



Department of
Primary Industries

Natural Disaster Preparedness
Flood Ready Cane Farming Strategic Plan
for the North Coast Region of NSW

Building on resilience through better preparedness



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Foreword


The coastal floodplains of the NSW North Coast are well suited to cane production though flood risk, drainage management, acid sulphate soils and urban encroachment are challenges for the industry.

Flood risk in particular creates unique challenges particularly when consecutive floods occur which impact on infrastructure, productivity and farm recovery. None the less, the industry is resilient to floods and this project is aimed towards strengthening the capacity of the sector and its people to adequately manage flood risk.

The Flood Ready Cane Farming project seeks to increase the resilience of the sugar cane industry by improving the ability of cane farmers and the milling sector to better prepare and plan for the risk of flooding as well as to respond effectively and hasten recovery from the impact of flooding.

The goal is to maintain the sustainability of the sugar cane industry in NSW, maintain the productivity and profitability of production systems and ensure the security of cane supply to the local mills and the sugar refinery at Harwood. It is hoped that the pathways towards increased resilience to natural disasters created by the project will provide a framework that other industry sectors can follow in preparing themselves for the challenges and opportunities ahead.

This Plan is not the end of the story for the Flood Ready Cane farming project but is a reference document to encourage the continuation of dialogue, collaboration and local connections for building on the capacity, innovation and strengths within the cane industry.



Rik Whitehead

Chairperson – Flood Ready Cane Farming Steering Group



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1. Introduction to Flood Ready Cane Farming

About the NSW North Coast Sugar Cane Industry

Sugar cane production has dominated the floodplains of the Far North Coast of NSW from the Clarence valley to the Tweed valley for over 100 years. Spanning an area of 32,000 hectares it is a \$230 million industry and a major employer across the region employing some 2,200 people including growers, harvesters, haulers, and mill and refinery workers¹.

Currently there are 550 growers² producing cane for three sugar mills; Condong (Tweed River), Broadwater (Richmond River) and Harwood (Clarence River) (Table 1). A regional farmer's cooperative, NSW Sugar Milling Cooperative owns the three mills and also operates the Manildra Harwood Sugar refinery of which it has a half share ownership.

Collectively the region has the capacity to produce 270,000 tonnes of raw sugar derived from 2.5 million tonnes of sugar cane annually. By-products include molasses and bagasse³.

Snapshot of NSW Sugar Cane Production

Table 1: Average Sugar Cane Farm Production

No of growers	Average hectares per farm	Average production per farm	Average Commercial Cane Sugar (CCS)
550	56	4,000 tonnes	11 - 12

Sugar cane on the North Coast is primarily grown in a two year cycle due to the sub-tropical climate and environmental conditions. Between 65-70% of tonnage harvested is two-year cane. Typically Condong farmers will harvest 67% of their farm each year, with Broadwater and Harwood Farmers harvesting around 50-55% of their farm annually⁴. The main planting months are August – September (Condong) and September – October (Broadwater and Harwood). Harvesting occurs from mid-June to late November or early December.

Why the project was initiated

The North Coast region has experienced annual flooding since 2009. The cumulative flood events have had a significant impact with some catchments estimated to be operating at around 35% of production levels.

Table 2 illustrates the individual and collective sugar cane production for the 2011 and 2012 harvesting seasons across the three milling areas. The total 2011 harvest tonnage was only 66% of capacity and in 2012 this was further reduced to 36% of capacity⁵.

Annual Cane and Sugar production 2011 and 2012

Table 2: Sugar and Cane Production 2011 & 2012

Mill Area	Tonnes of Cane		Tonnes of Sugar IPS		Commercial Cane Sugar (CCS)		Hectares Harvested	
	2011	2012	2011	2012	2011	2012	2011	2012
Condong	312,852	301,984	35,287	36,307	12.42	12.27	3,635	4,308
Broadwater	714,956	376,921	79,484	44,560	12.12	12.15	5,395	4,277
Harwood	585,659	236,122	65,938	26,977	12.10	11.64	4,537	2,868
Total	1,613,467	915,027	180,709	107,844	12.17	12.06	13,567	11,453

In early 2013 three significant rainfall events in relative succession caused extensive flooding across the NSW North Coast. The Clarence River reached record height and the Tweed and Richmond Rivers experienced extended periods of elevated river levels.

Regional damage to the cane industry was reported as approximately \$69 million, \$29 million of which was within the growing sector and the remaining \$40 million in milling and refining production⁶. Approximately 3,500 hectares were either destroyed or severely damaged. The forecast loss of sugar cane is 1.4m tonnes (60% of normal production). It is estimated that even without additional flood events in coming years, full capacity will not be reached until 2018 due to the cumulative effects of annual flood events⁷ and the 2-year cropping cycle.

Impacts on Sugar Cane and Soy Bean Production 2013

Table 3: 2013 Cane and Soy Bean loss⁷

	Sugar Cane			Soy Bean		
	loss/damage (ha)	Replant Costs	Loss to industry	loss/ damage (ha)	Loss to industry	Total Loss
Condong	457	\$1 m	\$2.07m	535	\$214,400	\$3.29m
Broadwater	579	\$735,000	\$2.58m	607	\$910,500	\$4.22m
Harwood	1,315	\$2.9m	\$5.86m	1,156	\$1.7m	\$10.46m

This Project has been initiated in recognition of the high costs of flooding across the cane industry in relation to damages, loss of production and cost of recovery, and the need for greater preparedness and resilience. The Project aims to identify opportunities which enable industry and floodplain managers and stakeholders to work together to find solutions through collaboration and dialogue.

In a survey conducted following the 2013 floods, 85% of respondent farmers⁸ indicated a critical issue was the increased flood impact they were experiencing across the floodplains as a consequence of inadequate or poorly maintained infrastructure. This had contributed to increased damage to crops. Areas of concern included:

- On and off farm drainage
- Bottlenecks and blockages in the flow of water
- Other obstructions and impediments

Following the successive flood events on the North Coast, sugar cane farmers and other stakeholders were keen to reflect on what had occurred and identify strengths, weaknesses, opportunities and future risks to improve resilience and sustainability of individual farms and the industry as a whole.

About the Project

Funding provided under the joint State and Commonwealth Natural Disaster Resilience Program provided an opportunity to establish the Flood Ready Cane project to identify strategies for building on industry resilience to meet the challenges of floods. Co-funding and in-kind contributions were provided by NSW Cane Growers, NSW Sugar Milling Cooperative and NSW Department of Primary Industries and a small working group consisting of a representative from each of these organisations have been responsible for managing the project.

A steering group comprising grower representatives from the three cane growing areas (Tweed, Richmond & Clarence) provided the strategic direction and priorities for the project. Other organisations such as local government, local flood plain authorities, SES and Local Land Services were consulted as required. Consultants were engaged for specific components of the project to enhance the work undertaken.

Opportunities for reducing the impact of flooding on the sugar cane sector were identified throughout the consultation process including:

1. Development of a Flood Ready Plan that has industry ownership and adoption thereof
2. Dialogue between industry, floodplain authorities and stakeholders regarding drainage systems and networks
3. Implementation of highest value practices, at all levels of the supply chain, to address flood risks, including risks to productivity, infrastructure, machinery, personal property, business continuity, financial viability and personal well-being.
4. Continuation of on-farm and community initiatives that have proven effective in building and maintaining resilience and reducing the impacts of flood events.

2. Aim

The purpose of the project is to increase the capacity and capability of the sugar cane industry sector on the north coast to mitigate, prepare for, respond to and recover from the risk and impact of floods in order to maintain the long term productivity and sustainability of the sector.

Specifically, the project aims to identify a model farm-level flood plan and other tools that set priorities and practical actions for managing and reducing the impacts of floods on farm enterprises as well as the supply chain.

About this plan

This plan identifies and addresses key vulnerabilities, risks, opportunities and the management strategies and practices that can be used to better prepare farm enterprises, farm families as well as the supply chain for the impacts of floods to increase overall resilience.

It provides a pathway to achieving the vision and represents the partnership and the commitment from farmers, industry, local emergency groups and key government service providers to addressing the issues identified throughout the dialogue of the project.

The plan adopts the following set of principles of resilience as developed by the Coalition of Australian Governments - COAG (2011)[^] and applied to the National Disaster Strategy:

Understand the hazards and risks

Anticipate floods, prevent and prepare

Work together to coordinate effort, use strengths

1. Work in partnership with agencies and authorities
2. Make Emergency Management Plans that build resilience
3. Be flexible in response
4. Volunteer
5. Reduce risks
6. Restore satisfactory functioning quickly

Vision

NSW sugar cane industry continues to thrive and develop through the adoption of collaborative and resilient practices, flood preparedness and the management of risks across all stages of production from the farm to the mill.





These principles acknowledge the four phases of disaster management: prevention, preparedness, response and recovery (Figure 1).

Prevention of impacts includes considering ways of working with environment, water flow and infrastructure to prevent or mitigate flood progress.

Preparedness is a process of risk management and planning to anticipate floods and limit adverse impacts.

Response is the immediate action taken once a flood is present to ensure safety and limit impacts.

Recovery is the work done to restore people, farm and industry operations and communities back to everyday functioning and includes reviewing and learning from the flood events.

The concept of a disaster management cycle is important because every experience of flood builds experience and learning to be even more effective before during and after floods in the future. It reminds us that we are always somewhere on the cycle and often dealing with a couple of phases at once such as recovery and preparedness.

***This is resilience:
to be able to learn from the past,
act more wisely, collaboratively and effectively over time.***

Flood Ready Cane Farming builds resilience through developing connections at the local and regional level. Nearly every strategy in this plan and its implementation is dependent upon effective leverage of these connections through the four phases of disaster management to:

- obtain and disseminate information, experience and know how including the establishment of a resource hub;
- plan and work together to respond confidently to floods to protect people, crops, property and farm resources;
- cooperate to promptly address obstacles and maximise farm continuity;
- support farmers, their families, their employees and their communities at all times; and,
- influence decision makers and floodplain service providers to consider the particular needs of and proposals from the sector

3. Who benefits

The beneficiaries of Flood Ready Cane Farming and application of strategies based on the principles of resilience include many stakeholders:

Cane farmers and their community can benefit from:

- ✓ A plan designed to reduce the impacts of floods on the farm business, crops, its assets (including natural assets) and the people that live and work on the farm.
- ✓ The sharing of knowledge, experience and the building of skills through connections with other cane farmers, industry organisations and support agencies.

Millers and Refiners can benefit from:

- ✓ Working collaboratively with suppliers and key agencies to reduce the impacts of floods on production, farm operations and the people involved.

Consumers and community can benefit from:

- ✓ The continued viability of the North Coast Sugar Industry ensuring supplies to the domestic and export market are maintained.
- ✓ The continued viability of the North Coast Sugar Industry ensuring ongoing employment of local people and the significant contribution the industry makes to the economies of the North Coast.
- ✓ The ongoing environmental stewardship of the floodplains by the cane farmers and in particular the world leading management of acid sulfate soils and black water.

The Sugar Industry as a whole can benefit from:

- ✓ Cane farmers having confidence to go forward and manage risks which improve the industry position and increase the sustainability of the sector.
- ✓ Cane farmers having a better understanding of what support services are available.

Government agencies and emergency services can benefit from:

- ✓ Understanding the issues and priorities for the sugar cane industry in the preparedness, response and recovery phases of floods to enable more targeted and effective support services.

It is anticipated that benefits will extend beyond the core of the sugar industry to other community stakeholders such as emergency management bodies, local governments and the wider community through stronger networks, cooperation and partnerships.

4. Key flood issues for sugar cane productivity

A range of consultation forums were held across the region for industry representatives, local government and floodplain agencies. The forums offered an opportunity to identify local and regional flood issues and priorities and provide the platform for the Strategic Plan^{9, 10, 11}.

Themes identified in consultation forums

	Industry	Floodplain Managers	Government Entities
Drainage	Maintenance of on-farm and off-farm infrastructure has an impact on crop damage and flood water inundation	River heights can exceed drainage levels resulting in longer periods of inundation. Rising sea levels and climate change will continue to impact on this.	The Drainage System is integral to the entire floodplain and natural resource management including management of: <ul style="list-style-type: none"> • Acid sulphate soils • Blackwater • Fish habitats
Funding	There is insufficient funding for installation, upgrade and maintenance of drainage works	Funding is insufficient to enable all priorities to be met. Focus tends toward urban flood mitigation works	Funding is insufficient for all competing natural resource management and floodplain priorities
Ownership and Tenure	There is a need for greater clarity regarding off-farm ownership including what exists, who owns and manages it, the current condition and capacity	Need to identify ownership and responsibility of drainage infrastructure. NB: Audits are currently or have been undertaken for this	Government entities do not have management of or responsibility for drainage maintenance and works.
Regulatory environment	Regulatory requirements are arduous and restrict capacity to undertake on-farm land and drainage management activities	Maintenance of hydraulic functions of drainage need to be balanced with environmental requirements and objectives.	Regulations serve to provide protection of the environment and enhance hydraulic capability.
Planning	There is a need for on-farm flood preparedness and recovery planning which incorporate local knowledge and experience	Authorities have responsibility for planning for the entire floodplain across the local and regional levels	Government entities provide the framework for floodplain management and rely upon authorities and other delegates to manage
Communication	<p>There is a need for greater dialogue and communication between industry, floodplain managers and government regarding floodplain priorities.</p> <p>Continued Industry representation on Floodplain Management Committees will provide a forum for working and planning together for flood events.</p> <p>Farmers require information pre and post flood events to better prepare and reduce impacts</p>		

5. Strategy for increasing resilience to floods

Flood Ready Cane Farming requires identification, analysis and treatment of risks at 3 levels:

1. ***The Farm level,***
2. ***Local industry and community level*** and
3. ***The sector as a whole at the regional level.***

The tables on the following pages have used a risk management approach to identify desired outcomes, strategies for action and options against identified risks at the farm level, local level and regional level. Not all risks will be evident or present at each level in all cases so the tables serve to capture possible strategies and actions that may be useful to reduce flood impact.

An important approach is that farmers and industry participants are empowered, encouraged and supported to take an active and influential role in being flood ready based on what is in their influence. Focussing on issues that are outside our sphere of influence can create undue stress and frustration with little gain.

Key strategies for being flood ready at all levels can involve farmers and other stakeholders to:

• Plan	• Support	• Be informed
• Participate	• Connect	• Synthesise
• Communicate	• Improve	• Consult
• Know who	• Share	• Represent
• Know how	• Prioritise	• Lobby
• Coordinate	• Report	• Clarify
• Assess	• Empower	• Encourage
• Be proactive	• Network	• Negotiate
• Use tools	• Evaluate	• Volunteer
• Assist	• Advocate	• Influence

The above Table identifies a range of pro-active strategic approaches that encourage participants to work together in managing risks. They are based on “actions” which are available to, and can be readily applied by all stakeholders in floodplain management.

The Strategies presented in the following pages utilise these actions to provide Options for flood readiness at the farm level and across the local and regional plains. The Options have been derived as examples of practices which enable engagement, collaboration and highest value outcomes. It is important to remember that the Options serve as a guide and are not prescriptive. Farmers, floodplain managers and government entities are encouraged to identify and adopt measures which best reflect their risks, hazards, priorities, needs and resources.

Table 1: Farm level strategies for Flood Ready Cane Farming

Risk	Desired Outcome	Strategy	Options
Farming communities are unprepared for the impacts of flood events.	Farming communities have sufficient knowledge to prepare for, respond to and recover from flood events.	<p>Plan</p> <p>Farmers have well developed plans which identify on-farm risks and options for mitigation, response and recovery activities and continuity.</p> <p>Connect and participate</p> <p>Farmers share local knowledge and experiences to further the understanding of emergency management practices within the sector.</p>	<p>Farmers are aware of and have access to Risk Management Planning Tools to analyse flood risk, and identify preparedness and recovery options.</p> <p>Farmers incorporate flood management and continuity in their Business Plans.</p> <p>Opportunities are provided to farming communities to participate in emergency planning activities.</p>
Communication and early warning systems do not allow for early preparedness measures.	Adequate warning is provided to farming communities to enable preparation for flooding and reduce impacts.	<p>Communicate</p> <p>Communication structures enhance dissemination of early warning messages and information during flood event's</p>	Farmers understand and have access to weather warning technology and early warning systems e.g. BoM and SES website , ABC Radio.
Loss of productivity and increased damage to crops as a result of inundation.	On-farm and external drainage systems enable timely removal of flood waters.	<p>Evaluate</p> <p>The drainage system is well understood by all parties and responsibilities upheld.</p> <p>Network</p> <p>Farmers, industry and government entities work in collaboration to review legislative and regulatory obligations and identify best practice.</p>	<p>Industry engages with farmers to enhance understanding of the drainage system, owner responsibilities and legislative requirements.</p> <p>Farmers conduct optimal and best practices in managing and maintaining on-farm drainage assets. Farm asset management systems used to record and support asset maintenance works.</p>
On-farm recovery is impeded due to financial constraints	<p>Farmers are adequately covered by Insurance and/ or have access to financial reserves.</p> <p>Farmers have access to external assistance through government grants, donations and philanthropy.</p>	<p>Plan</p> <p>Financial planning is a key element in farm business and risk management plans.</p> <p>Know who</p> <p>Farmers are aware of available financial assistance and have an understanding of application processes and requirements.</p>	<p>Farmers incorporate financial planning in Business Plans.</p> <p>Farmers identify appropriate insurance options.</p> <p>Farmers are aware of how to access information regarding financial assistance, assessment requirements and application processes.</p>

Risk	Desired Outcome	Strategy	Options
<p>Farmer and personal health and well-being are negatively impacted by increased stress and physical health risks associated with flood waters.</p>	<p>Farmers have access to personal and industry based support services during flood recovery.</p>	<p>Know who and Plan Health and well-being support measures for farmers and farming communities are identified and incorporated into on-farm, local and regional Emergency Management Plans.</p> <p>Communicate Information is available and disseminated to farmers affected by flood waters in relation to health and well-being impacts.</p>	<p>Farmers are aware of and have access to health risks associated with stagnant and flood waters through information from authorised health agencies and services.</p> <p>Farmers have access to information in relation to safe clean-up methods and practices.</p> <p>Farmers are aware of and have access to personal support services through Industry's Employee Assistance Program, as well as introduced recovery activities and programs.</p> <p>Rural support networks are established for identified vulnerable and at risk persons.</p> <p>Information regarding Employee Assistance Program is readily available and included in employee induction and training.</p>
<p>Farmers, their families and visiting persons sustain injury on farms affected by flood waters.</p>	<p>Recovery and clean-up are conducted using safe farming practices and visiting persons are safe from hazardous materials and other damaged objects.</p>	<p>Be proactive Recovery and clean-up activities are undertaken utilising safe farm work practices.</p> <p>Be informed Farmers, their families and visiting persons are aware of the inherent dangers of flood impacted properties.</p>	<p>Farmers identify safety as the highest priority during recovery operations.</p> <p>Farmers are aware of and have access to information regarding safe farm practices e.g. hazardous materials, disposal of damaged goods</p> <p>PPE is available to all persons involved in recovery activities and clean up.</p> <p>Visitors are made aware of safety issues.</p>
<p>Natural resources are further damaged during recovery operations.</p>	<p>Compounding impacts on natural resources are considered during recovery operation and risks minimised.</p>	<p>Know how Farmers and employees undertake recovery activities in an effort to minimise additional damage to natural resources on and off-farm.</p>	<p>Farmers and workers are aware of and have access to information and resources that minimise additional damage to natural resources e.g. soil compaction, exposure of acid sulfate soils.</p>

Table 2: Local level strategies for Flood Ready Cane Farming

Risk	Desired Outcome	Strategy	Options
<p>Drainage infrastructure impedes removal of flood waters and increases impacts of inundation.</p>	<p>Local drainage systems have the capacity to quickly reduce water inundation levels.</p>	<p>Evaluate</p> <p>The drainage system is well understood by all parties and responsibilities upheld.</p> <p>Network and Communicate</p> <p>Farmers, industry, floodplain managers and government entities maintain open dialogue and work together to achieve highest value outcomes.</p>	<p>Opportunities are provided for open dialogue between key parties with interests across the drainage system to share flood studies and modelling, work together on developing maintenance schedules and clarify the purpose of infrastructure.</p> <p>Industry engages with key groups and agencies to support optimal practice, whole of farm management and manage environmental risks.</p> <p>Guidance is provided regarding owner responsibilities and legislative requirements.</p> <p>Avenues for funding and dialogue with government are sought to support drainage maintenance and upgrade.</p> <p>Industry is an active member on Floodplain Management Committees which facilitates awareness of whole of catchment values.</p>
<p>Cane supply networks are disrupted due to road closures and loss of transport networks.</p>	<p>Road infrastructure can quickly recover from inundation.</p>	<p>Evaluate</p> <p>Impacts of new local road infrastructure upon floodplains are assessed at the design and build stages providing industry with an opportunity for comment.</p> <p>Plan</p> <p>Potential impacts are communicated to farmers to enable planning and preparedness activities.</p>	<p>Risks to cane supply networks are identified and incorporated into farming and sugar milling emergency management plans.</p> <p>As funding is available critical roads to industry are prioritised for works.</p> <p>Farmers have access to websites and radio information regarding road and transport impacts (e.g. SES, My Road, ABC Radio).</p>

Risk	Desired Outcome	Strategy	Options
<p>Insufficient information for measuring and assessing impacts results in delays in release of relief package and assistance.</p>	<p>Impacts and damage are reported in a timely manner.</p>	<p>Coordinate Damage assessment is coordinated through local networks and regional arrangements.</p>	<p>Farmers and industry have access to and are familiar with key websites providing information regarding financial assistance, assessment requirements and application processes.</p> <p>Industry is connected to Recovery Committees and structures following flood events.</p>
<p>Recovery initiatives do not consider and reflect needs of sugar cane industry.</p>	<p>Recovery activities recognise priority needs of sugar cane industry and incorporate tailored programs in Recovery Action Plans.</p>	<p>Advocate Industry issues are identified in local Recovery Plans and other recovery activities.</p> <p>Communicate Industry engages in dialogue with recovery managers to ensure industry issues remain at the forefront of recovery considerations.</p>	<p>Industry participates in recovery planning and operational activities in line with established NSW Recovery arrangements.</p> <p>Sugar Cane industry flood issues are recognised by Local and Regional Emergency Management Committees through Agricultural Services Functional Area representation.</p> <p>Local and Regional Emergency Management Plans identify issues and options for sugar cane industry in risk assessments and operational plans.</p> <p>Industry continues to collate timely damage reports and provide to NSW DPI.</p>

Table 3: Regional level strategies for Flood Ready Cane Farming

Risk	Desired Outcome	Strategy	Options
Complexities of off farm infrastructure ownership and obligations impede effective management of drainage systems and transport networks.	Off farm floodplain infrastructure is managed for effective and efficient operation according to the purpose of structures and reduces flooding impacts through ongoing maintenance and innovative upgrades and practices consistent across growing areas.	Advocate and negotiate Industry, floodplain management authorities and government work together to reduce perceived complexities of legislation and regulations regarding tenure, ownership and management.	Opportunities are sought for open dialogue between all parties with interests across the drainage system. Opportunities to work together with Floodplain Management Committees to raise awareness around infrastructure, regulations and funding capability are sought.
Drainage system efficiency is impeded by inconsistent practices.	Drainage system management is consistent and applicable across cane growing areas.	Synthesise Drainage management is well understood and where possible streamlined across cane growing areas.	Stakeholders work towards identifying opportunities for streamlining and reconciling current drainage management infrastructure and develop strategic management plan. Industry is an active member on local and regional Floodplain Management Committees. Committee Induction training is provided to Industry representatives on multi-agency Committees.

Risk	Desired Outcome	Strategy	Options
Insufficient warning is provided to enable preparedness activities.	Timely and accurate information is provided to inform early warning messaging.	<p>Use tools</p> <p>Where available, flood gauges provide information for monitoring and predicting water level changes</p> <p>Farmers are aware of sources for accessing information regarding changing water levels.</p> <p>Communicate</p> <p>Communication systems are identified as key methods for dissemination of messages and information during flood events.</p>	<p>Farmers and Industry are familiar with early warning systems and have access to websites and radio information regarding water level changes and flood predictions (e.g. SES, BoM, ABC Radio).</p> <p>Industry and emergency managers regularly communicate to ensure awareness of risks to farmers and cane production prior to and after flood events.</p>
Reduced regional economic viability and loss of business.	Local and regional business can withstand interruption to farming production.	<p>Plan</p> <p>Continuity plans are developed for local business likely to be affected by fluctuations in farming production.</p>	Industry and other stakeholders incorporate flood and continuity risks into their Business Plans.
Unemployment increases due to loss of opportunities on farm and in mill and refinery sectors.	Production is maintained to a level which ensures ongoing employment within the industry.	<p>Participate</p> <p>Employees are trained and have skills in alternative practices and recovery actions.</p> <p>Empower</p> <p>Employees are provided access to support and social programs.</p>	<p>Employees are multi-skilled and provided training opportunities.</p> <p>Employees and farmers are encouraged to access the Employee Assistance Program provided through Industry.</p>

Risk	Desired Outcome	Strategy	Options
<p>Industry is unable to withstand cumulative effects of annual and multiple flood events.</p>	<p>Industry encourages and supports innovative practices.</p>	<p>Improve</p> <p>Opportunities to develop innovative farming, milling and refining practices are provided.</p> <p>Encourage</p> <p>Continue to support practices and activities which encourage collaboration, innovation and resilience.</p>	<p>Utilise the expertise within Sugar Research Australia and Ag Services Group to achieve gains in farming practices.</p> <p>Build on and showcase resilient practices.</p> <p>Risk of farming low level areas is fully identified and recognised by industry.</p> <p>Seek opportunities and funding for Industry, floodplain managers and government to work together.</p> <p>Continue positive culture within the industry towards tackling challenges and cooperation.</p>

6. Future direction

Success will be the achievement of the desired outcomes of this Plan. Along the way will be indicators that progress is being made for example:

- Industry and farmers are proactive in sourcing flood information from a range of avenues including: websites, gauges, communication with emergency managers
- Farmers are more confident and proactive in engaging in dialogue with key agencies to manage risks and planning for and preparing for floods
- Cooperative groups are established at regional and local levels to carry out the roles set-out in this plan
- Industry participants are communicating often about their roles in the 4 phases of disaster management and carrying them out in cooperation with each other
- Other primary industry sectors are adopting some of the ideas from this plan.

While there is considerable good-will and collaboration in ensuring strategies and actions are progressed, it is suggested that some more formal mechanisms be incorporated to track and promote progress of the Flood Ready Cane Farming Strategic Plan.

To ensure success, it is suggested that the following steps be taken:

- a. Establish a mechanism to monitor progress
e.g. working group, sponsorship and agreed processes
- b. Identify indicators for each of the outcomes
- c. Identify risks and potential barriers to success
- d. Address the barriers
- e. Gather data and/or qualitative information to assess progress as defined by the indicators
- f. Foster industry "Champions" to lead initiatives and promote active engagement

"Responsibility" for Flood Ready Cane Farming is a shared role. Success and progress will rely on continued dialogue and interaction on the strategies identified within the plan but also allowing for flexibility in accordance with the principles of resilience.

It is recognised that among other things, climate change poses a risk to primary industries. For the cane industry these risks include rising sea level, coastal erosion, increased frequency and severity of storms and floods, and increased incidents of cyclonic weather and east coast lows. The impacts of such events could result in increased storm surges, prolonged inundation of flood waters and reduced recovery time between events.

This Plan does not intend to specifically address issues of climate change risk to the NSW sugar cane industry though flood preparedness measures and aspects of the plan will go some way towards promoting dialogue and planning with regard to climate variability and climate change. The focus of the plan is on current land use activities, infrastructure, farm level flood readiness and the identification of local and regional level strategies for moving forward within the current risk context. However, understanding and awareness of the extent of risks and timeframes associated with climate change scenarios would assist to inform and prepare for the predicted future influences of a changing climate.

7. References & Resources

1. Sunshine Sugar – Industry Brochure -

http://www.nswsugar.com.au/images/nswsugarDocs/files/2013_Sunshine_Sugar_Docs/Sunshine_Sugar_Info.pdf

2. Richmond River Cane Growers -

<http://richmondrivercanegrowers.com.au/sample-page/cane-farming/>

3. Sunshine Sugar –Cane Farming Brochure

http://www.nswsugar.com.au/images/nswsugarDocs/files/2013_Sunshine_Sugar_Docs/Cane_farming.pdf

4. Sunshine Sugar – Information for New Farmers -

http://www.nswsugar.com.au/images/nswsugarDocs/files/Info_for_Growers/Information_for_new_farmers_2013_1.pdf

5. Canegrowers Annual Report 2012/2013-

http://www.canegrowers.com.au/icms_docs/168274_CANEGROWERS_Annual_Report_2012-13.pdf

6. Monica Poel, NSW Cane Growers Assoc Inc, June 2014, “NSW Sugar Industry Critical Issues for Flood Resilience and Drainage Improvement”

7. Geolink, 2013, “Increasing Agricultural Production Resilience on the Coastal Floodplain: Sugar Cane Engagement with Northern Rivers Local Floodplain Infrastructure Authorities

8. Beattie, R. 2013, “Flooding and Drainage Impacts on the NSW Sugar Industry”, Sunshine Sugar,

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11. Michelle Walker, Curious Minds Co, Aug 2013, Forum Report “Flood Resilience in the Sugar Cane Industry

12. Australian Cane Grower Magazine, 2013, Issue 31, “Drainage Feature” -

http://www.canegrowers.com.au/page/Industry_Centre/Publications/Australian_Canegrower_magazine/

13. Geolink, 2013, Authorities Forum “Increasing Agricultural Production Resilience on the Coastal Floodplain: Sugar Cane Engagement with Northern Rivers Local Floodplain Infrastructure Authorities”

14. DECC, 2007, Floodplain Risk Management Guideline -

<http://www.environment.nsw.gov.au/floodplains/StandardFloodplainRiskManagement.htm>

15. Canegrowers, SmartCane Principles of Best Management Practice -

http://www.canegrowers.com.au/icms_docs/70456_BMP_Principles_of_BMP.pdf

16. BSES, Managing Flood Damaged Cane -

http://www.canegrowers.com.au/icms_docs/147481_BSES_Managing_flood_damaged_cane.pdf



Appendix A – Tools & Resources

The Flood Ready Cane Farming project uncovered a diverse array of potentially useful material, tools, checklists and guides that all could potentially play some role in increasing capacity at the farm, local and regional level. For use and future reference, some of the tools identified are listed below along with where to find them.

Links to these resources are also provided on the Flood Ready Cane Farming website at www.dpi.nsw.gov.au/floodreadycanefarming.

Tool	Description	Where to find it (links)
Planning Tools		
Farm Emergency Preparedness Plan (checklist)	One page easy to follow checklist for farms by the Centre for Food Security & Public Health; Iowa State University	Farm emergency checklist from IowaSU
NSW SES Floodsafe Business Plan Template	<ul style="list-style-type: none"> • Available on-line – can be downloaded and/ or printed • assists a farmer to write a farm level flood plan: <ul style="list-style-type: none"> - potential impacts - triggers for action before, during and after a flood - detailed action plan before, during and after - staff contact list - emergency contact list 	SES Floodsafe Business Toolkit
Risk Management Framework	<ul style="list-style-type: none"> • Managing flood risks using The Risk Management Process and the Risk Evaluation Tool (grid). Framed as a step-by-step tool for farmers and communities to use. 	NSW DPI Flood Ready Cane Farming Website
Farm Management System	A tool for Sugar Cane growers to identify and manage risks to on farm production	SmartCane Modules
Floodplain Risk Management Guideline¹⁴	Guidelines for preparing FRM Plans including Committees and management structures	Floodplain Risk Management Guideline
Flood Management		
Flood Plan – Simple Outline	Farm mud map (physical property) and key questions	
Managing Flood Damaged Cane¹⁶	Information Sheet for assessing flood impacts and waterlogging tolerance	BSES
Electricity and Safety during Floods	<ul style="list-style-type: none"> • One-page guide from Essential Energy - includes contact numbers 	Safety During Floods
What to do Before, During and After a Flood	<ul style="list-style-type: none"> • 28 page handbook issued by Emergency Management Australia for use by general public 	Flood Handbook from EMA

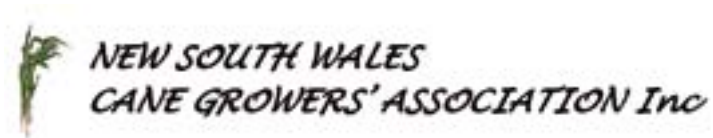
Tool	Description	Where to find it (links)
Farming Practice		
SmartCane Principles of Best Management Practice¹⁵	Provides information regarding land, soil and water management and practices for improving sugar cane production	Principles of Best Management Practice
NSW Sugar Industry Farming Code of Practice	Provides information for undertaking best practice including drainage	Sunshine Sugar
Information for New Farmers	Provides overview of sugar cane farming best practice and relevant contacts	Sunshine Sugar
QCANESelect™	Information and decision support for growers on variety selection, block recommendations and whole of farm planning.	see URL at end of doc
Health and Well being		
Building Emotional Resilience - GRDC	<ul style="list-style-type: none"> Farmer Health Fact Sheet from Grains Research and Development Corporation (GRDC) highlights strategies for strengthening emotional resilience at an individual level Touches on depression, helping others and resource organisations/websites	Grain Research and Development Corporation website
How Disaster Affects Everyone	'Fact Sheet' from Disaster Assist setting out common human reactions to disaster:	How disaster affects every one
NSW DPI training	List of online courses available including 'Managing climate risk on farm'	NSW DPI Profarm Training Website
Contact people and their organisations	A list of some of the main stakeholder organisations, groups, acronyms, roles, resources and Web links relevant to flood preparedness response and recovery	NSW DPI Rural Resilience Program
Tips for looking after yourself	'Fact Sheet' from Disaster Assist setting out practical strategies for coping.	Tips for looking after yourself
Communication		
Contact people and their organisations	A list of people and their organisations/interests that are invested in maximising the resilience of the cane industry. This list is provided to encourage collaboration and co-operation. Continually being updated	NSW DPI Rural Resilience Program

QCANESelect™ link -

<https://tools.sugarresearch.com.au/QCANESelect/Security/WebLogin.aspx?ReturnUrl=%2fQCANESelect%2fDefault.aspx>



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