

Documents checked for relevance to levees as background research for:

Wenger, C., 2015, "Building walls around flood problems: the place of levees in Australian flood management", *Australian Journal of Water Resources*, Vol. 19 No. 1.

This document consists of notes on policies and legislation that were studied as background research into provisions relating to levees. Documents surveyed include: legislation, regulations, guidelines, policies, strategies, programs and assessment / approval documents from Victoria, New South Wales and Queensland. A small number of Commonwealth documents were also checked, especially those cross-referenced by State documents. The survey did not include State flood review and inquiry reports (post 2010-11) or Commonwealth disaster resilience provisions. These were analysed separately and where relevant are cited in the journal article.

Some documents are specific to levees. However others are less directly linked. For example, many concern flood-related planning legislation (as strong planning controls may prevent the future need for levees). Provisions relating to 'levee-like structures', where flood mitigation is not the primary purpose, also required a broader search. To restrict scope, provisions checked were generally limited to embanked channels for irrigation delivery, storage and drainage. Transport infrastructure was not specifically investigated. However, neither was it deliberately excluded.

The document can be navigated using the hyperlinks in the contents table and in the text. A list of acronyms is at the end of the document. Tables that synthesize the results of this document review can be found on the [Bushfire and Natural Hazards CRC website](#).

#	Document	Version
	VICTORIA	
1	Water Act 1989	1 July 2014
2	'Floodplain Management' DEPI website: http://www.depi.vic.gov.au/water/Floods-and-floodplains/floodplain-management	[accessed Dec 2014]
3	Victorian Environmental Water Holder (VEWH) http://www.vewh.vic.gov.au/about-us	[accessed 5 Feb 2015]
4	Catchment and Land Protection Act 1994	1 Oct 2014
5	Environment Protection Act 1970	13 Nov 2014
6	Environment Protection (Resource Efficiency) Act 2002	18 June 2002
7	State Environment Protection Policy (Waters of Victoria)	4 June 2003
8	State Environment Protection Policy (Groundwaters of Victoria)	1997
9	Variation of state environment protection policy (Groundwaters of Victoria)	2002
10	Environmental Effects Act 1978	4 May 2012
11	Ministerial guidelines for assessment of environmental effects under the Environmental Effects Act 1978	June 2006
12	Aboriginal Heritage Act 2006	1 Jul 2014
13	Aboriginal Heritage Regulations 2007	13 Feb 2013
14	Practice Note 45: The Aboriginal Heritage Act 2006 and the planning permit process	Oct 2013
15	Heritage Rivers Act 1992	17 May 2012
16	Heritage Act 1995	1 July 2014
17	Wildlife Act 1975	17 Sept 2014
18	Flora and Fauna Guarantee Act 1988	1 Dec 2013
19	Victoria's Biodiversity: Directions in Management	1997
20	DEPI Flora and Fauna Guarantee Act 1988 Threatened List	Oct 2014
21	DSE Flora and Fauna Guarantee Act 1988 Processes List	July 2012
22	National Parks Act 1975	1 Sept 2014
23	Forests Act 1958	1 July 2014
24	Conservation, Forests and Lands Act 1987	1 July 2014
25	Project Development and Construction Management Act 1994	1 July 2014
26	Building Act 1993	15 Oct 2014
27	Building Regulations 2006	10 Feb 2015

28	Levee design, construction and maintenance technical guidelines	2002
29	Regional Directions for Irrigation Development: Regional Irrigation Development Guidelines Northern Victoria	July 2007
30	North Central Regional Irrigation Development Guidelines	June 2008
31	Goulburn-Murray Water Application for a Licence to Take and Use Surface Water and Operate Works (Unregulated)	nd
32	North Central catchment management authority: application for a permit to construct and operate works on a waterway	nd
33	Application for a Water-Use Licence or Water-Use Registration: Form 23	nd
34	Policy for managing take and use licences	2 Feb 2014
35	Improved flood protection for Kerang community (Media Release: Minister Peter Walsh) http://www.peterwalsh.org.au/_blog/Media_Releases/post/improved-flood-protection-for-kerang-community/ (accessed 26.2.2015)	Apr 24, 2014
36	Walsh opens upgraded Kerang levee (ABC News) http://www.abc.net.au/news/2014-04-25/walsh-opens-upgraded-kerang-levee/5411368 (accessed 26.6.2015)	25 Apr 2014
37	Announced Local Government Infrastructure Program Grants (2011- current) http://www.rdv.vic.gov.au/about-us/announced-funding/lqip (accessed 26.2.15)	1 Dec 2014
38	'Town levee works' in The Northern Times (reporter: Farrah Plummer) http://www.thenortherntimes.com.au/story/217373/town-levee-works/ (accessed 13/10/2014)	Apr 23, 2012
39	Post-flood interview with a Gannawarra Shire official [unpublished extract]	2012
40	2012 Flood Recovery Community Infrastructure Fund	Feb 2011
41	Floods Community Recovery Fund Funding Guideline for Community Organisations and Local Councils	Feb 2011
42	Reducing flood impacts for Victoria (media release: Minister Walsh) http://vic.liberal.org.au/News/MediaReleases.aspx?id=7131&title=Reducing%20flood%20impacts%20for%20Victoria (accessed 22 Nov 2013)	17 Oct 2013
43	Natural disaster resilience grants scheme – Victoria: applicant guidelines 2014-15	Aug 2014
44	Natural disaster resilience grants scheme – Victoria: application form 2014-15	Aug 2014
45	Emergency Risks in Victoria	Feb 2014
46	Rapid Appraisal Method (RAM) for Floodplain Management	May 2000
47	Climate Change Act 2010	8 Mar 2013
48	Climate Change Adaptation Plan	Mar 2013
49	Building a climate resilient Victoria: Victorian Climate Change Adaptation Plan progress report	2014
50	Victoria Flood Database update specification	Mar 2009
51	Gauntlett, I and Cawood, M. 2000. The Victorian Flood Data Transfer Project. Paper presented to the 40 th Annual Conference of the Floodplain Managers Association	2000
52	Victorian Government's Response to the Environment and Natural Resources Committee Inquiry into Flood Mitigation Infrastructure in Victoria	Oct 2013
53	Victorian Emergency Management Reform White paper	Dec 2012
54	Draft Victorian Floodplain Management Strategy (VFMS)	2014
55	Victorian Waterway Management Strategy (VWMS)	Sept 2013
56	Land Acquisition and Compensation Act 1986	10 Nov 2014
57	Crown Land (Reserves) Act 1978	22 Sept 2014
58	Land Act 1958	22 Sept 2014
59	Riparian management Licences: recognising that Crown land water frontages are being managed to protect the riparian environment	2014
60	Crown land water frontage licences	2014
61	Managing Crown water frontages: for better farms and waterways	2014
62	Local Government Act 1989	15 Oct 2014
63	Planning and Environment Act 1987	10 Sept 2014
64	Victoria Planning Provisions User Guide	19 Sept 2014
65	State Planning Policy Framework (SPPF) Floodplain management policy	20.09.2010
66	Climate change impacts: coastal inundation and erosion	04.07.2012
67	Catchment planning and management	20.09.2010
68	Water quality	20.09.2010
69	Local Planning Policy Framework (LPP) Rural Living Zone	05.09.2013
70	Green Wedge Zone	(all)
71	Green Wedge Zone A	
72	Rural Conservation Zone	
73	Farming Zone	

74	Rural Activity Zone	
75	Local Planning Policy Framework (LPP)	8.8.2010
76	Urban Floodway Zone	15.09.2008
77	Floodway Overlay	15.09.2008
78	Land subject to inundation overlay	15.09.2008
79	Special Building overlay	15.09.2008
79	General provisions	22.08.2014
80	Practice Note 12: Applying the flood provisions in planning schemes: a guide for councils	Nov 2012
81	Gannawarra Planning Scheme	19 Sept 2014
82	Gannawarra Planning Scheme – local provision: Rural Floodway Overlay Map No. 15RFO	03.10.2009
83	Gannawarra Planning Scheme – local provision: Land Subject to Inundation Overlay Map No. 15LSIO	03.10.2009
84	Planning application information checklist for Rural earthworks	1 Mar 2004
85	SPPF: Regional Planning Strategies and Principles Strategic Plans	30.05.2014
86	Gippsland Regional Growth Plan	May 2014
87	Loddon Mallee North Regional Growth Plan	May 2014
88	Gippsland Regional Strategic Plan	2010
89	Loddon Mallee Regional Strategic Plan Northern Region	2010
90	North Central Catchment Management Authority submission on the Draft Victorian Floodplain Management Strategy. Ref: NCCMA-63-37251	11 Aug 2014
[91]	[North Central Regional Floodplain Management Strategy]	[Out of date: not available]
92	North Central CMA Media Release: Draft Castlemaine, Campbells Creek and Chewton Flood Plan	Feb 2015
93	2013-19 North Central Regional Catchment Management Strategy	2013
94	2014-2022 North Central Waterway Strategy	2014

#	Document	Version
	NEW SOUTH WALES	
95	Water Act 1912	1 Jan 2014
96	Water Management Act 2000	4 July 2014
97	Water Management (General) Regulation 2011	25 July 2014
98	Application for approval for water supply works, and/or water use	Sept 2010
99	Application for Approval of a Controlled Work	Sept 2010
100	Application for a Surface Water Licence	Sept 2010
101	Application for a Surface Water Permit	Sept 2010
102	Application for a Groundwater Licence	Sept 2010
103	Application for an Authority for a Joint Water Supply Scheme	Sept 2010
104	Application for a Controlled Activity Approval for works on waterfront land	Sept 2012
105	Proposed changes to controlled works issued under part 8 of the <i>Water Act 1912</i> - Frequently asked questions	Sept 2014
106	Floodplain Development Manual: the management of flood liable land	2005
107	Whites Creek Floodplain Risk Management Study and Plan	7 Dec 2012
108	Wingecarribee Shire Council Wingecarribee River Flood Study	Feb 2014
109	Hawkesbury Floodplain Risk Management Strategy and Plan	Dec 2012
110	Planning Circular PS 07-003: New Guideline and changes to section 117 direction and EP&A Regulation on flood prone land (Department of Planning)	31 Jan 2007
111	Floodplain Risk Management Guideline: Practical Consideration of Climate Change	25 Oct 2007
112	Local Land Services Act 2013	2 Jan 2014
113	Local Land Services Regulation 2014	1 Jan 2014
114	NSW Healthy Floodplains Project (online factsheet)	May 2013
115	Water management partnership agreement between the Commonwealth and New South Wales: Project schedule 4: Healthy Floodplains Project	11 Jan 2010
116	Floodplain Management Plan for the Gwydir Valley Floodplain 2015 Draft Order	Sept 2014
117	Draft Background document to the floodplain management plan for the Gwydir Valley Floodplain 2015	Sept 2014
118	An overview of floodplain management plans under the <i>Water Management Act 2000</i>	Aug 2014
119	Gwydir River : Lower Gingham Watercourse Floodplain Management Plan	2006
120	State Water Management Outcomes Plan Order 2002 No.1028 (NSW)	18 Dec 2002
121	Floodplain Management Plan: Murrumbidgee River Hay to Maude	April 2014
122	Floodplain Management Plan: Edward and Wakool Rivers Stage 1: Deniliquin to Moama–Moulamein Railway	Jan 2011

123	Public Works and Procurement Act 1912	24 Feb 2014
124	Land Acquisition (Just Terms Compensation) Act 1991	31 Jan 2011
125	Environmental Planning and Assessment Act 1979	25 July 2014
126	Environmental Planning and Assessment Regulation 2000	25 July 2014
127	Environmental Planning and Assessment Amendment (Flood Related Development Controls Information) Regulation 2007	16 Feb 2007
128	State environmental planning policy (infrastructure) 2007	23 Oct 2014
129	NSW Wetlands Policy	March 2010
130	State Environmental Planning Policy No 14—Coastal Wetlands	1 Oct 2011
131	State Environmental Planning Policy (Major Development) 2005 (NSW)	31 May 2014
132	State Environmental Planning Policy No 1—Development Standards	17 May 2002
133	State Environmental Planning Policy (Exempt and Complying Development Codes) 2008	18 July 2014
134	State Environmental Planning Policy No 33—Hazardous and Offensive Development	13 Mar 1992
135	Standard Instrument (Local Environmental Plans) Order 2006 No.155 (NSW), Local Environmental Plans, Regional Environmental Plans	15 Aug 2014
136	Standard Instrument—Principal Local Environmental Plan	15 Aug 2014
137	Model Local Provisions clause 7.3 – flood planning	Dec 2010
138	State Environmental Planning Policy (State and Regional Development) 2011	5 Sept 2014
139	What is State significant development and how are applications assessed and determined?	Feb 2012
140	Local Government Act 1993	4 July 2014
141	Media Release: Commissioner warns of severe penalties for constructing levees without approval	13 Mar 2012
142	Native Vegetation Act 2003	1 Jan 2014
143	Threatened Species Conservation Act 1995	17 Oct 2014
144	NSW 2021	nd [2012?]
145	Fisheries Management Act 1994	4 Nov 2014
146	Floodplain Management Programs Guidelines for Applicants	2014-15
147	Floodplain Management Program new works project ranking form 2014-15	2014-15
148	Work Plan - Investigation and Design Project [sample document]	2014-15
149	Work Plan - Floodplain Risk Management Study and Plan (FRMSP) [sample document]	2014-15
150	Work Plan - Flood Study [sample document]	2014-15
151	Funding Agreement for Financial Assistance under the 2012/13 Natural Disaster Resilience Program's Floodplain Risk Management Grants Scheme [sample document]	2014-15
152	Funding Agreement for Financial Assistance under the 2012/13 NSW Floodplain Management Program [sample document]	2014-15

#	Document	Version
	QUEENSLAND	
153	Land, Water and Other Legislation Amendment Act 2013	2013
154	Regulation of Levees in Queensland: Consultation Regulatory Impact Statement	2013
155	Water Act 2000	1 July 2014
156	Water Regulation 2002	4 July 2014
157	IDAS code for development applications for construction or modification of particular levees	4 July 2014
158	Self-assessable code for construction or modification of levees	2014
159	Guidelines for the construction or modification of category 1 levees	2014
160	Guidelines for the construction or modification of category 2 and 3 levees	2014
161	Queensland Building and Construction Commission Regulation 2003	1 July 2014
162	Water Supply (Safety and Reliability) Act 2008	21 May 2014
163	Manual for Assessing Consequence Categories and Hydraulic Performance of Structures	Nov 2013
164	Environmental Protection Act 1994	1 July 2014
165	Environmental Protection Regulation 2008	1 July 2014
166	Environmental Protection (Water) Policy 2009	6 Dec 2013
167	Generic draft terms of reference for an environmental impact statement	2013
168	Guideline: Environmental Protection Act 1994: Structures which are dams or levees constructed as part of environmentally relevant activities	Version 6
169	Guidelines for Ring Tank Storages, edited by Dr Hugh Barrett (Irrigation Australia Ltd)	Oct 2007 2 nd Edition
170	State Development and Public Works Organisation Act 1971	19 June 2014
171	Sustainable Planning Act 2009	20 Feb 2014
172	Sustainable Planning Regulation 2009	4 Aug 2014

173	Queensland Planning Provisions	25 Oct 2013, Version 3
174	State Planning Policy	Dec 2013
175	State Development Assessment Provisions (SDAP)	21 June 2013
176	Construction or modification of levees state code	9 May 2014 Version 1.3
177	State interest—natural hazards: Guidance on flood, bushfire and landslide hazards [draft version]	2 Dec 2013
178	State Planning Policy—state interest guideline: Natural hazards, risk and resilience	Aug 2014
179	State Planning Policy 1/03 Guideline: mitigating the adverse impacts of flood, bushfire and landslide	June 2003
180	Technical Manual - Evaluation report: Flood hazards	Aug 2014
181	Technical Manual - A 'fit for purpose' approach in undertaking natural hazard studies and risk assessments	Aug 2014
182	Technical Manual - Guidance for considering natural hazards, risk and resilience when designating land for community infrastructure	Aug 2014
183	Code for self-assessable development for taking overland flow water for stock and domestic purposes	2014 Version 9.1
184	Code for self-assessable development for taking overland flow water using limited capacity works	2014 Version 7.1
185	Code for self-assessable development for taking overland flow water to satisfy the requirements of an environmental authority or a development permit for carrying out an environmentally relevant activity	2014 Version 3.1
186	Building Regulation 2006	1 Feb 2012
187	Certification guidelines for assessable works that take overland flow water	2008
188	Code for assessable development for operational works for taking overland flow water	2012 Version 5
189	IDAS Forms:	1 July 2013 Version 3.0
190	IDAS 12 - Taking or interfering with artesian or sub-artesian water	
191	IDAS 13 – watercourse pump	
192	IDAS 14 – water storage	
193	IDAS 15 – gravity diversion from a watercourse	
194	IDAS 17- water diversion	
195	IDAS 21 – other work in a watercourse	
195	IDAS Form 20: Interfering with overland flow water and construction and modification of a levee	16 May 2014 Version 4
196	IDAS Form 19: Taking overland flow water	1 July 2013 Version 3.0
197	IDAS Form 27 – waterway barrier works	1 July 2013 Version 3.0
198	IDAS Form 33 – Great Barrier Reef Wetland Protection	1 July 2013 Version 3.0
199	Application for licence to take water	2013 W2G001-v3
200	Application for licence to interfere with the course of flow	2013 W2G006-v6
201	Queensland Urban Drainage Manual	2013 Version 3
202	Vegetation Management Act 1999	31 Mar 2014
203	Local Government Grants and Subsidies Program (LGGSP) 2013-14 Local Government Floods Response Subsidy	June 2013
204	Joint Application Package 2014-15 Information pack for Queensland disaster mitigation and resilience funding available through the: <ul style="list-style-type: none"> • Royalties for the Regions • Local Government Floods Response Subsidy • Natural Disaster Resilience Program 	March 2014
205	Planning for stronger, more resilient floodplains (Queensland Reconstruction Authority) Part 1 & Part 2	Part 1: 2012 Part 2: 23 Jan 2012

#	Document	Version
COMMONWEALTH		
206	Managing the floodplain: a guide to best practice in flood risk management in Australia	2013

		(2 nd edition)
207	National Emergency Risk Assessment Guidelines	Oct 2010
208	Guidelines to good practice for the Construction and Refurbishment of Earthen Channel Banks (Land and Water Resources Research & Development Corporation)	Aug 2001
209	Environment Protection Biodiversity Conservation Act 1999	1 July 2014

VICTORIA

1. Water Act 1989

1 July 2014

The purpose of the Act is listed s1 (a)-(m), including: integrated management of all elements of the terrestrial phase of the water cycle; conservation of water resources to manage them for the sustainable use for the benefit of present and future Victorians; protection and enhancement of the environmental qualities of waterways and their in-stream uses; and the protection of catchment conditions.

The Act guides allocations and entitlements for surface and groundwater.

Anyone has the right to use rainwater or water that flows over land for any purpose if they occupy the land it is on (other than water from a waterway or bore) s8(5). This doesn't include spring / soak / dam water except for stock & domestic use.

The Minister can grant *licences to take or use water* (including in a 'non-declared water system') (s51, 53, 55 56, 84VA), *water use licences & registrations* (s64L-Q; Y; Z; AD; 84R), and *works licences* (s67-71; 81-82; 84V). Sections above cover the authority to grant licences, matters that need to be considered and conditions, as well as what is to be recorded about them in the water register. There are also sections covering water shares s33E-J (in a 'declared water system': see s6A), bulk entitlements (to take and use water) s34A-42; & environmental entitlements.

'Works' under the Act include above or below ground works, including channels and fencing (see 'definitions') as well as any works that may result in '(a) the drainage of any land; or (b) the collection, storage, taking, use or distribution of any water; or (c) the obstruction or deflection of the flow of any water': s10(1), thus levee-like structures.

However, *works licences*, are restricted to 'works on a waterway' and the waterway definition does not appear to include surrounding land or artificial channel. This is therefore unlikely to cover embanked irrigation channels. Matters for consideration (s68) include those listed under section 40(1)(b) to (n), as well as adverse effects on the drainage regime, in-stream uses of water; on the aquifer or flow of water within the waterway or on land surrounding it, on conservation policy, on the effect of water escaping from the works, and whether or not the works are in a heritage river or natural catchment area covered by the [Heritage Rivers Act 1992](#).

Of matters listed under section 40(1)(b) to (n), those most relevant to levees are: (c) the existing and projected quality of water in the area; (g) the need to protect the environment, including the riverine and riparian environment; (k) if appropriate, the proper management of the waterway and its surrounds or of the aquifer; (m) the needs of other potential applicants; (n) so far as available to the Minister- (i) any relevant report or statement prepared under any Act; or (ii) the findings of, or any evidence given or submission.....etc.

Conditions (s71) can relate to fees, construction standards, qualifications, dimensions or other features, maintenance and operation, reporting, date of commencement, and various environmental, flow and drainage conditions (and other categories of conditions not relevant to levees).

The *water register's* purpose is to enable monitoring and reporting about water-related entitlements and allocation and use of water resources, and to facilitate a water market (s84B). It maintains the following information:

- **water-use licences** (s84R): licence holder, description of land, licence conditions, annual use limit and 'any other'.
- **works licences** (s84V): licence holder, description of land, description of works, licence conditions, period of licence, and 'any other'.
- **licences to take and use water** (s84VA): licence holder, description of land (if applicable), licence conditions, period of licence, volume of water licenced for take and use, name of waterway, aquifer or works from which water may be taken and water system (if applicable), fees information and 'any other'.

It therefore seems unlikely that the water register would constitute an alternative source of information for 'levee like structures'. Unless covered in licence conditions or 'other', there is no evident requirement for recording details about irrigation embankments, their location, alignment or dimensions (other than for works licences which are only for in-stream works). (For more information on specific licences and the water register, see documents #29-34).

Granting a water-use licence depends on there being works or systems in place (or in the near future) to deliver water: s64N(c).

'Irrigation and waterway management districts' may be relevant to levees. There don't appear to be any controls on the establishment of a new irrigation district: s122J; an application to extend a district (of any kind under s122M) needs to follow application guidelines: s122 O and to consider submissions (s122R).

s124 (5) An Authority is 'not obliged to perform any function conferred by the Act, unless the Act expressly provides otherwise'. i.e., empowered but not obliged: ENRC's comment is that this reflects CMAs' reliance on annual state government grants, so ability to fulfil functions is constrained by government priorities and funding.

s130 allows authorities to carry out compulsory purchase of land (watercourse bed and banks and other criteria) if it relates to its functions, fulfilling objectives.

Other possible levee-relevant sections relate to the ownership, abandonment and decommissioning of major works (ss138-139A; 148-150; 153); access to land for the maintenance of works (s238); and right of access to public land (s241). S238, 241 appear to relate only to access for drainage, water supply or salinity mitigation purposes (s234).

Ss138-139A only applies to works owned by an authority. Permission is needed to abandon or decommission major works. S148 requires consent to build structures or place fill in drainage easements.

s150 requires landholders to maintain or repair works on their land necessary for providing a service by an Authority. s157 Authorities are liable for injury, damage & loss resulting from flow of water escaping from their works due to negligence or intention.

A lake, marsh, swamp or lagoon is only defined as such if it's been declared, following application by someone who has the right to use or take water from it (s4)

Catchment Management Authorities (CMAs) and Melbourne Water Corporation are Floodplain Management Authorities for their regions (the latter has responsibility for the Melbourne Metropolitan area, the Werribee and Upper Maribyrnong catchments and catchments which flow into Western Port Bay). Authorities have statutory powers under the Act to manage:

waterways (ss185-197):

An Authority can declare a waterway, land or works to be designated (s188). Regarding works, it has to be where water flows over it; regarding land it has to be within 20m of a waterway or abutting it, and for both it has to be significant for the stability, conservation or functioning of the waterway. For these areas, functions of authorities at s189, include the development of schemes, plans, carrying out works and activities. They also develop regional waterway strategies that cover plans, priorities and actions for waterway management that have to take into account other strategies, policies and plans under this Act and other Acts (s190-192). [NB: ENRC Inquiry p.104 says designated waterways make up the majority of waterways in Victoria]

rural drainage (ss198-200)

floodplains (ss201-212)

including finding out flood information, declaring flood levels, flood fringe, building lines [in relation to either side of a designated waterway or of designated land or works], development controls for land adjoining waterways, and developing and implementing plans to minimise flooding and flood damage (s202). The latter (s202(1)(e) for CMAs; s202(2)d) for MW) appears to be the legal basis for regional floodplain management strategies. The [Victorian Waterway Management Strategy](#) notes that these strategies 'set out the policy framework, the floodplain characteristics and the detailed programs for each region, focusing primarily on flood damage prevention or mitigation.'

'MW and the CMAs currently provide important functions in providing flood advice to local councils as floodplain management referral authorities under the Planning and Environment Act 1987. Those functions are linked to Section 202 of the Water Act 1989' (draft [Victorian Floodplain Management Strategy](#)).

Flood levels are expected to be 1% AEP, although 'an Authority may designate a flood level that allows a risk of flooding to exist in the use of lands' (s204). They can declare flood liable land on the basis of 1%AEP and floodway areas based on high hazard due to active flow path and/or flood storage (s205). S208 controls the construction of works and structures on flood liable land or in a declared floodway by anyone other than a public statutory body

(except by consent of CMA/MW), that has the effect of: (a)(i) controlling or mitigating floodwaters; or (ii) discharging stormwater; or (iii) excluding tidal water; or (iv) concentrating or diverting floodwater or stormwater, or (b) where excluded by a building line. S209 allows the modification or demolition of existing works in a declared floodway, flood liable land area or in relation to a building line.

Councils and other statutory bodies 'must prevent land uses that are inconsistent with any identified flood hazards' (s206(3)).

Part 10, Div 5 ss213-217 covers 'water management schemes'. According to the draft [Victorian Floodplain Management Strategy](#) this means flood mitigation infrastructure:

'Historically the Water Act (Division 5 of Part 10) has been used for the preparation of Water Management Schemes for new levees. In some instances levee management has been undertaken through provisions within the Local Government Act 1989.' (Government response to ENRC p.16)

'The Victorian Government's clear preference is for large scale flood mitigation infrastructure to be designed and implemented as Water Management Schemes under the Water Act' (p.41).

Provisions include: Minister's functions: s213 (assessment & investigation; preparing and implementing schemes for improved management; public education programs about roles of authorities); investigations including provisions for notification, forming a community-based committee, membership and resourcing, consultation requirements (s214); s215 covers preparation of the water management scheme by the committee, notification requirements, provisions to allow those affected to inspect and make submissions, committee able to modify and submit to Minister, who can accept, reject and modify and publish the decision. Those affected can apply for a review. s216 explains approval procedures (Ministerial declaration published), and nomination of the Authority or Council charged with implementing the scheme, and who needs to be notified (DTPLI and any authorities listed under the P&E Act). s217 allows the implementing authority to apply for a scheme's works to be modified or removed if the works cause unreasonable flows or interference with flows.

s306: All the Minister's powers, duties etc., under the Act may be delegated except those specified. i.e., many of the powers, such as licencing, may be delegated to CMAs or other water management agencies.

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2. Floodplain Management, DEPI website:

<http://www.depi.vic.gov.au/water/Floods-and-floodplains/floodplain-management>
[accessed Dec 2014]

"CMA responsibilities are:

- prepare a Floodplain Management Strategy for their region. The strategy includes: flood mapping, flood studies, floodplain management plans, flood awareness and education and asset management
- coordinate the collection of flood information such as: flood photography, flood heights and flow rates and velocities in times of significant regional floods
- provide input to planning schemes, responding to planning referrals and helping resolve planning issues
- facilitate the implementation of regional flood warning systems
- provide for the conservation of natural resources of regional significance
- supporting SES on the behaviour and movement of floods
- monitoring regional flood warning systems
- coordinating flood monitoring and collecting data

They have a role in authorising individuals and organisations to carry out activities, including flood mitigation activities, on waterways.

Recent amendments enable CMAs to issue individuals with permits to maintain existing levees on Crown land without changing height or extent. Where this applies, a permit under the relevant Municipal Planning Scheme will not be required but compliance with legislation protecting Aboriginal, environmental, & cultural heritage is required.

Approvals will be on the basis of willingness for beneficiaries to pay for maintenance. As well they need to have demonstrable benefits in terms of reduced average annual damage (AAD), with benefits being greater than any costs to waterway health.

Local council responsibilities are:

- develop and implement local floodplain management plans
- to control development on floodplains through their local planning schemes
- provide and manage local community flood mitigation infrastructure
- implement local flood warning systems, including systems for flash flooding
- monitor significant local flood events"

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3. Victorian Environmental Water Holder (VEWH) web page: <http://www.vevh.vic.gov.au/about-us> [accessed Dec 2014 and 5 Feb 2015]

Established on 1 July 2011 through an amendment to the WA 1989 (s33DA-33DZA), passed by the Victorian Parliament in August 2010. The VEWH is unlikely to be a vehicle for levee modification and retrofitting to restore floodplain connectivity but its objectives support this:

"The VEWH is the independent statutory body responsible for holding and managing Victoria's environmental water entitlements (the Water Holdings). The use of the Water Holdings for environmental watering aims to ensure environmental benefits of Victoria's rivers, wetlands and floodplains are maintained and improved.

The VEWH works with catchment management authorities and Melbourne Water to ensure environmental water entitlements are used to achieve the best environmental outcome with the water that is available.

VEWH aims to return some flows back to river systems to achieve environmental outcomes. Primarily, within river channels, (below levels that pose a risk to private land or infrastructure), and in some instances to the floodplain. This occurs mainly on public land, such as National Parks and State Forests, but may also occur on private land with the consent of the landholder."

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**4. Catchment and Land Protection Act 1994
1 Oct 2014**

s1 - Purpose of the Act: a framework for the integrated management and protection of catchments; encourage community participation in land and water resource management (as well as pests / weeds).

s3 defines a catchment and a catchment management. Former is "an area which, through run-off or percolation, contributes to the water in a stream or stream system". Latter is coordinated management of land and water using catchments as a basis. Contrast this with the [NSW Floodplain Management Manual](#) definition that stops at a 'particular site'.

Water resources relates to the quality, quantity or rate of flow of water (p.11).

s4 Objectives of the Act reiterate purpose, primarily in terms of 'long term land productivity'... 'while also conserving the environment'. It only 'aims' to ensure land and water resources, their plant & animal life are maintained and enhanced. Productivity has no such qualifier. It sometimes excludes water resources: s4b), the Act provides for processes for assessing the condition of both water and land resources. However, for assessing the effectiveness of measures, it specifies *land* protection measures (not water). Another objective of the Act is the establishment of the Victorian Catchment Management Council (VCMC) and CMAs.

s9 the function of the VCMC is to provide the minister with advice (e.g., on the condition of resources, on priorities), to foster cooperation and raise community awareness.

s10 allows the VCMC to establish catchment management and land protection boundaries, vary and abolish them.

s11 requires the Minister to appoint a CMA for each catchment & land protection region.

s12 (1) explains CMA functions. In particular developing regional strategic plans and special area plans (within the region). CMAs are responsible for coordinating / monitoring implementation, for promoting cooperation and community awareness and for advising minister about: priorities, implementation funding, on guidelines for

integrated management, on land/water condition, on matters relating to catchment management or land protection, including actions to prevent land degradation on Crown Land.

s16 each CMA Board is responsible for strategic planning, policies, for the CMA carrying out its functions. It may exercise the CMA's powers.

s19A: the Minister may give directions to a CMA about performing its function / exercising its powers.

s19J CMAs may establish advisory committees, or a committee to undertake a function or exercise a power. Delegation requires ministerial consent: s.19F, 19H, 19J(f).

s20 includes general landowner duties (a-f), including (c) protecting water resources, (b) soil conservation and (a) avoiding causing / contributing to land degradation that may damage land of another land owner. This latter could conceivably include a levee that causes land erosion or flooding downstream.

ss23-26 covers regional catchment strategies. s.24: content of strategies, including: specify the region; assess land and water resources and how they are used; assess the nature, causes, extent severity of land [water is not mentioned] degradation in catchments in the region and priority areas; identify land and water quality objectives; set a program of measures for improved land and water use and to treat land degradation; state action to be taken, by whom; processes for monitoring implementation; processes for achieving land and water quality objectives; processes for assessing the effectiveness of the program of measures; review. It MAY also include: research, education, land use planning, advisory services, incentives. According to [Victorian Waterway Management Strategy](#), regional catchment strategies are 'the primary framework for integrated management of land, water and biodiversity... under which are a range of sub-strategies and action plans for each region. The long-term objectives and priorities for action in the RCSs that are related to waterways are reflected in the regional planning processes for waterway management'

s27 a 'special area' is an area classified as a 'special area water supply catchment' (or it may classify in any other way it considers appropriate). But application seems limited to protecting catchments used to supply drinking water. Factors that must be considered in making a special area declaration include the existing and potential land uses in relation to water quality or aquatic habitats, land quality and condition, aquifer recharge / discharge areas. The CMA makes recommendation to the Minister, who may then make a recommendation to the Governor in Council, who may then make a declaration.

s30 includes special area plan contents: land management issues to be addressed, program of action, costs and benefits, targets, responsibilities, review. It MAY also specify suitable land uses, state what land can be used for what purpose and identify the need for land use conditions. If conditions, then identifies properties, conditions, costs of compliance (including land value implications) and how to apportion costs.

ss33-36 application of land use conditions (relates to a special area plan).

s25(1), s.31: CMAs can recommend amendments that planning authorities can make to planning schemes to implement regional catchment plans or special area plans. Ministers and land management authorities are meant to 'have regard' to plans (ss.26,32).

ss37-38 provides for a land management notice to be served if a land owner does not comply with s.20 or a 'priority area' or 'directions' notice (can be appealed: s.48). While s.20 covers water as well as land, the way s.38 is written (contents of the land management notice), water is not mentioned. The contents can prohibit / regulate a land use or management practice, or require a specific action. s.38(1)(c) could cover water. But it's odd that water is not specified in (a) or (b) along with land. A land use condition takes precedence over a land management notice (s.47).

s47A and 47B relate to the declaration of a priority area (priority for the eradication / control of pests and weeds).

Schedule 2 relates to developing regional catchment plans and special area plans. CMAs need to develop them in accordance with any guidelines established by the VCM Council. The schedule also details consultation, approval requirements and other processes.

Schedule 5 lists 124 special water supply catchment areas.

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5. Environment Protection Act 1970
13 Nov 2014

There do not appear to be any regulations under this Act that relate to levees. Regulations relate to levies and fees, vehicle emissions, various toxic waste and pollutants, including noise.

Authorises the development of State environment protection policies (SEPPs):

s16: an environment protection policy may be declared in an Order made by the Governor in Council

A regional catchment strategy (developed by a CMA under the *Catchment and Land Protection Act 1994* may be incorporated into a State environment protection policy (developed under this Act), in whole or in part, and with or without changes. See CLP Act s25(2). Likewise, CMAs may recommend amendments to planning scheme to implement a special area plan: CLP Act s31.

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6. Environment Protection (Resource Efficiency) Act 2002
18 Jun 2002

The sole purpose of the Environment Protection (Resource Efficiency) Act 2002 was to amend / repeal other Acts, primarily the EP Act 1970, also the Litter Act 1987 (repealed), the Local Government Act 1989 and the Magistrates' Court Act 1989.

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7. State Environment Protection Policy (Waters of Victoria)
4 June 2003

[published in the Government Gazette of this date]

Can be located at: <http://www.epa.vic.gov.au/about-us/legislation/water-legislation/water-related-policies>

This SEPP was first developed in 1988 and was updated in 2003.

In the legislative hierarchy, a SEPP is under the *Environment Protection Act 1970*, on a par with regulations, and above Guidelines.

The policy covers three aspects of water: beneficial uses; environmental quality objectives; and the attainment program.

The document's definition of 'floodplain' is restricted: 'an area of land inundated with an average flood recurrence interval of one hundred years'.

This contrasts with the (draft) *Victorian Floodplain Management Strategy* (VFMS) definition of floodplain: 'An area of land that is subject to inundation by floods up to and including the largest probable flood event - that is, flood-prone land.'; flood-prone: 'Land susceptible to flooding by the largest probable flood event. Flood-prone land is synonymous with the floodplain. Floodplain management plans should encompass all floodprone land rather than being restricted to areas affected by defined flood events.' Neither the *Environment Protection Act 1970*, the *Catchment and Land Protection Act 1994*, nor the *Water Act 1989* provide a floodplain definition. However, Water Act (s201-204) makes it clear that floodplain includes 'flood fringe' and not just 'flood level', the latter being the extent of the 1% AEP.

The policy aims to maintain (and where realistic, improve) water so it is of suitable quality / quantity for environmental value and beneficial uses (drinking water; recreational activities; industrial & shipping; agriculture; aquaculture; cultural & spiritual, and aquatic ecosystems). To verify whether this is being achieved there are indicators: water quality, biological, flow, sediment, habitat. To achieve this, the policy assigns roles & responsibilities, and identifies strategic actions and tools.

The policy gives its purpose, principles and intent in s5-7. Ecologically sustainable development (ESD) principles figure strongly. Intent includes setting sustainable 'beneficial uses' and 'environmental values' of surface water for economic, social and environmental benefits for 'all' communities. Actions undertaken on a priority driven and

progressive basis. To be implemented through regional catchment management strategies and plans, which set goals, priorities and targets.

Clauses particularly relevant to levees include:

43. Surface water management and works

Works on or adjacent to surface waters need to be managed to minimise environmental risks posed to the aquatic ecosystem and to protect other beneficial uses. To enable this, surface water managers need to:

- (1) ensure that works within or adjacent to surface waters are managed so that unnatural erosion, sediment re-suspension and other environmental risks to aquatic habitats are minimised; and
- (2) ensure that existing and new in-situ structures do not pose a barrier to native fish movement.

51. Irrigation channels and drains

Artificial irrigation channels and artificial irrigation drains need to be managed for the purposes for which they were constructed (see clause 10). They must be designed and managed so that their waters are not harmful to humans or have unacceptable impacts on animals, and so that the impact of their flow, sediments, nutrients, salt and other pollutants on surface water and groundwater is minimised.

i.e., with respect to structures it mainly governs water quality, though it does also cover 'flow' and 'other environmental risks' is a broad catch-all.

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8. State Environment Protection Policy (Groundwaters of Victoria) 1997

Regional catchment strategies are to make adequate provision for beneficial uses of groundwater covered by this SEPP (clause 23).

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9. Variation of state environment protection policy (Groundwaters of Victoria) 2002

The variation, p.530-531 of the gazette, relates to the 'groundwater quality restricted use zone'.

Not much seems relevant to levees, though groundwater is important for agricultural uses and channels and embankments are used for this purpose. However, restrictions imposed by this policy relate to quality (of groundwater) rather than to loss of connectivity and damage to riparian ecosystems.

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10. Environmental Effects Act 1978 4 May 2012

This Act requires the environmental effects of certain works to be assessed. It applies to works declared to be public works by Order of the Minister and published in the Gazette (s3). 'public works' are defined as "works undertaken or proposed to be undertaken....by or on behalf of the Crown or for statutory bodies but *does not include works undertaken by or on behalf of municipal councils*" (s2). An Environmental Effects Statement needs to be prepared and submitted to the Minister for assessment of environmental effects (s4).

An Environmental Effects Statement *may* be needed for the following [Planning and Environment Act 1987](#) decisions: a decision to approve or adopt a planning scheme or amendment to a planning scheme; to amend or refuse to amend, to grant or refuse to grant, an application for a permit or amendment to a permit (s8F). The minister can order an inquiry into the environmental effects of any works or proposed works to which this act applies (s9). The Minister may issue guidelines (s10), e.g., types of works requiring a statement, procedures, statement content.

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**11. Ministerial guidelines for assessment of environmental effects under the Environmental Effects Act 1978
June 2006**

The guidelines state that Municipal Councils are 'relevant decision makers', as are Ministers or statutory bodies responsible for public works, the *Environment Protection Act 1970* or Ministers or agencies administering approvals legislation. An environmental effects statement (EES) is required if the proposed works are likely to have a regional or state significant adverse effect on the environment, where normal statutory processes are inadequate and there is a need for integrated assessment. The Minister provides an assessment of the EES to the relevant decision maker to enable them to make a decision on the environmental effects and the Minister's advice about whether it will lead to an acceptable outcome.

'significant' effect is defined on p. 6.

referral criteria for individual potential environmental effects are found on p.7. There are also referral criteria for a *combination* of potential environmental effects (i.e., for the latter, two or more criteria have to apply). With regards to riparian ecosystems, most criteria could be relevant. However, criteria are restricted to, say, Ramsar listed wetland, listed threatened species or communities under the *Flora and Fauna Guarantee Act 1988*.

Nine matters the Minister must consider when determining whether an EES is required are listed p.10. The required content of EES is on p.15.

Cumulative and indirect effects p.18 means the cumulative effects of the proposed project along with other *proposed* projects or *existing* activities. However, the Guidelines note the proponent may have limited knowledge about the impacts of existing activities or proposals. It therefore suggests that information on impacts be provided 'in a form that can be integrated with information relating to other projects or activities' so the Minister can assess potential cumulative impacts. It does not provide guidance on what form would enable information to be integrated. The Guideline highlights the need for cumulative effects assessment for staged projects. It suggests qualitative (i.e., subjective) rather than quantitative (i.e., based on data) cumulative effects assessment as the latter may be impractical. Other than this there is no information on suitable cumulative effects methodology used by either the proponent or Minister.

Five factors are provided to determine the extent of indirect effects assessment required. They may not need to be assessed in detail if: effects will be diffuse or low level; it's not practical to predict through modelling; where it involves sourcing of construction materials for ancillary works; where it relates to the use of a product being produced (e.g., mined); or where the effects are addressed through other statutory mechanisms.

Once the EES public review process has been followed (pp.23-26), the Minister makes an assessment (EES contents: magnitude, likelihood, significance of environmental effects; project modifications; the environmental significance in the context of legislation, policy, strategies and guidelines). The assessment can conclude it is acceptable, unacceptable or in the need of modifications, and provide advice (p.27). The Minister's assessment is not binding on decision makers (p.28).

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**12. Aboriginal Heritage Act 2006
1 Jul 2014**

**13. Aboriginal Heritage Regulations 2007
13 Feb 2013**

**14. Practice Note 45: The Aboriginal Heritage Act 2006 and the planning permit process
Oct 2013**

Documents #12, #13 and #14 were read together and considered collectively.

The DSE submission to the ENRC Inquiry that noted 95% of registered Aboriginal places (and many non-indigenous heritage sites) are found within 1 km of water sources - and are thus at risk from both floods and flood management works (p.24).

Aboriginal places and objects in Victoria, whether known or unknown, are protected under the *Aboriginal Heritage Act 2006* and cannot be disturbed or destroyed without authorisation. Part 4 of the Act (ss42-49A) includes

provisions for developing a Cultural Heritage Management Plan (CHMP). These assess areas for Aboriginal heritage and make recommendations to protect and manage anything found. ss46-49A explain circumstances for which a Plan is needed: if regulations require it, if the Minister directs it or if an environmental effects statement is required, or an impacts plan or impacts management plan. ss 50-67 discuss processes relating to the development and approval of the plans.

Aboriginal Heritage Regulations 2007 list areas of cultural heritage sensitivity for proposed high-impact activities (Part 2, Division 3). Among other things, they include registered cultural heritage places, named waterways and land within specified distances of these areas of cultural heritage sensitivity. A map of sensitive areas in their area is provided to the local council.

High impact activities are specified in the *Aboriginal Heritage Regulations 2007* (Part 2, Division 5), and generally include buildings and works that result in significant ground disturbance. The specified activities include, but are not limited to:

- subdivisions of three or more lots;
- the construction of three or more dwellings;
- constructing roads, bicycle and walking tracks over 100m in length;
- activities that require an Earth Resource Authorisation; and
- industrial developments.

Responsible authorities (e.g., councils) cannot issue a planning permit where a CHMP is required until they receive a copy of the approved plan (s52(1)) and the permit has to be consistent with the CHMP (s52(3)).

The sponsor is responsible for developing a CHMP and must employ a cultural heritage advisor to help prepare it.

Cultural heritage agreements can be made for the protection, maintenance or use of land containing an Aboriginal place: s68(2). An Agreement is not for matters that require a Cultural Heritage Management Plan.

'The aim of the Cultural Heritage Management Plans is to protect and manage cultural heritage, while allowing for some development'; 'Applicants for levee maintenance permits will need to provide evidence of compliance with the requirements of the relevant Aboriginal cultural heritage authorities to avoid or minimise the impacts on any relevant sites or objects.' (draft) [Victorian Floodplain Management Strategy](#), p.46.

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15. Heritage Rivers Act 1992

17 May 2012

The purpose of the act is to protect public land in particular parts of rivers and catchment areas that have significant nature conservation, scenic, recreation or cultural attributes, thereby providing for Victorian heritage rivers (s1).

The Act applies to Heritage River areas (s5) listed in Schedule 1 (18 areas currently listed) and natural catchment areas (s6) listed in Schedule 2 (26 areas). One of the natural catchment areas (Part 3 of the Schedule) - includes specified parts of the Avon River, which is located in North Central CMA*: 'all those pieces of land in the catchments to the Avon, Turton and Dolodrook Rivers and Ben Cruachan and Theile Creeks outlined in green on the plan....'

*NB: I used North Central - an area greatly affected by recent floods - to cross check how legislation is translated into regional strategies / CMA licencing.

A management authority responsible for the area must both 'take all reasonable steps' to protect it; to allow activities such as recreation, education and landscape appreciation; to maintain its free flowing state and in its natural condition (s7). The managing authority or CMA must prepare a management plan for the area if the Minister requests it (s8). Content of plans (s9).

s10 specifies land and water uses not permitted in a heritage rivers area. This includes s10 (1): 'an impoundment must not be constructed or extended in a heritage river area' (in definitions, s3, an impoundment is 'an impoundment, barrier or structure that impedes the passage of water fauna'. In the event of a flood, this would presumably apply to levees, i.e., water fauna expand their range onto the floodplain during a flood. There are also restrictions relating to water diversions and timber harvesting for specified heritage river areas, listed in Schedule 3.

Specified areas (s11; schedule 4) must be managed according to recommendations by the Land Conservation Council (LCC) under the *Land Conservation Act 1970* [NB: the *Land Conservation Act 1970* was repealed in 1997 by the *Environment Conservation Council Act 1997*, but the current *Heritage Rivers Act 1992* still refers to the repealed Act].

Regarding natural catchment areas, 14 prohibited land and water uses are listed in s12. Levees are not explicitly mentioned. Included in the list are: '(g) the construction of new water storages or new water diversions; (h) the carrying out of waterway management; and (j) the making of new roads or upgrading of existing roads'. 'New water storages' (e.g., ring tanks), 'new water diversions' and 'roads' could include pseudo-levees. Mining and extractive industries are also prohibited, so the list is unusually comprehensive. s13 & Schedule 5 list specific land and water uses for which 5 specified natural catchment areas must be managed according to LCC recommendations.

Other provisions relate to these areas not being allowed to be disposed of; the precedence of this Act over others; emergency situations; entering into agreements with specified entities; Minister can make regulations.

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16. Heritage Act 1995

1 July 2014

The purpose of the Act is the protection and conservation of places and objects of cultural heritage significance; registration of such places and objects; establish a Heritage Council and a Victorian Heritage Register (s1). It only applies to non-Aboriginal heritage (s5). The Heritage Council is responsible for determining assessment criteria for consideration about whether or not objects or places should be included in the Heritage Register. They are also responsible for adding to or removing from the list: s8(1)(c, d, e). Matters to be considered when determining assessment criteria are at s8(2) (a-j).

The Heritage Council must employ an Executive Director. Among other functions, the ED is responsible for determining applications for permits and consents: s15 (c).

An interim protection order can be served. This effectively includes an object or place on the Heritage Register until a decision can be made about whether or not it should be nominated for inclusion (or until the period of time it is valid for elapses): ss55-62.

Part 4, permits (s63-84) and covenants (s85-92) is probably most relevant to levees.

s.64 prohibits anyone from (1) removing, demolishing, damaging, despoiling, developing, altering or excavating any part of a registered place (note 'develop' is defined in s3), nor (2) remove, demolish, damage, despoil or alter a registered object, nor (3) relocate or disturb the position of a fixed object (4) unless they have a permit or the activity or works are exempt under s65 or a permit is not required by the Heritage Council (s66 & Part 3). Permit application is required under s67. Applications are made to the ED, who must refer them to the Heritage Council and also provide a copy to the responsible authority for the area where the place or object is located (usually the municipal council). The Heritage Council can inform the ED it does not object to the proposed activity / works; it does not object subject to conditions; or it does object on any specified grounds. s73 includes matters the ED must consider when making a determination about the permit application. Each of these requirements has a time limit associated with it.

A covenant binds the owner as to (a) the development or use of the place or land on which the registered place is situated; or (b) the conservation of the place and any registered object at that place (s85). An owner can enter into a covenant with either the Heritage Council or the National Trust. A covenant can also affect Crown land (s90). The covenant must be registered by the Registrar of Titles on the application of the owner (s91). The covenant must be enforced by the Heritage Council or National Trust as though it were a restrictive covenant (s92).

Part 6 (ss120-134) relates to the protection of archaeological places and relics. The ED needs to maintain a Heritage Inventory for this purpose (s121). The wording of s121 suggests that this includes Aboriginal relics, though the definitions (s3) excludes Aboriginal artefacts from the definition of archaeological relics. Archaeological relics in a registered place are the property of the Crown (s125).

It is an offence to damage or disturb unregistered relics and unregistered archaeological sites (s127) but one can pick up and collect an unregistered object from the surface.

A consent may be issued by the ED to uncover, expose, excavate, damage or deface, possess, buy or sell an archaeological relic (s129).

Where relics are discovered they must be reported to the ED or an inspector by the person who discovered it or by the person in charge of the construction where it relates to the construction or excavation of any land (s132). Note s132 (3), that ignorance the object was an archaeological relic, and the person could not reasonably have known, can be used as a defence. Thus it is important to obtain a professional assessment of a site.

Land may be acquired for the purpose of the Act s142.

Enforcement provisions Part 8 (ss146-183B).

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17. Wildlife Act 1975

17 Sept 2014

This Act appears to primarily relate to the regulation of taking, buying, selling, owning, displaying, breeding, disturbing, destroying, injuring, processing, hunting or experimenting on wildlife. In particular it relates to public land managed for wildlife conservation. It makes provision for licencing and permits. It also regulates wildlife tour operators.

The Act allows the removal of structures and crops found on reserves without authorisation: s19 (3-5). This could be relevant to levees.

s21(2) notes it is an offence to 'damage any structure or interfere with the flow of water into, out of, or within a State Wildlife Reserve or a Nature Reserve' (unless authorised under the *Water Act 1989*).

s67 of the *Flora and Fauna Guarantee Act 1988* suggests that lists of protected species have been made under this Act but I was unable to find specific reference such lists. The Wildlife Act only refers to species listed under the *Flora and Fauna Guarantee Act 1988*.

However s3 of the Act does give a definition of 'protected wildlife' as being *all* taxa other than those declared pest species or published in the gazette and 'wildlife' includes *all* Australian indigenous vertebrate taxa other than humans; certain specified non-indigenous species, hybrids between indigenous and non-indigenous and invertebrates listed under the *Flora and Fauna Guarantee Act 1988*.

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18. Flora and Fauna Guarantee Act 1988

1 Dec 2013

The purpose of the Act is flora and fauna conservation and the management of threatening processes and to offer a choice of procedures (s1). It does this through listing species; communities threatened with extinction; and threatening processes that threaten survival or evolutionary development of a wide range of species (s10).

Schedules 2 and 3 give lists of 'previously recommended' species, communities and threatening processes that the Governor in Council may include on the list 'without further recommendation' (i.e., without going through processes outlined in s10 (3), (6) & (7) & s16 of this Act - see s71).

The Act's objectives (s4) are technically not limited to those threatened with extinction but also aim for all Victorian taxa to 'survive, flourish and retain their potential for evolutionary development in the wild', including genetic diversity, sustainable use, community conservation education programs, provision of incentives and encouraging cooperative community endeavours. It does this through:

- Preparation of a Flora and Fauna Guarantee Strategy (s17-18)
- Action statements for listed species, communities, processes (s19)
- Declaration of critical habitat for listed species, communities, processes (s20)
- Make a management plan for 'any' taxa, community, process in consultation with landholder or water manager (s21-24). It's not clear whether this is intended to mean those that are 'listed' or whether it really means 'any'.
- Enter into an agreement with a public authority about the management of 'any' of the above (s25)

- Make an interim conservation order for the critical habitat of the 'listed' or 'nominated' of [the above] on either Crown or private land (s26). This can require works to be undertaken for conservation, can prohibit, regulate or manage activities or processes that happen within or outside the critical habitat (but that would adversely affect it) (s27). This is only valid for 2 yrs (s32). If a licence, permit or authority under another Act permits the harmful activity or process, it can be suspended (s38) but a permit may be granted for an activity or use (s40). An interim conservation order prevails over a planning scheme (s39). Compensation is payable (s43). Before the interim conservation order has expired, action must be taken to ensure the long term conservation of that taxa /community /critical habitat (s44).

Any flora may be declared protected, including non-indigenous flora (s46) (this regulates taking, trading in, keeping, moving or processing of flora) and fish (s52-53).

Other sections relate to general provisions for permits, enforcement, making regulations and so forth.

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19. Victoria's Biodiversity: Directions in Management 1997

The Flora and Fauna Guarantee Strategy, is authorised under ss 17-18 of the *Flora and Fauna Guarantee Act 1988*. The current version was published in 1997 under the title "Victoria's Biodiversity Strategy". It covers *all* taxa and communities (not just those listed under the Act), though it's hard to see how this document could adequately fulfil the Act's purpose and objectives. It was published in 3 volumes: Victoria's Biodiversity: Our Living Wealth; Victoria's Biodiversity: Sustaining Our Wealth; and Victoria's Biodiversity: Directions in Management:

<http://www.depi.vic.gov.au/environment-and-wildlife/threatened-species-and-communities/flora-and-fauna-guarantee-act-1988/ffg-strategy>

Volumes 1 and 2 do not mention floods or levees. Inland waters and wetlands have half a page in vol.1 giving an overview of their importance and degradation. Vol. 2 covers some issues and risks and general approaches.

Volume 3 seems most relevant as it includes 'management responses' and 'priority management responses'. It has sections on 'Wetlands' and 'Rivers and Streams'. It specifically mentions levees just once in the context of altered water regimes. Altered water regimes are responsible for: 'drastically [changing] wetland appearance and functioning, disrupting natural productivity cycles, causing changes in vegetation, including loss of existing species, and changes in habitat'. The document suggests that altered water regimes be addressed through management agreements with water authorities to take account of wetlands that are part of their distribution systems; CMA plans (salinity; wetland management; watering strategies); through bulk entitlements of water authorities and irrigators ('bulk entitlement conversion' and 'new allocation processes'). Most of this relates more to river regulation, including distribution systems that have leveed channels, than to flood control levees.

The document recognizes the value of wetlands in regulating floods naturally 'by storing floodwater and releasing it slowly'.

Approval of works and water shares [take and use of water] [water use] licences under the *Water Act 1989* requires consideration of the 'conservation policy of the government' and may include conditions relating to it: s33J(f), s36(1), s40(1)(i), s43(i)(iv), s48B, s48F(1)(c), s51, s51(1)(vi), s67, s68(b)(iv), s71(1)(b)(vii). I've not been able to find a document called the Victorian Conservation Policy so it may refer to conservation policies in general (in which case it is not clear whether this refers to environmental or heritage conservation or both, or something completely different like water conservation: dams to conserve water). However, this document may be relevant.

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**20. DEPI Flora and Fauna Guarantee Act 1988 Threatened List
Oct 2014**

**21. DSE Flora and Fauna Guarantee Act 1988 Processes List
July 2012**

Documents #20 and #21 were read together and considered collectively.

Lists created under the *Flora and Fauna Guarantee Act 1988*, s10, Schedules 2 and 3. These species, communities, their critical habitat and threatening processes are subject to management provisions and development controls under the Act.

The species listed include a number of riparian birds, insects, fish, frogs, crustacea, plants, so this could potentially affect levees built in riparian areas. Note the crustacea include five species of 'burrowing crayfish', which could potentially affect levee maintenance where close to banks (see Land and Water Resources Research and Development Corporation technical guidelines: [Guidelines to good practice for the Construction and Refurbishment of Earthen Channel Banks](#) which warns against burrowing creatures, their habitat and 'yabbies').

The threatening processes list includes processes that are associated with levees and/or flood control:

- Alteration to the natural flow regimes of rivers and streams
- Alteration to the natural temperature regimes of rivers and streams
- Degradation of native riparian vegetation along Victorian rivers and streams
- Habitat fragmentation as a threatening process for fauna in Victoria.
- Increase in sediment input into Victorian rivers and streams due to human activities
- Prevention of passage of aquatic biota as a result of the presence of instream structures
- Removal of wood debris from Victorian streams
- Wetland loss and degradation as a result of change in water regime, dredging, draining, filling and grazing.

[point 2 would be relevant to riparian vegetation clearance, e.g., if levees are built close to rivers and have to be maintained by removing all vegetation on them and within 3-5m of them. This could cause a rise in water temperature. However, it is more likely those writing the list had in mind cold water releases from dams. Point 4 could be relevant if a levee blocks connectivity, e.g., between watercourse and wetland].

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**22. National Parks Act 1975
1 Sept 2014**

Not much seems directly relevant to levees. Structures and works are not permitted in some types of park, e.g., Wilderness areas and Remote and Natural Areas (works are permitted in the latter if legally approved prior to becoming a park).

s30M For some other Parks a licence can be granted under section 51 or 67 of the Water Act 1989 that authorises the construction, installation, operation, alteration, removal or decommissioning of works. Other than this I was not able to find anything that might relate to private individuals' access to parks in order to maintain and repair levees on that land.

Schedule 1AA allows 'Licences for a pump, levee bank and cultivation-Gunbower National Park'

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**23. Forests Act 1958
1 Jul 2014**

This Act relates to forest policy and in particular the use and ownership of forest products in State-owned forests and licencing arrangements. Private forests can be acquired under the Act. It also makes special provisions for reserved forest and protected forest.

Protected forest definition (s3) includes 'all unoccupied Crown land proclaimed as a protected forest pursuant to this Act or any corresponding previous enactment and every unused road and every water frontage' (see Lands Act 1958).

Reserve land may be leased and is subject to covenants (s51) and providing the use is not detrimental to the purpose for which the land was reserved.

There is little that seems that relates to levees. Reference to works and structures on forest land relate primarily to transport and works enabling produce to be harvested and processed. s50(5)(ca) is broad enough that it could include levees: the Minister in Council can make regulations concerning 'the carrying out of works and improvements'.

s52 of the *Forests Act 1958* provides for forest licences and permits. The activities listed in the Act don't obviously cover levees. However, the *National Parks Act 1975* (Schedule 1AA) says that Forest Act s52 'continues to apply to enable licences to be granted under that section for the purposes of a pump, levee bank and cultivation on any part of the land described in Part 47 of Schedule Two [of the NP Act]'. I'm therefore guessing that s52(1A)(j) can cover levees under the catchall: 'any other purpose whatever relating to or connected with a state forest or forest produce'.

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24. Conservation, Forests and Lands Act 1987

1 July 2014

Part 4 (ss27-28) allows the DEPI Secretary to charge fees for any service, provision of information, registration, permission or approval granted by DEPI under any Act. This could have relevance to levees where a levee is on Crown land and private interests wish to maintain the levee.

Part 5, s31, the [DEPI] Minister may make Codes of Practice for standards or procedures relating to a relevant law. Presumably this could apply to levee standards.

Part 7, s66, requires public authorities to submit a plan of works for activities listed in Schedule 3 to the DEPI Secretary prior to commencement. The Secretary may then comment on any necessary measures needed to protect land, water or wildlife. The public authority 'must not take action' that conflicts with Codes of Practice developed by DEPI (s31) or the Secretary's comment 'unless.....' [there is no feasible / prudent alternative; all measures that can reasonably be undertaken to minimise adverse impact are taken] (s67).

s3: A public authority for the purposes of this Act means: a municipal council, a State Superannuation Board, an educational institution incorporated under an Act, or a body corporate declared to be a public authority via the Gazette. This doesn't make it clear whether CMAs are considered a public authority under this Act but I expect there must be a Gazette entry making them public authorities.

Schedule 3 of this Act includes work programs of Authorities (i.e., CMAs) under the *Water Act 1989* which suggests that CMAs are considered to be public authorities under this Act.

Schedule 3 activities include:

The annual works programmes of Authorities under the [Water Act 1989](#) that operate under Division 2*, but not Division 3, of Part 10 of that Act.

Construction of dams, weirs, or other structures, in or across waterways which potentially interfere with the passage of fish, or the quality of aquatic habitat.

Carrying out of developments within a habitat which has been determined to be a critical habitat under the [Flora and Fauna Guarantee Act 1988](#).

Part 8 (s69-70) gives the power to enter into agreements with landholders related to effecting the purpose and object of a law, including terms and conditions relating to land use, management, works for flora / fauna conservation, financial assistance and compensation for loss of income. This could possibly have relevance to the operation of private levees, or the use of land so that levees are not needed (flood compatible land use) – e.g., similar to what happened in the Lower Loddon buybacks when land that was resold had flood compatible land use conditions attached.

*NB: Part 10, Division 2 of the *Water Act 1989* relates to CMA functions for waterway management. This probably does not relate to levees which would logically be covered under Division 4 of the Water Act (relating to floodplain management, plans to minimise flooding and flood damage, s202). Part 10, Division 2 of the Water Act covers planning for State and

community social, economic and environmental needs in relation to land and waterway values. It also covers plans for specified purposes, e.g., Water Holdings and regional waterway strategies and plans: see ss189-190. Part 10, Division 3 of the Water Act relates to regional drainage.

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25. Project Development and Construction Management Act 1994

1 July 2014

s1 The main purposes of this Act are:

(a) to facilitate certain development projects in Victoria;

(b) to provide for the setting of standards and the issuing of directions in relation to public construction;
[etc]

s6 The Governor in Council, on the recommendation of the Premier, may, by order published in the Government Gazette, declare a development or proposed development to be a project to which this Act applies.

s29 The Minister may set standards, not inconsistent with any other Act or any statutory rule, relating to public construction.

The Act enables compulsory purchase and sets procedures for contracting etc.

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26. Building Act 1993

15 Oct 2014

s1: The Act regulates building work and building standards; provides for the accreditation of building products, construction methods, building components and building systems; provides a system for issuing building and occupancy permits; and regulates building practitioners [also matters relating to plumbing work].

s3 (definitions): building includes structure, temporary building, temporary structure and any part of a building or structure.

This could cover levees if levees are 'structures', however 'structure' is not defined, so this is not clear. The *Building Code of Australia* (used in the regulations) includes among its classes of buildings Class 10 '**a non-habitable building or structure**', including 'Class 10B: a structure being a fence, mast, antenna, retaining or free standing wall, swimming pool or the like.' Thus some types of levees or levee-like structures could be considered a Class 10 building.

As the Act regulates building in flood liable areas, it is also relevant to the *future* need for levees.

s.7 (1) the Governor in Council can make regulations to prohibit or regulate:

'(a) the construction, use, maintenance, demolition and removal of buildings;

(b) any matter relating to the safety of buildings...'

s.7(2) regulations, standards and requirements can relate to any matter in Part 1 of Schedule 1. This includes Schedule 1, Part 1, Clause 10: 'Prevention of flooding of buildings and designation of areas liable to flooding.'

ss.16-20 a building permit is required to carry out building work.

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27. Building Regulations 2006

10 Feb 2015

The building regulations cover flood in clause 802.

The regulations allow flood liable land to be identified in a variety of ways: using the *Water Act 1989* definition; if it's been identified as such in a planning scheme under the *Planning and Environment Act 1987*; if it's identified as such on a certified or sealed plan of subdivision (etc.); or if the council has identified the land as a waterway (according to *Water Act 1987* definitions), or land over which water may occasionally flow, including land affected by drainage system flows.

Where land is identified as flood liable (as above), a building permit needs to be applied for and consented to by the council [with exceptions at cl. 802(1) - e.g., Class 10* buildings; extension no greater than 20m² and at cl.802 (4) - if a planning permit is required or if floor height is regulated by a planning scheme].

A council 'must not give consent' if by doing so there will be a 'danger to the life, health or safety of the occupants'. This puts the focus on life-threatening locations, not locations where flooding would merely cause damage to assets, including to public assets that need to be built to service the new development. If Australia is looking at reducing its damage costs, maybe the economic consequences also need to be considered as part of consent.

The council may specify the floor height of the lowest floor in the building [802(6)] but first it must consult with the local floodplain management authority (i.e., CMA or MW). Floor height needs to be at least 300mm higher than flood levels declared by the Water Act 1989 [the Water Act specifies 1%AEP in s204] or by the CMA - unless the CMA consents to a lower floor level [802(7)].

Clause 1804: A council may exempt Class 10 buildings on farm land from the requirement to obtain a building permit.

*Class 10 buildings: see [Building Act 1993](#) section which quotes the *Building Code of Australia* definition.

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28. Levee design, construction and maintenance technical guidelines

2002

This technical guidelines document is due to be updated, consequent to ENRC flood review recommendations (see [Victorian Government response](#) to the recommendations). However, this had not been completed at the time this research was conducted:

'The Government supports the need to update material that provides guidance for building and maintaining levee systems, and to include guidance for the construction of ring levees around buildings and their immediate surroundings. DEPI will revise the Levee Design, Construction and Maintenance technical guidelines by 2014.'

The 2002 version provides guidance on levee location, preferring levees to be located on private land rather than river frontages 'as a principle'. This reduces the need for vegetation clearance, means that levees are built on land they are intended to protect and have less potential to restrict floodwater that would cause worse flood impacts (p.2).

Types of levees, their advantages and disadvantages, are discussed pp. 2-5; access requirements for various activities pp. 5-6. Various design aspects are covered (e.g., suitable batter where there is a need to mow in urban areas, crest and batter treatment (e.g., sealed, grass type that can be used, soil types), works (services) that need to be built under or through levees, and the pros and cons of different types of design features to enable drainage.

Design standards include the general rule that protection is needed against a 1% probability flood in urban areas, and 20-30 ARI for rural areas, with standard freeboard of 600mm (or greater where there is uncertainty), p.9. The 1% probability standard may change (see draft [Victorian Floodplain Management Strategy](#) which allows communities to choose a lower standard of protection, p.42).

Construction standards do not provide specifications as it is hard to cover all soil types and conditions. Instead it suggests an 'outcomes based' approach for large works (e.g., using compaction or moisture content specifications designed for that project), while a more prescriptive approach is appropriate for smaller works associated with levees, (e.g., specifying roller size to be used). Lower standards (e.g., of compaction) may be acceptable for minor rural levees up to 1m high (p.12). The Guidelines also cover contractual arrangements (p.13), fencing (pp.13-14), vehicle crossings (p.15) and design of services through levees (pp.16-19). Levee maintenance is also covered (pp.19-21). The current guidelines require annual inspections. Various threats to levees are discussed, including trees, rabbits, grazing, vehicles, slumping, the need to maintain crest height, to mow in certain situations and to maintain drainage structures.

The guidelines cover emergencies and there needs to be a response plan that includes:

'Details of individual levees, or strategic parts of levees, should be included in the plan. These should include longitudinal sections of the levee, the level of protection, any drains involved, including levels at which they should be closed, and when pumps should be started' (p.22).

A community awareness program is also required and guidelines include a list of issues that need consideration (p.22-23).

Appendix 1 provides a 'Components of an Earthworks Specification'.

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29. Regional Directions for Irrigation Development: regional irrigation development guidelines Northern Victoria July 2007

p.6 of the Regional Directions states that:

'Irrigation developments can pose a direct and on going risk to wetlands, remnant vegetation, fauna, and threatened species through clearance, salinisation, waterlogging and water quality issues.'

That irrigation channels and embankments pose a problem to the environment through loss of connectivity between wetland, floodplain and waterway does not appear to be recognised in this document. The focus seems to be on water quantity and quality.

The document also addresses cumulative effects of water use on drainage disposal (i.e., water quality, salinity etc.), biodiversity and groundwater infiltration. It anticipates this will be managed by placing conditions on water licences and building review mechanisms into licences. It suggests the 'trigger' for review would be nominated 'sum total of annual use limits' for a designated area. Linking cumulative effects to total water usage may be a good indicator of the magnitude of environmental effect but seems somewhat deficient in terms of cumulative effects methodology. For example, it does not establish baselines, ecological thresholds (and timing), establish assets that need to maintain connectivity and are sensitive to irrigation development.

Plans for siting, construction, operation and maintenance of works need to be approved (p.9) so there is the opportunity to ensure works are aligned / located to minimise impacts (see 'Policy for managing take and use licences").

p.10 clarifies respective roles of CMAs and Rural Water Corporations and other agencies. Water Corps are responsible (among other things) for issuing licences for new development (following these Guidelines); determining availability of water to enable development to proceed; approving farm irrigation systems (in line with these G/Ls); endorsing Irrigation and Drainage Plans; enforcing licence conditions.

The following advice on Irrigation Development Guidelines was found on the DEPI website:

<http://www.depi.vic.gov.au/water/rural-water-and-irrigation/managing-impacts-of-irrigation/irrigation-development-guidelines>

"Irrigation development guidelines (IDG) have been operating for up to 15 years in four northern Victorian catchments of Goulburn Broken, North Central, Mallee and North East. Following recent changes in the Water Act 1989 (the Act) there was a need to revise or develop the guidelines across Victoria.

IDG guide irrigation developments in meeting best practice standards to avoid or minimise the off-site impacts of irrigation water use. These enable due consideration of natural resource management issues in the catchment (issues identified in the regional catchment strategy, land and water management plan or other regional plans covering matters such as streamflow or groundwater).

The IDG document how any impacts will be accounted for, including relevant charges, when they will be implemented and how the fees will be recovered. IDG are regionally based and implemented by the relevant catchment management authority(s) (CMA) and rural water corporation(s) (RWC).

Irrigation development guidelines provide guidance, to both irrigation developers and government agencies, on the process, matters for consideration, conditions and approvals required to obtain or modify a water-use licence or take and use licence.

Irrigation development guidelines seek to:

- document the approval process for irrigation development applications

- offer a cost-effective way to demonstrate that a new irrigation development will proceed in a way that will avoid or minimise environmental impacts
- clarify linkages with other environmental or cultural heritage protection procedures and agencies
- reduce the uncertainty for prospective developers by clarifying standards and expectations.

IDG are developed to meet the specific needs and reflect the different characteristics of each region. They articulate the outcomes that licence conditions will be helping to achieve, the standard of information that needs to be provided for development proposals to be assessed, and the criteria that will be used to determine if all parts of the IDG process are required.

The irrigation development guidelines that apply to your part of the State can be accessed through your respective CMA's website."

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30. North Central Regional Irrigation Development Guidelines June 2008

The Regional Irrigation Development Guidelines (RIDG) are triggered when applying for:

1) Water Use Licences (WUL): The RIDG apply to applications for, or variations to, WUL for irrigation purposes where the proposed irrigation development:

- will occur on land for which there has never been a water use licence;
- involves an increase in the annual use limit in an existing WUL;
- involves an increase in the area to be irrigated in an existing WUL.

2) Works Licence:

The RIDG apply to all applications for a new works licence, renewal or variation of an existing licence for irrigation purposes.

Medium and high risk applications require a professional report or product by a suitably qualified or experienced person addressing specific information needs including, but not exclusive to:

- Preparation of an Irrigation and Drainage Plan (for content requirements see document #34);
- Appropriate planning approvals;
- Water Use Objectives (i.e. managing groundwater infiltration, disposal of drainage, minimising salinity, protecting biodiversity and minimising cumulative effects of water use);
- Cultural Heritage Assessment;
- Native Flora and Fauna Assessment;
- And other necessary development documents.

Licence application forms (general):

Licences were checked for provisions relating to 'levee like structures': primarily embanked irrigation channels. s306: All the Minister's powers, duties etc., under the [Water Act 1989](#) may be delegated except specified powers (such as the power of delegation). The Victorian Water Register website provides licence application forms for some types of licence (e.g., Water Use licence). Some licence application forms (e.g., Works licence) are produced by CMAs. North Central only offers a Works Licence Application form. Some forms are also found on the website of Goulburn-Murray Rural Water Corporation, which covers the North Central area. There is thus some complexity regarding the number of different bodies that administer licences.

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31. Goulburn-Murray Water Application for a Licence to Take and Use Surface Water and Operate Works (Unregulated)

nd

Goulburn-Murray Water Take and Use and Works licence application:

This form relates to licencing requirements under s51 and s67 of the Water Act.

Information requested includes: the property where water is to be taken; the property where water will be used; name of waterway/tributary; proposed water use (e.g., area to be irrigated in ha); water volume (ML/year); whether or not the land has been subject to an irrigation licence in the past, whether irrigation area or water volume will increase. The form also cross references requirements under the [Aboriginal Heritage Act 2006](#) to verify those obligations have been met.

This form would not provide all the information required to assess the numerous 'matters to be taken into account' listed in the Water Act 1989 that need to be considered when determining an application for a take and use licence (s53 of Water Act) or works licence (s68 of the Act). However, the form includes some questions that would trigger assessment via regional irrigation development guidelines (see [North Central Irrigation Development Guidelines](#) and this would provide more details about environmental impacts etc.

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32. North Central catchment management authority: application for a permit to construct and operate works on a waterway

nd

Note this application is for works on a waterway, and thus would not include levees / embankments unless built across a waterway. Requires information regarding property, waterway, as above. Details of the proposed works are needed, including written description, location sketch and sketch of the works themselves (dimensions, materials, location in relation to waterway / road; sketch of waterway cross-section; measures to protect the waterway bed and banks; sediment control; the need to contact the CMA where the proposal includes vegetation clearance or stream deviation; the possible need to supply further information. It is not clear how this form relates to the G-MW works licence application form.

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33. Application for a Water-Use Licence or Water-Use Registration Form 23

nd

Victorian Water Register Water-Use Licence (Water Use Licence under s64 0 of the [Water Act 1989](#); Water use Registration under s64AR)

Requires details of water volume (ML) required; property on which water will be used; proposed use (e.g., area of irrigated land and crop type). It also notes the need for an irrigation and drainage plan in the explanatory notes:

'If you are applying for a WUL to irrigate land not previously covered by a WUL, an 'Irrigation and Drainage Plan' must accompany your application. The Irrigation and Drainage Plan must be developed in accordance with the Water Corporation's "New Irrigation Development Guidelines." These can be obtained from your Water Corporation.'

It provides the option for applications to be assessed using the Irrigation Development Guidelines [see North Central Irrigation Development Guidelines, above].

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34. Policy for managing take and use licences

2 Feb 2014

The policy covers issuing licences (e.g., not exceeding volume limits for the catchment and other limitations on issuing licences in northern & southern Victoria; sustainable diversion limits); licence conditions & requirements (e.g., to protect the environment and other users; irrigation drainage plans; metering; etc.); processes for deciding on licences (such as advertising, referrals); recording of licences; transfer of licences

Schedule 1 provides methodologies for applying sustainable diversion limits based on estimates for almost 1600 catchments. Gives proportions of the total to be allocated between uses (e.g., industrial, irrigation, domestic & stock etc.) and offers methods for calculating extractions allowable between July & October. Each catchment has a minimum flow threshold (indicated by a gauge), as well as identifying limitations of methods. Sustainable diversion limits are used when deciding on 'trigger flows' and restrictions on taking water in winter.

Schedule 2 provides standard conditions for take and use licences.

An *irrigation and drainage plan* (clause 18) needs to accompany applications for new and varied licences that will allow new development or major expansion, to be endorsed by the Minister or delegated authority. Schedule 3 includes the content required for an irrigation and drainage plan. This includes a map of proposed development (property boundaries; areas to be irrigated; crop type; existing development; location of resources; location of proposed development; existing native vegetation & wetlands). It also requires a topographic survey with a gradient limit of 1:50 for flood and furrow systems; a soil assessment; crop requirements; maximum application rates; irrigation system specifications; map identifying supply points and area to be irrigated; proposed irrigation scheduling arrangements. Irrigation design must be completed by a certified irrigation designer. The plan also needs to include arrangements for drainage disposal and biodiversity protection arrangements for native vegetation, wildlife habitat and wetlands (preventative measures, monitoring parameters and arrangements, corrective action thresholds, procedures, time limits, reporting, auditing, etc.) This is relevant to cumulative effects management.

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35. Improved flood protection for Kerang community (Media Release: Minister Peter Walsh)

http://www.peterwalsh.org.au/_blog/Media_Releases/post/improved-flood-protection-for-kerang-community/ (accessed 26.2.2015)

April 24, 2014

36. Walsh opens upgraded Kerang levee (ABC News)

<http://www.abc.net.au/news/2014-04-25/walsh-opens-upgraded-kerang-levee/5411368> (accessed 26.6.2015)

25 Apr 2014

37. Announced Local Government Infrastructure Program Grants (2011- current)

<http://www.rdv.vic.gov.au/about-us/announced-funding/lqip> (accessed 26.2.15)

1 Dec 2014

38. 'Town levee works' in The Northern Times (reporter: Farrah Plummer)

<http://www.thenortherntimes.com.au/story/217373/town-levee-works/> (accessed 13/10/2014)

23 April 2012

39. Post-flood interview with a Gannawarra Shire official [unpublished extract]

2012

40. 2012 Flood Recovery Community Infrastructure Fund

Feb 2011

41. Floods Community Recovery Fund Funding Guideline for Community Organisations and Local Councils

Feb 2011

Documents #35, #36, #37, #38, #39, #40 and #41 were read together and considered collectively.

The Walsh media release provides details on funding provided for the Kerang levee upgrade and extension.

Amounts allocated include:

\$500,000 (The Commonwealth through the [Natural disaster resilience grants scheme](#) (NDRGS))

\$500,000 (The State of Victoria through NDRGS)

\$770,000 (Regional Development Victoria)

Regional Development Victoria (RDV) has provided regional growth fund money under several programs, including the *Local Government Infrastructure Program*. The RDV webpage provides a list of projects funded since 2011 (up until 1 Dec 2014 when the webpage was last updated), including \$285,000 spent on Kerang levee. This does not tally with the \$770,000 amount reported by media releases and articles. None of the projects listed under other RDV programs include the Kerang levee. There is also no mention of the Seymour levee, which media releases also attribute to RDV.

The RDV website provides no information about how its programs are run, i.e., from media releases, it sounds as if this is considered to be the 'local government contribution' to levee projects. If this is the case, are funds considered to be an allocation to local government? How are funds allocated between local governments and regions? Is it proportional? Does there need to be a project proposal? Are funds allocated by considering relative local needs? How much autonomy do local governments have to determine how the money is spent? The website offers no information about how projects are selected, what types of projects are eligible or selection / prioritisation criteria. No application guidelines are provided (or does this program not require application?)

RDV staff were contacted to clarify these points. They sent 2 documents relating to RDV application guidelines: *2012 Flood Recovery Community Infrastructure Fund* (document #41) and *Floods Community Recovery Fund Funding Guideline for Community Organisations and Local Councils* (Feb 2011) (document #42). Selection criteria are based on 'what-why- how - who', equally weighted. The guidelines state that 'civil infrastructure such as roads and bridges' are ineligible for funding, nor community assets on Crown Reserve Land, nor municipal and public assets eligible under the National Disaster Financial Assistance Schedule. This would appear to make levees ineligible. A further query regarding the discrepancy about the Kerang levee funding amount (and the missing RDV Seymour levee funding) and the LGIP funding guidelines received no response.

The *Northern Times* article provides extra details about the location of new Kerang levees:

"PLANS to build additional levee banks around Kerang are underway....**Additional banks will be built to the north and south of the town** by April 2013, focusing on the Murray Valley Highway south of the town, as well as Kerang-Murrabit Road and Lower Loddon Road to the north. All three locations were the focus of extensive sandbagging works during last year's floods.

The Murray Valley Highway levee would protect the south of the town from the Loddon River if its banks overflowed. The Kerang-Murrabit Road site would negate flows from Pyramid Creek, whilst the Lower Loddon Road site would protect the town from the banking of water near the Kerang weir and the Loddon River/Pyramid Creek junction."

(NB: information on levee location was also provided by other sources but in less detail)

The location of additional banks is interesting in the context of the [Gannawarra Planning Scheme](#) and the [Loddon Mallee Regional Growth Strategy](#). These promote consolidation and expansion of Kerang, with expansion to take place to the **north and south** of the town. This almost suggests that additional levees are being built partly with the intent of facilitating the development of flood prone land. This will result in greater potential for damages in the future.

The comments of a local government official from the area (interviewed in 2012) show the effect of levees on natural drainage patterns around Kerang and suggest (to me) that promoting further development of this area is not good policy:

"Our area is situated on three catchments. So we have the Avoca River catchment which is the flood that affected Charlton. So it came out of that Avoca region, came through Charlton, onto a small little township of Quambatook and then onward into Kerang Marshes north of Kerang. So that was one catchment we had to deal with.

The catchment in the centre of our shire which is the Loddon River, that collected all the water coming out of the Loddon system. So coming out of Laanecoorie Reservoir, in behind Maldon...that all came through our area. Then we got all the Bendigo water around through Kow Swamp and Pyramid Creek. All that water intersects within our municipality and that's why the impact was so severe....**We essentially had a front of water which was estimated to be 54 kilometres wide and 90 kilometres long bearing down on the township of Kerang.**"

"The other issue that we have here, is it's very flat and we've only got about a one metre fall in 18,000 [metres].... one metre in 18 kilometres so the ground's quite flat. It spreads quite vastly....so the water stayed in our area..."

"I've heard old people's talk about the flood in 1909 where they had a similar peak discharge from Laanecoorie and the Loddon system and the flood essentially came through and just ran straight into the Murray River. So it just flooded over, ran the whole way right through and just poured into the Murray River and away it went. It wasn't held back behind levee banks ... we had to pump the water back out over those levees back into the natural carriers."

42. Reducing flood impacts for Victoria

<http://vic.liberal.org.au/News/MediaReleases.aspx?id=7131&title=Reducing%20flood%20impacts%20for%20Victoria> (accessed 22 Nov 2013)

17 Oct 2013

This is a Coalition media release (Minister Walsh), reporting that the Victorian government has funded 28 floodplain management studies 'for at-risk communities like Rochester, Numurkah and Bendigo to help determine levee priorities for local areas, including whether new levees are needed'. Presumably the [RAM](#) was used to assist prioritisation.

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43. Natural disaster resilience grants scheme - Victoria: applicant guidelines 2014-15

Aug 2014

The Natural disaster resilience grants scheme (NDRGS) is funded through Emergency Management Victoria, by the State Government of Victoria and the Commonwealth. No list of successful grants appears to be available, but media releases indicate that it partially funded recent Kerang levee upgrades and additions, along with the [Local Government Infrastructure Program](#). The former provided \$500,000 funding from the Commonwealth and \$500,000 from the State of Victoria; the latter provided \$770,000, deemed to be the local government contribution.

The guidelines provide information about how NDRGS applications will be assessed. This includes:

- The quality of the application and significance of the need for the project
- The potential value of the outcomes and outputs
- Applications that most effectively address 7 National Strategy for Disaster Resilience (NSDR) 'key action themes' (listed)
- Address the disaster risk profile of a region or locality (i.e., aligns with priorities in [Emergency Risks in Victoria](#))
- Social inclusion /those with disabilities/ Koori inclusion.

The NSDR themes do not include structural works but relate to 'empowering', 'communication', 'leading', 'partnering', and 'understanding risks'. They are not specific and some are open to interpretation. For example, 'Supporting capabilities for disaster resilience' could be widely interpreted (however, in the NSDR, the text relates to emergency response capacity). 'Reducing risks in the built environment' could easily be interpreted to mean levees, though in the strategy itself, it refers more to land use planning that reflects risk, betterment when rebuilding, including the consideration of the appropriateness of rebuilding in the same location following a disaster. The NSDR does not (specifically) advocate for structural solutions. Note land use planning would almost certainly be regarded by the Victorian applicant guidelines as the core business of an applicant organisation, thus a 'lower priority'.

Funding for multi-year projects cannot be guaranteed funding beyond a year (due to renegotiation of a National Partnership Agreement at the time the document was written). However, staged projects will be supported if they yield a useable outcome within a year.

Acceptable funding is usually between \$10,000 and \$250,000. However, larger projects appear possible: 'For projects costing over \$5 million, the project manager must ensure that only a builder or builders accredited under the Australian Government Building and Construction Occupational Health and Safety Accreditation Scheme is contracted.... Where the value of Australian government contribution to a project exceeds \$5 million and represents at least 50% of the total construction project value, a successful applicant must ensure that compliance with the Building Code 2013 is made a condition of tender for all contractors and subcontractors who tender for the Project.' This might be relevant to a levees project.

For flood projects, little information is provided on priorities. The guidelines note that funding is given for flood risk assessments and flood warning system infrastructure projects and that urban stormwater projects are ineligible. Projects located in areas lower than 5m AHD or within 1km of the coast need to comply with the Victorian Coastal Strategy 2008.

A list of successful projects is not publically available. I emailed the NDRGS liaison officer to find out if a list of successful projects since 2011 could be sent and also asked if there were more detailed assessment criteria for flood

projects, as well as what types of projects are eligible – for example, would house raising, relocation, ecosystem based approaches be eligible. No response was received.

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44. Natural disaster resilience grants scheme - Victoria: application form 2014-15 Aug 2014

Application form offers 3 broad categories of project - these include:

- A. the level and type of risk and/or knowledge about it and/or community understanding of it, and/or actions to reduce it (relates to National Strategy for Disaster Resilience (NSDR) themes 2, 3, 6)
- B. a need, shortfall or gap in community resilience or emergency management capability or capacity, that could include volunteer recruitment, training or retention (relates to NSDR themes 5, 7)
- C. a need/opportunity for enhanced resilience outcomes through collaborative effort that could include research, development or knowledge transfer (relates to NSDR themes 1, 4)

Any projects relating to levees are likely to relate to A. 'actions to reduce [risk]' and NSDR theme 6, 'reducing risks in the built up environment' (themes 2 and 3 are about understanding & communicating risks respectively).

Q.8 requires a statement about how climate change will be addressed.

Q.10 requests details about any community consultation processes

Q.20 requires details about how the proponent will fund future maintenance (if applicable).

Q.23 requires details about any approvals needed for the project to go ahead.

There is no project assessment tailored to levees. There is no mention of cost-benefit analysis. There is very little to guide the types of 'actions to reduce [risk]' that are acceptable or (where the project concerns levees), conditions for levee funding (such as having adequate development controls already in place or ensuring development controls behind levees, or the need to have contingency planning for residual risk). The guidelines are incredibly vague, as are assessment criteria.

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45. Emergency Risks in Victoria Feb 2014

This document is referred to in the [natural disaster resilience grants scheme applicant guidelines](#) as a means of assessing priority projects: flood is covered pp.21-24. It is produced by Victorian Department of Justice and covers many different types of emergency risks, not only natural ones. Flood is placed relatively high up on the risk profile for both increasing consequence and likelihood (bushfire has higher likelihood), pp7-9.

Flood priorities (p.22) include:

land use zonings and flood overlays that impose restrictions on building in the most flood-prone places, in accordance with the level of risk

flood detection and warning systems combined with community knowledge about and preparation for floods, including evacuation planning

Levees and enhanced drainage works 'can be useful for some key locations but are very expensive'. Levees are referred to in appendix 1 under 'mitigation controls' (pp.48-49), noting that they 'prevent floodwater from reaching buildings' but they are only as effective as their height.

'Currently there is increased emphasis on gaining better flood knowledge, making that knowledge more accessible to the local communities and using it to consider a wide range of mitigation, flood detection and warning and response measures. As current building stock in flood-prone areas is replaced over time, risk reduction requirements, such as elevated floor levels, are imposed.' (p.22)

In terms of future risks, the document acknowledges climate change and demographic changes such as population growth in floodplains, including rural towns, and intensification of the built environment (p.23) [I presume the latter means subdivision and urban infill].

In other words, levees are not seen as the preferred solution to flood problems in Victoria except in 'key locations'. This seems at odds with expenditure, as according to the [Climate Change Adaptation Plan progress report](#): '\$7.6 million has been spent on the construction of levees and other flood mitigation works'. The 'Emergency Risks' document indicates that better land use planning, based on improved flood information and improved flood warnings is the preferred strategy. Regarding future risks, the document observes there are issues with the development of flood-prone rural areas and 'intensification'. This suggests that such development should be tightly controlled. I'm not sure this is actually happening: see the [Loddon Mallee North Regional Growth Plan](#) which covers the Kerang area.

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46. Rapid Appraisal Method (RAM) for Floodplain Management May 2000

The draft [Victorian Flood Management Strategy](#) (VFMS) indicates that the RAM is going to be amended:

'Refined methodology will allow more rapid and consistent evaluation of floodplain management measures in a cost benefit analysis framework' (p.22)

The revised RAM will provide a consistent risk assessment framework in order to assess flood risk priorities in *regional floodplain management strategies* (authorised under the [Water Act 1989](#) s202): see VFMS p.21-25.

The current RAM document looks at ways to assess flood damages (AAD), direct, indirect and intangible costs (including health and safety, p.41-45). It is also concerned with the intangible impacts of structural flood management options. These include environmental issues such as waterway stability, sedimentation, water quality and floodplain biota (p.45-58). An index for judging environmental impacts is provided, including the use of weighting factors for intangible impacts (p.54). Weightings are to reflect the relative importance of impacts.

It advises a discount rate of 30 years (p.6) – this appears inadequate when applied to levees as levee problems may take many years to emerge (e.g., maintenance costs may be minimal in the first 30 years, and it can take many years for landscape-scale impacts of multiple projects to manifest). This also seems deficient if levees are used to address changes in flooding related to climate change – which will play out over a much longer time span. Structural works that only look 30 years into the future could merely delay the inevitable and result in much greater loss of assets (when the inevitable happens) than would otherwise have been the case if a different approach had been taken.

While indirect costs are touched on, (e.g., the role of levees in preventing salt from being flushed through the soil profile, p.84), RAM does not look at cumulative effects of projects, and only touches on incremental impacts (in the context of irrigation and drainage infrastructure and the polluter pays principle), once. RAM appears to be applied project-by-project. However, its use in *regional flood management strategies** could potentially consider cumulative effects and incremental change.

RAM provides a number of examples of how to apply the RAM, including structural mitigation, flood warning and statutory planning. There is no mention anywhere in the document of how to assess house raising, relocation or ecosystem based measures to restore natural floodplain storage (e.g., improved connectivity and retrofitting structures or revised management). Retention basins are covered, including environmental benefits (p.52-53). However, this does not appear to extend to natural wetlands. Appendix 2 on wetland valuation does not include flood mitigation benefits.

*NB: it appears funding has not been available for this CMA function in recent years, so most strategies are outdated (see [NCCMA submission on the draft VFMS](#)). While current policies reinforce the importance of basing flood management on *regional flood management strategies*, there is no guarantee that funding shortfalls will not occur again in the future when the country is once more subject to a decadal drought and the electorate has lost sight of flood threats.

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47. Climate Change Act 2010

8 March 2013

ss7-13 provide 6 principles that the Minister needs to take into account when making ministerial guidelines under s15 of the Act and when preparing a Climate Change Adaptation Plan under s16 of the Act. These principles are: informed decision making, equity, risk management, integrated decision making across government, complementarity with other levels of government, and community engagement.

Schedule 1 includes provisions of Acts that require decision makers to take climate change into account (s14). Among them, consideration of a draft Sustainable Water Strategy by the Minister under s22G of the [Water Act 1989](#) and the approval, refusal, recommended amendment or revocation of a management plan by the Minister under the [Catchment and Land Protection Act 1994](#), Schedule 2, clause 3 & 7.

Possibly the most relevant part of the Act is s16 which authorises the development of a [climate change action plan](#). A new plan must be prepared every 4 years, starting from 31 Dec, 2012. It is to contain: an assessment of potential climate change impacts and risks at both state and regional levels, to specify roles and responsibilities, priorities, adaptation measures and responses, data on observed changes, to provide a synthesis of best climate change science on climate change in Victoria and to report on the implementation and effectiveness of the previous plan.

The remainder of the Act mainly relates to carbon measures (e.g., forest carbon or carbon sequestration). Interestingly, the Act includes Part 5, Division 4 on fire suppression and prevention (ss57-61), but nothing on floods.

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48. Climate Change Adaptation Plan March 2013

The plan provides climate change impacts, including fewer but heavier rainfall days, sea level rise, storm surge and increased risk of floods (p.6).

The Act's 6 principles are listed and explained. The principle: 'integrated decision making across government', includes mainstreaming but also: 'develop adaptation actions with co-benefits' and 'avoid maladaptation, so that actions taken to avoid or reduce vulnerability to climate risks do not impact adversely on, or increase the vulnerability of other systems, sectors or social groups' pp. 8, 90. (i.e., Barnett & O'Neill (2010), the source I used to categorise levees as *maladaptive* in Wenger, 2015: <http://dx.doi.org/10.1139/er-2014-0060>). The equity section recognises that 'Planning and decision-making should take into account that some Victorians may be more vulnerable to climate-related impacts and may require greater support.'

The Plan notes that 'Roles and Responsibilities for Climate Change Adaptation in Australia' was prepared by all levels of government and the Local Government Association through the Council of Australian Governments' Select Council on Climate Change (SCCC), adopted in November 2012.

National priorities include water resources, coasts and emergency management.

One of Victoria's priorities is 3.3: Building disaster resilience and integrated emergency management. This section covers the all hazards, all agencies approach, building community resilience and safety, and vulnerable communities (i.e., the elderly, those on low incomes, those with chronic health issues or otherwise socially disadvantaged). Other than these areas, specific prevention measures are not discussed (e.g., land use planning, levees). For measures to build community resilience, the Plan refers to the [Victorian Emergency Management Reform White Paper](#). However, the importance of land use planning to manage flood risk is touched on p.35.

"The Victorian Floods Review (2011) also identified the need to look at the requirements for ensuring building greater resilience into how we manage infrastructure, plan and protect our settlements and design new developments in the context of flood risks. Land use planning is also considered to be the most effective means of reducing future risks and damages from flooding."

Although this has been written into the CCAP, it has not been taken on board. See draft [Victorian Floodplain Management Strategy](#):

'The [Victorian Flood Review] questioned if the 1% AEP flood should still be used as the designed flood event in Victoria. The Victorian Government has determined that the 1% AEP flood is the appropriate standard to regulate and protect new development through the planning and building systems' (p.27)

explaining on p.10:

'the costs of mandating higher floor levels for new buildings would be hard to justify outside the 1% AEP flood'.

Floods and storms are covered pp.48-49 and coastal inundation is on pp.50-51. Levee management is mentioned as part of strategic planning for risk mitigation.

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49. Building a climate resilient Victoria: Victorian Climate Change Adaptation Plan progress report 2014

Against priority 3.3, the report notes that 'to date' the FloodZoom Program (DEPI) has provided \$7.6 million towards the construction of levees and other flood mitigation works to improve community resilience to flooding (p.6). See the comment about the [Climate Change Adaptation Plan](#) principle to 'avoid maladaptation': levees display maladaptive characteristics.

The FloodZoom program was launched in 11 May 2011 and offers a total \$25 million over 4 years. NB: dates and figures were located on: on DEPI website, 'FloodZoom', <http://www.depi.vic.gov.au/water/floods-and-floodplains/government-flood-initiatives/floodzoom> [Accessed 12 Feb 2015].

The amount spent on levees can also be contrasted with the amount (\$1.2 million) spent on the program's stated purpose:

'a flood warning repair and improvement program focusses on improving warning systems, mapping and risk assessments and a web-based intelligence platform.' (p.6)

There is little publically available information about the program on the DEPI website, e.g., there is no list of FloodZoom projects funded, types of projects eligible, prioritisation methods, proposal evaluation criteria. A request to DEPI for this information yielded no response.

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50. Victoria Flood Database update specification March 2009

51. FMA Conference Paper: 'The Victorian Flood Data Transfer Project' (Gauntlett & Cawood) 2000

Documents #50 and #51 were read together and considered collectively.

Victoria started collecting information on levees in 1998 through its flood transfer data project, including topographic plans of levees, irrigation channels and bridges. Information is now held in the Victorian Flood Database (VFD) with updates on levee ownership, height (in metres, AHD), condition and modifications. Both levees and 'flood structures' (where 'levee' is not the primary function) are included in the dataset.

The update specification document indicates that revised information is provided by consultants when they undertake a flood study. Information derived from water licencing, held in the Water Register, appears to have no relationship with the VFD.

A request was sent to the former Department of Environment and Primary Industries (DEPI) to determine (a) how many Victorian towns have levee protection and (b) whether it is possible to obtain from the database information about the extent (km) of levee-like structures such as irrigation embankments, roads and (c) other information such as format, purpose, type of information kept, information origin, etc. DEPI has recently been merged with the Department of Transport, Planning and Local Infrastructure (DTPLI) to form the Department of Environment, Land, Water & Planning (DELWP) staff responded by email and telephone. 32 towns have levees, roughly 91 km (slightly less than the 100km reported in ENRC Inquiry report). For rural levees, they agreed the figure of 3,920 km reported by the ENRC Inquiry / former Department of Sustainability and Environment (DSE) submission was probably about right, although noted that it is difficult to extract an exact number of kilometres. They noted that the extent of levee-like structures is even harder to determine. However, information on 'all structures' is held in a GIS database. The information can be incorporated into flood modelling projects to assess flood behaviour, and is used to inform emergency response and land use planning.

NB: This is different to the situation in other states where such information is kept on individual files. For example, locational information is kept on individual work files in NSW. The fact that in Victoria the information can be compiled into a GIS model makes this information very adaptable and it could potentially be used for other purposes. For example, potentially it might be able to be used to model cumulative effects of levees and levee-like structures on flood behaviour across catchments and compare this with a 'greenfields' scenario.

The Victoria Flood Database is also a repository for other information such as flood extent overlays and historic flood levels, which is collated from other sources. Much of this information can be used by consultants undertaking flood

studies. Information in the Victorian Database is updated as better information becomes available. As well as from flood studies, information derives from levees audits. These occur intermittently and are usually triggered by major flooding or investigation of flood mitigation options, so there may be inconsistencies and data gaps. The more recent levee audits were conducted for urban levees (outside Melbourne) and rural levees across northern Victoria in 2011-12.

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52. Victorian Government's Response to the Environment and Natural Resources Committee Inquiry into Flood Mitigation Infrastructure in Victoria Oct 2013

This document states the government's position regarding ENRC Inquiry recommendations and how it will address them. The section most relevant to levees is on pp. 6-25.

The revised [Victorian Floodplain Management Strategy](#) (VFMS) will be the main vehicle for policy changes.

Revised Australian Rainfall and Runoff guidelines will address climate change, incorporating it into flood studies and design & planning decisions (p.10).

Regional flood strategies prepared by CMAs will determine floodplain management priorities, funding requirements and cost sharing arrangements. Local government will prepare (with CMA advice) local floodplain management plans, which should include specific measures agreed such as flood mitigation infrastructure (p.11). Any decisions to fund infrastructure will be based on beneficiary pays principle and capacity of local beneficiaries to implement the scheme and pay ongoing management costs. For priority levees, management under a Water Scheme (through the *Water Act 1989*) is preferred (p.12).

The VFMS is to include: roles and responsibilities for managing and maintaining levees of various types, and also principles for managing and maintaining levees (e.g. cost sharing, regulating levees on private land, inspection and maintenance requirements and removing non-priority levees), p.13.

Among the 6 *general principles* listed (p.14):

'Levees are not the primary response to mitigating flood hazards, particularly for new development.'

[NB: These principles are **not** provided in the draft VFMS].

The government response notes the importance of contingency planning for levees and ensuring areas behind levees can cope with inundation (p.15). Need for management and maintenance of existing levees will be prioritised through CMA revised Regional Flood Strategies (p.15). Those deemed priority levees need to be under formal Water Scheme arrangements under the *Water Act 1989* (p.16), though they can also be brought under formal arrangements under the *Local Government Act 1989*. For low priority levees, funding will not be available for their repair or restoration (p.17, 21): [NB: the document seems to use 'low priority' and 'non-priority' interchangeably].

'There will be many situations where levees are not formally managed by an Authority. The government will not contribute to the repair of these non-priority levees. This policy will be reinforced in the Victorian Floodplain Management Strategy. Unless the beneficiaries of such levees maintain them (informally on private land, or under licence on Crown land), over time, **they will become a legacy of history and will gradually weather away.**' (p.17)

This is a remarkable policy of non-intervention which may eventually see the connectivity of many waterways and their floodplains restored.

Access to levees for maintenance on private and public land is covered on p.18. Streamlining approvals for maintenance of levees on public land (providing no increase in height, footprint) is supported, noting that stronger controls over activities (e.g., vegetation removal) are needed in National Parks (p.19-20). A funding model is outlined, p.20, based on funding principles (that govern whether or not and in what circumstances the government / the beneficiaries will be responsible for funding construction, repair or maintenance). Regarding construction of new levees:

'Government funding will not be provided without clear evidence that the works are cost effective and that a reasonable majority of property owners support the proposed works.'

New levee projects will only be eligible for government funding if they are justified through a local floodplain management plan, which considers a number of options for mitigating flood risk, and they have a favourable cost benefit analysis.'

The document anticipates strong Commonwealth support for the construction and restoration of priority urban levees.

Provisions for regular maintenance, inspection and auditing are needed for priority levees, but it notes audit costs are high, so this task needs to be done strategically because there will never be sufficient money to check the height and condition of all private levees, even though this information would ideally be available to emergency services (p.21). This is a key affordability issue. It raises questions such as: are management requirements such as auditing factored into cost-benefit analysis (for public levees)? How important is the function and reliability of private levees to emergency services? How significant are the potential impacts of private levee failure to nearby properties? Should private levee owners be required to pay a contribution towards regular state audits? If basic management requirements like auditing are unaffordable, should we be building / approving levees?

Information on the standard and location, and any spatial information on new or upgraded levees or levees, will be incorporated into the Victorian Flood database (see documents #50, #51), and this will inform emergency response (p.21). The government response supports the ENRC Inquiry recommendation that [Levee Design, Construction and Maintenance Technical Guidelines](#), especially sections relating to construction, maintenance and ring levees, need to be updated (p.22). Levees are to be incorporated into municipal emergency response plans identifying 'agreed activities during a flood such as use of temporary levees'. [NB: the current (2002) technical guidelines already require levees to be incorporated into local response plans]. A decision-making policy will be put in place to allow incident controllers to breach or construct levees during a flood and the state will shoulder liability (p.23). The government response supports collaboration where infrastructure may affect flood behaviour (p.23) and developing cross-border arrangements (p.24). Its position on critical infrastructure seems ambiguous: while allocating overall responsibility to the state, it requires operators to put in place risk management strategies with no loss of service (p.24). It clarifies the government position on temporary (demountable) levees, i.e., only where incorporated into an emergency plan and not to be shared (p.25).

All the above is pretty well reflected in the draft VFMS, although, as discussed, general principles have been omitted.

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53. Victorian Emergency Management Reform White paper Dec 2012

This paper does not discuss levees but responds to Neil Comrie's 2011 Review into Flood Warnings and Response (Victoria). It covers aspects such as resilience, community participation, emergency response and recovery roles, responsibilities, administrative structures and how to realise the all hazards, all agencies approach.

The main point that could apply to levees is the recognition of the importance of community involvement in planning and mitigation:

'Expert technical knowledge and resources will be provided to support community processes, acknowledging that it is the community's role to agree on its risks and determine an action plan.' (p.4)

Thus, the community has a primary role in determining mitigation options.

Land use planning is only lightly touched on: 'Land use planning policy must fully account for a location's risk profile to properly determine the nature and extent of new developments.' There is no discussion about Comrie's advice that planning for 1% AEP might be inadequate (see Comrie Report p.197), nor (given the document's bottom-up flavour) what would happen if a community decided its preferred option was to implement more stringent planning controls.

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54. Draft Victorian Floodplain Management Strategy (VFMS)

26 June 2014

This replaces the former *Victoria Flood Management Strategy 1998* under which CMAs developed Regional Floodplain Management Strategies. The regional strategies set priorities for flood mapping, flood studies & floodplain management plans; statutory planning; flood awareness and education; and asset management. At time of the ENRC Inquiry, the VFMS was under review and at the time this research was undertaken the new Strategy was only in draft.

The strategy covers prevention-response-recovery aspects of flood management and aims to respond to recent flood inquiries. It also assigns responsibilities.

p.15 provides a useful table of activities undertaken at state, regional, local levels. DEPI is responsible for the VFMS [as well as various guideline documents mentioned in the text]. CMAs are responsible for regional floodplain management strategies based on a state-wide risk assessment framework; CMAs and or councils are responsible for commissioning flood studies, for identifying mitigation response; CMAs issue permits for mitigation works; councils are responsible for Water Management Schemes (includes levees) and for managing & maintaining flood mitigation infrastructure.

Regional floodplain management strategies [developed by CMAs under the *Water Act 1989*] are expected to align as closely as practicable with the policies and objectives of corresponding regional waterway management strategies (see *Victorian Waterway Management Strategy*). The Government is preparing a framework to authorise individuals, infrastructure managers, councils and other authorities to carry out flood mitigation activities on waterways, including large-scale flood mitigation projects (e.g., urban communities), as well as small-scale activities (e.g., individual landholders), clearing vegetation, and removal of debris and sediment (p.48).

Meanwhile the Department of Transport, Planning and Local Infrastructure (DTPLI) is responsible for Regional Growth Plans, which are meant to:

'support strategic planning at the regional level. Regional Growth Plans recognise the impacts of natural hazards, including flood, and set strategies for development to be located away from flood hazard areas and, where relevant, areas that are prone to coastal inundation as a result of climate change' (p.28).

[this implies climate change is only recognised in relation to coastal flooding, although AR&R is mentioned elsewhere]

Planning schemes need to be consistent with regional growth plans and councils have to consult with CMAs and the SES about access and egress for proposed development (pp.28-29).

With regards land use planning, the draft VFMS emphasises the importance of 1:100 ARI (preferring 1% AEP as a term):

'the costs of mandating higher floor levels for new buildings would be hard to justify outside the 1% AEP flood'...
'Emergency services need to be able to plan with their communities for flooding beyond the 1% AEP event' (p.10);

'of particular importance for land use planning ... the 1% AEP flood level.' (p.20);

'The Victorian Government has determined that the 1% AEP flood is the appropriate standard to regulate and protect new development through the planning and building systems.' (p.27);

'The impacts of floods rarer than the 1% AEP flood (i.e. less than 1% AEP) are not regulated through the planning and building systems' (p.27).

Note this does not mean development is not allowed in areas below 1% AEP. It means developments in such areas would have to be built to standards, e.g., floor height levels, and maybe have floodwater diverted (p.27).

However community infrastructure (listed on p.27) must be located 'outside' these (1% AEP) areas [NB: other documents require community infrastructure to be located above the level of Probable Maximum Flood if possible, see *State Planning Policy Framework*].

Other levels are cited as being important for emergency management planning and setting insurance premiums that reflect risk; flood maps are to 'include information for a range of floods, from 20% to 0.1% AEP - and rarer floods where appropriate' (p.20).

Vendor disclosure already applies to planning controls and bush fire risk. So within 1% AEP is / will be covered once planning schemes incorporate it. But the document notes that Victoria is looking to include flood risk in vendor disclosure outside the 1% AEP flood (vendor statements are covered by the *Sale of Land Act 1962*). DEPI, Consumer Affairs, DTPLI are consulting on this: p.59. If this is successful, disclosure provisions will be stronger than in NSW.

The draft VFMS mentions climate change in relation to revised Australian Rainfall and Runoff (AR&R) tables (p.24). Government funded flood maps will 'be informed' by the most recent AR&R (p.20). AR&R will also guide appropriate climate scenarios to consider as part of the development of regional floodplain management strategies (p.24).

'[Councils] are also responsible for ensuring that planning controls apply to developments **in low-lying areas behind levees**. As discussed in section 13.1.4, this is necessary to take account of the residual flood risk caused by storm water flooding behind levees and by the overtopping of levees' (p.29).

'Councils are responsible for ensuring that their Planning Schemes help to minimise or avoid the growth in the risk of flooding **in the lowest-lying parts of those areas protected by levees**' p.42.

[i.e., increased development elsewhere behind a levee is considered acceptable!] Development controls behind levees are left to councils (despite levee being funded primarily by state and federal governments). Moreover, controls are only expected in the 'low-lying areas' behind levees. A location considered so high risk that it required a levee can now abandon flood related development controls in all except the most low lying sites. This could lead to the regression of building standards and higher potential consequences.

The draft VFMS says that planning controls 'should' continue to apply behind levees that provide protection to less than 1% AEP plus freeboard. However, this is still inadequate as it assumes a 1% AEP levee provides the same protection as a house built on 1% AEP floodplain without a levee, or a house raised to 1% AEP. This is not the case. Flood consequences are higher if there is a levee and it fails or overtops.

A catchment approach is intended, mainly for priority setting:

'DEPI is piloting a methodology to produce regional flood studies..... Once the pilot projects are finished, catchment-scale flood mapping will progressively be completed for the rest of Victoria's major floodplains.... The outputs from future regional flood studies will include draft planning scheme amendments' (p.30)

p.8; 21-25: 'Regional floodplain management strategies' [authorised under the *Water Act 1989* s202] 'will provide the basis for assessing flood risk priorities' using a consistent risk assessment framework (updated [RAM](#)). This includes assessment of: 'the potential needs for flood mitigation infrastructure; areas where flood risk is not considered in land use planning; areas that may require detailed flood risk evaluations' (as well as addressing the needs of Victoria's *Total Flood Warning System*).

Where a town does not rectify (amend planning controls) to reflect risks, the issue may be 'escalated', first to Regional Emergency Response Planning Committee and if no result, to the Risk and Resilience Sub-committee of the State Crisis and Resilience Committee (p.30).

Coastal change adaptation plans may include mitigation infrastructure. In this case costs will be shared between local government, the state government, and the Commonwealth, with locals responsible for ongoing costs. Benefit cost analysis (BCA) will be used to determine funding priorities. The external cost of reduced sand replenishment at *other* beaches will be factored in (p.32). The document appears a lot stronger on coastal climate change and sea level rise than it is on inland flooding.

Chapter 13 deals with mitigation infrastructure: 'The Victorian Government's clear preference is for large scale flood mitigation infrastructure to be designed and implemented as Water Management Schemes under the *Water Act*.' p.41 (see *Water Act 1989* s213-217). Future state government funding, e.g., for upgrades, 'may be conditional on the local council agreeing to manage the infrastructure formally' (p.44).

DEPI is to develop 'management guidelines for flood mitigation infrastructure' that should include: location to minimise high energy flows in line with the [Victorian Waterway Management Strategy](#) [NB: I was unable to find this in the VWMS], management and maintenance arrangements, inspection and auditing and use of temporary levees (p.42). Temporary levees need to be approved by the SES Incident Controller who must first consult with the Emergency Management Team (includes CMA / Police) (p.62). Incident controllers can also authorise the control breach or modification of structures during an event, for which DEPI will make decision-making guidelines.

Except on-going costs, all costs are to be equally shared between Commonwealth, State and Councils on a priority basis (p.42).

Construction and maintenance of private [e.g., ring] levees on private land is regulated through Municipal Planning Schemes, but 'their use must not substitute for building floor levels above 1% AEP' (p.43).

The strategy states that while urban levees may be justifiable on benefit-cost grounds, that 'building new, large-scale rural levee systems may no longer be considered best practice The government will not fund construction of new rural levee systems, or repair flood damage to existing rural levee systems, that primarily provide private benefits" (p.43). This includes about 900km of rural levees on Crown land that are not currently maintained (p.44).

'Levees on Crown land that are not being formally managed **will be allowed to weather away** unless those benefiting decide to repair and maintain the levee (or part of the levee) under a permit issued by a CMA' (p.43).

'a new permit system that will enable the Minister for Water or a delegate such as a CMA to issue individuals with permits to maintain existing levees on Crown land they will not be able to increase their heights or lengths' (p.46).

'a person holding a levee maintenance permit will not require a permit under the relevant Municipal Planning Scheme' - but maintenance will have to comply with any Aboriginal, environmental or heritage legislation (p.46).

The process for decommissioning is on p.45 and involves a permit, impact assessment, right of appeal by third parties, cost-benefit assessment. 'In most situations, it may be more appropriate to leave existing flood mitigation infrastructure unmanaged'.

Urban levees (outside Melbourne) will be brought under formal management arrangements: 'they will be owned, managed and maintained by local councils through Water Management Schemes under the Water Act' (p.44).

Where a council chooses **not** to manage or maintain an urban levee, this must be reflected in Municipal Planning Schemes. In such circumstances, planning schemes must assume the levee isn't there and must apply building controls up to the 1% AEP level (plus freeboard) for areas behind the levee. The Municipal Emergency Plan must assume the levee is there but that it is liable to catastrophic failure (p.45).

p.47 covers the proposed strategy for dealing with cross border levee issues.

Flood mitigation measures should be designed and implemented in the expectation that emergency management access, egress and evacuation may be needed (p.60). The SES has templates for Municipal Flood Emergency Plans, including Appendix C, an overview of existing mitigation infrastructure. Templates also cover flood threats, peak travelling times, impacts and consequences, required actions, warning times and maps (NB: SES plans are informed by the [Victorian Flood Database](#)). Emergency management plans also need to plan for failure of levees to prevent flooding, e.g., evacuation in advance of levees overtopping (p.60).

Councils or CMAs / MW may initiate flood studies (guided by regional floodplain management strategies that 'identify areas where flood mitigation **infrastructure** is a priority for investigation.') 'Options for flood mitigation infrastructure' is a key output of flood studies. Community consultation should happen in parallel with flood studies and third party impacts need to be assessed and managed (p.41).

[NB: this demonstrates a bias towards structural approaches as opposed to alternatives, such as relocation and house raising that are never mentioned in this document. Neither is the enhancement or restoration of natural flood storage. Retention of floodwater is only mentioned in the context of off-setting urban infill and expansion].

Where the total benefits outweigh the total costs, the costs of designing and building large-scale urban levees will be shared equally between the Commonwealth Government, the Victorian Government and the relevant councils (p.41).

Under the revised Victorian Floodplain Management Strategy, **guidelines** [not currently available] will be prepared on how to apply for permits to maintain levees on Crown land. This will include practical advice on how the applicants for these permits can meet their obligations to protect heritage and environmental values (p.46, 47).

Guidelines will help landholders, asset managers, CMAs, MW to determine whether a flood study is needed for a proposed flood mitigation activity, such as removal of vegetation, debris and sediment and ensuring consistency with the [Victorian Waterway Management Strategy](#). Need for a flood study is based on the scale of risks associated

with the proposed activities on waterways, (pp.48, 49). NB: 'large scale' is equated to township scale (first sentence of section 4.1.1).

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55. Victorian Waterway Management Strategy (VWMS) Sept 2013

The Victorian Waterways Management Strategy (VWMS) supersedes the Victorian River Health Strategy 2002 (the new VWMS now incorporates wetlands and estuaries as well as waterways).

The VWMS provides the framework for maintaining and improving the condition of Victoria's rivers, estuaries and wetlands. It aims to ensure that waterways continue to support environmental, social, cultural and economic values for all Victorians.

According to the (draft) [Victorian Floodplain Management Strategy \(VFMS\)](#):

"Flood mitigation activities on waterways (such as vegetation clearance, debris removal and sediment removal) must be carried out in ways that are consistent with the VWMS"

My reading of the VWMS does not suggest that this relates to structural mitigation as the VWMS makes no recommendation about minimising the environmental effects of levees.

The VFMS also says the VWMS provides 'guidance on the location of flood mitigation infrastructure' which should, 'as far as practicable, be located to minimise the impacts of high-energy flows' (p.42). However, I was not able to find this referred to in the VWMS.

Chapter 15 addresses 'Extreme events of flood and bushfire' but the section on managing levees, 15.3.2, merely states that management of levees will be set out in the updated VFMS and lists a few general levee problems. Levee problems are also listed in 11.1.2 (under 'threats to the river channel: loss of connectivity') and 12.7.1 on wetlands and floodplain connectivity.

Chapter 18.6 (pp.254-255) covers: 'Management arrangements for structures in waterways'. Levees are included, under the definition of public infrastructure. The VWMS states that for new and existing structures, clear management arrangements with agreed responsibilities are required to enable their ongoing and operation. Regarding responsibilities, these need to be assigned for:

- construction to the required standards
- operation and maintenance to ensure it is effective for its designated purpose
- refurbishment, replacement or removal if the structure is no longer required

The proponent (usually the entity that built the structure) is responsible for its future management.

It also defines ownership of existing structures in terms of land ownership, though acknowledges some management ambiguities.

Regional waterway management strategies are authorised under ss190-192 of the Water Act.

Undertaking waterways activities is not just a local decision: 'Government may not initiate or fund work on sites of local priority if the work does not align with priorities identified in regional waterway planning processes' (p.36). This seems similar to flood mitigation (see draft [Victorian Floodplain Management Strategy](#)).

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56. Land Acquisition and Compensation Act 1986 10 Nov 2014

This allows an Authority to acquire land by agreement or compulsory acquisition (s4).

Purposes for which land may be acquired are not provided other than s1 'for public purposes', which could possibly include levee construction. Purpose is specified in Acts that use / cross reference this Act ('a special Act').

Land must first be registered as being reserved for a public purpose by or under a planning instrument (s5(1)) - with a few exceptions listed under s5(2-4D)).e.g., *Planning and Environment Act 1987* s172(2); 201i(3).

The Act then goes into details about processes relating to notice of intent to acquire.

Part 3 provides for compensation (s30-39). Part 4 covers measuring compensation (s40-45). Part 5 provides for compensation where the Authority abandons its claim to acquisition or for temporary occupation (s46-48). Part 6 covers who is paid, by whom and any interest payable for unpaid compensation (s49-64). Some parts relate to the acquisition of mortgaged land and other circumstances. Part 9 covers powers of entry and temporary occupation (s74-79). Disputes are covered in Part 10. Part 11 is 'miscellaneous' including the ability to make regulations and provisions for disposal of acquired land and others.

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57. Crown Land (Reserves) Act 1978

22 Sept 2014

Crown land can be reserved for public purposes (s.4). Specific purposes are listed s4(1)a-zf. None of these purposes relate to flood management or levees. However, some could involve levee-like structures and obtaining materials for constructing levees:

4(1)(b): roads, railways

4(1)(d): 'watersheds and gathering grounds for water supply purposes, the supply and distribution of water and works associated therewith including reservoirs aqueducts pipe-lines channels and waterways'

4(1)(u): 'the supply of sand gravel stone and other materials for the construction of public roads buildings and other works'.

Other purposes include (e) the protection of beds, channels, banks of waterways and (f) drainage and sewerage - as well as all kinds of recreational, conservation, utilitarian purposes.

s5: Land can be purchased and acquired for these purposes.

s5(4) - (8): Compulsory acquisition is allowed for specified purposes listed in s4(1), in which case the *Land Acquisition and Compensation Act 1986* applies. (b), (d) and (u) are not included in purposes where compulsory acquisition can occur (except possibly s5(4)(ii), where purchase is for a park in conjunction with any of the uses).

s8 says that land reserved under s4 must not be sold, leased or licensed unless authorised by this or another Act. However s13(1)(b) says that licensing, permits, agreements can occur where the Minister, the Minister's trustees or the Governor in Council make regulations.

Schedule 5 lists a number of reserves including Part 6: Water Reserves for water supply purposes (see also s47C).

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58. Land Act 1958

22 Sept 2014

s4A: the Minister may purchase land for purposes listed in *Crown Land (Reserves) Act 1978* s4(1), in accordance with s5(1), if attached to land bought for that purpose or if partly, wholly surrounded by Crown land.

The Act incorporates some flexibility that may facilitate land acquisition and make it less contentious: the vendor can occupy the sold land for their lifetime s4A(2) or Crown land may be used to exchange with land the government wishes to acquire (s12A).

Part 1 Division 7 relates to swamps and reclaimed land. It allows the Minister to drain swamps to reclaim land. For this purpose, canals, ditches, drainage works, embankments (etc.) are allowed to be built on anyone's land, including access for maintenance purposes. Land is subject to compulsory acquisition (ss101-104). These provisions include: construction "in upon across under or over any lands streets hills valleys roads brooks or other waters" and altering the course of waterways: s103(4).

s130 Licences can be granted for agricultural purposes. This includes: reserved or unreserved Crown land (see s4 of *Crown Land (Reserves) Act 1978*) and water frontages (s130AB). The latter can be granted for a maximum of 35

years (s130AA) and may include conditions, e.g., relating to 'water supply and other improvements', land degradation, native vegetation and other (s130AC).

s138(3)(a)(i) allows licence for entering unleased Crown land, whether or not it is reserved, "to remove materials from the bed or banks of any waterway on the land" and some other purposes.

s139: Buildings or structures built on land as permitted by a s138 licence must be removed on expiry of the licence or they become property of the Crown.

s303: a development lease may be granted to an 'Australian Mutual Provident Society' for primary production for 25 years. The lease must include provisions for activities that the society carries out at their expense, like surveys, subdivisions, division by roads, buildings, fences, structures and other improvements. I.e., this could include levees or levee - like structures.

Part XII relates to 'beds and banks of certain water courses'. This refers to the channel, not the floodplain.

watercourse definition: 'any river, creek, stream, watercourse, lake, lagoon, swamp or marsh'

s385-386 relates to the bed and banks waterways that have remained the property of the Crown. It covers access rights for grazing and trespass, (not levees).

Part XIII relates to water frontages (and unused roads). s401A allows anyone to enter water frontage land for recreational purposes, even if it is licensed (under Part I, Div 8 or s138). The licensee has to erect and maintain pedestrian access, e.g., over fences. s403: A licence must be obtained if no fence divides the private land from the river frontage.

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59. Riparian management Licences: recognising that Crown land water frontages are being managed to protect the riparian environment

60. Crown land water frontage licences

61. Managing Crown water frontages: for better farms and waterways 2014 [all the above]

Documents #59, #60, #61 were read together and considered collectively.

These brochures were produced by DEPI to explain rights and obligations that relate to Crown land water frontage licences. From my reading of relevant Acts, the primary legal basis appears to be Part XIII of the [Land Act 1958](#).

Public ownership of riverfront land gives the Victorian government more legitimacy and power over decisions concerning levee construction (or prevention) close to riverbanks than some other states.

Frontages vary in width from 20-100m, occasionally more. Of Victoria's 170,000 km of water frontages, an estimated 30,000 km are Crown frontages (river, creek or wetland). Waterfront land can be licenced for grazing. A riparian management licence may be granted (for reduced fees) if works are carried out like fencing to exclude stock or revegetation.

The ENRC Inquiry discusses the history of frontages. They originated in 1881 when 280 watercourses were set aside as Public Purpose Reserve. Waterways flowing through towns are almost always public land (bed and banks), giving government authorities (councils, DEPI, CMAs) direct powers to undertake works on larger streams and urban streams. ENRC reports approximately 25,000 km of Crown land river frontages and says they are 'often' 20m in width. These figures are slightly lower than indicated by DEPI brochures. The ENRC Inquiry notes that only the smaller waterways tend to be owned privately. Privately owned riparian land may be subject to covenants, easements or it may be leasehold or be subject to compulsory acquisition.

Other than frontages, National Park, other parks, municipal reserves may also be publically owned riparian land.

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62. Local Government Act 1989

15 Oct 2014

s186 restricts the ability of Councils to enter into contracts for the purchase of goods or services or the carrying out of works of \$100,000 or over. Where this is the case there are procedures (e.g., public notice, expressions of interest, tendering and exemptions from these requirements). This is relevant as most levee projects would cost over \$100,000. Provisions relating to procurement policy are at s186A.

s187 the council may purchase or compulsorily acquire land required for the performance of its functions.

ss198-201 provides local governments with powers in relation to drainage.

s201 covers 'approved schemes', which can include levees. s201(1):

"a council may construct, operate, control, manage or maintain any works or undertakings that form the whole or part of a scheme declared to be an approved scheme under section 216 of the Water Act 1989."

[s216 of the Water Act concerns the nomination of an Authority or Council to implement a water management scheme]

However, the ENRC Inquiry, p.137, comments on legacy problems that: 'Given the age of the schemes outlined above, however, they do not come under the formal schemes declared under the Water Act.'

The [Victorian Government response](#) to the ENRC Inquiry, p.16, notes that:

'Historically the Water Act (Division 5 of Part 10) has been used for the preparation of Water Management Schemes for new levees. In some instances levee management has been undertaken through provisions within the Local Government Act 1989. Local councils will continue to be free to bring levees into formal arrangements under the Local Government Act'.

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63. Planning and Environment Act 1987

10 Sept 2014

This Act establishes the framework for planning the use, development and protection of land (s1). Objectives are relevant to flooding; they require the provision of a 'safe' environment and 'to protect public utilities and other assets': s4(1)(c),(e). The Act also includes biodiversity and sustainability objectives: (a) 'sustainable use and development' (b) 'to provide for the protection of natural and man-made resources and the maintenance of ecological processes and genetic diversity' and (g) 'to balance present and future interests'. These are copied verbatim into the [Victoria Planning Provisions](#).

s4A authorises the Minister to develop standard planning provisions (Victoria Planning Provisions). Part 2 (ss5-46AF) deals with planning schemes. s6(2)(e) allows planning schemes to: (e) 'regulate or prohibit any use or development in hazardous areas or in areas which are likely to become hazardous areas'. s6(3) restricts the ability for land use (buildings, works) to be changed if it was being used for a purpose that was lawful prior to the planning scheme or its amendment coming into effect (s6(4) and s6(4A) include exceptions).

s6(6) specifies planning scheme boundaries, which may cover a single municipal district or adjoining parts of other municipalities. This provision would enable catchment based planning to occur.

s14A includes duties of referral authorities. Note CMAs are recommending referral authorities for development of floodprone land under clause 66.03 of the Victorian Planning Provisions. See also s25(1) of the [Catchment and Land Protection Act 1994](#): a CMA may recommend to a planning authority amendments to a planning scheme to give effect to a regional catchment management strategy.

s46AO allows the Minister to declare an area of land a 'growth area'. Regarding the relationship of Growth Areas to planning schemes, they are located within specified municipal districts (see s201R). A Growth Areas Authority (s46AQ) manages this land. Objectives at s46AR include 'affordability' (e) and 'employment opportunities' (d). The only remotely environmental objective is 'to promote sustainable development' (c). Safety (e.g., flood hazard) is not mentioned either. Functions include making recommendations to the Minister on 'the planning, use, development and protection of land in growth areas'. The relevance of these provisions for flood management is illustrated by the QFCI which noted that 'satellite planning schemes' that aim to provide things like housing affordability often bypassed standard flood controls, potentially resulting in development susceptible to flooding. This could lead to future need for flood protection.

s.46 I allows the planning scheme to include Development Contributions Plans to levy contributions to the provision of works (etc.) This would apply to levees. Provisions relating to such levies are at s46 I - s46QC.

Permits that are required by planning schemes are at s47. This is likely to apply to private levees. Development applications need to be submitted along with copies of any restrictive covenants that apply (presumably covenants could relate to flood). s55 requires the responsible authority to provide copies of applications for permits to referral bodies. 'Responsible Authority' is defined in s13 as being whoever is responsible for the planning scheme.

The ENRC Inquiry comments (p. 146):

“The construction of private levees is managed through local government planning schemes. Generally, a landholder will require a planning permit to construct or significantly modify a levee. In most situations, an application for such a permit is referred to the relevant Catchment Management Authority (CMA). Under the Planning and Environment Act 1987, responsible authorities (for example, local councils) and members of the public can apply to the Victorian Civil and Administrative Tribunal (VCAT) to enforce planning scheme provisions and prevent or remove works that do not comply with those provisions.”

However, this statement is accompanied by a footnote that quotes DSE submission no.99 (p.23) to the Inquiry:

“not all councils have 'adequate flood zone and overlays in their planning schemes, and many do not recognise the strategic importance (and limitations) of levee protection in their local planning policy frameworks.' This means that some 'new levees may be able to be constructed without requiring a planning permit and there is no referral to the CMA for advice as to the appropriateness of the levee”.

Moreover, "while the introduction of planning schemes with controls on earthworks led to a reduction in the growth of private levees, the Department of Sustainability and Environment (DSE) stated that, 'this has certainly not stopped some private levees being constructed without a permit.' " (p.146).

s60 provides matters that need to be considered when deciding whether to grant approval: the planning scheme; Victorian state planning objectives; submissions; decisions and comments of a referral body; effects on the environment; and social and economic effects. Consideration can also be made of any approved regional strategy plan. Additional considerations are given in s60(1A), e.g., legislation, guidelines, amendments to planning schemes not yet approved, specified regional plans, etc.

s95 permit applications need to be referred to the Minister under certain circumstances (e.g., where it is a specified class of applications; where there is over-riding state interest). s97B gives the Minister call-in powers.

Projects of State or Regional Significance are covered under Part 9A (s201E-201Q). Development or proposed development may be declared by the Minister to have state or regional significance and for this and for this land may be acquired.

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64. Victoria Planning Provisions User Guide 19 Sept 2014

"Planning schemes are subordinate legislation under the Planning and Environment Act 1987. Planning Schemes set out policies and provisions for the use, development and protection of land. They are legal documents prepared by the local council or other planning authorities, and approved by the Minister for Planning".... "The Victoria Planning Provisions (VPPs) contain a comprehensive set of planning provisions for Victoria, including compulsory state and local policies and strategies, and zones and overlays used locally. This approach helps ensure that Planning Schemes are prepared in a consistent way." [These quotes are from the draft [Victorian Floodplain Management Strategy](#)].

Planning schemes need to include:

- a Municipal Strategic Statement that explains a council's objectives and strategies in exercising land-use controls in a planning scheme
- zones and overlays that regulate the use and development of land

VPP includes one zone (urban floodway zone) and three overlays (floodway, special building and land subject to inundation overlays) directly relevant to flood-prone areas.

The State Planning Policy Framework (SPPF) is included in the VPP. It sets out the statewide principles, policies and strategies for how land is to be used and developed in Victoria.

The SPPF has objectives that relate to public safety (i.e., this relates to flood management): 'To protect public utilities and other assets...' and 'To secure a ... safe working...environment'. It also includes a biodiversity objective: 'To provide for the protection of natural and man-made resources and the maintenance of ecological processes and genetic diversity'.

Copied from the VPP user guide section:

'The State Planning Policy Framework covers strategic issues of State importance. It lists policies under nine headings - settlement, environmental and landscape values, environmental risks, natural resource management, built environment and heritage, housing, economic development, transport and infrastructure. Every planning scheme in Victoria contains this policy framework, which is identical in all schemes.

The Local Planning Policy Framework contains a municipal strategic statement and local planning policies. The framework identifies long term directions about land use and development in the municipality; presents a vision for its community and other stakeholders; and provides the rationale for the zone and overlay requirements and particular provisions in the scheme.

The Zone and Overlay requirements and Particular provisions show -

- The type of use and development allowed in each zone.
- Additional requirements for subdivision, buildings and works on land that is affected by an overlay.
- Requirements for any specific uses and development."

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65. State Planning Policy Framework (SPPF) floodplain management policy

20.09.2010

The purpose of the SPPF floodplain management policy is to protect life, property and community infrastructure and also to protect the flood carrying capacity of waterways and floodways, and the flood storage areas of floodplains and waterways. It also aims to protect floodplain areas of environmental significance and river health.

Strategies include:

- the identification of floodways and 'land affected by flooding' (defined as land affected by the 1:100-year flood) in planning scheme maps.
- Avoid intensifying flood impacts through inappropriate use / development
- Locate specified emergency management & community facilities outside 1:100 year floodline (and if possible above PMF).
- Do not locate facilities that store environmentally hazardous materials in the floodplain, unless they are designed and managed to prevent contact with floodwaters (without affecting flood carrying capacity and storage capacity of the floodplain).

The policy requires the following to be considered in planning: [SEPP \(Waters of Victoria\)](#), Regional Catchment Plans, Special Area Plans, any relevant policy and practice or strategy that has been adopted by the local floodplain management authority, Environment Protection Authority stormwater guidelines and the VFMS (1998).

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66. State Planning Policy Framework (SPPF) Climate change impacts: coastal inundation and erosion

04.07.2012

The State Planning Policy Framework (SPPF) section on climate change impacts has only one policy: 'Coastal inundation and erosion'.

Its purpose is 'to plan for and manage the potential coastal impacts of climate change' and it includes the following strategies:

"In planning for possible sea level rise, an increase of 0.2 metres over current [1% AEP] flood levels by 2040 may be used for new development in close proximity to existing development (urban infill)."

"Plan for possible sea level rise of 0.8 metres by 2100, and allow for the combined effects of tides, storm surges, coastal processes and local conditions such as topography and geology when assessing risks and coastal impacts associated with climate change."

"For new greenfield development outside of town boundaries, plan for not less than 0.8 metre sea level rise by 2100."

Other strategies include considering climate change risks when making planning decisions; making sure land subject to hazards is identified and managed to prevent risk to future development; making sure development and protective works don't have a detrimental impact on coastal processes and avoiding development of land susceptible to river and coastal inundation and other hazardous areas, e.g., susceptible to erosion, land slide, geotechnical risk, acid sulphate soils, bushfire.

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67. SPPF Catchment Planning and Management

20.09.2010

This SPPF includes strategies such as maintaining a vegetated buffer of at least 30m either side of waterways. This may be applicable to levees: i.e., a minimum set back (note this is a strategy, not a mandated requirement).

Other strategies relate to filtration of stormwater, protecting wetlands and land for water retention, etc., which is relevant to ecosystem approaches.

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68. SPPF Water Quality

20.09.2010

This SPPF includes a strategy to discourage incompatible land use in areas subject to flooding (i.e., that would affect water quality in a flood or affect flow volumes).

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Local Planning Policy Framework

- 69. Rural Living Zone**
 - 70. Green Wedge Zone**
 - 71. Green Wedge Zone A**
 - 72. Rural Conservation Zone**
 - 73. Farming Zone**
 - 74. Rural Activity Zone**
- 05.09.2013 [ALL]**

Documents #69, #70, #71, #72, #73, #74 were read together and considered collectively.

'Buildings and works' policies for these zones are found in Victoria Planning Provisions, clauses 35.03-4, 35.04-5, 35.05-5, 35.06-5, 35.07-4, 35.08-4. A permit is needed if proposed work is within 100m of a waterway, wetland or designated floodplain. A permit is also needed for 'Earthworks specified in a schedule to this zone, if on land specified in a schedule.' This is relevant to levees and levee-like structures built on rural land.

The policy is followed by decision guidelines that require consideration of environmental impacts and the Regional Catchment Strategy.

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Local Planning Policy Framework

75. Urban Floodway Zone

8.8.2010

76. Floodway Overlay

15.09.2008

77. Land Subject to Inundation Overlay

15.09.2008

78. Special Building Overlay

15.09.2008

Documents #75, #76, #77, #78 were read together and considered collectively.

Under 'buildings and works', a permit is required for various activities such as building fences and other structures. Subdivision also requires a permit. Some activities are **exempt** from the need to obtain a permit, including:

'Flood mitigation works carried out by the responsible authority or floodplain management authority.'

The 'Decision Guidelines' require consideration of a wide range of flood-related matters, including effect of the proposed development on flood behaviour, how susceptible the development is to flood, any local flood management plan, comments by the floodplain management authority, existing land uses, effect on waterway and wetland health, habitat, erosion, alternative sites the SPPF, LPPF and the municipal strategic statement.

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79. Local Planning Policy Framework General provisions

22.08.2014

Many overlays concerning land management, the environment and landscape require permits for native vegetation clearance, of relevance to levee building. There are some exemptions to the need to get a permit (e.g., clearance of regrowth), but permits are still required where damage was caused by flood, fire or other natural disaster (for example, see environmental significance overlay, clause 42.01).

However, general provisions (clause 62) provide:

'no permit is required for 'maintenance works carried out by a municipality or public authority to prevent or alleviate flood damage.'

Clause 66.03 states that CMAs (identified as the 'relevant floodplain management authority' in the table) are 'recommending referral authorities' for applications in specified types of zone and overlay, including applications for overlays covered by documents #75, #76, #77, #78.

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80. Practice Note 12: Applying the flood provisions in planning schemes: a guide for councils

Nov 2012

The practice note identifies earthworks as being a problem in floodways (including levees and raised roads). 'Councils should consider introducing earthworks provisions into their planning schemes' (p.7), i.e., it is not compulsory for councils to do so.

The appendix provides some examples. The example on p.17 identifies a hypothetical flood problem and offers objectives and strategies. Objective 1 is to implement appropriate floodplain management strategies. The first strategy offered is structural: the effective management, maintenance and upgrade of levee construction along floodplains. Other objectives & strategies relate to minimising potential for flood damage for new buildings and works, education about the natural storage function of wetlands, integrated approaches, ensuring maximum bank height is 10 ARI, and ensuring irrigation and drainage works don't diminish the capacity of floodplains to carry and store floodwaters. There are some good strategies in here. However, it's disappointing that the very first example strategy was levees. If trying to discourage this method it should figure as a last resort.

The earlier version of this practice note, 'Applying for a permit under the flood provisions: a guide for councils, referral authorities and applicants' (Aug 2000) contains slightly more instruction about levees, for example, permit conditions can address levee height and extent.

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81. Gannawarra Planning Scheme 19 Sept 2014

The Gannawarra Planning Scheme covers 'earthworks' (which can mean levees or embanked irrigation channels), levees and provisions relating to flood. Flooding is one of the six natural resource management (NRM) key strategic issues in the municipal strategic statement (MSS); the other key issues are closely related (water quality, quantity and use; biodiversity; wetlands; agricultural productivity; salinity).

The MSS includes a strategy to achieve its NRM objectives that relates to levees:

'establishing, in conjunction with the North Central Catchment Management Authority, a program of levee management that reviews the legal liabilities associated with levees, provides an impact assessment of levees including effects on other lands, implements feasible management and funding arrangements for levees, and develops a register of levees that includes a public relations campaign to improve levee management.'

A permit is required for earthworks carried out in a farming zone if on land specified in the zone's schedule and to buildings or within 100m from a waterway, wetlands or designated flood plain (35.07-4). The schedule requires a permit for earthworks which change the rate of flow or the discharge point of water across a property boundary; and any land (excluding earthworks carried out in accordance with an approved whole farm plan).

Floodway Overlay (FO) (44.03): In floodways, permits are not required for levees protecting a habitable dwelling or that don't raise ground level topography above 300mm (unless it is an important flow transport area identified by the Floodplain Management Authority). Note the flatness of the landscape in Gannawarra Shire. The land around Kerang has a gradient of 1m in 18km (i.e., 1m in 18,000m) (see document #39). In this situation, 300mm could make a big difference to the free flow of water in floodways.

Similarly, the land subject to inundation overlay (LSIO) (44.04), does not require a permit for earthworks that do not raise ground level topography by more than 300mm and do not change the rate of water flow or the discharge point of water across a property boundary. Nor for a protective levee bank around the immediate surrounds of a habitable dwelling.

The Environmental Significance Overlay (ESO) (42.01) acknowledges that 'the environmental condition of waterways has degraded as a consequence of levee banking.....which has altered flow levels and flooding regimes'.

22.13 (Gannawarra Shire's local planning policy concerning levees) aims to support the LSIO, FO & ESO. The 'policy basis' requires that levee siting and construction confine floodwaters to parts of the floodplain where the passage of floodwater will cause minimum damage to people and property. The policy itself says nothing about siting. It is concerned with construction materials and standards, alignment with flood management strategies [of which none seem to be (currently) publically available for Gannawarra]; maintenance and upgrade to ensure continued protection; and consideration of Floodplain Management Authority comments relating to construction and maintenance.

The policy makes no mention of off-site impacts, damage to ecosystems or heritage.

Flood mitigation works (e.g., levees) carried out by the responsible authority or floodplain management authority are exempt from requiring a permit (44.03; 44.04; 42.01 schedule 1). 56.07 (Integrated Water Management 'particular provisions') requires that any flood mitigation works be designed and constructed in accordance with the requirements of the relevant floodplain management authority.

Regarding flood provisions in general, many parts of the Planning Scheme require the identification of open space that can be used for open space in conjunction with other objectives such as recreation and biodiversity, and that siting and design of new development are to minimise risk to life, property, the natural environment and community infrastructure. This is also a climate change strategy (e.g., structure planning 11.02-3; 11.05-2; 11.05-4; 11.09-4; 11.09-7; 13.01-1; 14.02-1; 56.05-2; 65.01). Note these clauses (clauses 9-19) are all copied from the Victoria

Planning Provisions (VPP) as they are part of the State Planning Policy Framework (SPPF), so are not 'tailored' to this planning scheme. Clauses 56.05 & 65.01 are general provisions.

SPPF on Floodplains is at 13.02. It provides objectives, strategies, policy guidelines as per the VPP. Land affected by flooding is defined as 'land inundate [sic] by the 1 in 100 year flood event or as determined by the floodplain management authority.'

For the Local Planning Policy Framework (LPPF), the Lower Loddon and Avoca Floodplain Management Plan (1994) is listed among the reference documents. It does not appear to be available online. Nor is the North Central Regional Floodplain Management Strategy.

For Kerang, residential development is encouraged to the North and South, as well as urban infill and consolidation of the existing township (clause 21.04). (NB: following the 2010-11 floods, additional levees were planned to the north (Kerang-Murrabit Road and Lower Loddon Road) and south (Murray Valley Highway) of the town (see documents #35, #36, #37, #38). Given the floodprone nature of the town, this suggests more levees will be needed, leading to greater potential consequences. Development in Murrabit will be focused on 'low flood risk' land in designated areas.

Schedule 1 of ESO (42.01) includes a large number of flood-related environmental objectives, including: 'To ensure development does not occur on land liable to flooding.' Land liable to flooding is not defined. If it is the same as 'land affected by flooding' (13.02), which is likely, then it only includes land up to 1:100ARI. A permit is not required for various activities (e.g., if development is further than 100m from a waterway; if it is carried out by a public authority to regulate flooding). Decision guidelines include the potential for flooding to occur and affect development; the potential for the development to impact on flow, and flood control measures, as well as various environmental outcomes.

Schedule 3 relates to the lake environs (near Kerang) and includes the environmental objective 'To maintain the function of the lakes as a flood control basin'. Decision guidelines encourage revegetation and excluding stock.

Schedule 4 relates to areas of poor drainage, potentially subject to flooding. Objectives include the identification of land liable to inundation and for development to maintain the free passage of floodwater (among other flood related objectives). Incredibly, no permit is required for development (including earthworks and irrigation channels) less than 500mm high (bearing in mind the earlier comment that the land gradient is 1:18,000). In this context, 500mm (half a metre) is very high and would definitely block free passage of water. It is hard to see how this permit exemption would achieve the environmental objective.

The FO (44.03) requires a flood risk report, including some solid provisions for identifying flood impacts, as required by the SPPF. This, as well as floodplain management authority comments; the local floodplain development plan (if any); the Victorian River Health Strategy (now updated, see [Victorian Waterway Management Strategy](#)); the SPPF, LPPF and MSS, all need to be considered according to the decision guidelines.

Decision guidelines for LSIO (44.04) are pretty similar but the flood risk report content is written out. The schedule to the LSIO does not require a permit for a replacement dwelling where the floor level is 300mm above 1:100 ARI if in the same location / same ballpark size. The Special Building Overlay, 93.08-2, a recent addition (19.09.14), also has similar decision guidelines.

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**82. Gannawarra Planning Scheme – local provision: Rural Floodway Overlay Map No. 15RFO
03.10.2009**

**83. Gannawarra Planning Scheme – local provision: Land Subject to Inundation Overlay Map No. 15LSIO
03.10.2009**

Documents #82, #83 were read and considered together.

Planning scheme maps showing LSIO and FO for Gannawarra Shire only cover Kerang township. Areas marked as LSIO and RFO (Rural Floodway Overlay) are both outside the leveed areas. There are many zones within the levees, including various commercial and residential zones. The General Residential Zone (clause 32.08) in the planning scheme ordinance requires approval for subdivisions but *there appear to be no flood-related building controls within*

this zone. Flood-resilient building standards such as floor height to the 100 ARI level plus freeboard do not apply within the leveed area. This means cheaper building standards. However, it also means that in the event of levees overtopping or failing, damages will be much greater than they would have been without a levee (as building controls in the no-levee scenario would have limited the damage). This is an 'all or nothing' approach to mitigation.

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84. Planning application information checklist for Rural earthworks (Gannawarra Shire)

1 Mar 2004

An application for rural earthworks requires (among other things), a written submission on the type and extent of earthworks and how they will change the rate of flow or discharge point of water across a property boundary; explain how it supports State Planning Policy Framework / Local Planning Policy and catchment strategies; how it complies with zoning and overlays; how it provides for sustainable agriculture and versatility of use; and how earthworks have been designed to minimise impacts on:

- Changed water flows, to the property and to surrounding and downstream properties
- The natural water flow path and overland flow
- Environmental assets, including native vegetation, flora, fauna, other biodiversity assets
- Natural physical features including waterways, drainage lines, areas subject to flooding and wetlands in the vicinity of the proposal
-erosion.....areas or features of historic or scientific importance....rural landscape ...vistas....roads & utilities.

The application also requires plans and diagrams: including site dimensions, existing works and buildings, nearby roads, topography, biodiversity assets, waterways, drainage lines, areas subject to flooding, wetlands, wildlife corridors, soil conditions (including areas subject to erosion); existing drainage and outfall points to other properties and/or drainage outlets; surrounding land uses and position of adjacent property buildings; downstream drainage regimes; other notable features. Diagrams are also required of the proposed works, including dimensions and batters (if relevant), methods of dealing with drainage impacts; erosion/salinity control; removal of vegetation (number and species); proposed changes in water flow.

This is the most detailed Victorian document I've found furnishing the information required to assess the impacts of individual 'levee-like structure' projects. This reflects the central role planning schemes play in flood control. Note however that assessment is on a project-by-project basis. It also relies on (1) planning schemes to include controls for rural earthworks (2) expertise of local councils to assess impacts (3) staff capacity. Such earthworks may also require assessment, e.g., for water use licences, which would also lead to assessment using Irrigation Development Guidelines in some places. The latter attempt to limit cumulative effects - mainly through limits to water use (see [Regional Irrigation Development Guidelines](#)).

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85. SPPF: Regional Planning Strategies and Principles Strategic Plans

30.05.2014

Regional Strategic Plans are required under Victoria Planning Provisions State Planning Policy Framework (SPPF) clause 11.05-4: Regional Planning Strategies and Principles. Regional Growth Plans need to be considered in their preparation.

One of the regional planning principles relates to 'climate change, natural hazards and community safety' and under this there are 4 requirements, among them:

'Respond to the impacts of climate change and natural hazards and promote community safety by:

Siting and designing new dwellings, subdivisions and other development to minimise risk to life, property, the natural environment and community infrastructure from natural hazards, such as bushfire and flood.

Developing adaptation response strategies for existing settlements in hazardous and high risk areas to accommodate change over time.'

Regional Growth Plans are prepared under the State Planning Policy Framework (SPPF). See Victoria Planning Provisions (regional development), clauses 11.05 - 11.13-8. See also s46AO & s46AR of the [Planning and Environment Act 1987](#).

Victoria has eight regional growth plans as well as the Metropolitan Planning Strategy that covers Melbourne. The following information comes from the G21 Regional Plan (April 2013, prepared by 5 councils near Geelong). The Growth Plans are prepared to be consistent with State policy, particularly the SPPF. The SPPF sets out objectives and strategies that guide the:

- planning of our settlements, including land supply, housing, activity centres and employment areas
- protection of environmental and landscape values
- planning for coastal inundation, fire, flood and other risks
- management of our resources, agricultural areas and key infrastructure assets and provision of integrated transport.

I looked at 2 regions (Gippsland and Loddon Mallee North) to form an impression of how flood issues are covered in regional growth plans and regional strategic plans.

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86. Gippsland Regional Growth Plan May 2014

Natural hazards, population growth and climate change are identified as drivers of change and challenges to growth (p.12-16).

The Gippsland plan notes the risk of unmanaged development exacerbating flood risks, add to infrastructure costs and lead to a loss of natural assets (p.12). Avoiding natural hazards is a particular challenge for small and remote communities and climate change will magnify flood risk (p.14). One of the plan's principles (no.2) is to minimize the region's exposure to natural hazards and risks. Urban and economic development will be directed to areas of lower risk from bushfire, flood and other natural hazards (p.17).

A strategy for future land use is to 'avoid or manage natural hazards' (p.27).

Information on flood is provided primarily on p.40: it notes the need for development to be planned with the best possible information and flood mapping and for flood provisions in planning schemes to be applied consistently. It identifies areas of settlements with a known current flood risk and notes that other settlements may also need flood overlays as new information about flood hazards emerge. Places that have an existing flood overlay are marked on a map (p.38).

The plan suggests the following responses: design responses, mitigation works such as retarding infrastructure or providing alternative means for water to escape, development of urban flood prone land for open space or recreation, mitigation through infrastructure works to divert floodwater or provision of drainage.

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87. Loddon Mallee North Regional Growth Plan May 2014

This plan encompasses highly floodprone areas around Kerang and Swan Hill. It acknowledges:

'Significant areas of the region are subject to flood. This includes extensive rural areas, but also urban areas, as regional cities and centres expand outside existing levees.' (p.30).

'inconsistencies across the region in terms of how and where flood-related overlays are applied. Flood provisions in planning schemes should be used consistently across the region to avoid inappropriate development and to require new development to be located and designed to minimise risk' (p.30).

Mapping following the 2011 floods is being translated into planning scheme overlays.

The strategy provides principles for growth, including no.4 : '...and minimise the region's exposure to natural hazards', which is aligned with the future direction 'Manage risks to growth from natural hazards', and the specific strategy, : 'Direct development away from locations where there is significant risk from flood' (p.62).

Map 12 identifies 5 towns with urban flood overlays.

While the strategy talks about avoiding hazard, it also identifies areas suitable for future growth, such as Kerang which is dependent on flood levees:

'The residential growth strategy for Kerang, outlined in the Gannawarra Urban and Rural Strategy (2007), is based on consolidation and expansion of the existing town' (p.44).

An action for delivering growth is:

'Support growth of Kerang through planned development, incremental expansion and infrastructure investment' (p.45).

I'm not sure if this could be interpreted as investing in levees to enable future growth. Unlike Geelong, no generalisation is made with regard to responses to reduce flood risk other than avoiding locations with significant risk. The expansion of Kerang appears inconsistent with the aim of avoiding flood risk.

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88. Gippsland Regional Strategic Plan 2010

The Gippsland plan identifies areas where flooding is an issue (it will constrain growth in Traralgon, Latrobe Valley, and is a current issue for Lakes Entrance which is relevant to settlement planning due to projected population growth: p.76).

Climate change is likely to lead to more flooding; flood cycles will be 'amplified' (p.131), with increased flood risk and or sea level rise / storm surge at Lakes Entrance, Gippsland Lakes, Tooradin and Honey Suckles (p.132). Historic flooding has led to disadvantage for some communities (p.134) but the region is considered to have good emergency response structures and capacity (p.141).

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89. Loddon Mallee Regional Strategic Plan Northern Region 2010

The Loddon Plan mentions flood only once (climate change will lead to flood impacts: p.35). Although this seems inadequate in the context of State Planning Policy Framework expectations, it was prepared prior to recent floods.

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90. North Central Catchment Management Authority submission on the Draft Victorian Floodplain Management Strategy. Ref: NCCMA-63-37251 11 Aug 2014

91. North Central Regional Floodplain Management Strategy Not available

92. North Central CMA Media Release: Draft Castlemaine, Campbells Creek and Chewton Flood Plan Feb 2015

North Central CMA (NCCMA) was selected for investigation as it overlaps with the Loddon Mallee North Region (see also the following documents relevant to this region: #35, #36, #37, #38, #39, #81, #82, #83, # 86, #89) and it has within it the flood prone towns of Swan Hill, Kerang, Echuca and Creswick and others.

The *Water Act 1989* (s202) is the legal basis for Regional Floodplain Management Strategies. According to the North Central Regional Catchment Strategy (2013), a Regional Flood Strategy was produced for this CMA in 1999 (p.10). It is not available on the CMA or DEPI websites. The DEPI website also lists 3 sub-regional floodplain management strategies produced by Camp Scott Furphy Environmental:

http://vro.depi.vic.gov.au/dpi/vro/nthcenreg.nsf/pages/nthcen_lwm_fdplmgt

- Lower Loddon and Avoca River Floodplain Management Strategies (CMPS&F Environmental, 1994).
- Lower Loddon Floodplain Management Strategy: Bendigo Creek Huntly to Goornong (Camp Scott Furphy, 1994).
- Lower Loddon Floodplain Management Strategy: Serpentine to Kerang (Camp Scott Furphy, 1992)

These are also referenced in the [Gannawarra Planning Scheme](#). However they are not available on line.

The NCCMA submission on the draft Victorian Floodplain Management Strategy notes that at the moment NCCMA receives no state funding to produce a Regional Floodplain Management Strategy (unlike the Regional Catchment Strategy and Regional Waterway Management Strategy which are funded).

It therefore appears there is no current / available Regional Floodplain Management Strategy for this CMA. Nor could I locate strategies for most other CMAs. The only Regional Floodplain Management Strategies I found (brief search) were for Goulburn-Broken CMA (2002), and a Flood Management and Drainage Strategy for Melbourne Water (2007).

Floodplain management plans that are available for this region aim to address local flood problems and are less strategic, e.g., the Castlemaine, Campbells Creek and Chewton Draft Flood Management Plan:

'recommends building three new levees, upgrading three existing levees, developing a flood warning system for the area, and minor waterway improvement works. It also recommends updating the Mount Alexander Planning Scheme and developing an ongoing management plan for urban waterways' (NCCMA media release 13.2.2015).

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93. 2013-19 North Central Regional Catchment Management Strategy 2013

Authorised under ss23-26 of [Water Act 1989](#).

The catchment strategy includes the same information about impacts of activities on waterways and floodplains as per the North Central Catchment Management Authority's (NCCMA) Waterway Strategy, including *ad hoc* works, inappropriate development, levees (p.23-24). It also advises the use of 'best practice floodplain management' to reduce flood damage and says that 'the inherent functions of the floodplain to convey and store floodwater should be recognised and preserved to minimise the deterioration of environmental values and the long-term flood risk' (p.23). Levees are only identified as a rural activity (not urban) impacting on waterways and floodplains (p.24).

Levees are identified as a particular threat for wetlands. The first threat listed, p.47, is: "altered hydrology / changed water regime" and the impact is: "flooding [of wetland] reduced due to river regulation, water diversion, levees and infrastructure impediments (e.g., irrigation channels)." Levees are also identified as a threat to priority waterway assets, e.g. to Lower Avoca River (p.27).

To address the threat posed by levees and other infrastructure impediments, there is no information given in the text (other than the most general catch-all wording 'protect and enhance', and the management of environmental water: p.48).

More specific threats and activities are identified for specific priority assets. But the approach to levees and structures is still not clear. For waterway asset Lower Avoca River, threats are: "overgrazing, weed invasions and levees". However "key actions" are: "Fencing and grazing management" with no mention of levees. "Altered flows" for the Lower Campaspe River are to be addressed by "environmental flow management" (p.27). For wetland assets, "altered flow regimes" are a threat for Gunbower forest Ramsar site, Central Murray Wetlands and Mid-Loddon Wetlands. This is to be addressed through "infrastructure works and measures and environmental flow management" (Gunbower) and "structural works" (Central Murray and Mid-Loddon), p.51. Thus for some priority areas, modifications to existing infrastructure may be envisaged. However, it seems more likely that this actually means the construction of additional regulators and new levees to divert environmental water into wetlands, as at Gunbower - see <http://www.mdba.gov.au/sites/default/files/pubs/MDBA-Gunbower-13352-Web-FAB.pdf> on 'MDBA The Living Murray planned works in the Gunbower Forest'.

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94. 2014-2022 North Central Waterway Strategy 2014

Authorised under ss190-192 of the [Water Act 1989](#).

The strategy is primarily concerned with improving the environmental health of waterways and wetlands.

'Inappropriate levees or infrastructure' (p.13) is identified as one of 11 threats to waterways, causing:

'Changes in flow patterns leading to loss of biological cues for aquatic species, reduced linkages, changes to habitat availability and changed geomorphic processes.' (p.13)

'Ad-hoc works and inappropriate development in the past have significantly impacted on the natural floodplains' (p.16).

However, the strategy's text does not identify a means of addressing the problem of 'inappropriate levees' or 'ad hoc works'. Targets and activities are listed for priority areas and a small number aim to improve delivery flow paths e.g., through 'water delivery structures' or 'outflow regulating structures' (pp.54, 66, 71-73).

The strategy advises 'best practice floodplain management will reduce flood damage' (p.16), presumably through management plans: 'North Central CMA has worked with local government and the community to develop flood management plans to reduce the future risk of flooding in some of the worst affected communities...' (p.17).

The strategy also advises 'Regional flood management strategies are scheduled for renewal and will consider regional floodplain characteristics and set out a detailed floodplain management program' (p.37).

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NEW SOUTH WALES

95. Water Act 1912

1 Jan 2014

[To be repealed and absorbed into the [Water Management Act 2000](#)].

Part 8 relates to flood control works (s.165-186A).

According to the definition of a 'controlled work' (s.165A), this includes an earthwork, embankment or levee situated on the bank of a lake or river or on a floodplain, or that affects the flow of water to or from a lake or river, or that prevents land from being flooded. Note definition of a floodplain (s.166): it needs to be designated, mapped and publicised.

Regarding levee-like structures, the definition excludes: 'a work or bore in respect of which a licence, group licence, authority, permit, consent or authorisation is in force under Part 2, 3, 5, 6, 7 or 9'. Only parts 2, 5 & 9 are current, and of these only Part 2 appears to relate to irrigation (part 5 artesian bores; part 9 relates to specific water supply & energy corporations listed in schedule 3). Part 2 (s.10) allows licensing for purposes of: water conservation, irrigation, water supply, drainage, changing the course of a river. See also ss.19, 20, 20K regarding joint water supply scheme authorisation and group licences as they can be irrigation related. Information that needs to accompany applications is listed. For the level of detail required, see [application for approval of a controlled work form](#).

Despite WA 1912 s165A providing a broad definition of 'controlled works', according to an official I spoke to, town levees were rarely required to obtain approval under this Act as the NSW Office of Water (NOW) exercises its 'discretionary powers' to determine what they want to look at. Part of the reason for excluding works within town boundaries from requiring controlled works approval is that towns are excluded from the definition of a designated floodplain (under s.308(2), a floodplain under Part 2 needs to be declared by the Minister). However, being in a designated floodplain is only one of several circumstances whereby work is identified as 'controlled' (s.165A). Thus although the Act appears to cover town levees, it seems that in practice it was rarely used for this purpose. NOW sometimes required town levees to be approved through this Act where they were to be situated on land that 'forms part of, the bank of a river or lake' (s165A). This inconsistency in dealing with approvals for town levees is one reason why it is proposed to exclude levees within town boundaries from the definition of 'flood works' in the [Water Management Act 2000](#).

s. 166A allows for the development of floodplain management plans (a scheme for the management of floodwaters within a floodplain) in accordance with the [Floodplain Development Manual](#).

s.166C includes matters that must be considered when approving flood control works, including the floodplain management plan, as well as: the effect of flood control works on passage, flow and distribution of floodwaters; effect on floodways, flow rates, water levels, duration of inundation; impacts on environment, the need for natural flood regimes in wetlands, related ecosystems and preservation of habitat for species relying on periodic flooding; effect on downstream water flows; effect on geographical features or Aboriginal interest.

s.169, a non-complying controlled work can be approved if publicised, with objections taken into account.

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96. Water Management Act 2000
4 July 2014

Dictionary defines a river:

- (a) any watercourse, whether perennial or intermittent and whether comprising a natural channel or a natural channel artificially improved, and
- (b) any tributary, branch or other watercourse into or from which a watercourse referred to in paragraph (a) flows, and
- (c) anything declared by the regulations to be a river, whether or not it also forms part of a lake or estuary, but does not include anything declared by the regulations not to be a river.

[Note the NSW Office of Water (NOW) interprets this to mean “any blue line on the largest topographical map of that area (i.e. at least 1:25,000)”: [Application for approval for water supply works, and/or water use](#)].

A lake is defined as:

- (a) a wetland, a lagoon, a saltmarsh and any collection of still water, whether perennial or intermittent and whether natural or artificial, and
- (b) any water declared by the regulations to be a lake, whether or not it also forms part of a river or estuary, but does not include any water declared by the regulations not to be a lake.

Waterfront land includes a river, lake or estuary and 40m inland from the shore / high bank.

The definition of a ‘flood work’:

a work (such as a barrage, causeway, cutting or embankment) that is situated in or in the vicinity of a river, estuary or lake, or within a floodplain, and that is of such a size or configuration that, regardless of the purpose for which it is constructed or used, it is likely to have an effect on:

- (i) the flow of water to or from a river, estuary or lake, or
- (ii) the distribution or flow of floodwater in times of flood,

and includes all associated pipes, valves, metering equipment and other equipment, but does not include any work declared by the regulations not to be a flood work.

The ‘flood work’ definition including the phrase ‘regardless of the purpose’ is broad enough to cover both levees and levee-like structures.

Water management (general) regulation 2011 (below) excludes some works from being ‘water supply works’ (note flood works fit under the category ‘water supply works’: see s.90). Note that anticipated changes that will exclude development within town boundaries from the definition of ‘flood works’ (see document #105).

s.90 includes three types of water management works approvals: those for water supply, drainage and flood. However, it should be noted that ‘flood works’ do not have separate approvals but are covered under ‘water supply works’ approvals (s.90). See: [Application for approval for water supply works, and/or water use](#).

The water supply work definition includes levees and ring tanks:

- (a) a work (such as a water pump or water bore) that is constructed or used for the purpose of taking water from a water source, or
- (b) a work (such as a tank or dam) that is constructed or used for the purpose of:
 - (i) capturing or storing rainwater run-off, or
 - (ii) storing water taken from a water source, or
- (c) a work (such as a water pipe or irrigation channel) that is constructed or used for the purpose of conveying water to the point at which it is to be used, or
- (d) any work (such as a bank or levee) that has, or could have, the effect of diverting water flowing to or from a water source, or

(e) any work (such as a weir) that has, or could have, the effect of impounding water in a water source, including a reticulated system of such works, and includes all associated pipes, sluices, valves, metering equipment and other equipment, but does not include: ...etc.

Activities on waterfront land are 'controlled activities' subject to a different approval s91(2) (see [application for a controlled activity approval for works on waterfront land](#)). As per the *Water Act 1912*, an official informed me that NOW uses its discretionary powers in deciding what they look at and there is no set list of activities near river banks or in-stream they will consider.

[Controlled works approvals](#) under the *Water Act 1912* are currently transitioning to flood works approvals (a type of [water supply work](#), under this Act). The definition will exclude works within town boundaries (for proposed changes, see document #105). In the future, works within town boundaries will only be covered under [Environmental Planning and Assessment Act 1979](#) (EP&A Act) approval requirements. E.g., works will be covered by EP&A Part 4 assessment if a local government identifies it as 'designated development' in a [Local Environment Plan](#), or by Part 5A if state significant infrastructure. I wondered what would happen if a council failed to include 'flood mitigation works' as 'designated development' and made inquiries – taking advantage of the submissions and inquiries process about the proposed changes. Various officials I spoke to feel that this will not reduce safeguards or impact assessment. They noted that where the NSW Office of Water (NOW) approves levees (using environmental impact assessment (EIA) requirements under Part 5 of the EP&A Act), usually the council has already prepared an environmental impact statement / assessment and NOW is only a 'rubber stamp'. One noted that approval by NOW was inappropriate given that local governments have the lead responsibility for development control in their area. It was also noted that town levees were informed by urban floodplain management plans. I presume they were referring to the floodplain risk management process in the Floodplain Development Manual but have not received confirmation from the relevant official that this is correct. One official noted that town levees are rarely approved through the *Water Act 1912* regardless. I noted that grants processes required EIA, meaning it's unlikely a town levee would receive funding without one and this was confirmed. Thus the exclusion may be of little significance, providing EIA requirements continue to be reflected in processes (e.g., in the Manual, in grants requirements). However, it does highlight that both in the past and present, processes are mostly locally driven and approved.

s.5 The Act includes water management principles. Principles 2 (general) and 6 (floodplain management) are relevant. s.5(2)(d) includes: cumulative effects of approving water licences / approvals on water sources and dependent ecosystems to be considered / minimised [however this does not necessarily cover cumulative impacts on flood storage & behaviour]. Principle 6 includes avoiding / minimising soil degradation, including erosion, impacts on other water users; minimise existing and future risks to life and property. It should be noted that according [Environment and Planning Assessment Act Regulation 2000](#), Part 5 approval (which goes through the department) requires the assessment of cumulative effects on the environment but Part 4 approval does not.

s.11 The Minister may declare a water management area.

s.15 a water management plan may cover any aspect of water management, including (but not limited to) water sharing, water source protection, drainage management, floodplain management.

s.29 covers the core content of water management plans, including: existing / natural flood regimes; ecological benefits of flooding; existing flood control works, their ecological impacts (including cumulative), and protection afforded; and risk of flooding to life and property.

s.30 covers additional content that may be included. This partially overlaps with *Water Act 1912* s.166C). A major difference is that the development of floodplain management plans does not refer to the [Floodplain Development Manual](#).

[State Water Management Outcomes Plan Order 2002 No.1028 \(NSW\)](#) was authorised under this Act. It aimed to restore connectivity in 11 floodplains and required the development of management plans. Management plans are authorised under Part 3 of this Act (ss15-49). Part 3 includes: Division 3—Water use, Division 5—Floodplain management, Division 6—Controlled activities and aquifer interference activities.

s.113 requires a register of approvals to be maintained, which could provide the basis of a database on levee-like structures, depending on the purpose of the database and what information it records (information is presumably collected via approval application forms). Communication with NOW officials provided information about the controlled works database. The information it contains covers ownership, purpose, location, approval conditions,

status of application, application history (e.g., advertising, objections). Other information, such as structure design, height, setback from riverbank, if provided, are not held on the database but are kept on controlled works files. A related database is planned for the [NSW Healthy Floodplains project](#). Most of the data is drawn from the Controlled Works database. However, it also has supplementary information and a lot of effort has been invested in mapping, which identifies floodplain management zones (e.g., floodways), environmental and cultural assets.

There are no appeal provisions for integrated development under the Water Management Act 2000, but appeals can be made through the [Environment and Planning Assessment Act 1979](#) to Land & Environment court.

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97. Water Management (General) Regulation 2011

25 July 2014

Regulations do not exclude any type flood work from the [Water Management Act 2000](#) (WMA) definition, suggesting the Act covers levee-like structures.

Clause 3 ('definitions') for water reticulation works includes irrigation channels but excludes any work that is also a flood work.

Flood works are a type of 'water supply work' (s90 of the WMA) and regulations include exemptions for water supply works (clause 36 & Schedule 1). This includes exemptions for specified types of dams, e.g., used by landholders for flood mitigation on minor streams, or constructed before a specified date.

Controlled activities include specified activities on waterfront land (within 40m of the bank). The controlled activities definition in the WMA is broad enough to cover levees. The regulations includes exemptions for 'controlled activities' in clauses 36-40 and Part 2 of schedule 5 (this includes situations where there is a water supply work approval, a harvestable rights order, lawful removal of vegetation).

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98. Application for approval for water supply works, and/or water use

Sept 2010

Application for approval is authorised under section 92 of the [Water Management Act 2000](#).

This document does not specifically mention embankments / levees although it covers channels and drainage and water storage (including ring tanks). It requires the applicant to provide details on height (m) above surrounding ground level, as well as other dimensions.

Works may require development consent from the local government.

A map needs to be provided, including the location, property boundary, existing and proposed water supply works including flood protection works (including pumps, diversion works, water storage channels, etc.), wetlands and watercourses.

Other details that need to be mapped include: soil types, native vegetation (including grassland), heritage, drainage/recycling systems, high water table areas, the area covered by an Irrigation Drainage Management Plan (see ss25-27 of the [Water Management Act 2000](#)).

The applicant needs to provide purpose of proposed water use: crop, area irrigated and delivery system. They also need to specify slope of irrigated land; provide the name of nearest river(s) within or near property boundary; specify soil types and issues including sodic, acid sulphate, erosion, contamination, etc.; and proposed native vegetation clearance (m²).

Depending on the size of the water supply works proposal and its potential impacts, applicants may be required to provide a species impact statement; a surveyed plan showing the proposed layout; the dimensions and construction details of the work/s; or any other additional information about your proposal as required by NOW.

"You may be required to lodge a separate application under the [Water Act 1912](#)" if proposed water storage works are in a floodplain (this includes ring tanks).

Other licence forms are at: <http://www.water.nsw.gov.au/Water-licensing/Applications/default.aspx>

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99. Application for Approval of a Controlled Work

Sept 2010

Controlled works approvals under the *Water Act 1912* are currently being transitioned to flood works approvals under *Water Management Act 2000*. See document #105 for information on the policy change.

Application for approval authorised under section 167(1) of Part 8 of the *Water Act 1912*. s166C of the Act gives a list of the considerations that need to be assessed when making an approval decision.

Controlled works include levees, ring tanks, dams, irrigation supply channels that are in a floodplain, river or lake. Information required to make an environmental impact assessment is at Appendix 1 & 2 of the form. This includes tenure, location, height above ground level (of levees, not irrigation channels), source of material, native vegetation on the site or area immediately surrounding proposed works, soils & erosion issues, existing works, existing land use, heritage, wetlands/depressions that would be affected, proximity to a watercourse, whether development will affect flows, irrigation and drainage location maps, including in relation to watercourse and floodplain.

According to an official I spoke to from NSW Office of Water (NOW), this form (under WA 1912) is currently used for approvals of levees within town boundaries. If a development application (DA) is required by a local government (i.e., through its [Local Environment Plan](#), then the local government carries out the environmental assessment (under part 4 of the *Environmental Planning and Assessment Act 1979*. If the local government does not require a DA, NOW carries out the environmental assessment under Part 5 of the EP&A Act (using the same application form).

This will change due to the transition to *Water Management Act 2000* and flood works within town boundaries will no longer be covered by this approval.

Under the new arrangements, development will need to be consistent with urban floodplain management plans (that have been undertaken by Office of Environment and Heritage). Levees within town boundaries will not be covered by approvals unless the local council requires a DA under their LEP.

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100. Application for a Surface Water Licence

101. Application for a Surface Water Permit

102. Application for a Groundwater Licence

103. Application for an Authority for a Joint Water Supply Scheme

Sept 2010 [date for all 4 applications]

Documents #100, #101, #102, #103 were read together and considered collectively.

- Application for a Surface Water Licence (Section 10 of the Water Act 1912)
- Application for a Surface Water Permit (Part 2 of the Water Act 1912)
- Application for a Groundwater Licence (Part 5 of the Water Act 1912)

Section 2 of the above 3 forms includes irrigation (the details required are almost identical to those required in the [application for approval of a controlled work](#) form).

- Application for an Authority for a Joint Water Supply Scheme (Section 20 of the *Water Act 1912*)

More detailed information is requested for this form, including plans of the cross-sections of channels and capacities.

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**104. Application for a Controlled Activity Approval for works on waterfront land
Sept 2012**

This form is authorised under Part 3, Chapter 3 of the [Water Management Act 2000](#).

Waterfront land defined as being within 40m of the bank. Development or 'controlled activities' could include levees, but activities covered by the form is not clear and it doesn't specify levees as being a controlled activity. However it does mention things like gravel extraction and channel widening. Development/ encroachment on riparian land is permitted where offsets are used (land protected from development).

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**105. Proposed changes to controlled works issued under part 8 of the Water Act 1912 - Frequently asked questions
September 2014**

'Controlled works' approvals (under *Water Act 1912*) are currently being transitioned to 'flood works' approvals (*Water Management Act 2000*). This is anticipated to be finalised in 2015.

Flood works exemptions are expected to include all flood works within a town boundary. Other exemptions include ring levees round property and earthworks no higher than 150mm, if not in a floodway.

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**106. Floodplain Development Manual: the management of flood liable land
2005**

**107. Whites Creek Floodplain Risk Management Study and Plan
7 Dec 2012**

**108. Wingecarribee Shire Council Wingecarribee River Flood Study
Feb 2014**

**109. Hawkesbury Floodplain Risk Management Strategy and Plan
Dec 2012**

Documents #107, #108 and #109 were used as examples to support the analysis of document #106.

The [Local Government Act 1993](#), Section 733, (1)(a) & (b) states that councils are not liable if they give advice, do or omit to do anything 'in good faith' relating to likelihood of land being flooded. Publication of a flood liable land manual is mentioned s733 (5)(a). It is also referenced in [Water Act 1912](#) s166A in relation to floodplain management plans, which are to be considered when making a determination for controlled works (s166C). The manual is not currently referred to in the [Water Management Act 2000](#).

This is a key document, detailing the floodplain management process and requirements. It covers governance (state agencies, local government, floodplain risk management committee), processes, content of studies and plans, risk management, options analysis and decision making processes.

Levees are covered in various sections: they are appropriate for 'high hazard' areas (J2.3). Options assessment is covered G7. Levees are viewed as being generally the most 'economically attractive' measure (J4.3) and are 'tried and true' (G9.6). Their drawbacks are also covered, including environmental impacts (G9.6) and impacts of levees on flood storage (G6.1). Cost-benefit analysis using average annual damage estimates is covered (M6) and suggests that while levees are more expensive to build and maintain, they are also more effective at reducing damage. The Manual suggests the use of development controls behind levees (G9.6; J4.3). Levee height may be lower than 1:100 ARI for a range of reasons (K3.2, K4.2.2).

Relating to development in general, no 'significant' impacts on other properties should be acceptable (C9.2). Significant is not defined.

Catchment-wide development trends are to be taken into account (E4). Catchment management plans prepared by CMAs and other agreed catchment objectives and environmental objectives (water reform process) are meant to be considered in assessing options (E5.2.1). D2 suggests that adjoining councils may need to form a committee for addressing catchment-wide flooding. The scale of flood studies (F2) suggests that the flood study could be broader and be the basis of a number of management studies. Note the catchment definition:

“the land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location”

In practice, looking at recent flood studies, this area can be very small locality-based. E.g., the Whites Creek floodplain risk management study and plan (2012), covered the Whites Creek catchment, noting it's at the top of the sub-catchment. Whites Creek appears to be a tributary of Wingecarribee River, though so small it is not marked on the 2014 Wingecarribee flood study map, with Moss Vale omitted from that study (though it's in the Wingecarribee catchment). Wingecarribee is a sub-catchment of Hawkesbury-Nepean. The Whites Creek flood study area starts to the south of Moss Vale, where residential development is proposed, and ends where the creek leaves the town, illustrating the use of the catchment definition where a catchment stops at 'a particular site'. At a higher level of complexity, the Dec 2012 Hawkesbury Floodplain Risk Management Study and Plan (2012) is a comprehensive document in three volumes, close to 300 pages in total. It covers an area of floodplain wholly within municipal boundaries (not the entire Hawkesbury basin) but draws on earlier regional floodplain studies. It covers proposed development but does not appear to reference a catchment management plan.

Cumulative effects assessment is covered (p.5, 9, C9.1, C9.2, C9.3, D2,E5.1, G3, G6, G6.1, G6.2, G6.3 G9.1, L2, L3, L4). It is not clear whether cumulative environmental impacts are included. Some parts suggest it does, (p.5, G3) while the main section covering cumulative impacts (G9.1) omits the environment and just talks about effect on flood behaviour and emergency services capacity. It appears to take 'now' as the baseline. i.e., past modifications and reductions in flood storage are not used to calculate the total loss of flood storage from natural state. Cumulative assessment is expected to anticipate development changes over a 20-year period (G6).

Climate change considerations are covered in E6, F6 and G9.8. While consideration of climate change is required in flood study and management study, G9.8 discourages the consideration of climate change (e.g., when setting Flood Planning Levels) beyond a 20-year timeframe. This is the period envisaged for a floodplain management plan and freeboard is expected to accommodate changes in risk within the 20-year period. 1%AEP + 0.5m freeboard is the expected standard for residential development (K3.1, G9.8) and even when a subsequent study finds that what was believed to be a 1%AEP is actually a 1 in 80 AEP, this does not necessarily warrant a revision (K4.3.3).

This timeframe seems inadequate. Development can be expected to remain in place considerably more than 20 years and if flood risks increase as a result of climate change, this will only fuel future demand for levee protection.

Environmental enhancement opportunities should be considered: G4.1, G9.4, J5.2 (retarding basins could improve water quality), J4.2 (rehabilitation – improved connectivity etc.). This is a good inclusion and it would be interesting to see if flood mitigation programs provide funding for such activities and to review floodplain management studies to find out how many recommend this.

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110. Planning Circular PS 07-003: New Guideline and changes to section 117 direction and EP&A Regulation on flood prone land (Department of Planning)

31 Jan 2007

To be read in conjunction with the [Floodplain Development Manual](#). It states that

“unless there are exceptional circumstances, councils should adopt the 100-year flood as the Flood Planning Level (FPL) for residential development.”

Planning controls above 1:100 year flood for residential land are only to be applied in 'exceptional circumstances' with written agreement from State government. Non-compliance means councils are *not* exempt from liability under s733 of the [Local Government Act 1993](#). [NB: according to Ass. Prof. Michael Eburn, this is not necessarily so, seeing as the Act exempts Local Governments from liability if they act in good faith. So it would need to be proved that when applying more stringent safety standards they did not act in good faith]. Section 149 certificates must not identify flood prone land unless development controls apply (i.e., including 'low flood' areas above 100 ARI).

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111. Floodplain Risk Management Guideline: Practical Consideration of Climate Change (Department of Environment and Climate Change)

25 Oct 2007

The Guideline offers points for councils to consider when assessing climate change risks and management options. It covers both sea level rise and rainfall related flooding.

The document provides: a graph to show how increasing rainfall intensity will affect ARI (e.g., a 1:100 ARI flood is expected to become a 1:20 ARI flood with a 30% intensity increase). It provides CSIRO's projected changes for each of NSW's thirteen catchments. Extreme 1 day total rainfall projections are given for 2030, 2070. It recommends the use of scenarios and timeframes for sensitivity analysis to be carried out as part of flood studies. It also suggests site specific considerations that can be considered in flood studies and floodplain risk management studies.

Possible management strategies are included for 'minor' and 'significant' climate change impacts for future and existing development. Scenarios range from planned retreat / leaving land undeveloped, house raising and placing fill, to levees able to cope with high range climate scenarios (this includes allowing for incremental levee raising and pumping out stormwater). The latter allows land to remain inhabited; house raising may not.

Suggested options also include altering flood planning levels. However Sellers & Mooney (2012)* argue councils rarely apply for 'exceptional circumstances' (to date only 2/30) and that the Department of Planning shows little appreciation of the [Flood Prone Land Policy](#) and its application to the LEP process (i.e., planning schemes). They argue the [Department of Planning guideline](#) prevents their council from applying management measures appropriate to address climate risks.

*Sellers, E and Mooney, A. (2012). So just how exceptional is Fairfield? Contesting the 100 year ARI plus 0.5 metre flood planning level. 2012 Floodplain Management Association National Conference. 21st – 24th February, Batemans Bay, Australia.

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112. Local Land Services Act 2013 No 51

2 Jan 2014

This Act replaces the *Rural Lands Protection Act 1998* and the *Catchment Management Authorities Act 2003*. It provides for the development of local strategic plans [catchment action plans under the former CMA Act 2003].

Functions of Local Land Services (LLS) are at s.14, and include administration, delivery, governance of local land services, education and training, (including in natural resource management and emergency management), encouraging community participation, financial and reporting arrangements and development of a 'State Strategic Plan'.

The Act provides for a state board at s.25-6 and local boards (one for each region) at s.27. Regions are defined at s6 and the authority to change them s.7. A map of 11 regions is shown in schedule 1.

Local boards have members elected by rate payers and appointed by the Minister (Minister-elected members outnumbering elected ones) and eligibility requires relevant qualifications and experience. Functions include developing a local strategic plan for the region, s.29(1)(a).

State strategic plan arrangements are at ss36-44. Plans are valid for a 10-year period. Contents include social, economic, environmental outcomes, timeframes and reporting.

Provisions for local strategic plans are at ss45-54. 5-year plans set regional vision, priorities and strategy to deliver LLS with appropriate social, economic, environmental outcomes. Content includes regional outcomes, timeframes, reporting, and 'other matters'. Plans may also cover water quality and other non-regulatory water management issues.

Both State and local plans have to take into consideration existing management plans under the [Water Management Act 2000](#) and the provisions of the [Environment and Planning Assessment Act 1979](#), state priorities, community engagement, evidence-based practices to support primary industries, resilient communities, healthy landscapes (s37(3); s47(3)).

Emergency provisions are at s.12.

Annual report contents are given in s.23 (performance, outcomes, progress in achieving compliance, community participation, and financial statements).

s.201 provides for land acquisition by agreement or compulsory purchase under the *Land Acquisition (Just Terms Compensation) Act 1991* and where acquisition relates to the *Public Works Act 1912*, Local Land Services is the constructing authority and ss34-37 of *Public Works Act 1912* don't apply.

s.202 allows Local Land Services staff to enter land to construct, repair or maintain works (building or structure) in relation to natural resource management or regulatory functions, with provisions for compensation.

s205 limits liability where things were done or omitted to be done in good faith (a problem with the grammar of this section of the Act - it seems to be missing a verb).

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113. Local Land Services Regulation 2014 **1 January 2014**

The type of regulations that can be made are listed in s206 of the *Local Land Services Act 2013*, including 'the process of making, and the form and content of, the State strategic plan, local strategic plans and local annual reports' (s.206(f)). The regulation does not provide any additional direction regarding plans.

Part 4 (clauses 31-50) provides for the levying of catchment contributions from a catchment contribution area (defined as an area under the CMA Act before it was repealed or a new catchment contribution area declared by the Minister). LLS is to maintain a map of these areas and they may only levy amounts sufficient to cover any shortfall in funding for LLS to carry out 'catchment activities' (clause 33). 'Catchment activities' are not defined either in the Act or the regulation. The intention may be to specify activities under local strategic plans (made on the basis of defined regions). The relationship between 'catchment contribution areas' under the regulation and 'regions' under the Act is not clear.

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114. NSW Healthy Floodplains Project

(factsheet available at <http://www.water.nsw.gov.au/Water-management/Water-recovery/Sustaining-the-Basin/Healthy-floodplains/Healthy-floodplains>)

May 2013

115. Water management partnership agreement between the Commonwealth and New South Wales: Project schedule 4: Healthy Floodplains Project

11 Jan 2010

116. Floodplain Management Plan for the Gwydir Valley Floodplain 2015 Draft Order

Sept 2014

117. Draft Background document to the floodplain management plan for the Gwydir Valley Floodplain 2015

Sept 2014

118. An overview of floodplain management plans under the Water Management Act 2000

Aug 2014

119. Gwydir River: Lower Gingham Watercourse Floodplain Management Plan

2006

Documents #114, #115, #116, #117, #118, #119 were read together and considered collectively.

Valley-wide floodplain management plans are under the *Water Management Act 2000*. NB: earlier rural floodplain management plans under the *Water Act 1912* are being transitioned to valley-wide plans. Rural plans were first developed under the *State Water Management Outcomes Plan Order 2002*.

The health floodplains project currently covers 5 valleys: Gwydir, Border Rivers, Namoi, Macquarie and Barwon-Darling. Water harvesting structures are to be assessed for impacts on 'key' environmental assets and there is also a

remediation program. It will also map floodway networks. The project aims to improve connectivity / protect farms from flood damage. The brochure notes that there will be a database. According to the partnership agreement this will “identify Floodplain Harvesting Works, Flood Control Works and associated extractions and environmental assets at a valley scale to provide baseline information for Floodplain Management Plans”. The brochure says valleys will have extraction limits and references the new NSW Floodplain Harvesting Policy (2013).

The project objectives are outlined under schedule 4 of the partnership agreement. Remediation to restore connectivity is a clear objective. Remediation forms stage 2 of the project, and according to the partnership agreement the decision to progress to that stage is subject to review. Communication with the NSW Office of Water (NOW) indicated that Stage 1 of the project is scheduled to be completed by 30 September 2016.

Remediation is not mentioned on the NSW Office of Environment and Heritage project website, which uses the word ‘maintain’. However the NOW brochure (May 2013) specifies remediation.

The first draft plan (Gwydir Valley) has been released. It’s primarily concerned with conditions for granting approvals (i.e., to ‘maintain’ connectivity). However, clause 52(8) and (9) provide for the removal or modification or decommissioning of existing flood works.

The ‘overview’ document explains that valley-wide plans are floodplain management plans authorised under the [Water Management Act 2000](#) (s.15), as part of the transition from the floodplain management plans authorised under the [Water Act 1912](#) (s.166A). It explains there are few differences in provisions, except that the old plans addressed small specific areas of intensive irrigation that had caused flood behaviour changes; the new plans will cover larger floodplains covering the extent of major flooding. Specific rules will apply to different management zones for determining future flood works approvals. Flood work approval exemptions will apply for “certain minor flood works or flood works that are important for the protection of life or property.”

Floodplain management plans are to provide a map showing areas enclosed by existing major levees to give an indication of areas having some measure of protection from flood risk. It won’t map all flood works. The floodway network, flood extent and flood storage areas will be mapped to assign management zones –thus helping to maintain connectivity. For information collected by the Healthy Floodplains database, see comments in document #97, second last paragraph: the database is largely reliant on the controlled works database for its information on structures but has also invested in mapping ecological and cultural assets and has mapped floodplain zones. The overview document focuses on rules governing new works to minimise harm. It mentions modification and removal of works in a generalised sentence on p.1 but provides no information about how this will be achieved in the text. Discussion of existing works is confined to identifying them (types of works and number of approvals, map as above) in the context of risks to life and property.

The Gwydir Valley Floodplain Management Plan background document includes a section on measuring hydraulic cumulative impacts (p.52-53). It aims to limit the redistribution of flood flow to no greater than 5% of the 2012 event (1:25 ARI). This is a blanket limit across the floodplain using the level of floodplain development existing in 2014. Against this 2012-2014 baseline, ‘current’ development and ‘proposed works’ will be measured. The effect this is expected to have is: “flood works in areas outside the existing floodway networks would continue to be approved, while the approval rate of flood works within floodway network would be expected to decline as cumulative impacts approach acceptable limits.” (p.61) Greenfields distribution of flow (where all existing works were removed) was modelled: “It was found that some re-distribution has likely occurred due to existing flood works” (perhaps an understatement given that “current estimates are that the area protected by flood works (hereafter developed areas) makes up approximately 20% of the Gwydir floodplain”).

It is not clear what role the greenfields model had in setting limits. Neither is it clear what relationship the current plan has to the earlier rural floodplain management plans (e.g., Gwydir River: Lower Gingham Watercourse Floodplain Management Plan) in the context of setting limits and baselines. However, it appears that thresholds were set with reference to earlier floodplain management plans, including the Lower Gingham. This earlier plan (covering a smaller area) aimed, in 2006, for there to be ‘no significant redistribution of the peak discharge - less than 2% for individual works and 5% cumulative be used to guide the assessment of proposed or existing flood control works’ (the Lower Gingham plan used the 1:20ARI 1971 design flood event as baseline, though ‘pre-development’ is used for velocity). ***It is not clear whether the 5% threshold in the new plan is on top of the 5% increase allowable under the earlier plan. The potential for baselines to move with successive plans is concerning.***

When I asked about the type of information collected and about its use for flood risk management, a departmental official provided me with the following explanation:

“For the purposes of developing strategic rural floodplain plans for regulatory planning, only the ‘footprint’ of developed works is being mapped – typically the areas enclosed by private rural levees.

It should be noted that the plans developed under the WA 1912 and / or WMA2000 are not flood risk management plans (e.g. council urban plans). Rural FMPs are more holistic and are guided by the WMA2000 planning provisions which consider a range of issues including the protection of ecological and cultural assets as well considering flood risk issues.

Primarily, WMA2000 plans are represented by spatial products which map management zones with specific rules to control future rural flood work development and maintain floodplain connectivity (e.g. Zones A & D in the Gwydir plan capture ecological and cultural assets and restrict development – similar to the floodway networks found in WA 1912 plans).

NOW keeps a database of the details of approved specific works: which may include works within leveed areas, licence conditions such as minimum height for levees etc. – not sure of how restrictive access is.

NOW is also developing a database for extractive works used for floodplain harvesting purposes as part of the Healthy Floodplains Project.

Although the WMA2000 plans address flood risk management it is mainly by coordinating floodplain works through planning rules to minimise their impact on flood behaviour and thereby not to worsen the flood risk on surrounding areas. It should be noted that flood mitigation works are the responsibility of landholders in rural areas (i.e. landholders decide on the level of risk they want protection from).

For urban flood risk management plans prepared by councils, flood risk and hazard are investigated with recommendations made to consider a range of flood mitigation measures e.g. construction of town levees and setting minimum height for floor levels etc.

Finally although some of the supporting technical work being undertaken for developing rural plans specifically modelling flood behaviour may be of interest to the SES, the plans themselves are not intended to provide specific flood intelligence for use by the SES.”

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**120. State Water Management Outcomes Plan Order 2002 No.1028 (NSW)
18 Dec 2002**

**121. Floodplain Management Plan: Murrumbidgee River Hay to Maude
April 2014**

**122. Floodplain Management Plan: Edward and Wakool Rivers Stage 1: Deniliquin to Moama–Moulamein
Railway
Jan 2011**

Documents #120, #121, #122 were read together and considered collectively.

The State Water Management Outcomes Plan has expired,(i.e., it was only in effect for 5 years after its publication in the Gazette, as per section 6 (6)of the [Water Management Act 2000](#).

Target 25 of this Order aimed to restore connectivity of eleven rural floodplains (30,000 ha) in the Namoi, Gwydir, Lachlan, Macquarie, Liverpool Plains, Billabong Creek and Central Murray, focusing on the 1:5 ARI floodplain. Target 25 included the following:

“prepare strategic floodplain management plans with a view to identifying those levees that must be modified or removed in order to restore more natural flooding regimes to wetlands and floodplain ecosystems”

“Options to reduce the impact of those structures must then be identified and negotiated with landowners.”

I have not been able to find a review of how effective this order was in achieving its targets – particularly target 25. A government official told me:

“Target 25 of the SWMOP aimed to provide floodwater access to at least 60% of the 1 in 5 year flooded area. Floodplain Management Plans (FMPs) developed under the WA 1912 mapped floodway networks where rural floodplain development was restricted to allow for the unimpeded passage of floodwaters and to maintain flood connectivity. These flood way networks which catered for a range of design flood events generally exceeded Target 25. NSW Office of Water (NOW) is the determining authority for floodplain works in designated floodplains. NOW implements statutory rural FMPs by referring to them when determining floodplain work approvals under the WA 1912 and /or WMA2000. To the best of my knowledge neither NOW or Office of Environment and Heritage (OEH) have done a review of the effectiveness of rural FMPs in assisting with improvement of floodplain connectivity and regulatory activities.”

“Most of the earlier plans had a schedule of remediation activities which listed responsibilities and time frames. A lot dependent on getting dollars to provide assistance to landholders to undertake the works especially if there were environmental benefits. My understanding is that in most cases NSW Office of Water issued licence renewals ‘as is’ without remediation as there was no funding to progress works. The only plan where funding was provided (approx \$80K) was for the Hillston FMP in the Lower Lachlan Valley by the Lachlan CMA; however, only a portion of the money was spent on material (e.g. pipes etc. to improve connectivity) because of a lack of interest.”

In response to a query to clarify whether ‘by negotiation’, ‘varying approval conditions’ or ‘with funding / compensation’ was a more accurate reflection of how things were done in the past:

“More by negotiation especially if the remediation had environmental benefits. Once a negotiated outcome was agreed to the existing conditions on an approval would be varied. In some cases where the impact was significant then a removal notice would be issued – this would only really be for those works that were unauthorised (ie did not have an approval in the first place). In most cases where there was no approval to begin with the landholder would be asked to modify the works to make them compliant with a plan then NOW would get the landholder to apply for an approval.”

The order has now expired but there are many current Floodplain Management Plans.

Checking the Murrumbidgee Hay to Maude Floodplain Management Plan, mechanisms to enable restoration include varying the conditions of approved works under Water Act 1912 s176A. Removal or modification can be required for unauthorised works. Plans are meant to be reviewed every 5 years. The floodplain management plan provides complying works criteria, including thresholds against the 1974 flood (e.g., flood stage, redistribution, velocity, obstruction, delivery to environmental assets).

The Edmund-Wakool Floodplain Management Plan was developed under Part 8 of the Water Act 1912 and it includes table 5.1, ‘environmental improvement measures’. Most actions where the landholder is responsible have a footnote: ‘modifications to these approved works are subject to funding options further investigation and landholder consultation’.

These rural floodplain management plans (under the *Water Act 1912*) are currently being transitioned to valley-wide plans (through the Healthy Floodplains Project (#114, #115) under the *Water Management Act 2000*). The new project covers the same areas: Gwydir, Border Rivers, Namoi and Macquarie, and Barwon-Darling River valley.

These initiatives would support Guiding Principle 3 of the [NSW Wetlands Policy](#).

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123. Public Works and Procurement Act 1912

24 February 2014T

This Act was formerly known as the *Public Works Act 1912*.

s. 39-41, gives the power to acquire land for authorised works (compulsory or by agreement), including works for the prevention of floods or the control of floodwaters: s41(ab).

This Act is referred to by the [Environmental Planning and Assessment Act 1979](#) in s.10, which says that s34, 35, 36 and 37 of the *Public Works Act 1912* (relating to authorisation of public works) do not apply.

s. 80(c) gives the Minister (‘constructing authority’) the power to build embankments (and other works) ‘in, upon, across, under or over land, streets, roads, rivers streams or other waters’. S.80 (d) gives the power to alter the course of watercourses.

It’s not clear what relationship this Act and these powers have to the [Water Management Act 2000](#) and the [Environment and Planning Assessment Act 1979](#). According to definitions (s.3), ‘authorised work’ means ‘any work

the carrying out of which has been authorised in manner herein provided’, which suggests it only refers to provisions of this Act.

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124. Land Acquisition (Just Terms Compensation) Act 1991 **31 Jan 2011**

Land may be acquired for a public purpose by agreement (Part 2 Div 3, ss21-27) or by compulsory process (Part 2 Div 1 & 2 ss11-20). Compensation is dealt with in parts 3 & 4. The *Land Acquisition Act* is authorised for use under EP&A Act (s9, s27) (#119). I.e., land can be compulsorily purchased to build flood mitigation infrastructure.

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125. Environmental Planning and Assessment Act 1979 **25 July 2014**

There is little in the Act directly related to flood mitigation, but this Act governs infrastructure approvals. ‘Infrastructure’ *can* mean flood mitigation works where it relates to ‘state significant infrastructure’ (s.115T). For irrigation or water supply works, s89, 90, 91 of the *Water Management Act 2000* are referred to (these cover flood works approvals). For the purposes of EP&A Act, WMA approvals don’t always apply (i.e., in the case of State Significant Infrastructure (SSI), and State Significant Development (SSD). See also integrated development, s91).

The Act covers requirements and processes for development approvals including environmental planning instruments (State Environmental Planning Policy (SEPP) or Local Environmental Plans (LEP), the content of which may relate to levees or levees-like structures. [NB: LEP is the NSW equivalent of a local planning scheme].

According to the NSW Planning and Environment website: <http://www.planning.nsw.gov.au/local-and-regional-development>, the overwhelming majority of development proposals in NSW are assessed under Part 4 of the Act (s76-s109).

s76A details 3 types of development consent: state significant development; designated development (where it’s designated by an environmental planning instrument: LEP or a SEPP) and integrated development.

Definitions: development includes ‘works’ as long as they are not ‘complying’ (this definition is likely to include levees).

Development applications (DA) are used where development consent is needed. DAs require environmental impact statements (EIS) s78A(8). Content requirements for an EIS under Part 4 of the Act are listed in the regulations (see below). Matters to be considered when determining a DA are at s79C of the Act, including social, economic, environmental impacts. s79(c) requires consideration of the suitability of the site for the development, which is relevant to flood-related development controls. ss14-16 of the *Native Vegetation Act 2003* is relevant to Part 4 evaluation but is not referred to in this section. Concurrence decision making where development involves threatened species, populations, ecosystem communities and habitat impacts is covered in s79B.

Designated development can be declared in a LEP, SEPP or by regulations: s77A; s29:

The [Local Environment Plan \(LEP\) template](#) includes ‘flood mitigation works’ as a development type that can be used in a development zone. Zones specify which development types can be carried out: with, without or exempt from consent.

[SEPP \(Infrastructure\)](#) identifies flood mitigation work as something that may be carried out without consent

The *Environmental Planning and Assessment Regulation 2000* has a list of ‘designated development’ in schedule 3 that doesn’t include flood mitigation infrastructure (but nor does it include housing, so my interpretation is that schedule 3 is a list of ‘compulsory’ designated development and the rest ‘may’ be depending on whether it is declared elsewhere). Thus, levees may be included in a LEP as requiring consent or they may not require consent. If they don’t require consent, they may be included as SSI. Regardless of whether consent is needed, environmental impact assessment may still apply: see note s76(1).

Development can be subject to development control plans (Part 3, Division 6), e.g., to provide guidance to developers, to provide public notification, etc.

Joint regional panels may carry out the development consent functions of councils (s23G), which could be relevant to catchment-scale flood management. Regional development covered under this section is found in Schedule 4A. It includes 'general development' with a capital investment value over \$20 million that requires consent. So this provision could be used for levees. 'Staged development' provisions (s83A-D) could also be relevant.

Environmental assessment provisions are in part 5 (s110-115), but do not apply where consent has been obtained under Part 4: s110(1)(g), or for SSI or SSD. Environmental impact provisions for SSD are at s89G and for SSI at Part 5.1 Div2.

Integrated development is where more than one Act needs to give approval (e.g., development consent under both this Act and the [Water Management Act 2000](#) (s90, flood works approvals).

Where development consent *is not required* under Part 4, infrastructure (definition includes flood mitigation infrastructure: s115T) may be 'state significant infrastructure' (s115U). This is also stated in [SEPP \(State and Regional Development\) 2011](#), Part 3, clause 14(1)(a). Note the [SEPP \(Infrastructure\)](#) includes flood mitigation works as development which may be carried out without consent (clause 49, 50). SSI does not need to obtain [Water Management Act 2000](#) approvals for flood works: s115ZG(g). Nor does state significant development (SSD): s89J.

Development can be declared 'state significant development'. [State Environmental Planning Policy \(State and Regional Development\) 2011](#) lists SSD in schedules 1 (specified activities over a 'capital investment value') and schedule 2 (specific development in specific locations). Flood mitigation works are not included in these schedules but there are other reasons why development can be declared SSD (e.g., call in powers under s89c(3) of the Act).

s117 – local environment plans (LEP) (see documents #135, #136) need to comply with ministerial directions. There is a [ministerial direction #15](#) for flood prone lands.

Section 149 covers notification of planning controls through section 149 certificates. This includes flood-related development controls:

"...the council shall....issue a planning certificate specifying such matters relating to the land to which the certificate relates as may be prescribed...." s149(2)

"A council may, in a planning certificate, include advice on such other relevant matters affecting the land of which it may be aware" s149(5)

"A council shall not incur any liability in respect of any advice provided in good faith pursuant to subsection (5)" s149(6)

Many sections of the Act state that decisions can be appealed at the Land and Environment Court.

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126. Environmental Planning and Assessment Regulation 2000

25 July 2014

Clause 4 and schedule 3 define 'designated development' for various activities (including agricultural and extractive industries). Flood mitigation works are not included in the list of activities.

Schedule 3 includes limits to determine whether or not an activity is 'designated development' for the purposes of this regulation, e.g., setback from water bodies (40 – 100m depending on activity), slope of land (6- 18 degrees from horizontal), whether development is on a floodplain, and whether it's on acid sulphate soil. The activities listed don't appear to include anything that could be classified as a flood control work or a levee.

Interestingly 'floodplain' in this schedule is defined as the 1:100ARI floodplain, not the land that could be inundated up to & including Probably Maximum Flood (the latter being the [Flood Development Manual 2005](#) definition). This suggests a disconnect between planners and floodplain managers.

According to the Act, s.29, 77A, designated development can also be declared by LEPs and SEPPs. Some of these include 'flood mitigation works'.

Content requirements for an Environmental Impact Statement (EIS) under Parts 4 and 5.1 of the Act are listed in the regulations (see Schedule 2, Part 3, clauses 5-7). Content does not specifically require cumulative effects assessment though it must 'have regard' to intergenerational equity when justifying development: clause 7(1)(f); 7(4)(b).

For 'Part 5' environmental assessment (where approval is needed under an Act other than the EP&A), clause 228 details the factors that need to be taken into account. Environmental assessment needs to follow specific or general guidelines under this clause or if none exist, it needs to address items listed in cl.228(2). This includes 228(2)(o): "any cumulative environmental effect with other existing or likely future activities".

Clause 279 addresses: "What matters must be specified in a planning certificate?" This relates to section 149 (2) of the *Environmental Planning and Assessment Act 1979*. Prescribed matters to be specified in a certificate are included in Schedule 4, including 'flood related development controls information' in clause 7A of the schedule.

Schedule 1 (forms) includes information that needs to be supplied when making a development application (part 1), applying for a complying development certificate (part 2), or a construction certificate (part 3). The first is probably most applicable to levees. It includes requirements for SSD. It includes environmental impact, species impact, site location, proposed works, proposed land drainage, proposed landscaping and treatment of land, and a development sketch.

Schedule 4, clause 7A includes a requirement for information on flood-related development controls to be included in planning certificates.

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127. Environmental Planning and Assessment Amendment (Flood Related Development Controls Information) Regulation 2007

16 Feb 2007

This amends *Environmental Planning and Assessment Regulation 2000*. It clarifies requirements for inclusion of information in planning certificates about flood related development controls applicable to certain development on land. It relates to *Environmental Planning and Assessment Act 1979* ss149, 157.

The amendment deletes the word 'flooding' from planning certificates (schedule 4, clause 7) and inserts clause 7A 'flood related development controls information' in the same schedule.

[NB: Effectively this restricts the information that can be provided in planning certificates. Certificates used to be able to state whether land was in an area susceptible to flooding, i.e., up to probable maximum flood. They are now only able to state whether there are flood related planning controls on the land – and unless there are 'exceptional circumstances', flood controls are not permitted above the 1:100 year ARI floodplain. See document #110].

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128. State environmental planning policy (infrastructure) 2007

23 Oct 2014

Section 49 includes levees in the 'flood mitigation works' definition. According to section 50:

"Development for the purpose of flood mitigation work may be carried out by or on behalf of a public authority without consent on any land"

(Including construction, routine maintenance and environmental management works).

This means that s115U of the *Environmental Planning and Assessment Act 1979* is likely to apply. i.e., if it can be approved without development consent under Part 4 of the Act then it is state significant infrastructure (see document #138).

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129. NSW Wetlands Policy

March 2010

The policy aims to improve the condition of 'important' wetlands and 'maintain' their extent. 'Important' means: the relevant threatened species communities listed in the *Threatened Species Conservation Act 1995*; wetlands mapped for *SEPP 14*; sites in the Ramsar directory; and sites identified as having regional significance by regional organisations.

The policy identifies threats, including levees and drainage, and it recognises the importance of wetlands for flood management:

“regulating services that wetlands provide are related to their capacity to purify water, retain floodwaters, and provide a buffer to terrestrial areas at risk of flooding or pollution”.

There are 12 guiding principles. Principle 2 includes reference to levees:

“It is important, therefore, that dams, weirs, levees, floodgates and barrages are managed to maintain the characteristics of natural inundation”.

Principle 3 recognises that levees and levee like structures have reduced connectivity:

“Inland wetlands have been affected by levees and other earthen structures built to protect agricultural development from flooding. Such ‘flood barriers’ have led to the loss of connectivity to riverine systems, and the loss of the natural ecosystems and the services they provide....The cumulative impact of flood control works on water sources and their dependent ecosystems has been considerable.”

It’s interesting that here, ‘cumulative’ relates to cumulative from the original natural condition, rather than taking present state as the baseline.

“Wetland functions need to be considered up-front in floodplain management and in the formulation of development proposals”.

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130. State Environmental Planning Policy No 14—Coastal Wetlands 1 Oct 2011

This policy applies to wetlands marked on specific maps referred to in this policy. Levees are not allowed to be built on the land (i.e., wetland) specified in this policy without the consent of a council and the concurrence of the Director-General of Department of Planning. Considerations for concurrence are stated in clause 7(2). Presumably the environmental impact statement is required to address these points.

Information about this SEPP on the government website: <http://www.planning.nsw.gov.au/list-of-state-policies> as follows:

“...applies to local government areas outside the Sydney metropolitan area that front the Pacific Ocean. The policy identifies over 1300 wetlands of high natural value from Tweed Heads to Broken Bay and from Wollongong to Cape Howe.”

“Such development also requires an environmental impact statement to be lodged with a development application. The policy is continually reviewed. It has, for example, been amended to omit or include areas, clarify the definition of the land to which the policy applies and to allow minimal clearing along boundaries for fencing and surveying.”

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131. State Environmental Planning Policy (Major Development) 2005 (NSW) 31 May 2014

Requirements are given for some specified sites (e.g., Sydney Opera House).

For example, for many sites ‘development is permitted with consent’ is required for flood mitigation works in certain zones (e.g., public recreation, low density housing, ‘local centre’, such as a commercial centre, environmental management, environmental conservation, etc.).

Regarding flood planning requirements, sites sometimes require consent for development below 1:100ARI to ensure that it doesn’t flood increase hazard or cause safety risks. This SEPP is only for specified sites.

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132. State Environmental Planning Policy No 1—Development Standards 17 May 2002

This SEPP provides for ‘flexibility’ in applying development standards where the standards are unreasonable. It doesn’t apply to ‘complying development’:

“provides flexibility in the application of planning controls operating by virtue of development standards in circumstances where strict compliance with those standards would, in any particular case, be unreasonable or unnecessary or tend to hinder the attainment of the objects specified in section 5 (a) (i) and (ii) of the [EP&A] Act.”

The person who wants to develop must make a written objection explaining why it's unreasonable and decision about consent is then made.

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133. State Environmental Planning Policy (Exempt and Complying Development Codes) 2008
18 July 2014

This SEPP specifies development conditions for complying and exempt development covered under the Policy.

Land to which flood related development controls apply is referred to as a 'flood control lot'.

3.36C (general housing code); 3A.38 (rural housing code); and 5A.30 (Commercial and Industrial (New Buildings and Additions) Code) specify that any development on a flood control lot needs to be certified as not being a flood storage area, flow path, floodway, high risk or high hazard area. Habitable areas have to be above the Flood Planning Level (areas 'at or below' have to be constructed using flood compatible materials), and must not increase flood hazard elsewhere on the floodplain. Some provisions relate to ability to self-evacuate. It refers to the [Flood Development Manual 2005](#).

Earthworks, retaining walls and structural support (i.e., could be levee-like structures) are not covered by these SEPP codes if they are in a flood control lot. See 2.29: Exempt development; 5.19: Commercial and Industrial Alterations Code; 2.33: Exempt fences, residential; and 2.37: Business and industrial zones.

For rural and environment protection zones and Zone R5) fences may be 'exempt development' providing they meet specifications in clauses 2.35, 2.36.

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134. State Environmental Planning Policy No 33—Hazardous and Offensive Development
13 March 1992

This SEPP does not appear to relate to natural hazards.

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135. Standard Instrument (Local Environmental Plans) Order 2006 No.155 (NSW) Local Environmental Plans, Regional Environmental Plans
15 Aug 2014

136. Standard Instrument—Principal Local Environmental Plan
15 Aug 2014

137. Model Local Provisions clause 7.3 – flood planning
Dec 2010

Documents #135, #136, #137 were read together and considered collectively.

The 'order' prescribes the form and content of a principal local environmental plan under the [Environmental Planning and Assessment Act 1979](#) (s33A). The 'standard instrument – principal environmental plan' is provided at the end of the order (pp.6-77).

The 'standard instrument – principal local environmental plan' (authorised by the order) is a template setting out the standard provisions for a local environmental plan (the NSW equivalent of a local planning scheme).

The Local Environmental Plan (LEP) requires maps and it lists standard land use zones. Maps can include flood prone land (see s55 of [Environmental Planning and Assessment Act 1979](#)). For each zone, objectives and the type of development allowed with or without consent or prohibited have to be specified (Part 2). If development is allowed

to be carried out without consent it continues to be subject to environmental approvals under Part 5 and Part 3A of the EP&A Act (see clause 2.3 notes).

Flood mitigation works is a development type that may be included in the in the 'land use table' (Direction 5). In the dictionary 'flood mitigation works' includes levees.

Zone SP2 Infrastructure might apply to levees although it's not specified. It provides the objectives of this zone and specifies that development, as per the Land Zone map, as well as 'ancillary' development, is permitted with consent.

Coastal issues are considered under 'miscellaneous provisions' in relation to cumulative impacts and climate change. Catchment flooding is not. The NSW Coastal Policy is referred to in clause 5.5: (1)(b)(iv): "recognise and accommodate coastal processes and climate change" (1)(b)(x) [see also (2)(f)]: "ensure that decisions in relation to new development consider the broader and cumulative impacts on the catchment" and (2) "Development consent must not be granted to development on land that is wholly or partly within the coastal zone unless...." (3)(d) includes provisions relating to coastal hazards.

Waterway zones are in 3 categories (natural, recreational, working): clause 2.

'Environmentally sensitive area' is defined in clause 3.3, (e.g., Ramsar).

Model Local Provisions have been developed. Clause 7.3 covers flood planning. It provides development consent considerations for areas considered flood prone (i.e., at or below Flood Planning Level). Presumably this clause could be used to require consent for flood mitigation works.

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138. State Environmental Planning Policy (State and Regional Development) 2011 **5 Sept 2014**

This SEPP covers 'State significant infrastructure' (SSI) and 'state significant development' (SSD).

Under Part 3, clause 14(1)(a) of this SEPP, any infrastructure that does not require development consent due to the operation of a SEPP under part 4 of the *Environmental Planning and Assessment Act 1979* is declared state significant infrastructure (see EP&A Act s115U). *SEPP (Infrastructure)* includes flood mitigation works as development that may be carried out without development consent. Thus levees (where development consent is not required by a LEP), become SSI.

Schedule 3 of this SEPP includes a number of categories of SSI. Flood mitigation infrastructure is not included in the list.

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139. What is State significant development and how are applications assessed and determined? **Feb 2012**

This is a NSW Planning and Infrastructure fact sheet giving an explanation of relevant *Environmental Planning and Assessment Act 1979* (and related regulations) provisions.

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140. Local Government Act 1993 **4 July 2014**

Schedule 9 (dictionary) confines the definition of 'flooded' to inundation of land resulting from rainfall runoff (groundwater and riverine flooding not mentioned, though could be implied as both are related to rainfall).

Chapter 6 of the Act makes local governments responsible for flood prevention, protection and mitigation services and facilities (see chapter 6: introduction).

s68 covers activities that generally require the approval of the council. Flood mitigation is not included. Water supply works are included (except for on land within the area of operations of a water supply authority under *Water Management Act 2000*). Activities prescribed by regulations are included (s68, Part F10). This last is a catch-all that could conceivably include levees.

Under s733 (1), councils are exempt from liability for advice, anything done or omitted to be done 'in good faith' relating to the likelihood, nature or extent of flooding.

s733 (3) (e, f, f3) councils are exempt from liability for carrying out of flood mitigation works or coastal management works in a coastal zone or failure to upgrade them in response to projected or actual climate change.

s733 (5)(a) – authorises publication of a manual relating to the management of flood liable land by the Minister for Planning (i.e., the [Flood Development Manual 2005](#)).

A council can acquire land by agreement or compulsory purchase for the purpose of exercising any of its functions, even if the land lies outside its council area (ss186-189).

Local governments need to prepare a management plan for community land. Possible 'natural area' categories include wetland (s36K), watercourse (s36M) and foreshore (s36N). Core objectives include their restoration, regeneration, ecological protection, bank stability, water flows and quality and community access and education.

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141. Media Release: Commissioner warns of severe penalties for constructing levees without approval 13 March 2012

Penalties for unauthorised levees: maximum \$1.1 million (\$132,000 per day) for corporations and \$247,500 (\$66,000 per day) for individuals, e.g., protecting crops, which may redirect floodwater to other properties or towns.

The NSW office of water documents compliance and prosecutions. This is available at:
<http://www.water.nsw.gov.au/Water-licensing/Compliance/default.aspx>.

There have been successful prosecutions but fines awarded (mainly for taking water) are nowhere near as high as potential penalties. Only one person has been convicted for levee related offences: in 2013 an illegal embankment at Conargo resulted in a fine of \$750 + \$5,000 professional costs and 2 convictions.

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142. Native Vegetation Act 2003 1 Jan 2014

This Act requires development consent to clear native vegetation, **or** it requires a vegetation management plan: s12(1). Levee construction and maintenance may involve native vegetation clearance.

This Act applies to [Environmental Planning and Assessment Act 1979](#) (Part 4 – not to Part 5) requirements for development consent (s14, s15, s16).

[NB: part 4 of the EP&A Act s 79C covers matters for consideration when making a determination, including environmental impacts, but the *Native Vegetation Act* is not specifically referred to].

Clearing consent determination also needs to refer to [Local Land Services Act 2013](#) 'local strategic plans'. ss26-32 cover vegetation management plan provisions.

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143. Threatened Species Conservation Act 1995 17 Oct 2014

This Act is very closely linked with the [Environmental Planning and Assessment Act 1979](#) and contains content requirements for species impact statements (s110). Content includes: "a full assessment of the likely effect of the action on those species and populations, including, if possible, the quantitative effect of local populations in the cumulative effect in the region". This is one of the most specific descriptions I've found in any state of the methodology expected in a cumulative effects assessment.

Schedules list endangered, critically endangered, vulnerable and presumed extinct species, populations, and ecological communities, as well as key threatening processes covered by this legislation. Social and economic consequences of critical habitat listing have to be assessed before being declared. Maps are prepared showing critical habitat (ss37-55).

A licence is required to damage/harm/pick if it is a species/population/ecological community/critical habitat (Part 6). If the activity is not on 'critical habitat' and does not have an environmental impact statement, assessment is made of whether it will have a 'significant effect' (s94). Factors that need to be taken into account are in s94(3). These criteria include things like: 'whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action' (applicable to levees if they reduce connectivity), but this only applies to *listed* species/populations/communities. Thus floodplain species such as river red gum, black box, coolabah are not listed (except for 2 localised communities). It is possible they are included in 'critical habitat' maps for other threatened species (e.g., birds/mammals/reptiles).

Provision is made for licence exemptions (ss113A, 113B), which could require development of a property management plan.

Part 7A makes provisions for biobanking to enable offsets. This includes tradeable biodiversity credits.

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144. NSW 2021 2012?

This is a 10-year state plan to guide policy and budget in NSW. Relevant Goals include Goal 28: natural disasters (for flooding, via a NSW flood studies database and floodplain risk management plans); Goal 22: Protect our natural environment (water sharing plans are mentioned); Goal 23 Catchment Action Plans 'Catchment Action NSW'.

The state plan is also relevant from the point of view of pressure to develop flood prone areas. For example, Goal 5: improve housing affordability and availability and Goal 19: invest in critical infrastructure.

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145. Fisheries Management Act 1994 4 Nov 2014

For development in an aquatic reserve (development application under part 4 of *Environmental Planning and Assessment Act 1979* factors for consideration before giving consent are listed at s197C (e.g., management plan, permissible uses).

The Act requires people who wish to construct a dam, floodgate, causeway or weir across a river or creek to have a permit (s.219 of Fisheries Management Act; s.91 of *Environmental Planning and Assessment Act 1979*).

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146. Floodplain Management Programs Guidelines for Applicants

147. Floodplain Management Program new works project ranking form 2014-15

148. Work Plan - Investigation and Design Project [sample document]

149. Work Plan - Floodplain Risk Management Study and Plan (FRMSP) [sample document]

150. Work Plan - Flood Study [sample document]

151. Funding Agreement for Financial Assistance under the 2012/13 Natural Disaster Resilience Program's Floodplain Risk Management Grants Scheme [sample document]

152. Funding Agreement for Financial Assistance under the 2012/13 NSW Floodplain Management Program [sample document]

2014-15 [date for all the above]

Documents #146, #147, #148, #149, #150, #151, #152 were read together and considered collectively.

These documents provide funding application guidelines for councils.

Projects are approved in four stages: (1) flood study, (2) flood risk management plan, (3) design / feasibility study, (4) implementation.

Regarding implementation, there is no restriction on the type of management option funded providing it is an action identified in the Floodplain Risk Management Plan (FRMP).

Where works projects are identified in the FRMP and are likely to exceed a total project cost of \$500,000, an investigation, design and/or feasibility study must be undertaken. This appears to include voluntary house raising (VHR) and voluntary purchase (VP) projects.

Funding is offered on a \$2 to \$1 of council money, but special consideration is available where the project has state or regional significance and the council doesn't have the financial capacity (capacity is assessed by considering per capita general purpose grants under the Local Government Financial Assistance Grants).

Assessment criteria include compliance with the [Flood Development Manual 2005](#), processes and the ability to deliver within the allowed timeframe.

Regarding timeframe, "a stage should not extend beyond three years. If the project stage is likely to extend beyond three years, consideration should be given to staging the project", with the warning that failure to complete on time can impact funding available for future rounds. Limited project terms are an issue for voluntary purchase programs which are often ongoing.

Information includes a ranking form that can be used for scoring projects including structural works, evacuation, warning and voluntary purchase or house raising.

The score sheet looks at things such as scale of hazard, number of dwellings affected, benefit-cost ratio, development controls in place to manage future development, Ecologically Sustainable Development compatibility and community participation.

The sample funding agreements (sharing the same specific conditions) have standard clauses, including: 'the property or properties the Recipient proposes to purchase are part of a voluntary purchase scheme approved by OEH', (ditto for house raising) which could potentially restrict availability of funding for these options.

For levees (and other works), the standard clause requires the recipient to maintain works at their expense and include funding for maintenance in their asset management plan.

No restrictions on the use and communication of flood study information are permitted (required in most cases to be undertaken by an external consultant).

Model work plans have been developed for the first 3 stages. The work plan for an 'investigation and design' project expects levees option assessment.

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QUEENSLAND

153. Land, Water and Other Legislation Amendment Act 2013

This Act amends various pieces of legislation, and incorporates QFCI recommendations on levees.

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154. Regulation of Levees in Queensland: Consultation Regulatory Impact Statement

This is a consultation document carried out prior to passing the new levee legislation. It contains an indicative survey of the extent of levee use in QLD. 40 out of 73 councils answered the survey.

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155. Water Act 2000

1 July 2014

For levees, see especially ss967, 969, 972, 1247, schedule 4 (dictionary). The dictionary definition excludes levee-like structures.

The Act provides for the assessment of new or modified levees so as to minimise adverse impacts on overland flow water, the catchment, landholders, communities and land planning and emergency procedures. The Act only applies to new levees or new modifications, not to those 'existing' or 'under construction'.

The Act covers water licencing to take or interfere with water (attached to land) (s206-236) and water permits (attached to an activity such as road construction, mining) (s237-245). This is relevant to 'levee-like structures'.

s20 includes a general authorisation to interfere with or take overland flow. This may be regulated if the minister prepares a water resource plan or water operations plan for a specified area (s38; s46-47; s95), or if it's in a wild river area (s971, 972) or a declared drainage and embankment area (s.1014 h). Note the purpose of a water resource plan is the sustainable management of water. Among other things, it can regulate taking of overland flow if it interferes with availability for other users; if it impacts ecosystem requirements or beneficial flooding. A water operations plan implements the water resource plan (s95-103). A water operations plan can cover just part of the water resource plan area. Plan content includes water sharing, licencing, allocations and environmental management rules. s123 gives plans precedence over water allocations.

The Minister can also prepare a water use plan if there are risks that water use may destabilize river banks / beds, lower water quality or damage river environment (s60).

The Act enables permits to excavate or place fill in a watercourse, lake or spring. There are a number of matters that need to be taken into consideration when assessing applications, including (among others) the effect on water quality, vegetation destroyed, the physical integrity of the water body and cumulative effects (ss266-268).

Resource operations licences and distribution operations licences may be granted. The former for interfering with flow of water for the operation of water infrastructure (relating to water entitlements), the latter for taking water, interfering with flow of water, or distributing water (under water allocations).

Catchment is not defined.

There is a water allocations register (s 127; 146), containing details about the allocation holder, volume, location of extraction, purpose, conditions, resource operations plan and other matters. More details on the register are found at: <https://www.business.qld.gov.au/industry/water/managing-accessing/markets-trading/register>. It doesn't appear likely that this register would provide details about irrigation embankments or the type of information that would be useful to assess flood behaviour impacts or environmental impacts on habitat, wetlands or cumulative effects.

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156. Water Regulation 2002

4 July 2014

Sections 62-62D provide parameters for defining a levee (amount of fill: 50m³). Categories of levee are assigned according to the size of population 'significantly' impacted. The definition of 'significant impact' is an increase (**above** floorboards) of the height of flood by >5cm or velocity >0.2m/s. It is notable that this categorisation is in terms of impacts on off-site inhabitants. If there are major off-site environmental or heritage impacts and the site is uninhabited, the level of assessment will be for a low category levee.

The regulations include provisions for licences and permits for taking or interfering with water. They cover water allocation, metering, water supply administration, etc., rather than assessment of environmental impacts or effects on flooding (for environmental impacts, see *Sustainable Planning Act 2009*).

Regulations also include operational works intended to take overland flow water (s62). It's not clear how this fits with s 20 1(g) & 2(b) of the *Water Act 2000* which includes interfering with and taking overland water as general authorisations.

Schedule 9 lists three declared drainage and embankment areas: Haughton River, Major Creek; Tully and Murray Rivers. Under s.61 of the regulations, operational work controlling flow of water in and out of watercourses, lakes and springs in these areas, is assessable development areas (this relates to s1014 of the *Water Act 2000*).

Schedule 1AA defines Valley Reaches (Upper, Middle & Lower). This is relevant to the catchment definition of a watercourse.

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157. IDAS code for development applications for construction or modification of particular levees

4 July 2014

This IDAS code is provided in schedule 15B of the *Water Regulation 2002*.

The code is used by local and state governments to assess Category 2 & 3 levees (a category 2: levee has an off-property impact, affecting less than 3 people. A category 3: levee has an off-property impact affecting more than 3 people. This definition is as per clause 62C of the *Water Regulation 2002*. For category 1 levees (where there are no off-property impacts), there is a [self-assessable code](#).

The code provides 3 performance outcomes with associated acceptable outcomes. These are:

- (1) Any off-property impact from the levee is minimised and acceptable having regard to the following:
 - the environment in which the levee is located;
 - the measures proposed to be taken to mitigate any off-property impact;
 - any compensation measures for an impact that are proposed by the applicant

Acceptable outcome: the levee does not result in: (a) an unacceptable change in hydraulic effects that occur off-property; and (b) an unacceptable impact on people, property or the environment.

- (2) the levee is a safe and stable structure

Acceptable outcome: the design, construction, operation and maintenance for the levee is appropriate for the materials used and the levee's intended function.

- (3) community safety is ensured in the event a category 3 levee fails or overtops

Acceptable outcome: appropriate emergency action procedures are in place for category 3 levees

'Unacceptable' is not defined. Catchment-wide impacts are not specifically mentioned. Nor are incremental and cumulative change.

Category 2 only has to address the first 2 performance outcomes. Category 3 has to address all 3 performance outcomes as well as the 'construction or modification of levees state code' which is part of the State Development Assessment Provisions (SDAP). Section 6.1 of the [category 2 and 3 levee guidelines](#) state that category 3 levees also have to comply with any relevant planning schemes, temporary local planning instruments, master plans, or preliminary approval as per s242 of *Sustainable Planning Act 2009* and they need to undergo public notification.

The [State Development Assessment Provisions](#) code, dated May 2014, has a similar requirement for category 3 levees, but it is worded slightly differently.

The Category 3 levee must be designed, constructed and managed such that it maintains or enhances the resilience of affected people to the potential impacts of the levee.

Editor's note: Refer to the *Guidelines for the construction or modification of category 2 and 3 levees*, Department of Natural Resources and Mines, 2014 for guidance on meeting the performance outcome, including through:

- a) carrying out a risk assessment of the potential impacts of the levee on the community's resilience.
- b) carrying out an analysis of the proposed mitigation measures.
- c) undertaking public consultation.

It has no prescribed acceptable outcome.

Supplementary guidance on how to address performance outcomes of the IDAS code is given in section 6 of [Guidelines for the construction or modification of category 2 or 3 levees](#). This includes cumulative / catchment-wide impacts that 'should' be considered when determining levee location and alignment (6.3.1). Exploration of other options besides levees and providing a report on this is recommended but not mandated (6.2.3). The contents of a hydrological / hydraulic assessment (6.5.1) include 'contribution of levee to cumulative impacts on a catchment or sub-catchment scale' (detailed design phase). The contribution of a single levee project to overall impacts on a catchment is likely to be small. This is a project-by-project approach and not really cumulative effects assessment. The document also includes consultation requirements.

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158. Self-assessable code for construction or modification of levees

2014

Self-assessable levees (category 1) can only be in a rural zone and must have no off-property impacts (judged according to flow path, velocity, flooded area off-property and height of floodwater). Local government needs to be notified of the location, dimensions, construction material, design height of levee, etc., using a form (attachment 1 of the code).

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159. Guidelines for the construction or modification of category 1 levees

2014

These guidelines relate to the [self-assessable code for construction or modification of levees](#). They apply to levees in rural areas where there are no-off-site impacts.

The guidelines provide readily understandable information on how to self-assess levee impacts, such as changes in the off-site flow path, velocity, flooded area, and the height of floodwater (section 6 and Appendix E). They also contain a recommended checklist (Appendix D). The checklist is not mandated but it's noted that the owner of the new levee has liability for any impacts and recommends that self-assessment records be maintained.

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160. Guidelines for the construction or modification of category 2 and 3 levees

2014

These guidelines explain legislative requirements, definitions, levee categories, roles, responsibilities and assessment requirements and processes.

Section 6 gives guidance about how to comply with the [category 2 and 3 levee IDAS code](#) and [category 3 levee state impact assessment](#). Cumulative and catchment-wide impacts 'should' be considered when determining levee location and alignment (6.3.1). Levee appraisal reports for Category 3 levees are advised but not mandated to address social, economic and environmental impacts (section 6.2.3). Levee location and alignment are expected to consider floodplain function (e.g., floodway, flood storage), proximity to water bodies, existing and potential future catchment development, and the cumulative impacts of the levee and other structures in the catchment (and other factors: see section 6.3.1) It advises set-back to reduce impacts on flooding and vegetation. These considerations are comprehensive and well thought out.

The contents of a detailed design phase hydrological / hydraulic assessment (6.5.1) are to include 'contribution of levee to cumulative impacts on a catchment or sub-catchment scale'. Methodology is not specified and depending on how it is carried out, the 'contribution' of a single levee may appear insignificant on a catchment scale, allowing incremental change.

6.8 relates to levees in the context of community resilience. This reflects the category 3 levee performance outcome included in the [State Development Assessment Provisions](#).

Appendix D includes levee failure mechanisms that need to be considered and refers to the CIRIA (2013) *International Levees Handbook* for technical guidance.

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161. Queensland Building and Construction Commission Regulation 2003

1 July 2014

This has limited relevance to levees. It covers the qualifications you need for various activities, including an irrigation licence.

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162. Water Supply (Safety and Reliability) Act 2008

21 May 2014

This Act is relevant to ring tanks that are assessed as referable dams (see the schedule 3 definition of a dam). For a ring tank to be assessed it would need to be >10m high and have a storage capacity of 750-1500ML (s343). The Act is concerned about safety, but not the impacts of ring tanks on flood behaviour or environmental impacts.

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163. Manual for Assessing Consequence Categories and Hydraulic Performance of Structures

November 2013

The manual only applies to levees ('regulated structures') that are part of 'resource activities' (i.e., mining & similar). The levees can be either for flood protection or for diverting contaminated water into containment dams. Where the purpose is to exclude flood water, levees (for resources operations) need to provide protection to 1:1000 AEP (p.17).

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164. Environmental Protection Act 1994

1 July 2014

The objective of the Act is given as ecologically sustainable development (s.3).

'Serious environmental harm' is defined in s17, including the threshold value to prevent or rehabilitate harm.

Environmentally relevant activity (ERA) is defined in s18. It includes three categories:

- resource activity (this includes activities such as mining, s107);
- prescribed activities that release contaminants (s11, s19; and listed in the *Environmental Protection Regulation 2008*, Schedule 2); and
- specified farming activities (s75): commercial sugar cane and cattle grazing that cover >2000ha in Great Barrier Reef catchments. For the latter, accredited environmental risk management plans (ERMP) are needed to improve water quality.

The 2 aspects that may be relevant to levees are vegetation cover and erosion control, s94(c) and (d)(iii). It is doubtful whether this would prevent levee building unless levees are identified as being a significant erosion-causing activity. It's mostly up to the farmer what goes into the ERMP, except for s90(3): the ERMP direction can include specific matters the Minister thinks necessary to reduce impacts.

Environmental protection policies (subordinate legislation when approved) may be made about anything that may affect the environment (s.27). This section does not appear to be confined to 'resource activities'.

Chapter 7 (s317) relates to any activity that could cause environmental harm: duty to notify, provisions to evaluate, investigate, audit.

Environmental protection orders can be made s358, where there is 'unlawful' environmental harm or lack of compliance.

Most of the rest of the Act relates specifically to 'resource activities'. It includes environmental impact statement (EIS) provisions. An EIS can be done for a development, activity, plan or policy. An EIS done under this Act cannot be used for decision making for the purposes of the *Sustainable Planning Act 2009*, except for mining / resource activities (s37). See also s115, which explains the relationship of this Act to the Sustainable Planning Act, which seems confined to resource activities. The Act also covers administration, legal offenses and enforcement.

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165. Environmental Protection Regulation 2008

1 July 2014

The Regulation includes specific parameters to apply the Act (e.g., how to measure noise) and administrative arrangements (e.g., matters devolved or not devolved to local government; record keeping requirements; fees; penalties).

s77 and schedule 9 include sediment as a prescribed water contaminant (no.6). Of relevance as levees can cause riverbank erosion and may increase sediment.

The environmental values of wetlands are given in s81A. They include interaction (connectivity) with other wetlands. 'Wetlands' only refers to wetlands listed on the 'Map of referable wetlands'. There is nothing about the connection between wetlands and watercourses.

'Watercourse' is defined in schedule 12 (no.8). Schedule 12 also defines: floodwater, wetland, riverine area, bed (of river / tidal area) and 'significantly disturbed land' (no.4 of schedule 12).

Land use assessment is in schedule 5 table 2. This only applies to 'environmentally relevant activities' (ERA).

Note the provisions of : Schedule 5,Table 1 [Operational assessment: Water: 2(f)]:

"any discharge to water or a watercourse or wetland will be managed so that there will be no adverse effects due to the altering of existing flow regimes for water or a watercourse or wetland;"

This only relates to ERAs, but if the ERA includes levees (see document #163), this provision could be relevant.

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166. Environmental Protection (Water) Policy 2009

6 December 2013

This policy supports the *Environmental Protection Act 1994*. It is primarily concerned with water quality but other aspects are covered in s6: 'environmental values'. Environmental values and water quality objectives are covered in s7. Waterways that have specified environmental values and water quality objectives are listed in Schedule 1.

Part 6, s24 allows for the development of healthy waters management plans. These assess threats to the water body covered in the plan, including 'any matters that may adversely affect the natural flows of the water'. Plans must identify ways to protect and monitor effectiveness. Levees can affect both water quality (e.g., sediment load), and natural flows, so this might policy be relevant.

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167. Generic draft terms of reference for an environmental impact statement

2013

This is only applicable to an environmental impact statement carried out under the *Environmental Protection Act 1994*. It only relates to 'resource activities' (i.e., mining and similar). However, where a project involves levees, these terms of reference would apply. (NB: the *Manual* notes that levees are used in resource activities to exclude flood waters or to divert/contain contaminated water on site].

The most relevant section is probably s8.6 which requires assessment of how the project may change flooding characteristics. This also includes changes in water quality and water resources, such as changed flow regimes (8.5.4), amenity, and safety. The latter includes changes to off-site flood characteristics (8.13.1).

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168. Guideline: Environmental Protection Act 1994: Structures which are dams or levees constructed as part of environmentally relevant activities

Version 6

This guideline covers levees and dams used for mining and resource activities. Consequence assessment is required (to determine whether it is a regulated structure) and it needs certification by a 'suitably qualified person' (an engineer).

Assessment must cover:

“the hydrology/hydraulics used to estimate and deal with flood events, internal and external to the regulated structure, at probabilities appropriate to address identified consequence scenarios, including containment of contaminants”

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169. Guidelines for Ring Tank Storages Edited by Dr Hugh Barrett (Irrigation Australia Ltd)

Oct 2007, Second Edition

This is cited as guidance material in [Guidelines for the construction or modification of category 2 and 3 levees](#). It mainly covers maintenance and management of ring tanks. It includes a small section on legislative requirements.

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170. State Development and Public Works Organisation Act 1971

19 June 2014

The purpose of this Act is: “to provide for State planning and development through a coordinated system of public works organisation, for environmental coordination, and for related purposes”.

A Queensland Government website about the Act explained that the aim is ‘infrastructure planning and development’ for ‘economic and social progress’ to ‘encourage public works and generate employment’.

Levees could easily fit under this. The Act covers the declaration of ‘coordinated projects’, compulsory land acquisition and ‘state development areas’. Environmental Impact Statement (EIS) requirements are provided in Part 4, Div 3. However, this Part doesn’t apply where an EIS is required under other legislation, such as the [Water Act 2000](#) or the [Vegetation Management Act 1999](#). Note the related [Economic Development Act 2012](#) allows the declaration of priority development areas.

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171. Sustainable Planning Act 2009

20 February 2014

This Act states its aim to be Ecologically Sustainable Development. It covers planning schemes, regional plans, assessable development, development approvals & permits.

Land may be designated for community infrastructure (for development in this category see [technical manual on designating land for community infrastructure](#): community infrastructure does not include levees but does include transport infrastructure, which can form levee-like structures).

s222 relates to land acquisition under [Acquisition of Land Act 1967](#), which could be relevant to levees (i.e., compulsory acquisition of land to build levees). It could also be relevant when buying properties for relocation as a levee alternative or for reserving floodwater storage areas, though ‘compulsory’ is not usually acceptable or successful.

Environmental impact statements are required for community infrastructure and for development requiring a development application (s688).

Schedule 3 includes flood mitigation in development infrastructure and state infrastructure categories.

Section 704 entitles people to compensation if local government acts result in reduced value of their land, except where s706 applies. E.g.:

1(b): where it’s mandatory as part of state planning scheme provisions;

1 (i): where there is ‘significant’ risk to people or property or the environment due to natural processes (including flooding) that could not be ‘significantly’ reduced by conditions attached to a development approval.

The use of the word ‘significant’ is very imprecise and may make it hard for local governments to defend decisions on this basis. The reason this is relevant to levees is that it may limit the use of alternative options – i.e., use of development controls to prevent the future need for levees.

At s724(z) local governments are required to make available documents including “its register of resolutions about land liable to flooding, made under the Building Act”.

Flood level is a site characteristic relevant to development assessment: s724(8).

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172. Sustainable Planning Regulation 2009 4 August 2014

Sustainable Planning Regulation 2009 covers assessable and self-assessable development.

Schedule 3, part 1 covers assessable development. Schedule 3, part 1, table 4 (operational work), items 11 and 12 identify category 2 and 3 levees as assessable development, with category 2 being subject to code assessment and category 3 subject to impact assessment.

Schedule 3, part 1 (assessable development), table 4 (operational work), item 3 (for taking or interfering with water) describes circumstances where taking and interfering with water is assessable. This includes most cases where it concerns water from a watercourse, lake, spring or dam on a watercourse.

Development assessment is not needed for taking / interfering with water for activities listed in Chapter 2, Part 2 Division 1A of the *Water Act 2000*. The Water Act includes general authorisations such as s20 1(g), 2(b) that allow interfering with and taking overland water for any purpose.

For overland flow, taking / interfering with water is assessable when in a declared drainage and embankment area (3 areas are listed in schedule 9 of *Water Regulation 2002*); where there is a wild river declaration; or an area covered by a water resources plan.

Schedule 3, part 2 covers self-assessable development codes, including table 4 (operational work), item 1 (taking or interfering with water). There are some circumstances where operational work in a wild river declaration; drainage and embankment area; water resource plan area are self-assessable. The regulation does not specify in what circumstances.

Environmental Impact Statement provisions (authorised under the *Sustainable Planning Act 2009*, s688) begin in s32.

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173. Queensland Planning Provisions 25 October 2013, Version 3

Land may be designated as flood prone (e.g., by using a flood hazard overlay, Part 8, table 8.1, p.60-61). The document does not directly refer to flood mitigation (other than development controls through designating land) or levees.

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174. State Planning Policy December 2013

This is legislation under s22 of the *Sustainable Planning Act 2009*. The Act and Regulation prevail in the case of inconsistency (s19). In hierarchy, it is subsidiary to the *Sustainable Planning Act 2009*, the *Sustainable Planning Regulation 2009* and the State Planning Regulatory Provisions. It takes precedence over Regional Plans, *Queensland Planning Provisions* and local planning instruments and schemes.

The State Planning Policy (SPP) is concerned with matters of state interest. Wetlands are identified as being of state interest for natural flood control (under ‘biodiversity’).

State interest in natural hazards is identified (p.35), including:

- the need to identify risks;
- ensuring risks are an acceptable level via risk assessment;
- avoiding OR mitigating risks;

- ensuring that directly, indirectly or cumulatively, the severity of the natural hazard (and damages) are not increased;
- maintaining natural landforms and vegetation that can mitigate risks;
- not 'unduly' burdening disaster response or recovery capacity.

These are also criteria for development application assessment, p.51.

Mitigation infrastructure is included in the footnote (p.35) as being part of integrated disaster management strategy. See also the coastal environment section.

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175. State Development Assessment Provisions (SDAP)

21 June 2013

These provisions contain the 'sustainable management of water resources state code' (module 7 relates to water resources). The [construction or modification of levees state code](#) is a recent addition to SDAP. Other than this, most of this code is not very relevant to levees but it may be relevant to levee-like structures used in irrigation.

The general section of the Table 7.1.2 'operational work' (PO-1 to PO-4) may be relevant. The section requires that works should not adversely affect riverine ecosystem, other users' ability to access the resource, or the integrity of the watercourse; and that it is consistent with specified water plans and legislation.

Levees (or embankments, diversion banks, bunds) are only specifically referred to in Table 7.1.2 PO-12, PO-13 in the context of reconfiguration of works, and in Table 7.1.3 AO-7.3 (operational works in wild river areas).

The overland flow section (PO-8 to PO-10) may also be relevant. It covers distance from wetlands, minimising impacts on neighbouring properties (e.g., containing inundation within property boundaries; retaining original flow path of water off the property) and the need for a certified report on construction and operation.

On the whole, the code does not address flood impacts of embanked irrigation works. It is more concerned about the ability of others to use the resource.

The 'constructing or raising waterway barrier works in fish habitats state code' includes levees built across waterways. Safe passage of fish is the main concern. PO-21 requires that the use of floodgates to be avoided or minimised.

While the purpose of the water resources code is given as 'sustainable management' (consistent with the [Water Act 2000](#)), the module is placed in a section of the document categorised as 'economic growth', which arguably places economic concerns above ecological or social sustainability.

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176. Construction or modification of levees state code

9 May 2014, Version 1.3

The construction or modification of levees state code (Table 7.3.1) is a recent addition to the [State Development Assessment Provisions](#) (SDAP). It covers the 'design, construction and management' of a levee to 'maintain or enhance resilience' of anyone affected by potential impacts of the levee. The editor's note directs applicants to [Guidelines for Category 2 and 3 levees](#) for more details about this requirement.

Refer to [IDAS code](#) where the wording of the IDAS code and the SDAP code for levees are copied alongside each other for easy comparison.

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**177. State interest—natural hazards Guidance on flood, bushfire and landslide hazards [draft version]
2 Dec 2013**

**178. State Planning Policy—state interest guideline: natural hazards, risk and resilience
Aug 2014 [final version]**

**179. State Planning Policy 1/03 Guideline: mitigating the adverse impacts of flood, bushfire and landslide
June 2003**

**180. Technical Manual: Evaluation report: Flood hazards
Aug 2014**

**181. Technical Manual: A ‘fit for purpose’ approach in undertaking natural hazard studies and risk
assessments
Aug 2014**

**182. Technical Manual: Guidance for considering natural hazards, risk and resilience when designating land
for community infrastructure
Aug 2014**

Documents #177, #178, #179, #180, #181, #182 were read together and considered collectively.

The status of these guidance documents is stated in the [State Planning Policy \(2013\)](#) (SPP):

“guidance material is optional - it does not form a statutory component of the SPP and hence is not a mandatory requirement of the state”

At the time research was begun (August 2014), the SPP State interest Guidance (#177) was only available in draft. A revised version has since been published and was also reviewed (#178).

State interest is explained in terms of six policies. The guideline explains how these policies can be satisfactorily addressed by local governments in their planning schemes. It also includes information on risk assessment (including references to define tolerable risk), a model flood hazard overlay and flood hazard investigation guidelines.

Levees are only specifically mentioned once in the draft and not at all in the final (p.40, Table 4: risk management measures). However, mitigating risk to acceptable or tolerable levels is frequently referred to.

Direct, indirect and cumulative impacts are to be avoided and compliance is to be demonstrated (for development assessment) by there being no increase in hazard affecting the site or surrounding areas (p. 14 of the final version). ‘Surrounding areas’ gives little indication of scale envisaged. Note ‘no increase’ implies from the present, not the cumulative effect taking the natural state as baseline.

The guideline includes ‘maintains or enhances natural processes...’ (p.15) which opens the door for ecosystem based approaches (although [grants guidelines](#) offer no indication that such approaches would attract funding). This provision applies to development approvals, so is a locally-based rather than a whole of catchment provision. It would presumably only apply to planning schemes that have a flood problem (note p.20 on overlay code outcomes which adds the phrase: “natural processes and the protective function of landforms and/or vegetation are maintained in natural hazard areas”). Upstream areas that don’t have a flood problem may be very important to mitigate flooding downstream. The strategic framework of a planning scheme may, however, extend beyond the direct hazard area (see final guideline p.17; evaluation Q. 9).

Land use strategies are discussed on p.49 of the draft guideline: strategies need to articulate where ‘the following can occur’. In areas that ‘mitigate risk to an acceptable or tolerable level’ an appropriate outcome can be ‘intensify with mitigation through built form responses’. This suggests levees are viewed as a means of intensifying development.

Wording of the final version (p.19) has deleted the dot points making this section almost unintelligible! :

“Mitigating risk to an acceptable or tolerable level by intensifying with mitigation through built form responses, by including mitigation infrastructure or change to the natural environment that will reduce the risk of a natural hazard and treat risks to transport/evacuation routes.”

Former SPP guidelines (published in 2003) expected the defined flood level to be 1% AEP or an historic flood level of about this magnitude (see below quote). This has changed. A defined flood level (DFL) is not currently prescribed by legislation or subordinate legislation and policy. Neither is one provided by the revised SPP guideline or technical manuals (other than some minimum levels for specified types of community infrastructure and transport, see #182). Instead, flood levels (authorised by Building Regulations clause 13), where adopted, must be established in accordance with risk assessment (Guideline p.8, section 2.4). The ‘fit for purpose’ Technical Manual (#181) expects a range of flood levels to be covered by flood studies to help determine the DFE (p.13). It remains to be seen whether ‘deregulating’ the DFE will result in planning controls that accurately reflect risk, (and incorporate anticipated increases in flood risk due to climate change) or whether it will facilitate the development of flood prone land. If the latter, future demand for structural mitigation will increase. Note, however, that the QFCI found that earlier policies were poorly applied by local governments and not enforced by state government, so there may be little change.

5.8 In relation to flood hazard management, the SPP sets out the State’s position that generally, the appropriate flood event for determining a natural hazard management area (flood) is the 1% Annual Exceedance Probability (AEP) flood. However, the SPP recognises that the adoption of a lower DFE may be appropriate depending on the circumstances of individual localities. The adoption of a lower DFE would require the local government to demonstrate by thorough analysis that the proposed level of flood protection is appropriate to the circumstances of the locality (p.10).

A2.23 Where a historical flood level is chosen as the DFE, some assessment of its AEP is necessary to give an indication of the level of flood risk that is accepted (p.36).

(above: quotes from the former SPP 1/03 Guideline: ‘*State Planning Policy Guideline: mitigating the adverse impacts of flood, bushfire and landslide*’, 2003. It has been superseded by ‘*State Planning Policy—state interest guideline: Natural hazards, risk and resilience*’, 2014).

The new Guideline provides a model code and provisions to show how to integrate requirements into a planning scheme, including the strategic framework and model code various natural hazard types.

The strategic framework covers: themes, strategic outcomes; land use strategies; overlays and mapping; overlay codes; zones; tables of assessment (for land use based on risk and tolerability); and zone codes.

The model code for flood includes application, purpose and criteria for assessable development, and optional flood hazard planning scheme policy. The assessment criteria are presented as tables of performance outcomes and acceptable outcomes. Outcomes include ensuring that development does not increase direct, indirect, cumulative impacts and the protection of natural features that mitigate flood (as required by [State Planning Policy](#)). PO4 of the model flood development assessment code covers ‘*operational works*’ and could apply to the flood impacts of levees and levee-like structures. Levees and many other works relating to ‘taking or interfering with water’ are classified as ‘*operational works*’ in the [Sustainable Planning Regulation 2009](#) (Table 4). The editor of the model flood hazard overlay code has added that for urban areas, ‘berms/mounds’ are undesirable and are not supported’ [by the model flood hazard overlay]. A levee is an operational work and it can be a mound (or wall), and a levee would only ever be built in a flood hazard area, so this is a little confusing.

The [technical manual on evaluation reports](#) provides a form for assessing whether or not planning schemes cover state interest requirements. For example, one of the things evaluated is whether or not the planning scheme will avoid the direct, indirect, cumulative increase in flood hazard.

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183. Code for self-assessable development for taking overland flow water for stock and domestic purposes 2014, Version 9.1

This is allowed under the Act but requires self-assessment to ensure it is consistent with the [Water Act 2000](#) s20(4) and [Regulation](#). It includes authorisation of embankments and channels. Requirements include notification of the location and capacity of works. The only flood-related requirement is that water exit the property as close as possible to the same location as prior to construction. The objective is to prevent impacts on neighbours or downstream users due to changes in overland flow.

The code only applies to specific areas, i.e., drainage & embankment areas, a wild river declaration and water resource plan areas, as specified in the [Sustainable Planning Regulation 2009](#).

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**184. Code for self-assessable development for taking overland flow water using limited capacity works
2014, Version 7.1**

This code applies to water resource plan areas, a wild rivers declaration or activities prescribed as self-assessable development under the [Water Regulation 2002](#). This includes embankments. Public notification is required. The code limits storage volume and impacts on neighbours.

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**185. Code for self-assessable development for taking overland flow water to satisfy the requirements of an environmental authority or a development permit for carrying out an environmentally relevant activity
2014, Version 3.1**

Either an environmental authority or a development permit is needed to carry out the 'environmentally relevant activity' (ERA). The purpose of this code is to take overland flow contaminated as a consequence of the ERA. It only applies to ERAs in water resource plan areas, a wild rivers declaration or prescribed as self-assessable development under the [Water Regulation 2002](#).

The code includes embankments. Notification is required, impacts on neighbours need to be minimised and the code limits storage volume.

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**186. Building Regulation 2006
1 Feb 2012**

Under section 13, local governments can designate land liable to flooding in their planning schemes and temporary local planning instruments or by resolution. They may also declare the level to which the floor levels of habitable rooms. When doing this they must comply with state planning policy and keep a register of designated land. The [SPP state interest guideline for natural hazards](#) includes a section on the relationship between a planning scheme flood hazard overlay and *Building Regulation 2006* building assessment provisions (p.27).

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**187. Certification guidelines for assessable works that take overland flow water
2008**

These are technical guidelines and were not available online. As potential relevance seemed low this was not pursued.

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**188. Code for assessable development for operational works for taking overland flow water
2012 Version 5**

This code identifies embankments as being part of operational works to take water. It includes similar provisions to those articulated in the [State Development Assessment Provisions](#) and [IDAS form 19](#) but in more detail. I am not clear about the relationship between this code and the SDAP.

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IDAS Forms:

- 189. IDAS 12 - Taking or interfering with artesian or sub-artesian water**
- 190. IDAS 13 – watercourse pump**
- 191. IDAS 14 – water storage**
- 192. IDAS 15 – gravity diversion from a watercourse**
- 193. IDAS 17- water diversion**
- 194. IDAS 21 – other work in a watercourse**

1 July 2013 Version 3.0 [date of all the above]

Documents #189, #190, #191, #192, #193, #194 were read together and considered collectively.

IDAS forms are application forms for assessable development specified in the SDAP. They enable the assessment of state interest and if compliant, a development permit can be issued.

Assessable development includes:

- works that take overland flow, where applicable
- works that take or interfere with water in a watercourse, lake or spring (using a pump, gravity diversion, stream redirection, weir or dam) if a properly specified water entitlement (an entitlement that states a rate of take or limits the height of the interference works) is not held by the applicant
- artesian bores anywhere in the state
- subartesian bores used for purposes other than stock or domestic use in declared subartesian areas within setback distances stated in the [Water Regulation 2002](#).

This may be relevant to levees as these activities are associated with embanked irrigation channels. Thus the assessment criteria are of interest. These forms all require a sketch plan to locate any area to be irrigated, as well as distance from property boundary, roads and watercourses. However the forms make no reference to embankments, watercourse or wetland connectivity or impacts on flood behaviour.

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195. IDAS Form 20: Interfering with overland flow water and construction and modification of a levee 16 May 2014, Version 4

This form needs to be filled in for category 2 and 3 levees.

The form covers not only levees but drainage works, embankment and storage. A sketch map needs to be provided that identifies location of works, including proximity to features such as watercourses, roads, property boundaries, existing works and if relevant, area to be irrigated. If applicable, a hydrology report is to be included. For a levee, hydraulic assessment is required and a design report.

Regarding 'interfering with overland flow', this form only applies where the area is an official drainage and embankment area (three such areas are listed in the [Water Regulation 2002](#), a water resource plan area, or a wild river area (see [Sustainable Planning Regulation 2009](#) and the [Water Act 2000](#), or where regulated by [Water Regulation 2002](#). Responses are assessed against [State Development Assessment Provisions](#) outcomes.

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196. IDAS Form 19: Taking overland flow water 1 July 2013 Version 3.0

This form only applies where the area is a drainage and embankment area, a water resource plan area or a wild river area (see [Sustainable Planning Regulation 2009](#) and the [Water Act 2000](#), or where regulated by [Water Regulation 2002](#). IDAS form 19 requires a sketch map showing the same features as required for [IDAS Form 20](#).

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197. IDAS Form 27 – waterway barrier works

1 July 2013 Version 3.0

This form specifically includes levees across waterways and floodgates. Where these form a permanent barrier, a hydrology report is required as well as modelling of velocity at different water levels, frequency, timing and duration of ‘drown-out’ of the proposed structure. The form also asks for design details that mitigate fish movements and aquatic habitats.

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198. IDAS Form 33 – Great Barrier Reef Wetland Protection

1 July 2013 Version 3.0

This form is for the approval for ‘high impact earthworks’ in specific wetland protection areas. Earthworks include levees, diversions, embankment, drainage, water storage and diversion.

A wetland protection area is a wetland in a Great Barrier Reef catchment (identified in the Map of Referable Wetlands) including a buffer area around the wetland of 100m (in an urban area) or 500m (in a rural area).

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199. Application for licence to take water

2013 W2G001-v3

This is a Department of Natural Resources and Mines form, presumably authorised under the *Water Act 2000*.

Details required by the form include: applicant name; location (lot / plan numbers); the water source (e.g., groundwater or surface) and the name of the watercourse / aquifer; and adjoining properties.

A plan must be included showing the location where water is to be taken from and used, including property boundaries; lot / plan descriptions; existing water facilities, such as pumps, bores; and the location of nearby water courses, lakes and springs. The application must state the water use purpose; irrigation needs (crop type, hectares, millimetres required per week, monthly volume, months required); maximum volumes and flow rates and any other comments.

In the explanatory notes, applicants are advised that a number of issues are considered when determining the application, including existing entitlements; the effect of taking or interfering with water on ecosystems; effects on the physical integrity of the watercourse, lake, spring, aquifer; policies developed in consultation with local communities; catchment policies and strategies for sustainable natural resource management and the public interest.

The information will be retained as per requirements in the *Public Records Act 2002* and may be stored on a departmental database.

This form does not request a plan of irrigation infrastructure (although ‘industrial users’ are expected to attach a project plan, and applicants are to supply the area irrigated). It is therefore difficult to tell whether this would provide information useful to assess cumulative effects on flood behaviour or environment.

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200. Application for licence to interfere with the course of flow

2013 W2G006-v6

This is a Department of Natural Resources and Mines form, presumably authorised under the *Water Act 2000*.

Details it requires include: applicant name; location (lot / plan numbers); the location / name of the watercourse, aquifer, lake, spring to be diverted or changed; how it will be diverted or changed.

A sketch must be included showing the location of the activity, including property boundaries, plan/lot description, existing licensed works and location of nearby water sources. The application must include the reason for the diversion or change and any other comments. The explanatory notes are the same as those in the [Application for licence to take water](#).

The requirement for the plan to include ‘existing licensed works’ means levee-like structures could be mapped (if they are licensed structures). However, it seems unlikely that information would provide adequate details for

assessing cumulative effects on flood behaviour or environment.

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201. Queensland Urban Drainage Manual 2013, Version 3

The version I checked was provisional, and was undergoing feedback. It is not intended to be a floodplain management manual but provides guidance on best practice for planning and design of urban drainage and to improve resilience to flooding.

The manual includes some provisions for levees. In section 2.7, priority infrastructure plans are required where infrastructure charges will be levied.

Section 7.3.13 requires that risk based freeboard be applied to levee design. This relies on risk based analysis of freeboard requirements.

Section 8.6 covers the use of backflow prevention devices in conjunction with flood levees and notes an increased risk of erosion of the levee face.

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202. Vegetation Management Act 1999 31 March 2014

This Act regulates the clearing of native vegetation. Permits are required prior to clearing a site. Where a levee requires clearance of native vegetation, this would apply.

The Act's dictionary defines 'necessary environmental clearing' which includes 'preparing for the likelihood of a natural disaster'. This is included in the self-assessable vegetation clearing code (s190) and development approval can also be given for this purpose (e.g., s. 20AH).

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203. Local Government Grants and Subsidies Program (LGGSP) 2013-14 Local Government Floods Response Subsidy June 2013

This grants program offers \$12.55 million per year and funds up to 40% of eligible project costs. See document #204 for the 2014-15 funding package.

Eligible flood mitigation projects include:

- flood mapping, flood management studies, reports, modelling and flood mapping in areas of identified need
- infrastructure, such as levees, detention basins, floodgates, backflow prevention devices that mitigate against flood damage and inundation in areas of identified need, and is informed by a completed flood management study which incorporates consideration of the potential impact on other communities within the catchment.

Land purchase is specifically excluded, so relocation would not be able to be funded.

Assessment criteria include:

- The project informs development of appropriate mitigation strategies such as flood management studies, mapping and modelling
- The project provides infrastructure that builds resilience for the community and achieves improved mitigation outcomes' (resilience work).
- The project is collaborative and based upon a regional catchment approach
- The project is financially sound and is ready to be delivered
- The project has demonstrated community support

While flood mapping, modelling and management studies are meant to inform development of 'appropriate' mitigation strategies, it appears that infrastructure is the only approach funded by this grants program.

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204. Joint Application Package 2014-15 Information pack for Queensland disaster mitigation and resilience funding available through the:

- **Royalties for the Regions**
- **Local Government Floods Response Subsidy**
- **Natural Disaster Resilience Program**

March 2014

This funding package that supports the Queensland Flood Mapping Program. Amounts offered by the different grants programs are as follows:

- **Royalties for the Regions (R4R):** \$10 million per year (for 4 years)
- **Local Government Floods Response Subsidy (LGFRS)** \$12.8 million in 2014-15 (3 year program)
- **National Disaster Resilience Program (NDRP)** \$24 million (a joint federal and state program based on a renewable partnership agreement)

The package focuses on infrastructure solutions. Flood information is eligible under [Local Government Floods Response Subsidy \(LGFRS\)](#) and the [Natural Disaster Resilience Program \(NDRP\)](#). NDRP also funds preparedness activities such as community education and volunteer capacity. The assessment criteria listed in the LGFRS apply to all programs.

In schedule 6, 'Guide for structural works', the first step is the preparation of a matrix of options. A range of options needs to be covered, including property modification measures. Cost-benefit analysis needs to be done for shortlisted options using a discount rate of 20 years.

Despite requiring a broad range of options be looked at to determine the best solution, the funding package does not appear to support all solutions. It is not clear what funding support is available if different options, such as house raising or relocation or ecosystem based approaches, are found to be more appropriate than structural measures. The lack of funding available for alternatives means they are less likely to be used.

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205. Planning for stronger, more resilient floodplains (Queensland Reconstruction Authority) Parts 1 & 2 Part 1 2012; Part 2 released 23 Jan 2012

This provides post-flood guidance on managing floodplains from the Queensland Reconstruction Authority (QRA). It is referenced as a 'supporting tool' in current technical manuals, including [Natural Hazards, Risk and Resilience Technical Manual - a fit for purpose approach](#) and *Natural Hazards, Risk and Resilience Technical Manual - An example: Terms of Reference for undertaking a flood hazard investigation*.

Part 1 document defines catchments. It distinguishes:

- (1) drainage divisions (from source to end-point where it drains into the sea / inland lake);
- (2) major river basins (246 nationally), comprising of rivers that feed into the basin after which the basin is named; and
- (3) 'sub-basins', each based on a river feeding into major basins (and its tributaries). There are 130 sub-basins in QLD.

"The best management of floodplains is for planning to be undertaken at a sub-basin level" (part 1, p.8).

The document advocates for progress away from the 'current' case-by-case individual development application approach to a strategic approach across a catchment or area (part 2, p.13). Part 2: How to overcome lack of correlation between local government boundaries and sub-basins advocates sub-basin planning through Regional Planning Committees (p.16). "Regional Planning Committee (RPC) may be best placed to oversee and guide the investigations and associated consultation". According to this document, the South East Queensland RPC has 11 sub-basins. 30% of the sub-basins are in more than one RPC. However, there is better correlation between RPCs and catchments than for local government areas which exhibit no correlation (part 2, p.9).

Three levels of flood study investigations are recommended depending on how developed an area is, the amount growth that is forecast, etc. Level 1 is based on large scale QRA maps at the sub-basin level. Subsequent levels are more localised but are meant to be co-ordinated at the regional level with compatible methodology (see part 1, p.9; part 2 p.16). A levee requires a level 3 investigation (part 2, p.38) as flood behaviour needs to be assessed for design.

The 'Regional Planning Committee' – 'sub-basin scale' planning approach promoted by this document does not appear to be supported by current guidelines. See: [Natural Hazards, Risk and Resilience Technical Manual - 'fit for purpose' approach](#). It mentions catchments in relation to reviewing existing studies to see if they need updating to incorporate recent catchment modifications or future development scenarios. Regional planning committee involvement is never stated. Instead:

"The most appropriate form and quality of mapping should be determined at a local level by the relevant council, informed by local needs, knowledge and issues." (p.4)

"a local government will need to identify if a strategic risk assessment across all or part of the local government area will be undertaken and the level of assessment, or if site based management plan will be required as part of a development application." (p.4)

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COMMONWEALTH

206. Managing the floodplain: a guide to best practice in flood risk management in Australia 2013 (2nd edition)

This replaces two earlier best practice manuals: the SCARM (2000) 'Flood management in Australia: best practice principles and guidelines' and Emergency Management Handbook no.19, also titled 'Managing the Floodplain'.

It (and its predecessors) cover cumulative impacts, e.g., cumulative impacts should be considered and addressed on the broader scale rather than on a site-specific scale (p.93). This agrees with what Duinker (2012)* says about cumulative effects assessment.

The guideline advocates a catchment approach: linking in with catchment management planning, emergency, land use and infrastructure plans across the catchment (p.37). A floodplain management entity (local level authority) would be responsible for managing flood risk and should be overseen by an administrative committee that can make decisions on cross-catchment priorities (p.25).

Decisions about which option to use is local, based on cost benefit analysis and an options assessment matrix that applies weightings to different criteria such as the environment (pp.117-121).

Levees are viewed as the most 'economically attractive' option (p.102), though the guideline also highlights that they are costly to build and have long term ongoing costs (pp.103, 151).

Development controls within levees are suggested, but only in the context of floodable areas in levees (near spillways etc.) rather than to limit potential damage (p.103). The guideline includes nothing about levee setback though it recognises that levee alignment options may be limited by development location, so levees may cut drainage pathways and cause flooding inside the levee (p.103).

Climate change is covered on p.65 and p.96. Levee designs need to be adaptable so they can be raised higher in the future. the importance of understanding impacts of climate change within the design life of the development is stressed (p. 57). This is longer than the 20 year 'reasonable timeframe' suggested by NSW [Floodplain Development Manual 2005](#). However, it is still a somewhat short timeframe seeing as the development protected by the levee can be expected to remain indefinitely; longer than a levee's design life.

Both this manual and its predecessors provide the flood study – floodplain management study – floodplain management plan model.

*Duinker, P.N., Burbidge, E.L., Boadley, S.R. and Greig, L.A. (2012). Scientific dimensions of cumulative effects assessment: toward improvements in guidance for practice. *Environmental Reviews*, 21(1): 40-52.

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207. National Emergency Risk Assessment Guidelines Oct 2010

National Emergency Risk Assessment Guidelines (NERAG) were developed as part of the National Risk Assessment Framework "to support the development of an evidence base for effective risk management decisions and to foster consistent baseline information on risk".

It aims to improve the consistency and rigour of emergency risk assessments and acknowledges the role of urban planning in prevention. The guidelines contain risk assessment tables.

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**208. Guidelines to good practice for the Construction and Refurbishment of Earthen Channel Banks
(Land and Water Resources Research & Development Corporation)
Aug 2001**

This is a detailed technical guideline document covering embanked irrigation channels.

It recommends the chemical control of vegetation. It warns against trees, especially the roots, yabbies, and habitat for burrowing creatures. [Note burrowing crayfish can be on threatened species lists: see [Victorian Flora and Fauna Guarantee Act 1988](#), schedule 2].

Trees should be located at least three metres and preferably five metres from the toe of the bank. It lists suitable species. 'Swamp She-oak* [is] not suitable and should not be planted within 50 metres of a channel'. This highlights that there are compatibility issues between levees and riparian vegetation.

*NB: there are two related species with the common name 'swamp she-oak': *Casuarina glauca* and *Casuarina obesa*. *C. obesa* is currently listed as 'endangered' in NSW (a separate population in southern WA is widespread). *C. glauca* has naturalised beyond its natural range (originally confined to E. NSW; SE and central QLD) and is considered an environmental weed in SA and WA.

The guideline notes that maintenance costs are initially low and that preventative maintenance is often given low priority due to lack of immediate benefits, but that this is false economy as it shortens levee life span, system efficiency (irrigation water loss presumably) and risk of failure.

"Serious erosion can happen very quickly in areas subject to intense rainfall if the banks are not protected by vegetation." "Where banks are inadequately protected the exposed surface loses moisture and as the material dries and shrinks, surface cracks begin to open."

This has implications for climate change flooding, especially as droughts will compromise vegetation cover.

Another role for vegetation (for irrigation channels) is: "water tolerant trees and grasses planted along channels can be used to lower the local watertable levels associated with seepage."

Channel alignment an important factor in controlling seepage (soil type affects seepage so location of channel may select best soil type), in erosion (e.g., wave action if in the direction of the prevailing wind). The manual says nothing about alignment in relation to interruption of flows to natural flood storage areas or wetlands. The possibility of flooding of adjacent lands, especially in the event of channel failure is mentioned several times.

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**209. Environment Protection Biodiversity Conservation Act 1999
1 Jul 2014**

The Act's objectives are at s3:

- (a) to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance; and
- (b) to promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources; and
- (c) to promote the conservation of biodiversity; and
- (ca) to provide for the protection and conservation of heritage; and
- (d) to promote a co-operative approach to the protection and management of the environment involving governments, the community, land-holders and indigenous peoples; and
- (e) to assist in the co-operative implementation of Australia's international environmental responsibilities; and
- (f) to recognise the role of indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity; and
- (g) to promote the use of indigenous peoples' knowledge of biodiversity with the involvement of, and in co-operation with, the owners of the knowledge.

The EPBC Act provides for environmental protection and management where it concerns matters of *national* significance, to conserve Australian biodiversity and cultural areas. There is a list of threatened species and ecological communities (ss 178-194). The Act also includes an environmental assessment and approvals process. This could be relevant for levee construction and maintenance activities where (listed) nationally threatened species or communities are involved. The Act is also highly relevant for any work proposed for a World Heritage or National Heritage area, a wetland of international importance (under the Ramsar Convention) or a migratory species.

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210. Abbreviations

<i>AEP</i>	<i>Annual Exceedance Probability</i>
<i>AHD</i>	<i>Australian Height Datum</i>
<i>ARI</i>	<i>Average Return Interval</i>
<i>CMA</i>	<i>Catchment Management Authority</i>
<i>DEPI</i>	<i>Department of Environment and Primary Industries (former Victorian department)</i>
<i>DSE</i>	<i>Department of Sustainability and Environment (former Victorian department)</i>
<i>DTPLI</i>	<i>Department of Transport, Planning and Local Infrastructure (former Victorian department)</i>
<i>DELWP</i>	<i>Department of Environment, Land, Water and Planning (Victoria)</i>
<i>EMV</i>	<i>Emergency Management Victoria</i>
<i>ENRC Inquiry</i>	<i>Environment and Natural Resources Committee Inquiry into Flood Mitigation Infrastructure in Victoria</i>
<i>GIS</i>	<i>Geographic Information System</i>
<i>MW</i>	<i>Melbourne Water</i>
<i>NOW</i>	<i>NSW Office of Water</i>
<i>OEH</i>	<i>Office of Environment and Heritage (NSW)</i>
<i>QFCI</i>	<i>Queensland Floods Commission of Inquiry</i>
<i>RDV</i>	<i>Regional Development Victoria</i>

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