TEMPLATE PROJECT BRIEF

For a stormwater management plan

Document Control

ISMF Security Classification

Security Classification/DLM	Public
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Document Release

Prepared for acceptance

David Trebilcock
General Manager Signed: Date: / /2020

Accepted for release

Stephen Hains
Presiding Member Signed: Date: / /2020

Disclaimer

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About the Template Project Brief

This template project brief has been prepared by the Stormwater Management Authority (SMA) for use by entities that are commissioning others to prepare a stormwater management plan (SMP) pursuant to Schedule 1A of the *Local Government Act 1999*. The template project brief has been prepared to promote consistency in the development of stormwater management plans, and should be used in conjunction with the most recent version of the *Stormwater Management Planning Guidelines* issued by the SMA and available from www.sma.sa.gov.au.

Using the Template Project Brief

The template project brief is for the scope of works required to deliver a stormwater management plan. It documents requirements for work and deliverables only. Contractual arrangements should be addressed separately by the project proponent, for example, using Australian Standard conditions of contract AS4000 or AS2412, or the proponent's own terms and conditions.

Coloured highlighted text used throughout this document indicates different actions required to complete the template:

- Words, phrases or paragraphs highlighted in green should be completed by the project proponent
- Words, phrases or paragraphs highlighted in orange should be completed by the project proponent, but may be optional, depending on the catchment area being studied or the proponent's requirements
- **User note:** Note text highlighted in yellow provides guidance for template users. These notes should be deleted before providing the document to tenderers.
- **Tenderer note:** Note text highlighted in grey provides guidance for tenderers. These notes should be left in the document provided to tenderers.

Acknowledgements

This template brief has been prepared by Mr Andrew Thomas, and has been adapted in part from *Using the National Generic Brief for Flood Investigations to Develop Project Specific Specifications* and the *Technical Project Brief Template*, which can be downloaded from the Australian Disaster Resilience Knowledge Hub at knowledge.aidr.org.au. The cooperation and assistance of numerous practitioners involved in the development, management and review of stormwater management plans who made contributions to this document is gratefully acknowledged.

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Project brief for:

Stormwater Management Plan for [catchment/city/town]

Prepared by:

[Entity name 1]
[Entity name 2]
etc

Entity Logo	Entity Logo	etc

Reference Number:	[Reference Number]
Closing Date:	[Date]
[Other:]	[Details as required by entity]

Table of Contents

List of Tables

List of Figures

List of Abbreviations

AEP	annual exceedance probability
AHD	Australian Height Datum
ARI	annual recurrence interval
ARR	Australian Rainfall and Runoff
DEM	digital elevation model
EY	exceedances per year
GDA	Geocentric Datum of Australia
MGA	Map Grid of Australia
MUSIC	Model for urban stormwater improvement conceptualisation
PMF	probable maximum flood
PMP	probable maximum precipitation
SMA	Stormwater Management Authority
SMP	stormwater management plan
TN	total Nitrogen
TP	total Phosphorous
TSS	total suspended solids

1 Introduction

[The principal] in partnership with [partner entities and agencies] is undertaking this project to develop a stormwater management plan (SMP) for the [location and/or catchment name]. [The project has received financial support from government program(s) and/or agencies].

The *Agreement on Stormwater Management between the State of South Australia and the Local Government Association of South Australia 2013* (the Stormwater Agreement) provides for stormwater management plans to be prepared by a council (or group of councils) for a catchment, regional city, or town, for the proper management of stormwater in that catchment, city or town.

Stormwater management plans are strategic plans which should provide for the management of stormwater in an integrated and holistic way. They should:

- Identify issues, risks and opportunities relating to stormwater management in a catchment
- Outline the functions and responsibilities of all stakeholders involved in stormwater management, including local government authorities and state government agencies
- Set objectives for the protection and enhancement of the economic, environmental, social and cultural values in a catchment (as they relate to stormwater quality, water security and flood hazard)
- Identify and prioritise investments and initiatives that contribute to achievement of these objectives and address stormwater issues in a considered and coordinated manner
- Outline a plan for implementation of the prioritised investments and initiatives
- Provide a means for monitoring and review.

Schedule 1A of the *Local Government Act 1999* establishes the Stormwater Management Authority (SMA). The SMA has been established to implement the Stormwater Agreement, and has powers to approve stormwater management plans.

The SMA issues *Guidelines for Stormwater Management Planning* (the SMP Guidelines) to assist entities to prepare stormwater management plans which will meet the requirements for approval by the SMA. Figure 1.1 below is reproduced from the SMP Guidelines and shows the typical approach to preparing a stormwater management plan. The red bounding box in the figure indicates generally the extent of this project within the overall process of developing a stormwater management plan. This project brief describes the work and activities required to develop an SMP for the [location and/or catchment name].

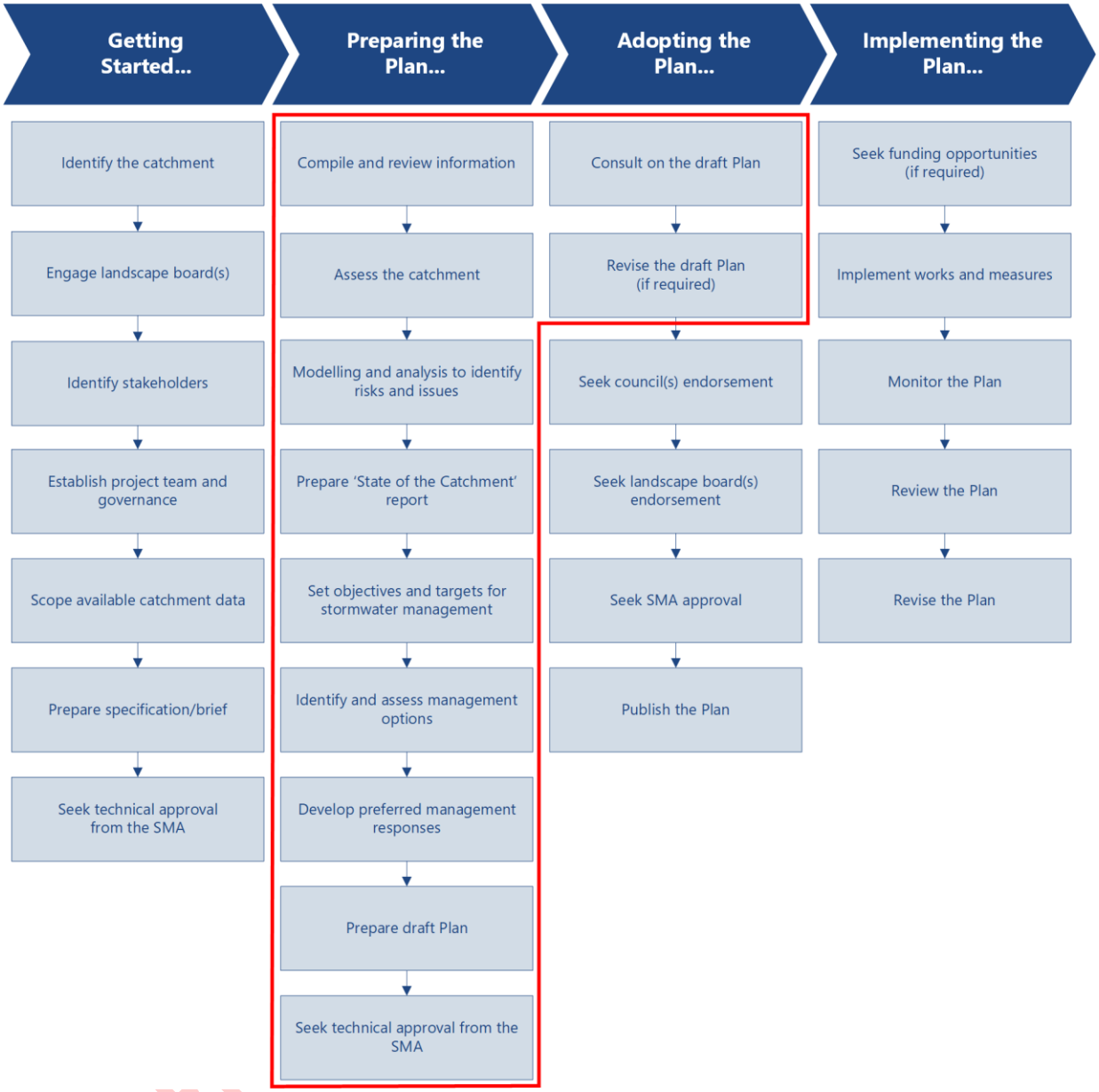

Figure 1.1: Typical steps required to develop a stormwater management plan.

2 Project Objectives

The purpose of this project is to prepare a stormwater management plan that will provide background and strategic direction for managing stormwater in the [subject catchment]. The project will be achieved through:

- An assessment of current catchment conditions
- Identification of risks and issues
- Identification of a range of management responses to address risks and issues
- Testing and validating the identified management responses
- Determining the most feasible, and/or effective combination of management responses
- Devising an implementation plan for the management responses.

The project will be delivered using the best available information as outlined in section 4 (Available Information), and by adhering to relevant standards and guidelines as outlined in section 5 (Definitions, Guidelines and References).

The [principal] will be the day-to-day contact for the project.

The project will be overseen and guided by [the principal and its steering committee], which may include representatives from key stakeholder and end user groups. The project may also be guided technically by [the principal and a technical committee], which may include representatives from the principal and other organisations (such as state government agencies).

The stormwater management plan will include:

- A set of objectives and targets which are consistent with state and local government policy, and prevailing community sentiment, as determined through stakeholder engagement during development of the plan
- Concept level recommendations for works and measures
- A sound technical basis for any further investigation in the area where required.

It is expected that the stormwater management plan will provide an understanding of stormwater management issues and risks to assist decision makers who are:

- Investing in the catchment
- Managing flood hazard through prevention, preparedness, response and recovery activities
- Managing stormwater quality to improve catchment and receiving water health
- Informing and educating the community on stormwater management.

The needs of these decision makers vary. The key end-user groups that this project aims to support are identified in Table 2.1. Meeting the requirements of these identified end user groups will be an important measure of the success of this project.

Table 2.1: End-user groups.

End user group	Examples identified for this project	Purpose
Strategic decision makers	[Council name], local government entities, SMA	Forward planning, financial forecasting, service standard setting and compliance
Funding agencies	SMA, Green Adelaide, landscape boards, Department for Infrastructure and Transport, [others]	Funding eligibility
Agencies with statutory responsibilities and powers	Green Adelaide, landscape boards, Environment Protection Authority, Department for Infrastructure and Transport, SA Water	Statutory and policy compliance
Community	Community groups, residents	Improve understanding, gaining community support, identify responsibilities, opportunities for involvement
Engineers involved in designing, constructing and maintaining mitigation works	Council engineering, asset management and maintenance staff, consultants, contractors	Technical background and support for further investigations
Emergency management planners	State Emergency Service, Police, council emergency management staff	Coordinate flood risk priorities and responses
Land-use planners (strategic planning and planning controls)	Council development staff, Attorney-General's Department (Planning and Land Use Services), SA Planning Commission	Implement planning reform and compliance requirements
Industry with vested interests in the catchment	Land developers	Identify suitability of and requirements for development of land
[Others]		

3 Background

Provide the rationale for why this catchment has been chosen for development of a stormwater management plan, and sufficient information to describe the key characteristics of the catchment.

3.1 Study Area Overview

User note: *This information is to describe the catchment and provide background information for tenderers for the purpose of developing their tender proposal. Technical detail should not be included here. Provide details of any relevant information sources in section 4 (Available Information) or section 5 (Definitions, Guidelines and References).*

If it is a project requirement to obtain information to define the catchment, then ensure that this requirement is identified in section 11 (Deliverables).

Provide a summary of:

- The catchment/city/town
- The location in the catchment (if not a whole catchment)
- History of development
- Major hydrological features
- Major flood history etc.

Provide a reference to a map (or maps) at Figure 3.1 etc.

3.2 Catchment Description

Describe the:

- Catchment size
- Watercourses
- Topography (e.g. steep upper sections, flat floodplain) and any key topographic features
- Geology and soils and hydrogeology
- Ecosystems of interest and any important (marine and freshwater) water-dependent ecosystems
- Receiving waters
- Locations of environmental or cultural significance
- The general form and extent of network drainage, including constructed wetlands
- The form and extent of residential/commercial/horticultural/other development
- Any key industries, cultural or community facilities.

3.3 Socio-political Context

Identify:

- The local government area(s) involved
- The suburbs wholly or partially within the study area
- Any specific local government entities with jurisdiction (e.g. regional subsidiaries)
- The relevant emergency services (i.e. State Emergency Service, Country Fire Service, Metropolitan Fire Service) region(s)/districts(s)/unit(s)/brigades(s)
- Key legislative and policy instruments that are likely to have an influence on development of the area – e.g. water allocation plans, character preservation areas, specific references in 30-Year Plan for Greater Adelaide, heritage protection areas, etc.

3.4 Current Water Management Systems and Known Flood Issues

Provide a brief overview of the current drainage and watercourse system(s) and any known drainage "hot spots".

3.5 Mandated and Preferred Software

User note: *The mandating of software packages is generally not considered to be best practice as it can discourage innovation and limit competition. However, the need to retain consistency with previous or related studies and investigations is an acceptable reason for mandating software.*

The principal prefers that the software identified in Table 3.1 is used in the delivery of this project.

OR

The principal requires that the software identified in Table 3.1 is used in the delivery of this project.

Table 3.1: Mandated and preferred software.

Software publisher	Software name	Software version (if applicable)	(M)andatory or (P)referred
[List software, or Nil]			

3.6 How the Stormwater Management Plan will be Used

Provide a summary which reflects on the needs and focus of the identified user groups. The summary should reflect:

- The strategic nature of the SMP and its role in outlining/defining future works
- The mechanisms for how these outcomes will be progressed, for example:
  - How the principal will engage with the other listed users/stakeholders
  - How the principal will incorporate SMP recommendations in future budgets and integrate with asset management plans and long-term financial plans.

Provide a map (or maps) of adequate resolution to describe the study area and key features, such as waterways, receiving waters, towns/suburbs, main roads, key stormwater infrastructure, environmental and cultural features etc.

If practical the map(s) should overlay an aerial image and cadastral information. If this is not feasible due to depth of detail, then separate maps should be provided.

The map(s) should include a legend, appropriate labelling to orient the reader, and should be produced at a minimum of A4 size.

Figure 3.1: Project study area.

4 Available Information

The project is to draw upon:

- Existing hydraulic, hydrological and hydrogeological, water quality and environmental investigations in the study area (Table 4.1)
- Relevant local climate change, environmental, open space, land-use planning policies, emergency management, cultural and heritage policy and guidelines (Table 4.2)
- Relevant state policy as listed in Table 1 of the SMP Guidelines
- Infrastructure service standards and technical design standards (Table 4.3)
- Data that is available from the principal (Table 4.4)
- Data provided by other organisations (Table 4.5).

The data listed in Table 4.4 will be provided to the consultant, or arrangements made for access prior to commencement of the project.

User note: *Be concise. Limit descriptions in Table 4.1 to Table 4.5 to a one-paragraph summary where possible.*

Table 4.1: Summary of previous studies.

Study name	Description	Author	Year	Accessible for tendering and project
Flood studies				yes/no/electronic/hardcopy/principal's office etc.
Hydrology studies/report				
Hydrogeological reports				
Climate change reports				
Ecological surveys/reports				
Heritage studies/reports				
[Add others as appropriate]				

Table 4.2: Summary of relevant plans and policies of the principal.

Document	Description	Author	Year	Accessible for tendering and project
Strategic Plan				yes/no/electronic/hardcopy/principal's office etc.
Long Term Financial Plan				
Asset management plans/policies				
Land-use planning policies/development plan				
Open space development policies				
Emergency management plan				
Risk management policy/manual				
Environmental policies				
Climate change policies				
Cultural and heritage policies				
Community engagement policy/procedure				
[Add others as appropriate]				

Table 4.3: Infrastructure service standards and technical design standards.

Document	Description	Author	Year	Accessible for tendering and project
Stormwater service standards				yes/no/electronic/hardcopy/principal's office etc.
Stormwater design standards				
Other relevant service standards				

Table 4.4: Data to be provided by the principal.

Data type	Description	Source	Year	Accessible for tendering and project
Historic flood information				yes/no/electronic/hardcopy/principal's office etc.
Hydrologic data (e.g. stream water level gauge number and period of record)				
Climate data (include source, if specific gauges are identified/recommended)				
Asset data				
Survey data (topographic survey, digital elevation models etc.)				
Spatial data sets (development zones, etc.)				
Cadastral data including location and extent of stormwater easements				
Hydrologic models				
Hydraulic models				
Hydrogeological models/data				

Table 4.5: Organisations with other relevant data.

Organisation	Contact	Comments
	Name, email, telephone number	

5 Definitions, Guidelines and References

5.1 Definitions

For the purposes of this project the following definitions will apply:

Annual exceedance probability (AEP) means the probability that an event of a given magnitude (precipitation or flood) will be exceeded in any one year, expressed as a percentage (e.g. 1%) or a ratio (e.g. '1 in 100').

Average recurrence interval (ARI) means the average or expected length of time between random events of a given magnitude (precipitation or flood) expressed as a unit of time (e.g. years).

Climate change scenario means the climate scenario expected under representative concentration pathway 4.5 and 8.5 respectively as described in Australian Rainfall and Runoff (2019) (or as amended by a future revision of Australian Rainfall and Runoff).

Exceedances per year (EY) means the average or expected number of times that a random event of a given magnitude (precipitation or flood) will be exceeded in any one year, expressed as a total.

Flood has the same meaning as in the Stormwater Agreement and means the covering of normally dry land by water that has escaped or been released from the normal confines of:

(a) any lake, or any river, creek or other natural watercourse, whether or not altered or modified;

(b) any reservoir, canal or dam.

Floodplain has the same meaning as in the Stormwater Agreement and means the area of land adjacent to a creek, river, estuary, lake, dam or artificial channel, which is subject to inundation by the probable maximum flood.

Network drainage means constructed stormwater drainage infrastructure including open drains, underground pipes and pits.

Major flow path means a flow path through main watercourses and trunk drains through the catchment, carrying flows from more than one upstream flow path, to the point of discharge into receiving waters.

Minor flow path means a flow path which commences within a catchment, and may follow the minor network drainage system to its connection with a major flow path.

Overflow path means the alternate extent of surface flows where they are the result of blockage, insufficient inlet capacity, surcharge or under-capacity of trunk drains or watercourses. An overflow path may not always align with underground drainage, roadways or watercourses. An overflow path is generally associated with flood extents, but may also reflect surface flows within a road carriageway or drainage easement before entering a major flow path.

P_n concentration means the concentration of an analyte or pollutant for which *n* per cent of sampled results are equal or less than.

Probable maximum flood (PMF) means the largest flood that could conceivably be expected to occur at a particular location, usually estimated from the probable maximum precipitation.

Probable maximum precipitation (PMP) means the greatest depth of precipitation for a given duration meteorologically possible for a given size storm area at a particular location at a particular time of year, with no allowance made for long-time climatic trends.

Trunk drainage means the highest order drainage infrastructure, collecting inflows from contributing network drains and channels.

Ultimate development means the point of development in a catchment where all vacant land is developed fully to the limit in accordance with current development policy.

Watercourse has the same meaning as in the *Landscape South Australia Act 2019* and means a river, creek or other natural watercourse (whether modified or not) in which water is contained or flows whether permanently or from time-to-time and includes:

(a) a dam or reservoir that collects water flowing in a watercourse;
(b) a lake through which water flows;
(c) a channel into which the water of a watercourse has been diverted;
(d) part of a watercourse;
(e) an estuary through which water flows;
(f) any other natural resource, or class of natural resource, designated as a watercourse by a regional landscape plan, a water allocation plan or a water affecting activities control policy.

5.1.1 Adopted flood frequency terminology

The consultant shall describe precipitation and flood events using the preferred terminology identified in Australian Rainfall and Runoff (ARR) (2019). Preferred terminology is shown within the blue bounding box in Table 5.1, which is reproduced from ARR 2019. (Shaded cells in Table 5.1 indicate 'acceptable' terminology.)

5.2 Guidelines and References

The consultant should use current guidelines, manuals and technical reference documents during the project, as listed in Table 5.2 and Table 5.3. These resources so identified should not be considered as limiting

Table 5.1: Preferred flood frequency terminology (ARR 2019).

Frequency Descriptor	EY	AEP (%)	AEP (1 in *x*)	ARI
	12			
Very Frequent	6	99.75	1.002	0.17
	4	98.17	1.02	0.25
	3	95.02	1.05	0.33
	2	86.47	1.16	0.50
	1	63.21	1.58	1.00
Frequent	0.69	50.00	2.00	1.44
	0.50	39.35	2.54	2.00
	0.22	20.00	5.00	4.48
	0.20	18.13	5.52	5.00
	0.11	10.00	10	9.49
Rare	0.05	5.00	20	20
	0.02	2.00	50	50
	0.01	1.00	100	100
Very Rare	0.005	0.50	200	200
	0.002	0.20	500	500
	0.001	0.10	1000	1000
	0.0005	0.05	2000	2000
	0.0002	0.02	5000	5000
Extreme			↓	
			PMP/PMF	
			PMF +dam failure	

Table 5.2: State and national guidelines and reference documents.

Reference	Source/URL	Topic	(A)dhere or (C)onsider
Adoption guidelines for stormwater biofiltration systems	watersensitivecities.org.au/content/stormwater-biofilter-design	Water sensitive urban design	C
Australian & New Zealand guidelines for fresh and marine water quality	www.waterquality.gov.au/anz-guidelines	Water quality management	A
Australian rainfall and runoff	arr.ga.gov.au	Hydrological and hydraulic modelling	A
Australian runoff quality	www.eabooks.com.au/Australian-Runoff-Quality-Guide-to-Water-Sensitive-Urban-Design	Urban stormwater management	C
Coastal erosion, flooding and sea level rise standards and protection policy	www.environment.sa.gov.au/topics/coasts/research-reports-policies	Coastal management	C
Coastal planning information package. A guide to coastal development assessment and planning policy	www.environment.sa.gov.au/topics/coasts/research-reports-policies	Coastal management	C
Disaster loss assessment guidelines (Manual 27)	knowledge.aidr.org.au/resources/manual-series	Flood damage assessment	C
Flood modelling guide (Circular 1)	www.sma.sa.gov.au/resources/guidelines	Hydrological and hydraulic modelling	A
Flood preparedness (Manual 20)	knowledge.aidr.org.au/resources/manual-series	Flood risk management	C
Guidelines on the consequence categories for dams	www.ancold.org.au	Dam safety	C
Guidelines for digital elevation data	www.icsm.gov.au/publications/icsm-guidelines-digital-elevation-data	Digital elevation data	C
Implementing water sensitive urban design in stormwater management plans (Technical report series no. 16/7)	www.goyderinstitute.org/publications/technical-reports	Water sensitive urban design	C
INFFEWS value tool: Guideline	watersensitivecities.org.au/content/inffews-value-tool-guideline-version-3	Benefit/cost analysis (non-market values)	C
International infrastructure management manual	www.ipwea.org/publications/ipweabookshop/iimm	Asset management	C
Condition assessment and asset performance guidelines: Stormwater drainage (Practice note 5)	www.ipwea.org/publications/ipweabookshop/practicenotes/practicenote5	Asset management	C
Managed aquifer recharge and stormwater use options: Net benefits report (Technical report series no. 14/1)	www.goyderinstitute.org/publications/technical-reports	Stormwater reuse	C
Managing the floodplain: A guide to best practice in flood risk management in Australia (Handbook 7)	knowledge.aidr.org.au/resources/handbook-managing-the-floodplain	Flood risk management	A
Flood emergency response classification of the floodplain (Guideline 7-2)	knowledge.aidr.org.au/resources/handbook-managing-the-floodplain	Flood risk management	C
Flood hazard (Guideline 7-3)	knowledge.aidr.org.au/resources/handbook-managing-the-floodplain	Flood hazard	A

Reference	Source/URL	Topic	(A)dhere or (C)onsider
Flood information to support land-use planning (Guideline 7-5)	knowledge.aidr.org.au/resources/handbook-managing-the-floodplain	Land-use planning	C
Assessing options and service levels for treating existing risk (Guideline 7-6)	knowledge.aidr.org.au/resources/handbook-managing-the-floodplain	Mitigation options and service levels	C
Considering flooding in land-use planning activities (Practice Note 7-7)	knowledge.aidr.org.au/resources/handbook-managing-the-floodplain	Land-use planning	
MUSIC water quality modelling guidelines	www.sma.sa.gov.au/resources/guidelines	Water quality modelling	A
Riparian design guidelines to inform the ecological repair of urban waterways	watersensitivecities.org.au/content/riparian-design-guidelines-inform-ecological-repair-urban-waterways	Watercourse restoration	C
Stormwater asset data requirements for hydraulic models (Circular 3)	www.sma.sa.gov.au/resources/guidelines	Asset management	A
Stormwater management planning guidelines	www.sma.sa.gov.au/resources/guidelines	Requirements for stormwater management plans	A
Water sensitive urban design technical manual	www.sa.gov.au/topics/planning-and-property/land-and-property-development/planning-professionals/water-sensitive-urban-design	Water sensitive urban design	C
[others]			

Table 5.3: Local guidelines and reference documents.

Reference	Source/URL	Topic	(A)dhere or (C)onsider
[local references]			

6 Scope of Work

The consultant's proposal is to describe a method that will achieve the objectives of the project listed in section 2 (Project Objectives) for the identified key end users (Table 2.1). The proposed method is to be developed to:

- Meet the scope of work
- Consider the available information detailed in section 4 (Available Information)
- Produce the deliverables described, and in the formats prescribed, in section 11 (Deliverables)
- Comply with the guidelines and best practices listed in Table 5.1 and Table 5.2.

The method is to include the following general stages outlined in Table 6.1. The project concludes with a handover of deliverables in the formats outlined in section 11 (Deliverables).

Table 6.1: Scope of work—summary of stages.

Stage	Description	Section
Stage 1	Information compilation and review	6.1
Stage 2	Assessment of the catchment	6.2
Stage 3	Modelling and analysis to identify stormwater management risks and issues	6.3
Stage 4	Preparation of a 'State of the Catchment' report	6.4
Stage 5	Setting objectives and targets for stormwater management in the catchment	6.5
Stage 6	Identifying and assessing option for management responses to address risks and issues	6.6
Stage 7	Selecting the preferred management responses	6.7
Stage 8	Preparation of the draft and final Stormwater Management Plan (including peer review)	6.8

6.1 Stage 1: Information Compilation

The information compilation stage will collect, collate and review all information available to inform the project, including guidelines, policy, standards, previous reports and investigations, asset data, survey and topographic data, climate data, and hydrological data.

The data listed in section 4 (Available Information) will be supplied by the principal. All available and collected data shall be reviewed and considered in the development of the project, and for the purpose(s) required. The consultant should therefore allow sufficient time to review the information supplied.

If It becomes necessary to collect additional information during the study *and*:

(a) it can be demonstrated that the need or availability could not have been reasonably anticipated during the tender process; *and*

(b) the principal cannot provide the information; *and*

(c) obtaining the information is beyond the scope of the project,

then the consultant is to submit a brief to the principal that outlines what data are required, and the cost and time to acquire them. Following the principal's approval, the consultant will undertake the additional data collection.

It is assumed that the consultant has sufficient prior knowledge of relevant national, state and local standards, guidelines, policy and legislation including (but not limited to) those listed in the SMP Guidelines.

6.1.1 Asset data review

***User note**: To ensure that accurate hydraulic models can be developed, stormwater asset data requirements should meet the requirements set out in SMA Circular 3: Stormwater Asset Data Requirements. Where these requirements cannot be met, the user should either:*

- *Undertake a separate data collection/extension project prior to commencing development of the SMP to ensure that the requirements can be met; or*
- *Adopt a range of assumptions regarding the basic form of the stormwater network, which will allow for development of hydraulic models, with potential limitations on the overall accuracy/resolution of the model.*

The consultant should review any asset data made available by the principal to determine their suitability for use in developing models, analysing results, and preparing maps and figures.

Asset data supplied by the principal will be supplied 'as is'. The principal warrants that the asset data comply with the requirements set out in SMA Circular 3: Stormwater Asset Data Requirements.

If the consultant considers that the supplied data do not meet the requirements of SMA Circular 3 or are materially deficient in some way that would adversely limit the performance of this scope of work, then the consultant shall:

OR

Asset data supplied by the principal will be supplied 'as is'. Where asset data are insufficient, the principal proposes that the methods of estimation and assumption for missing data attributes set out in Table 6.2 are applied. The principal acknowledges the limitations that this may place on the accuracy, resolution or applicability of any subsequent hydraulic modelling.

If the consultant considers that the use of the data in accordance with the methods of estimation and assumption set out in Table 6.2 would adversely limit the performance of this scope of work the consultant shall:

- Propose an additional method for utilising the existing data 'as is', including providing a range of assumptions that are to be applied. The consultant should also outline the estimated impact on the accuracy, resolution and applicability of modelled results as a result of any assumptions applied; and/or,
- Submit a proposal to the principal that outlines what the deficiency is, why it needs to be addressed to allow the conduct of the study, what additional data are required, and the means, cost and time to acquire them.

The principal will provide direction as to any additional data collection or additional method to be adopted.

6.1.2 Site familiarisation visit

The consultant shall allow for the project team to undertake a comprehensive familiarisation field inspection of the study area. The field inspection should be conducted to enable an understanding of key features within the study area that may influence flood behaviour, stormwater quality, opportunities for stormwater reuse and other options for stormwater management.

The field inspection should be undertaken with representative(s) of the principal.

During the field inspection, photographs of issues identified and other relevant features of interest should be taken and catalogued.

The consultant should make sufficient allowance for other site visits during the study required to ground truth and/or further evaluate issues and options identified during the course of the project.

Table 6.2 Proposed method of estimation or assumption for missing stormwater asset data attributes.

Asset type	Required attribute(s)	Method of estimation or assumption for missing parameter
Pipe	Depth to invert (downstream)	Assume 0.6 m cover
	Depth to invert (upstream)	Assume 0.6 m cover
	Direction of flow[1]	Deduce from surface gradient
	Gradient[1]	Assume surface gradient
	Pipe diameter	Professional judgement, or use downstream pipe size
	Segment length	Measure from plan/aerial imagery
Inlet pit	Pit opening width	Assume standard double pit
	Pit depth	Assume depth to invert for downstream pipe, or 1.0 m
	Grating/inlet type	Assume standard inlet-no grating
	Inlet pit connection pipe	Assume 375 mm diameter at pit depth
Channel or open drain	Bottom width	Measure from plan/aerial imagery
	Channel depth	Field inspection
	Left bank side slope	Deduce from plan/aerial imagery or field inspection
	Right bank side slope	Deduce from plan/aerial imagery or field inspection
	Segment length	Measure from plan/aerial imagery
	Top width	Measure from plan/aerial imagery
Culvert	Culvert depth	Professional judgement, or use downstream culvert depth
	Culvert width	Professional judgement, or use downstream culvert width
	Depth to invert (downstream)	Assume 0.6 m cover
	Depth to invert (upstream)	Assume 0.6 m cover
	Segment length	Measure from plan/aerial imagery
Gross pollutant trap (GPT)	Manufacturer	Design documentation or field inspection required to determine type of GPT
	Model	
Detention basin	Depth (from top of bank)	Field inspection
	Base area	Measure from plan/aerial imagery or field inspection
	Top area	Measure from plan/aerial imagery or field inspection
	Volume	Deduce from depth and area
	Inlet pipe size	Assume upstream pipe/culvert size or field inspection
	Inlet depth	Field inspection
	Outlet pipe size	Field inspection
	Outlet depth	Field inspection
	Overflow size	Measure from plan/aerial imagery or field inspection

Note:
1. Required if invert depths not provided at both ends of the pipe segment.

6.1.3 Digital elevation model (DEM)

A digital elevation model (DEM) is supplied by the principal. The consultant should review the DEM to determine its suitability for delivery of the scope of work. If the consultant considers that the supplied DEM is unsuitable or is materially deficient in some way that would adversely limit the performance of this scope of work, then the consultant shall submit a proposal to the principal for the cost of obtaining the required DEM, after considering any existing survey information listed in section 4 (Available Information).

OR

The consultant shall provide a realistic estimate of the cost of obtaining the required DEM to support their delivery of the scope of work, after considering any existing survey information listed in section 4 (Available Information).

DEMs produced or acquired for use as part of the project should meet the requirements shown in Table 6.3.

Table 6.3: Required attributes of digital elevation models.

DEM attribute	Value
Datum—horizontal	GDA 1994 or GDA 2020
Datum—vertical	AHD
Accuracy—horizontal	
Accuracy—vertical	
Grid size	
Break lines	

6.1.4 Floor level survey

The consultant shall allow for survey of floor levels of dwellings and other buildings liable to be inundated in a flood. The allowance should take into account:

- The potential for flooding in the study area, based on background information provided
- The potential number of dwellings and buildings affected, based on density of development and proximity to major flow paths.

The consultant should indicate in their proposal the number of properties that have been allowed for ground level survey and a fixed rate per property.

Floor level survey data should be provided to the principal at the completion of the project.

***Tenderer note**: Tenderers are advised that permission from landholders will be required for any access by the consultant and any subcontractor under this consultancy for the acquisition of survey information on private property.*

6.2 Stage 2: Assessment of the Catchment

The consultant is to allow for undertaking an assessment of the current state and condition of the catchment and shall provide details of how the assessment will be undertaken. The purpose of this assessment is to develop a sound understanding of the catchment and establish a baseline against which the effectiveness of stormwater management options can be assessed.

The assessment shall consider:

- The topographic form of the catchment and key influences on its hydrology, including land-use, geology and soils
- The climate and hydrology, including interactions with groundwater or coastal waters
- Environmental values of the study area, including, where applicable, threatened and sensitive ecological communities, watercourse condition, environmental flow requirements, and marine impacts
- Social, socio-economic and cultural values of the study area
- Water supply and demand in the study area
- The stormwater network in the study area and arrangements for its management
- Development policy in the study area
- Any other identified issues(s) or influence(s).

6.2.1 Topography and land use

The consultant is to identify the major topographic features and land-use forms in the study area which influence hydrology and drainage characteristics.

The consultant shall map known and likely surface and network flow paths through the study area and identify these as either 'minor', 'major' or 'overflow' flow paths. (Major and overflow flow paths should reflect the flows likely to result from higher order events, equivalent to 1% AEP or rarer).

An initial assessment should be undertaken to identify where flow paths traverse:

- Public open space (reserves, parks etc.)
- Drainage easements or reserves
- Community infrastructure (water and energy utilities, transit hubs etc.)
- Community institutions (schools, hospitals, town hall etc.)
- Commercial centres
- Major transport routes
- Land in private ownership.

Mapped flow paths may be subject to amendment once flood modelling has been conducted, and any hydrogeological interactions have been assessed.

6.2.2 Climate and hydrology

The consultant is to describe the climate of the study area including rainfall distribution and patterns, temperature, evaporation rates, historical variations and extreme events. The consultant should assess and comment on the source, quality and relevance of climate data for the study area.

The consultant is to describe the hydrology of the study area, including any known flood events, or events of significance. The consultant should assess and comment on the source, quality and relevance of hydrological data for watercourses/drainage networks in the study area.

The consultant is to describe the hydrogeology of the study area, including a description of the underlying strata and aquifers/aquitards, and interactions between surface water and groundwater. This information should be sufficiently detailed to inform discussion on:

- The potential for using aquifers for stormwater harvesting
- The protection of key water dependent ecosystems.

The consultant is to describe interactions between surface water and coastal waters within the study area. This may include the observed and potential impact of tidal movement on low level landforms and infrastructure, and the potential implications of climate change induced sea level rise.

6.2.3 Environmental values

6.2.3.1 Water quality assessment

The consultant is to assess the availability and suitability of representative water quality data in the study area. The consultant shall prepare an overview of water quality that describes:

- The known or likely types of stormwater pollutants and their source, with load based estimates and concentrations for pollutants (where possible)
- The impact of known or likely pollutants on receiving waters, stormwater reuse and water dependent ecosystems
- The method of any analyses undertaken or assumptions applied.

6.2.3.2 Watercourse assessment

The consultant is to undertake an assessment of watercourses within the study area to determine their condition. The assessment shall consider the degree to which human or other activity has impacted on watercourse function through, for instance:

- Changes to the natural hydrological regime
- Illegal or inappropriate works within the floodplain
- Access by stock or other activities
- Removal of native vegetation
- Infestation by weeds and exotic vegetation.

The assessment should be undertaken at a scale appropriate to record lengths of common condition and should highlight:

- Issues of concern that are likely to have an impact on a considerable extent of a watercourse
- Areas of significant amenity, cultural recreational or environmental value.

Where earlier assessments have been conducted, the consultant should provide a generalised comparison of the findings, taking into account the time elapsed and activity between the assessments.

The watercourse assessment is to be provided as an annexure to the stormwater management plan.

6.2.3.3 Threatened/sensitive ecological communities and ecological threats

The consultant is to identify the known (or likely) presence of any threatened or sensitive ecological communities or ecological threats within the study area which may impact on, or be impacted by, stormwater management activities. The consultant should be informed by:

- Schedules to the *Environment Protection and Biodiversity Conservation Act 1999 (C'wth)* (for listed threatened species and ecological communities, migratory species protected under international agreements, and wetlands of international importance under the Ramsar Convention)
- Schedules to the *National Parks and Wildlife Act 1972* (for endangered, vulnerable and rare species)
- Pest plants or animals declared under the *Landscape South Australia Act 2019*
- Any specific information provided and listed in section 4 (Available Information).

6.2.3.4 Marine impact assessment

The consultant is to assess the stormwater related impacts on marine waters and coastal environs. The assessment shall take into account impacts to seawater quality and coastal, reef, and marine benthic ecological communities.

Any areas of significant amenity, cultural, recreational or environmental value are to be identified and recorded.

The marine impact assessment is to be provided as an annexure to the stormwater management plan.

6.2.3.5 Environmental flow requirements

The consultant is to identify if environmental flow requirements have been determined or designated for the watercourses in the study area, and if so, shall report on the degree to which they have been achieved to date.

If environmental flows have not been determined for the study area, the consultant is to undertake a review of any literature regarding environmental flow requirements relevant to similar catchments and make recommendations on the form of suitable environmental flows.

The consultant shall provide comment on the desirability of incorporating environmental flow controls as an integral part of the development of options for catchment management.

6.2.4 Social, socio-economic and cultural values

The consultant is to identify the key social, socio economic and cultural values in the study area and indicate the extent to which they are vulnerable to the impacts of flooding, variations in water quality, erosion or works in the catchment. The consultant shall prepare an overview of the key social, socio-economic and cultural values that includes (but is not necessarily limited to) a description of:

- Major industries in the study area
- Major institutions in the study area
- Critical infrastructure in the study area
- Tourist, trade and social facilities and routes in the study area
- Cultural heritage areas or places in the study area.

6.2.5 Water demand and supply

For the study area the consultant is to identify current water demands, supply capacity, and trends in both. The consultant shall obtain these figures from published data for the study area, or provide estimates based on a similar catchment and/or published average statistics.

The consultant shall tabulate the amount of water currently supplied by each source separately (e.g. separate figures for groundwater, treated wastewater and treated stormwater).

If there is a Water Allocation Plan (WAP) in place or under development for the study area or part thereof, the consultant shall provide a summary of the WAP and its implications (if any) for stormwater capture and reuse.

6.2.6 Stormwater network and asset management

The consultant is to provide a general description of the stormwater network in the study area, including the approximate or estimated age and sequence of its development, the type of infrastructure, and its condition (based on a combination of visual inspection and review of asset data, if available).

The consultant shall review and assess the principal's asset management plans, policies and practices to identify whether suitable arrangements are in place for:

- An appropriate frequency and scope of maintenance activities
- Allocating budgets for operation and maintenance (Opex) and capital investment (Capex)
- Prioritising capital investment
- Asset data capture, storage and maintenance
- Handling incidents and complaints and reporting and responding to issues.

6.2.7 Development policy

The consultant is to review the principal's development plans, policies and compliance regime and shall identify whether suitable provisions are in place to:

- Limit risk of flooding to new development
- Prevent adverse impacts on water quality
- Prevent damage to or loss of marine and freshwater ecosystems
- Reduce demand on mains water and reuse stormwater.

The review should consider the current conditions as well as the ultimate development scenario for the study area.

6.2.8 Climate change

The consultant is to review climate change predictions for the study area. The consultant shall provide an outline of how climate change, in conjunction with foreseeable land use and development, may impact on the study area as a result of potential:

- Changes in rainfall intensity
- Changes in rainfall seasonality and temporal patterns
- Changes in average annual rainfall
- Changes in average temperatures
- Changes in average soil moisture
- Other impacts.

6.2.9 Other influences or issues

The consultant is to identify and document any other influences or issues not specifically identified above. For any influence or issue thus identified, the consultant shall provide details of its implications for stormwater management and details of any modelling, analysis, survey, investigation or assumptions used to support their observations.

6.3 Stage 3: Modelling and Analysis to Identify Stormwater Risks and Issues

The consultant shall apply one or more software models to assess the drainage performance of the stormwater network, the carriage of pollutant loads, and to define flood behaviour in the study areas, so as to achieve the outcomes of the project and produce the deliverables specified in section 11 (Deliverables).

General requirements for modelling are specified in section 7 (Requirements for Modelling).

All models shall be calibrated and validated prior to being used to assess drainage performance of the stormwater network, the carriage of pollutant loads, or to define flood behaviour. The consultant shall review the available data listed in section 4 (Available Information) and provide guidance on the possibility of undertaking a reasonable calibration and validation process.

OR

Due to a lack of calibration data for the study area, a comprehensive calibration and validation of models is unlikely to be possible. Prior to models being used to assess drainage performance of the stormwater network, the carriage of pollutant loads, or to define flood behaviour, the consultant should advise the principal how the selection of model parameters will be undertaken to achieve a reasonable accuracy in the model results.

Tenderer note: *In accordance with section 11 (Deliverables), it is expected that the consultant shall hand over all model input files, configuration files, parameter files and output files at the completion of the project. The principal shall be free to use the model(s) at their sole discretion for further studies and investigations.*

6.3.1 Drainage performance

The consultant shall model and simulate the drainage performance of the stormwater network over the full range of events and scenarios defined in Table 6.4. The consultant shall assess the modelled drainage performance of the drainage network against relevant infrastructure service standards and technical design standards listed in Table 4.3 and provide a discussion and tabulation of any identified deficiencies, including (but not limited to):

- Incidences of over floor flooding
- Incidences of high or extreme flood hazard
- Excessive gutter flow depths or flow widths.

6.3.1.1 Flood impacts

The consultant shall identify the impacts of flood events within the study areas including (but not limited to):

- Threats to life and property
- Over floor flooding of dwellings and other buildings
- Closure of main and local roads and other transport services
- Damage to critical infrastructure (telecommunications, energy, water, wastewater etc.)
- Damage to sites of environmental significance
- Damage to sites of cultural significance.

6.3.1.2 Flood damages

The consultant shall provide flood damage estimates over the full range of flood events and scenarios defined in Table 6.4 that are itemised by:

- The number of properties affected
- The type of properties affected
- The total, tangible cost of damage
- The average annual cost of damage
- An estimate of the intangible cost of damage.

Flood damages should be determined on a sub-catchment basis consistent with the same sub-catchments used for hydrologic and water quality analysis.

Flood damages are to be estimated in accordance with [method].

OR

The consultant shall propose a method for the estimation of flood damages.

Tenderer note: *It is anticipated that any model(s) developed to assess drainage performance will also be used at stage 6 to assess and demonstrate proposed management responses.*

6.3.2 Water quality performance

The consultant shall model and simulate the water quality performance of the stormwater network over a representative period of time. The consultant shall consider the range of analytes/parameters and scenarios shown in Table 6.4: Drainage performance modelling scenarios and outputs.

Scenario ID	Event	Condition(s)						Output(s)				Comment
		Ultimate development	Post mitigation	Dam/levee break	Storm surge	Climate change	Sea level rise	Extent	Depth	Velocity	Hazard (VxD)	
1a	18% AEP							✓	✓	✓	✓	Current conditions
1b	18% AEP	✓				✓		✓	✓	✓	✓	
1c	18% AEP	✓	✓			✓		✓	✓	✓	✓	
2a	2% AEP							✓	✓	✓	✓	Current conditions
2b	2% AEP	✓				✓		✓	✓	✓	✓	
2c	2% AEP	✓	✓			✓		✓	✓	✓	✓	
3a	1% AEP							✓	✓	✓	✓	Current conditions
3b	1% AEP	✓				✓		✓	✓	✓	✓	
3c	1% AEP	✓	✓			✓		✓	✓	✓	✓	
4a	0.2% AEP							✓	✓	✓	✓	Current conditions
4b	0.2% AEP	✓				✓		✓	✓	✓	✓	
4c	0.2% AEP	✓	✓			✓		✓	✓	✓	✓	

Table 6.5 for each identified sub-catchment and for the total catchment or study area overall.

The consultant shall assess the water quality performance of the stormwater network against the principal's relevant plans and policies (Table 4.2) and service standards and design standards (Table 4.3); state and national guidelines (Table 5.2); and local guidelines (Table 5.3).

Tenderer note: *It is anticipated that any model(s) developed to assess water quality will also be used at stage 6 to assess and demonstrate proposed management responses.*

Table 6.4: Drainage performance modelling scenarios and outputs.

Scenario ID	Event	Condition(s)						Output(s)				Comment
		Ultimate development	Post mitigation	Dam/levee break	Storm surge	Climate change	Sea level rise	Extent	Depth	Velocity	Hazard (VxD)	
1a	18% AEP							✓	✓	✓	✓	Current conditions
1b	18% AEP	✓				✓		✓	✓	✓	✓	
1c	18% AEP	✓	✓			✓		✓	✓	✓	✓	
2a	2% AEP							✓	✓	✓	✓	Current conditions
2b	2% AEP	✓				✓		✓	✓	✓	✓	
2c	2% AEP	✓	✓			✓		✓	✓	✓	✓	
3a	1% AEP							✓	✓	✓	✓	Current conditions
3b	1% AEP	✓				✓		✓	✓	✓	✓	
3c	1% AEP	✓	✓			✓		✓	✓	✓	✓	
4a	0.2% AEP							✓	✓	✓	✓	Current conditions
4b	0.2% AEP	✓				✓		✓	✓	✓	✓	
4c	0.2% AEP	✓	✓			✓		✓	✓	✓	✓	

Table 6.5: Water quality performance modelling scenarios and outputs.

Analyte/Parameter	Output	Conditions		
		Base case (current conditions)	Ultimate development (untreated)	Ultimate development (treated)
Discharge	Annual total	✓	✓	✓
Gross pollutants	Annual load	✓	✓	✓
Total Nitrogen (TN)	P_{50} concentration	✓	✓	✓
	P_{90} concentration	✓	✓	✓
	Annual load	✓	✓	✓
Total Phosphorous (TP)	P_{50} concentration	✓	✓	✓
	P_{90} concentration	✓	✓	✓
	Annual load	✓	✓	✓
Total Suspended Solids (TSS)	P_{50} concentration	✓	✓	✓
	P_{90} concentration	✓	✓	✓
	Annual load	✓	✓	✓

6.3.3 Modelling report

The consultant shall provide a comprehensive report regarding the establishment and conduct of modelling. This report shall include:

- Justification for the selected software models and their choice of configuration (if any)
- Justification for the selection of model parameters
- Description of the modelling methodology and any assumptions made
- Description of the means and results of model calibration(s)
- Discussion of any limitation of the model(s).

6.3.4 Risk assessment

The consultant shall complete a risk assessment in accordance with [the principals risk management framework (referenced in Table 4.2)] **OR** [other risk management framework (referenced in Table 5.3)]. The risk assessment shall consider risks to health, safety and wellbeing, strategic risks, operational risks, legal and regulatory risks, and reputational and political risks.

The risk assessment shall identify both existing risks (based on current conditions) and future risks without intervention (based on reasonably foreseeable development and climate change). Factors to be considered in the risk assessment are (but shall not be limited to):

- The nature and impact of flooding within the study area on people, properties, infrastructure and the environment
- Potential economic loss associated with flooding
- The potential for future development to exacerbate flood impacts

- Stormwater quality within streams and receiving waters, and ecological impacts of stormwater flows, flow rates, and volumes.

The risk assessment shall be undertaken on the basis of the information obtained through the project up until this point and, where necessary, reasonable and credible assumptions which are to be clearly documented. The identified risks are to be clearly articulated in a table which outlines the relative levels of risk.

The risk assessment shall form the basis for consultation with the principal and the general community regarding the setting of objectives for stormwater management in the study area.

6.4 Stage 4 'State of the Catchment' Report

The consultant is to prepare a 'State of the Catchment' report. The State of the Catchment report shall collate information from each of the preceding stages of the project into a comprehensive report that shall include:

- An executive summary
- A summary of the data collation and review undertaken as part of stage 1
- The description of the study prepared as part of stage 2, including its topography and land use; climate and hydrology; environmental values; social, socio-economic and cultural values; water demand and supply sources; stormwater network; development policy; likely impacts of climate change and any other identified influences
- A summary of the modelling and analyses undertake as part of stage 3, and a discussion of the identified drainage performance deficiencies and water quality performance deficiencies
- A tabulation of the risks and issues identified as part of stage 3, and a discussion on the relative importance of and priority of addressing those risks and issues.

Tenderer note: *It is expected that the report will make use of appropriate visual aids and use of full colour maps, tables and graphs for delineation of the various categories of risk, grades, performance etc.*

6.5 Stage 5: Stormwater Management Objectives and Targets

The development of a catchment-based stormwater management plan requires the identification of specific and measurable objectives and targets that are relevant to the local context. The objectives and targets should reflect the risks identified and community values and should collectively outline the desired end state for the catchment upon implementation of the plan.

The consultant, through consultation with appropriate stakeholders, shall develop the objectives and targets for the stormwater management plan. The objectives should take into account the social, economic and environmental values of the catchment, while the targets should be quantifiable and measurable, with a view to monitoring progress towards implementation of the stormwater management plan.

In consultation with the principal and relevant stakeholders, the consultant shall identify which targets are 'absolute' and which are 'aspirational':

- An 'absolute' target is one which can and must be achieved to retain the integrity of the stormwater management plan
- An 'aspirational' target is one that may be challenging to achieve, but where it is recognised that an incremental step towards its achievement still provides value.

The identified objectives and targets, and discussion on the process used to develop them, will form a part of the final stormwater management plan.

The SMP Guidelines include a model set of objectives and targets for a stormwater management plan. These model objectives may be used or adapted as necessary.

Tenderer note: *The model objectives represent a starting point for developing catchment specific objectives and targets. The model objectives may be suitable for this project, but should not be adopted simply out of convenience, nor omitted or modified without careful consideration of the appropriateness of doing so for this project.*

6.6 Stage 6: Stormwater Management Responses

Drawing on the previous State of the Catchment report (stage 4) and the aspirations of the principal and the community reflected in the chosen stormwater management objectives and targets (stage 5), the consultant shall devise a range of potential management responses which contribute to achievement of the objectives, capitalise on opportunities, and mitigate identified risks and issues.

Management responses may comprise a combination of works, measures, policy development or implementation, further investigations or other initiatives, and should be developed to a conceptual level. Where appropriate, responses may be combined into groups of responses which work together.

It is envisaged that this aspect of the scope of works will be achieved through a workshop style approach, and it is expected that management responses will:

- Comprise both opportunistic implementation and targeted works and measures
- Range from simple, practical and readily implementable, through to complex
- Include both "absolute" and "aspirational" approaches
- Include both structural and non-structural options
- Be implementable by any of the stakeholders (taking into account the limitations on their capacity to implement) – the recommended implementation agent is to be specified
- Where possible, be scalable—i.e. able to be sized up or sized down with varying degrees of, for example, capital investment or land required.

For all of the management responses (or combinations thereof), the consultant is to establish:

- The approximate form, size and extent of the response. Where works are proposed, appropriate, maps, plans and diagrams should demonstrate the physical extent, and impact of the works.
- A reasonable and credible estimate of the cost of implementing the response. Where works are proposed, costs should be estimated on the basis of industry standard rates or objective comparison with similar works. Where land acquisition is required, the cost of land acquisition should be estimated on the basis of commercial rates.
- A generalised assessment of the performance of the response
- A reasonable and credible estimate of the benefit provided by the response, quantified where possible.

6.6.1 Risk reduction assessment

The consultant shall revise the risk assessment in accordance with [the principals risk management framework (referenced in Table 4.2)] **OR** [other risk management framework (referenced in Table 5.3)] to demonstrate the efficacy of each management response (or combination of responses) at mitigating risk.

For each of the identified management responses (or combination of responses) the consultant shall revise the risk assessment assuming that the management response is implemented, to show both the reduction in risk that the response (or combination of responses) achieves, and the residual risk remaining.

6.6.2 Social and political capital requirements

For each management response (or combination of responses), the consultant shall assess the level of 'social and political capital' required for its implementation. Options which are expensive, require land acquisition, or require significant behavioural change are potentially the most difficult to implement. This assessment should therefore reflect the 'degree of difficulty' in implementing the given management response, based on current policy provisions and stakeholder

sentiment, and may be made broadly and qualitatively in the form of a 'high', 'medium' or 'low' ranking with appropriate justification provided for each ranking.

6.6.3 Presentation of options

The consultant shall provide a table that identifies, for each management response (or combination of responses):

- The objective(s) or target(s) to which it contributes
- The risk(s) or issue(s) which it mitigates
- Whether the response is structural or non-structural
- The type of action (e.g. works, land acquisition, investigation, policy change, integrated program)
- The type of benefit provided (e.g. flood mitigation, drainage service, stormwater reuse, information and knowledge, water quality improvement, ecological improvement, amenity improvement, administrative efficiency)
- The estimated costs of the management response (capital and operating)
- The benefit achieved by that management response
- The level of social or political capital that may be required to implement the management response
- The stakeholder responsible for funding/ implementing the management response
- The resultant residual risk(s) after the management response is implemented.

Tenderer note: *It is expected that appropriate visual aids and use full colour maps, tables and graphs will be used to present and communicate the stormwater management responses.*

For the purpose of engagement with the steering committee and other stakeholders, the table (or tables) should be presented in a locked, but filterable spreadsheet.

The identified management responses, and discussion on the process used to develop them will form a part of the final stormwater management plan.

6.7 Stage 7: Preferred Management Responses

The consultant [, in conjunction with the steering committee,] is to select a subset of preferred management responses from the set of responses identified in stage 6, which closely aligns with and could reasonably be expected to achieve the objectives and targets established in stage 5.

The selection of the subset of management responses should consider the:

- Likelihood for success based on social and political capital required
- Severity of risk addressed and level of residual risk achieved
- Capacity of the stakeholders to achieve the outcome required
- Economic value, in terms of cost versus benefit
- Potential for staging, or future upgrade.

6.7.1 Modelling and analysis to refine management responses

The consultant is to complete any necessary further investigations, modelling, site visits and calculations as required to ensure realistic estimates have been made regarding the performance, cost, and likelihood of success of the preferred management responses. A level of detail should be provided that demonstrates that the management response will achieve the nominated risk reduction and that permits further planning and development of the response.

The extent of modelling and investigation or work required to provide enough information for the development of preferred management response will vary according to the type of response. For example:

- Trunk drainage upgrades will require sufficient hydraulic analysis and design to justify approximate pipe/culvert sizes and demonstrate reduction in flood extents

- Wetlands or other water quality works will require sufficient design to determine hydraulic and water quality performance and extents and general details of the form
- Planning policy changes will require consideration of the number of properties the policy will achieve change for, the timing of the change, and the estimated cost to developers and community benefits to be gained.

Tenderer note: *The consultant must make sufficient provision in their proposal to adequately investigate a range of management responses.*

6.7.2 Implementation plan

The consultant is to develop an implementation plan for the preferred management responses, which identifies, for each response:

- Where further technical investigations are required to more accurately determine the scope and feasibility of the management response
- Where land acquisition is required
- Where planning or policy changes are required
- Where special approvals or licences are required to implement the management response
- A suggested timeframe for implementation of the management response (based on: immediate, 0-2 years, 2-5 years, 5-10 years, and more than 10 years).
- Who should be responsible for implementing the management response
- The capability and capacity of the responsible party to implement management response, and any support mechanisms which may assist
- Potential funding sources for the implementing the management response (including the SMA, Green Adelaide, landscape boards, and other state and Commonwealth programs).

The consultant shall propose arrangements for monitoring and reporting the progress of implementation of management responses, including, but not limited to:

- Reporting progress to stakeholders (including the community)
- Ongoing survey, sampling and analysis work
- Review of community sentiment/support for implementation, via regular surveys.

The implementation plan shall form part of the final stormwater management plan.

6.8 Stage 8: Stormwater Management Plan

The consultant is to prepare the stormwater management plan. The stormwater management plan shall be a standalone document which captures the entire body of work conducted, and shall include:

- An executive summary
- A description of the catchment, summary of the state of the catchment, and description of the risks and opportunities identified for the catchment in stage 4
- A discussion on, and description of, the objectives and targets set for the catchment in stage 5
- A description of the investment strategy identified in stages 5 to 6 and the rationale for the preferred management responses, including the outcome of community and stakeholder engagement
- The implementation plan identified in stage 7, including cost estimates
- A discussion of the issues and risks that are adequately addressed by the preferred management responses
- A discussion of the issues and risks that are not addressed by the preferred management responses
- A discussion on the degree to which the plan meets the requirements of all stakeholders
- Clear references to any supporting reports, models, maps, tables and figures.

Where noted, standalone reports prepared or obtained in the course of the project are to be provided as complete appendices to the stormwater management plan.

Tenderer note: *It is expected that appropriate visual aids and use full colour maps, tables and graphs etc. will be used throughout the stormwater management plan.*

6.8.1 Peer review

The consultant is to make allowance for and arrange for an appropriate and comprehensive peer review of the work including water quality, hydrologic and hydraulic modelling, risk management and other analysis methodologies, and study report(s).

The peer review is to be documented and provided as an annexure to the stormwater management plan and is to identify the method adopted, the persons undertaking the review, their relevant qualifications and experience, and their relationship to the consultant.

7 Requirements for Modelling

7.1 Hydrologic Modelling

The purpose of a hydrologic model is to account for the flows entering the study area either as rainfall, point inflows, or from an oceanic boundary.

Selection and/or development of a hydrologic model and its parameters is to be in accordance with the requirements of ARR 2019, SMA Circular 3: Flood Modelling, and relevant references listed in section 5 (Definitions, Guidelines and References).

7.2 Hydraulic Modelling

The purpose of a hydraulic model is to simulate the behaviour of network drainage and/or movement of flood waters through the study area. The model must be of a resolution able to resolve the influence of natural and made-made features on flood behaviour.

A [one-dimensional model **OR** two-dimensional model **OR** a combination of both a one-dimensional and a two-dimensional model] may be used.

The modelling approach should consider the impact of structures such as outbuildings and fences that have an impact on flow paths locally, but that may be physically moved or removed during a flood event. Similar consideration should be given where watercourses traverse highly erosive zones and a flood event can result in significant changes to watercourse alignment.

Selection and/or development of a hydraulic model and its parameters is to be in accordance with the requirements of ARR 2019, SMA Circular 3: Flood Modelling, and relevant references listed in section 5 (Definitions, Guidelines and References).

7.3 Water Quality Modelling

The purpose of a water quality model is both to determine the stormwater pollutant loads generated by the catchment, and to simulate the relative or absolute reduction in pollutant loads as a result of treatment interventions.

The identification of sub-catchments within the water quality model should be the same as the identification of sub-catchments in the hydrological model.

The Model for Urban Stormwater Improvement Conceptualisation (MUSIC), published by eWater Ltd, shall be used to model the water quality performance of the catchment. MUSIC shall be configured and parameterised in accordance with the MUSIC water quality modelling guidelines, issued by Water Sensitive SA, and relevant references listed in section 5 (Definitions, Guidelines and References).

OR

If a water quality model (other than MUSIC) is proposed by the principal or the consultant, then details of the model, the parameters used, the model inputs and the model outputs shall be submitted for inclusion in the peer review in accordance with section 6.8.1.

7.4 Modelled Scenarios

Each modelling scenario shall be described as a hydrological event with none or more conditions imposed. The following event descriptors shall be used:

- The event with a particular probability of occurring (e.g. '1% AEP')
- The event that results from a given flow (e.g. '10 000 Ml/d')
- The event that reproduces some historic flood event (e.g. '1992 flood')
- The event that relates to some specific threshold (e.g. probable maximum flood (PMF), dam crest flood (DCF), imminent failure flood (IFF) or sunny day failure (SDF) flood).

The following condition descriptors shall be used:

- Ultimate development (as distinct from existing development)
- Post-mitigation (i.e. with management responses in place)
- Dam break
- Levee failure
- Storm surge
- Climate change
- Sea level rise.

Conditions may be combined together.

7.5 Model Calibration and Validation

All models are to be calibrated and validated in accordance with the requirements of ARR 2019, SMA Circular 3: Flood Modelling, and relevant references listed in section 5 (Definitions, Guidelines and References).

Sensitivity analyses shall be carried out in accordance with the requirements of ARR 2019, SMA Circular 3: Flood Modelling, and relevant references listed in section 5 (Definitions, Guidelines and References).

The details of calibration, validation and sensitivity analysis shall be included in the modelling report produced in accordance with section 6.3.3.

8 Requirements for Consultation and Engagement

Stakeholder engagement is an important aspect in developing a stormwater management plan. Key stakeholders are listed in Table 8.1, and include the end users previously identified in Table 2.1. Additional stakeholder may also be identified during the project.

The goals of stakeholder engagement are to:

- Inform stakeholders about the project
- Identify stakeholder concerns
- Gather information from the community by participation
- Seek input from the community on stormwater management options
- Develop and maintain community confidence in the final stormwater management plan.

The consultant is to demonstrate how they will engage with identified and potential stakeholders using, at a minimum, the tools identified in Table 8.2 [and in accordance with the principal's community engagement policy/procedure referenced in Table 4.2].

Consultation and engagement are integral to delivery of the scope of works. The consultation and engagement activities and outcomes must be documented and will form a key section in the final stormwater management plan.

Table 8.1: Key stakeholders.

Stakeholder group	Engagement aim
General community	
Specific community groups (identify)	
Indigenous community representatives	
Technical staff at council	
Maintenance staff at council	
Council/elected members	
Landscape board/Green Adelaide	
Stormwater Management Authority	
Planning officers at council	
Other state agencies with interest/responsibility (specify)	
Emergency management representatives—State Emergency Service, Country Fire Service, council	
Others (define)	

Table 8.2: Stakeholder engagement points and tools.

Engagement process	Engagement tools	Engagement aim
[e.g. project inception]	[e.g. newsletter, media release]	[e.g. inform community]
[e.g. setting stormwater management objectives and targets]	[e.g. stakeholder workshop], briefings, emails	[e.g. refine goals and objectives for the catchment]

9 Requirements for Reports

Technical reports required as part of this project are to be provided initially in draft form to permit review by the principal. The principal may make comment on the order, content, and presentation of the reports during the draft review. Wherever necessary, the consultant should provide details of background investigations, modelling etc. used to inform the reports.

Tenderer note: *The consultant should allow two weeks for review of draft technical reports by the principal.*

Where appropriate, work on concurrent tasks can continue pending review and approval of the draft reports submitted.

Tenderer note: *Specialist reports prepared as part of the development of the plan may be provided in full as appendices to the stormwater management plan.*

10 Meetings

Meetings are to be held regularly throughout the duration of the project. Meetings will be attended by [principal's representatives etc…].

Meetings will generally take place at the project inception and when progress milestones are reached. The number of meetings, their purpose, their location and the expectations of the consultant are shown in Table 10.1.

Table 10.1: Project meeting requirements.

Meeting type/purpose	Number required	Frequency	Location	Expectation of consultant
[e.g. Inception meeting with Principal representatives]			[e.g. Principal/consultant offices]	[Finalising conditions of commission, handover of data, etc.]
[e.g. Principal's project technical committee and steering committee]			[e.g. Principal/consultant offices]	[Reporting and presenting to technical committee, receiving and discussing feedback, clarifying technical matters, etc.]

11 Deliverables

Deliverables will comprise both 'project management outputs' and 'project outputs' as identified in Table 8.2. Deliverables are to be provided to the principal in the format(s) specified in Table 8.2 and in accordance with the milestones of the project outlined in section 11 (Deliverables).

Tenderer note: *The deliverables required under this contract are to be prepared under a Creative Commons licence, and the consultant, and any subcontractor engaged under this consultancy will be required to agree to provisions relating to intellectual property and use by the principal, and government, under the Creative Commons agreement.*

Table 11.1: Deliverables.

Deliverable type	Deliverable item	Requirement(s)
Project management deliverables		
Report	Progress reports	email
[Others]	[Others]	
Project deliverables		
Data	Ground survey	
	LiDAR	
	Aerial imagery	
	Digital elevation model	
	Hydrologic data	
	Flood data	
	Floor level survey	
	[Others]	
Reports	Modelling report	Adobe portable document format (*.pdf)
	State of the catchment report	Adobe portable document format (*.pdf)
	Watercourse assessment report	Adobe portable document format (*.pdf)
	Marine assessment report	Adobe portable document format (*.pdf)
	Risk table	Microsoft Excel (*.xlsx),
	Stormwater management responses	Microsoft Excel (*.xlsx), Adobe portable document format (*.pdf), ESRI ArcMap compatible format
	Draft SMP	Adobe portable document format (*.pdf)
	Peer review report	Adobe portable document format (*.pdf)
	Final SMP	Adobe portable document format (*.pdf) Individual maps and figures to be provided as separate files
	[Others]	
Model files	Model input	
	Model output (raw)	
	Model output (processed)	
	[Others]	
Mapping	Flood extent	
	Flood depth	
	Flood hazard	

Deliverable type	Deliverable item	Requirement(s)
[Others]	[Others]	

12 Timing and Hold Points

The end of each stage represents a milestone and a hold point. The project will also include hold points where a principal review period should be allowed for. The consultant is not to commence works on any new stage beyond a hold point without written approval of acceptance of the previous stage from the principal's representative. Acceptance of the final report and handover of all relevant materials will mark the completion of the project. Key project stages for reporting and managing progress payments are shown in Table 12.1.

Table 12.1: Project timing and hold points.

Stage	Hold point		Deliverable due or action required
1	1–1	On identification of additional data requirements	Proposal for additional data collection or use 'as is'
	1–2	On completion of additional data collection	Data files
	1–3	On identification of DEM requirement	Proposal for DEM development
	1–4	On completion of DEM development	DEM files
	1–5	On completion of stage 1	
2	2–1	On completion of stage 2	
3	3–1	At point of model calibration and validation	Advice on calibration
	3–2	On completion of (stage 3) modelling and analysis	Modelling report
	3–3	On completion of (stage 3) risk assessment	Risk table
	3–4	On completion of stage 3	
4	4–1	On completion of stage 4	State of the catchment report
5	5–1	On completion of stage 5	
6	6–1	On completion of stage 6	Table of options for stormwater management responses
7	7–1	On completion of stage 7	Table of preferred stormwater management responses Proposed implementation plan
8	8–1	On completion of draft SMP	Draft SMP
	8–2	On completion of peer review	Peer review report
	8–3	On completion of stage 8	Final SMP, all model files and all map files