Management Advisory Committee has prepared the Acid Sulfate Soils Manual that should guide the development of floodplain risk management plans for these areas. This is especially the case if new flood mitigation works or modification to existing works are proposed that may either physically disturb these soils or result in alteration to the water table level.

Consideration should also be given to modifying operating procedures (particularly during non-flood periods) of flood mitigation structures (especially floodgates) to ameliorate acid discharges from acid sulfate soils.

Coastal councils in the worst acid sulfate soils affected areas have generally developed LEPs that require development consent for acid sulfate soils disturbance, whilst others are still developing or considering development of acid sulfate soils related LEPs.

E5.3 Cultural Studies

Protection of Aboriginal sites and places should be considered as part of any activities or works likely to affect floodplains. Section 90 of the National Parks and Wildlife Act (NP&W Act) makes it an offence to impact known Aboriginal sites and places without the consent of the Director-General of DEC. A known Aboriginal site is one which:

- is listed on the Aboriginal Sites Register of New South Wales;
- is known to the Aboriginal community and not listed on the Aboriginal Sites Register of New South Wales; and/or
- is located during surveys or test excavations prior to work commencing.

An Aboriginal Place is one declared by the Minister for the Environment due to its significance to Aboriginal culture.

Where an area is likely to contain Aboriginal sites, survey work must be undertaken in consultation with the local Aboriginal community to assess the presence and significance of sites and, if present, approval as indicated above is required. Where an impact on Aboriginal sites or places is unavoidable, Aboriginal communities should be asked to indicate their consent to impacts on areas of cultural significance as part of any Section 90 application to the DEC.

Consultation and reference in respect of activities or works likely to affect floodplains should include:

- the Director General of DEC where works are likely to effect known Aboriginal sites and places as defined by the NP&W Act;
- where an area is likely to contain Aboriginal sites, survey work must be undertaken in consultation with the local Aboriginal community to assess the presence and significance of sites and if present approval as indicated above is required; and
- Aboriginal communities should be asked to indicate whether proposed mitigation works impact on areas of cultural significance considering the application of NP&W Act 'Aboriginal place' provisions.

In addition, consideration should be given to the occurrence and likely impact on European heritage items of local, regional, state and national significance. Consultation should be undertaken with the local council, NSW Heritage office or the Australian Heritage Commission in this regard.

E6 Climate Change

The greenhouse effect refers to the inferred gradual warming of the earth and its atmosphere due to the accumulation of certain gases, such as carbon dioxide, in the atmosphere. It is a naturally occurring process, but atmospheric emissions of so called green house gases have accelerated the process giving rise to the enhanced greenhouse effect.

The greenhouse effect has possible implications to flooding behaviour and associated management decisions. Scientists and governments at an international level have accepted that the enhanced greenhouse effect is likely to result in climate change.

Inferred effects of climate change include increases in ocean levels and altered weather patterns which may have a number of possible adverse effects on flooding behaviour:

- increases in sea level (mainly due to thermal expansion) will exacerbate flooding problems in coastal areas, estuaries and along the tidal reaches of coastal draining rivers and creeks.
- Many of the flooding problems in these areas, particularly in intermittently closed lakes and lagoons would be exacerbated by additional build up of berms at ocean entrances bought about by higher ocean levels; and
- altered weather patterns may intensify storms and so increase the severity of the resulting floods. In effect, an increase in storm severities means that what is currently the 1% AEP (100 year ARI) rainfall event will become more frequent, for example, the 1.25% AEP (80 year ARI say) rainfall event due to climate change.

Scientists also predict that the incidence of extreme events would increase under climate change scenarios. This means that there would be more floods and droughts. Therefore, it is important to consider climate change in the:

- flood study (see Section F6), particularly in relation to the potential effects on flood behaviour; and
- management study (see Section G9.8), to consider the potential impacts upon management measures or associated decisions.

Current data on potential greenhouse effects should be discussed with DIPNR officers and reference should be made to www.greenhouse.gov.au, the Australian Greenhouse Office website. This site provides linkages to international projections and work, by CSIRO and the Bureau of Meteorology, amongst others, on projections for Australia.