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APPENDIX A: GLOSSARY

Taken from the Floodplain Development Manual (April 2005 edition)

acid sulfate soils	Are sediments which contain sulfidic mineral pyrite which may become extremely acid following disturbance or drainage as sulfur compounds react when exposed to oxygen to form sulfuric acid. More detailed explanation and definition can be found in the NSW Government Acid Sulfate Soil Manual published by Acid Sulfate Soil Management Advisory Committee.
Annual Exceedance Probability (AEP)	The chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage. For example, if a peak flood discharge of 500 m ³ /s has an AEP of 5%, it means that there is a 5% chance (that is one-in-20 chance) of a 500 m ³ /s or larger event occurring in any one year (see ARI).
Australian Height Datum (AHD)	A common national surface level datum approximately corresponding to mean sea level.
Average Annual Damage (AAD)	Depending on its size (or severity), each flood will cause a different amount of flood damage to a flood prone area. AAD is the average damage per year that would occur in a nominated development situation from flooding over a very long period of time.
Average Recurrence Interval (ARI)	The long term average number of years between the occurrence of a flood as big as, or larger than, the selected event. For example, floods with a discharge as great as, or greater than, the 20 year ARI flood event will occur on average once every 20 years. ARI is another way of expressing the likelihood of occurrence of a flood event.
caravan and moveable home parks	Caravans and moveable dwellings are being increasingly used for long-term and permanent accommodation purposes. Standards relating to their siting, design, construction and management can be found in the Regulations under the LG Act.
catchment	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.
consent authority	The Council, government agency or person having the function to determine a development application for land use under the EP&A Act. The consent authority is most often the Council, however legislation or an EPI may specify a Minister or public authority (other than a Council), or the Director General of DIPNR, as having the function to determine an application.
design flood	A hypothetical flood representing a specific likelihood of occurrence (for example the 100 year ARI or 1% AEP flood). It is a probabilistic or statistical estimate, generally being based on some form of probability analysis of flood or rainfall data.
design rainfall	Used in the estimation of a flood or the design of a particular component or feature of a hydraulic structure. Design rainfall estimates are based on the intensity, frequency and duration of the storm bursts. The use of a design rainfall in the estimation of a flood does not imply that if such rainfall occurred at a given time, the estimated flood elevations would result.
development	Is defined in Part 4 of the Environmental Planning and Assessment Act (EP&A Act).
	infill development: refers to the development of vacant blocks of land that are

	<p>generally surrounded by developed properties and is permissible under the current zoning of the land. Conditions such as minimum floor levels may be imposed on infill development.</p> <p>new development: refers to development of a completely different nature to that associated with the former land use. For example, the urban subdivision of an area previously used for rural purposes. New developments involve rezoning and typically require major extensions of existing urban services, such as roads, water supply, sewerage and electric power.</p> <p>redevelopment: refers to rebuilding in an area. For example, as urban areas age, it may become necessary to demolish and reconstruct buildings on a relatively large scale. Redevelopment generally does not require either rezoning or major extensions to urban services.</p>
disaster plan (DISPLAN)	A step by step sequence of previously agreed roles, responsibilities, functions, actions and management arrangements for the conduct of a single or series of connected emergency operations, with the object of ensuring the coordinated response by all agencies having responsibilities and functions in emergencies.
discharge	The rate of flow of water measured in terms of volume per unit time, for example, cubic metres per second (m ³ /s). Discharge is different from the speed or velocity of flow, which is a measure of how fast the water is moving for example, metres per second (m/s).
ecologically sustainable development (ESD)	Using, conserving and enhancing natural resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be maintained or increased. A more detailed definition is included in the Local Government Act 1993. The use of sustainability and sustainable in this manual relate to ESD.
effective warning time	The time available after receiving advice of an impending flood and before the floodwaters prevent appropriate flood response actions being undertaken. The effective warning time is typically used to move farm equipment, move stock, raise furniture, evacuate people and transport their possessions.
emergency management	A range of measures to manage risks to communities and the environment. In the flood context it may include measures to prevent, prepare for, respond to and recover from flooding.
flash flooding	Flooding which is sudden and unexpected. It is often caused by sudden local or nearby heavy rainfall. Often defined as flooding which peaks within six hours of the causative rain.
flood	Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences excluding tsunami.
flood awareness	Flood awareness is an appreciation of the likely effects of flooding and a knowledge of the relevant flood warning, response and evacuation procedures.
flood education	Flood education seeks to provide information to raise awareness of the flood problem so as to enable individuals to understand how to manage themselves and their property in response to flood warnings and in a flood event. It invokes a state of flood readiness.
flood fringe areas	The remaining area of flood prone land after floodway and flood storage areas have been defined.

flood liable land	Is synonymous with flood prone land (i.e. land susceptible to flooding by the probable maximum flood (PMF) event). Note that the term flood liable land covers the whole of the floodplain, not just that part below the flood planning level (see flood planning area).
flood mitigation standard	The average recurrence interval of the flood, selected as part of the floodplain risk management process that forms the basis for physical works to modify the impacts of flooding.
floodplain	Area of land which is subject to inundation by floods up to and including the probable maximum flood event, that is, flood prone land.
floodplain risk management options	The measures that might be feasible for the management of a particular area of the floodplain. Preparation of a floodplain risk management plan requires a detailed evaluation of floodplain risk management options.
floodplain risk management plan	A management plan developed in accordance with the principles and guidelines in this manual. Usually includes both written and diagrammatic information describing how particular areas of flood prone land are to be used and managed to achieve defined objectives.
flood plan (local)	A sub-plan of a disaster plan that deals specifically with flooding. They can exist at State, Division and local levels. Local flood plans are prepared under the leadership of the State Emergency Service.
flood planning area	The area of land below the flood planning level and thus subject to flood related development controls. The concept of flood planning area generally supersedes the “flood liable land” concept in the 1986 Manual.
Flood Planning Levels (FPLs)	FPLs are the combinations of flood levels (derived from significant historical flood events or floods of specific AEPs) and freeboards selected for floodplain risk management purposes, as determined in management studies and incorporated in management plans. FPLs supersede the “standard flood event” in the 1986 manual.
flood proofing	A combination of measures incorporated in the design, construction and alteration of individual buildings or structures subject to flooding, to reduce or eliminate flood damages.
flood prone land	Is land susceptible to flooding by the Probable Maximum Flood (PMF) event. Flood prone land is synonymous with flood liable land.
flood readiness	Flood readiness is an ability to react within the effective warning time.
flood risk	<p>Potential danger to personal safety and potential damage to property resulting from flooding. The degree of risk varies with circumstances across the full range of floods. Flood risk in this manual is divided into 3 types, existing, future and continuing risks. They are described below.</p> <p>existing flood risk: the risk a community is exposed to as a result of its location on the floodplain.</p> <p>future flood risk: the risk a community may be exposed to as a result of new development on the floodplain.</p> <p>continuing flood risk: the risk a community is exposed to after floodplain risk management measures have been implemented. For a town protected by levees, the continuing flood risk is the consequences of the levees being overtopped. For an area without any floodplain risk management measures, the continuing flood risk is simply the existence of its flood exposure.</p>

flood storage areas	Those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood. The extent and behaviour of flood storage areas may change with flood severity, and loss of flood storage can increase the severity of flood impacts by reducing natural flood attenuation. Hence, it is necessary to investigate a range of flood sizes before defining flood storage areas.
floodway areas	Those areas of the floodplain where a significant discharge of water occurs during floods. They are often aligned with naturally defined channels. Floodways are areas that, even if only partially blocked, would cause a significant redistribution of flood flows, or a significant increase in flood levels.
freeboard	Freeboard provides reasonable certainty that the risk exposure selected in deciding on a particular flood chosen as the basis for the FPL is actually provided. It is a factor of safety typically used in relation to the setting of floor levels, levee crest levels, etc. Freeboard is included in the flood planning level.
habitable room	in a residential situation: a living or working area, such as a lounge room, dining room, rumpus room, kitchen, bedroom or workroom. in an industrial or commercial situation: an area used for offices or to store valuable possessions susceptible to flood damage in the event of a flood.
hazard	A source of potential harm or a situation with a potential to cause loss. In relation to this manual the hazard is flooding which has the potential to cause damage to the community. Definitions of high and low hazard categories are provided in the Manual.
hydraulics	Term given to the study of water flow in waterways; in particular, the evaluation of flow parameters such as water level and velocity.
hydrograph	A graph which shows how the discharge or stage/flood level at any particular location varies with time during a flood.
hydrology	Term given to the study of the rainfall and runoff process; in particular, the evaluation of peak flows, flow volumes and the derivation of hydrographs for a range of floods.
local overland flooding	Inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam.
local drainage	Are smaller scale problems in urban areas. They are outside the definition of major drainage in this glossary.
mainstream flooding	Inundation of normally dry land occurring when water overflows the natural or artificial banks of a stream, river, estuary, lake or dam.
major drainage	Councils have discretion in determining whether urban drainage problems are associated with major or local drainage. For the purpose of this manual major drainage involves: <ul style="list-style-type: none"> ■ the floodplains of original watercourses (which may now be piped, channelised or diverted), or sloping areas where overland flows develop along alternative paths once system capacity is exceeded; and/or ■ water depths generally in excess of 0.3 m (in the major system design storm as defined in the current version of Australian Rainfall and Runoff). These conditions may result in danger to personal safety and property damage to both premises and vehicles; and/or ■ major overland flow paths through developed areas outside of defined drainage reserves; and/or ■ the potential to affect a number of buildings along the major flow path.

mathematical/computer models	The mathematical representation of the physical processes involved in runoff generation and stream flow. These models are often run on computers due to the complexity of the mathematical relationships between runoff, stream flow and the distribution of flows across the floodplain.
merit approach	<p>The merit approach weighs social, economic, ecological and cultural impacts of land use options for different flood prone areas together with flood damage, hazard and behaviour implications, and environmental protection and well being of the State's rivers and floodplains.</p> <p>The merit approach operates at two levels. At the strategic level it allows for the consideration of social, economic, ecological, cultural and flooding issues to determine strategies for the management of future flood risk which are formulated into Council plans, policy and EPIs. At a site specific level, it involves consideration of the best way of conditioning development allowable under the floodplain risk management plan, local floodplain risk management policy and EPIs.</p>
minor, moderate and major flooding	<p>Both the State Emergency Service and the Bureau of Meteorology use the following definitions in flood warnings to give a general indication of the types of problems expected with a flood:</p> <p>minor flooding: causes inconvenience such as closing of minor roads and the submergence of low level bridges. The lower limit of this class of flooding on the reference gauge is the initial flood level at which landholders and townspeople begin to be flooded.</p> <p>moderate flooding: low-lying areas are inundated requiring removal of stock and/or evacuation of some houses. Main traffic routes may be covered.</p> <p>major flooding: appreciable urban areas are flooded and/or extensive rural areas are flooded. Properties, villages and towns can be isolated.</p>
modification measures	Measures that modify either the flood, the property or the response to flooding. Examples are indicated in Table 2.1 with further discussion in the Manual.
peak discharge	The maximum discharge occurring during a flood event.
Probable Maximum Flood (PMF)	The PMF is the largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation, and where applicable, snow melt, coupled with the worst flood producing catchment conditions. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the extent of flood prone land, that is, the floodplain. The extent, nature and potential consequences of flooding associated with a range of events rarer than the flood used for designing mitigation works and controlling development, up to and including the PMF event should be addressed in a floodplain risk management study.
Probable Maximum Precipitation (PMP)	The PMP is the greatest depth of precipitation for a given duration meteorologically possible over a given size storm area at a particular location at a particular time of the year, with no allowance made for long-term climatic trends (World Meteorological Organisation, 1986). It is the primary input to PMF estimation.
probability	A statistical measure of the expected chance of flooding (see AEP).
risk	Chance of something happening that will have an impact. It is measured in terms of consequences and likelihood. In the context of the manual it is the likelihood of consequences arising from the interaction of floods, communities and the

	environment.
runoff	The amount of rainfall which actually ends up as streamflow, also known as rainfall excess.
stage	Equivalent to water level. Both are measured with reference to a specified datum.
stage hydrograph	A graph that shows how the water level at a particular location changes with time during a flood. It must be referenced to a particular datum.
survey plan	A plan prepared by a registered surveyor.
water surface profile	A graph showing the flood stage at any given location along a watercourse at a particular time.
wind fetch	The horizontal distance in the direction of wind over which wind waves are generated.

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FIGURE B1
SURVEYED PROPERTIES
BLACKWATTLE BAY CATCHMENT



- Study Area
- Floor Levels Surveyed (Flood Study - 2012) - 71 Properties
- Floor Levels Surveyed (FRMS&P - 2013) - 168 Properties



Floor Level Survey (undertaken in 2012 as part of Blackwattle Bay Flood Study)

Parcel Tags as on Council Cadastre (GIS Tag)	Photo Name	Number of Buildings	Street Number	Street Name	Easting (m)	Northing (m)	Indicative Ground Level (mAHD)	RESIDENTIAL BUILDING			NON-RESIDENTIAL BUILDING			
								Lowest Habitable Floor Level (m AHD)	Floor Construction Pier (P) Slab (S) Other (describe)	Type Commercial (C) Industrial (I) Public (P)	Name and Nature of Use/Business	Lowest Floor Level (mAHD)	Floor Construction Pier (P) Slab (S) Other (describe)	
174822	1 Belvoir Street.jpg	1	1	Belvoir Street	334174.4	6248726.0	30.74	P		Commercial (C)	Not known	31.05	P	
175732	104-106 Buckingham Street.jpg	1	104 to 106	Buckingham Street	334224.3	6248684.3	30.46	P		C		31.78	P	S
182309	2 Pembroke Street.jpg	1	2	Pembroke Street	334165.4	6248647.7	30.46	P		Com/Res	Chalmers Convenience Store	30.49	P	S
244124	203 Chalmers Street.jpg	1	204 to 214	Chalmers Street	334140.4	6248661.8	30.49	P		C	City Stationery W C Pentfolds - Stationers	30.49	P	S
515871	Shop 1, 330 Wattle Street.jpg	1	Shop 1, 330	Wattle Street	333177.0	6249733.7	4.05	P		C	Lits Trading Pty Ltd - Catering equipment supplier	4.05	P	S
515872	Shop 2, 330 Wattle Street.jpg	1	Shop 2, 330	Wattle Street	333169.2	6249748.6	3.88	P		C	Insanely Great Software - Computer Programmers	4.12	P	S
515873	Shop 3, 330 Wattle Street.jpg	1	Shop 3, 330	Wattle Street	333159.4	6249768.3	3.89	P		C	Nightingales - Bridal Shop	4.15	P	S
515874	Shop 4, 330 Wattle Street.jpg	1	Shop 4, 330	Wattle Street	333154.0	6249780.0	3.86	P		C	Fantastic Gourmet - Fast food shop	4.18	P	S
515875	430 Wattle Street.jpg	1	430	Wattle Street	332238.1	6249627.8	4.78	P		C		5.02	P	S
515876	432 Wattle Street.jpg	1	432	Wattle Street	333239.7	6249624.0	4.69	P		C		5.01	P	S
515877	434 Wattle Street.jpg	1	434	Wattle Street	333241.5	6249620.0	4.65	P		C		4.96	P	S
515878	435 Wattle Street.jpg	1	435	Wattle Street	333243.3	6249616.0	4.65	P		C		4.97	P	S
515879	438 Wattle Street.jpg	1	438	Wattle Street	333245.1	6249612.2	4.69	P		C		4.98	P	S
519134	36 Talour Street.jpg	1	36	Talour Street	332851.4	6249754.3	15.91	P		C		17.31	P	S
519135	38 Talour Street.jpg	1	38	Talour Street	332848.1	6249759.5	15.99	P		C		17.22	P	S
519136	39 Talour Street.jpg	1	39	Talour Street	332379.7	6249781.9	13.11	P		C		16.29	P	S
519137	40 Talour Street.jpg	1	40	Talour Street	332345.3	6249762.5	16.08	P		C		17.21	P	S
519138	41 Talour Street.jpg	1	41	Talour Street	332377.4	6249785.2	13.29	P		C		16.29	P	S
519139	42 Talour Street.jpg	1	42	Talour Street	332343.0	6249766.0	16.23	P		C		17.39	P	S
519140	43 Talour Street.jpg	1	43	Talour Street	332375.3	6249788.1	13.46	P		C		16.58	P	S
519142	45 Talour Street.jpg	1	45	Talour Street	332373.1	6249791.0	13.67	P		C		14.53	P	S
519184	9 Phillip Street.jpg	1	9	Phillip Street	332819.6	6249667.7	5.72	P		C		6.02	P	S
519186	11 Phillip Street.jpg	1	11	Phillip Street	332816.4	6249670.8	5.83	P		C		5.83	P	S
519187	13 Phillip Street.jpg	1	13	Phillip Street	332813.8	6249673.1	5.56	P		C		5.85	P	S
519189	15 Phillip Street.jpg	1	15	Phillip Street	332811.2	6249676.4	5.39	P		C		5.77	P	S
519334	35 Campbell Street.jpg	1	35	Campbell Street	332707.2	6249479.1	13.05	P		C		13.18	P	S
519335	36 Campbell Street.jpg	1	36	Campbell Street	332665.0	6249460.4	13.22	P		C		13.78	P	S
519336	37 Campbell Street.jpg	1	37	Campbell Street	332704.3	6249481.6	13.02	P		C		13.18	P	S
519337	38 Campbell Street.jpg	1	38	Campbell Street	332661.8	6249462.8	13.21	P		C		13.70	P	S
519339	39 Campbell Street.jpg	1	39	Campbell Street	332701.6	6249483.9	12.99	P		C		13.20	P	S
519340	40 Campbell Street.jpg	1	40	Campbell Street	332658.9	6249465.3	13.22	P		C		13.71	P	S
519342	42 Campbell Street.jpg	1	42	Campbell Street	332655.7	6249467.7	13.28	P		C		13.72	P	S
519344	44 Campbell Street.jpg	1	44	Campbell Street	332652.8	6249470.2	13.14	P		C		13.73	P	S
520356	121-27 Wentworth Street.jpg	1	21 to 27	Wentworth Street	332833.7	6249695.3	3.34	S		C		4.59	S	
520908	23 Forsyth Street.jpg	1	23	Forsyth Street	332207.7	6250284.7	5.30	S		C		5.34	S	
520910	25 Forsyth Street.jpg	1	25	Forsyth Street	332212.0	6250287.5	5.15	S		C		5.34	S	
520964	2 Wentworth Park Road.jpg	1	2	Wentworth Park Road	332872.0	6249774.1	2.39	S		C		2.94	S	
520965	4 Wentworth Park Road.jpg	1	4	Wentworth Park Road	332868.9	6249777.4	2.39	S		C		3.05	S	
520967	6 Wentworth Park Road.jpg	1	6	Wentworth Park Road	332865.7	6249780.8	2.39	S		C		3.06	S	
520968	8 Wentworth Park Road.jpg	1	8	Wentworth Park Road	332862.1	6249784.0	2.39	S		C		3.08	S	
520969	10 Wentworth Park Road.jpg	1	10	Wentworth Park Road	332858.4	6249787.0	2.44	S		C		3.10	S	
520970	12 Wentworth Park Road.jpg	1	12	Wentworth Park Road	332855.1	6249789.3	2.44	S		C		3.11	S	
520989	48-64 Wentworth Park Road.jpg	1	48 to 64	Wentworth Park Road	332726.2	6249993.4	2.12	S		C		2.24	S	
520990	Unit 1, 66 Wentworth Park Road.jpg	1	Unit 1, 66	Wentworth Park Road	332702.7	6250036.9	2.05	S		C		3.27	S	
520991	Unit 2, 66 Wentworth Park Road.jpg	1	Unit 2, 66	Wentworth Park Road	332706.6	6250032.7	2.12	S		C		3.27	S	
520992	Unit 3, 66 Wentworth Park Road.jpg	1	Unit 3, 66	Wentworth Park Road	332708.7	6250028.0	2.10	S		C		3.27	S	
520993	Unit 4, 66 Wentworth Park Road.jpg	1	Unit 4, 66	Wentworth Park Road	332712.1	6250023.2	2.14	S		C		3.27	S	
520994	Unit 5, 66 Wentworth Park Road.jpg	1	Unit 5, 66	Wentworth Park Road	332714.7	6250018.8	2.12	S		C		3.27	S	
520995	68 Wentworth Park Road.jpg	1	68	Wentworth Park Road	332694.0	6250038.1	2.02	P		C		3.12	P	
520996	70 Wentworth Park Road.jpg	1	70	Wentworth Park Road	332691.7	6250041.8	2.04	P		C		3.12	P	
520997	72 Wentworth Park Road.jpg	1	72	Wentworth Park Road	332688.9	6250045.2	2.06	P		C		3.11	P	
520998	74 Wentworth Park Road.jpg	1	74	Wentworth Park Road	332685.6	6250048.3	2.09	P		C		3.13	P	
520999	76 Wentworth Park Road.jpg	1	76	Wentworth Park Road	332682.8	6250051.8	2.17	P		C		3.11	P	
520999	78 Wentworth Park Road.jpg	1	78	Wentworth Park Road	332680.2	6250055.5	2.20	P		C		3.11	P	
520999	80-82 Wentworth Park Road.jpg	1	Unit 1, 80-82	Wentworth Park Road	332665.1	6250068.4	2.18	S		C		3.12	S	
520999	80-82 Wentworth Park Road.jpg	1	Unit 2, 80-82	Wentworth Park Road	332660.6	6250072.0	2.14	S		C		3.12	S	
520999	80-82 Wentworth Park Road.jpg	1	Unit 3, 80-82	Wentworth Park Road	332656.1	6250076.2	2.14	S		C		3.12	S	
520999	80-82 Wentworth Park Road.jpg	1	Unit 4, 80-82	Wentworth Park Road	332652.1	6250091.5	2.15	S		C		3.11	S	
520999	80-82 Wentworth Park Road.jpg	1	Unit 5, 80-82	Wentworth Park Road	332648.1	6250083.3	2.15	S		C		3.11	S	
520999	80-82 Wentworth Park Road.jpg	1	Unit 6, 80-82	Wentworth Park Road	332644.9	6250087.1	2.06	S		C		3.12	S	
520999	80-82 Wentworth Park Road.jpg	1	Unit 7, 80-82	Wentworth Park Road	332640.9	6250090.5	2.06	S		C		3.13	S	
520999	80-82 Wentworth Park Road.jpg	1	Unit 8, 80-82	Wentworth Park Road	332638.1	6250093.4	2.02	S		C		3.12	S	
520999	80-82 Wentworth Park Road.jpg	1	Unit 9, 80-82	Wentworth Park Road	332635.8	6250095.9	2.02	S		C		3.12	S	

Parcel Tags as on Council Cadastre (GIS Tag)	Photo Name	Number of Buildings	Street Number	Street Name	Easting (m)	Northing (m)	Indicative Ground Level (mAHD)	RESIDENTIAL BUILDING			NON-RESIDENTIAL BUILDING		
								Lowest Habitable Floor Level (m AHD)	Pier (P) Slab (S) Other (describe)	Type Commercial (C) Industrial (I) Public (P)	Name and Nature of Use/Business	Lowest Floor Level (mAHD)	Floor Construction Pier (P) Slab (S) Other (describe)
521613	2 Bridge Road.jpg	1	2	Bridge Road	332568.1	6250109.0	2.00			C	Kauri Foreshore Hotel - Pub	-0.02	S
521613	4 Bridge Road.jpg	1	4	Bridge Road	332554.4	6250097.8	1.99			C	Carnival & Party Warehouse - Party supplies retailer	2.45	S
521616	6 Bridge Road.jpg	1	6	Bridge Road	332538.7	6250087.1	2.02			C	Flat - Furniture supplier	2.20	S
521617	8 Bridge Road.jpg	1	8	Bridge Road	332529.3	6250080.8	2.02			C	Hello Happy Pty Ltd	2.29	S
521618	10 Bridge Road.jpg	1	10	Bridge Road	332507.8	6250065.4	2.07			C	Ruby Star Traders - Furniture retailer	2.35	S
521620	12 Bridge Road.jpg	1	12	Bridge Road	332501.0	6250060.9	1.98			C	Osmond Air Services - Air conditioning installers	2.44	S
521623	14-18 Bridge Road.jpg	1	14 to 18	Bridge Road	332488.5	6250052.4	2.03			C	BWS - Liquor retailer	3.09	S
521626	20 Bridge Road.jpg	1	20	Bridge Road	332470.9	6250039.4	2.38			C	Reece Plumbing - Plumbing supplies retailer	2.77	S
522943	38 Burton Street.jpg	1	38	Burton Street	332305.0	6250068.9	8.94			P			
525509	137 Broadway.jpg	1	137	Broadway	333343.8	6249232.1	5.68			C	Project 8 Cafe	5.28	S
	139 Broadway.jpg	1	139	Broadway	333338.8	6249232.3	5.68			C	Electric Monkeys	5.28	S
	141 Broadway.jpg	1	141	Broadway	333333.9	6249232.3	5.68			C	Chubby Girls Bunz Shop - Bakery	5.28	S
	143 Broadway.jpg	1	143	Broadway	333329.1	6249232.1	5.18			C	Tattoo World	5.28	S
	145 Broadway.jpg	1	145	Broadway	333323.8	6249232.0	5.18			C	ICM Mobile Phone Access	5.28	S
526433	86 Cleveland Street.jpg	1	86	Cleveland Street	333195.5	6248790.3	11.42			P			
526435	88 & 90 Cleveland Street.jpg	1	88	Cleveland Street	333200.1	6248789.3	11.35			P			
526437	89 & 90 Cleveland Street.jpg	1	90	Cleveland Street	333204.5	6248787.8	11.29			P			
526444	97 Cleveland Street.jpg	1	97	Cleveland Street	333189.4	6248749.1	11.59			P			
526445	99 Cleveland Street.jpg	1	99	Cleveland Street	333193.8	6248746.8	11.44			P			
526446	101 Cleveland Street.jpg	1	101	Cleveland Street	333198.8	6248746.6	11.42			P			
529443	9-15 MacArthur Street.jpg	1	9 to 15	MacArthur Street	333115.7	6249562.2	3.87			S	Thaï Tha Hai - Restaurant	11.78	S & P
614246	83 Glebe Street.jpg	1	83	Glebe Street	332735.3	6249340.5	11.26			S			
	95 Glebe Street.jpg	1	95	Glebe Street	332730.0	6249343.5	11.22			S			
	97 Glebe Street.jpg	1	97	Glebe Street	332725.3	6249345.0	11.02			S			
	99 Glebe Street.jpg	1	99	Glebe Street	332721.4	6249347.3	10.98			S			
	101 Glebe Street.jpg	1	101	Glebe Street	332717.6	6249350.0	10.87			S			
	103 Glebe Street.jpg	1	103	Glebe Street	332714.0	6249352.5	10.85			S			
	96 Mitchell Street.jpg	1	96	Mitchell Street	332708.1	6249579.7	9.46			S			
	98 Mitchell Street.jpg	1	98	Mitchell Street	332705.9	6249576.7	10.43			S			
	100 Mitchell Street.jpg	1	100	Mitchell Street	332703.4	6249574.1	10.43			S			
	102 Mitchell Street.jpg	1	102	Mitchell Street	332701.3	6249571.2	10.88			S			
	104 Mitchell Street.jpg	1	104	Mitchell Street	332699.4	6249567.8	10.88			S			
622676	12 Phillip Street.jpg	1	12	Phillip Street	332793.9	6249614.9	5.64			P		7.05	S
	15 Broughton Street.jpg	1	15	Broughton Street	332769.4	6249613.3	8.06			P		8.58	S
622677	24 Broughton Street.jpg	1	24	Broughton Street	332750.2	6249581.1	8.57			P		10.57	S
	24a Broughton Street.jpg	1	24a	Broughton Street	332744.5	6249586.3	8.43			P		10.06	S
	82 Mitchell Street.jpg	1	82	Mitchell Street	332731.0	6249605.1	8.82			P		9.37	S
	84 Mitchell Street.jpg	1	84	Mitchell Street	332727.9	6249601.4	9.10			P		9.37	S
	88 Mitchell Street.jpg	1	88	Mitchell Street	332721.4	6249593.0	9.30			P		9.72	S
	92 Mitchell Street.jpg	1	92	Mitchell Street	332718.0	6249589.3	9.50			P		9.73	S
622757	90 Glebe Street.jpg	1	90	Glebe Street	332720.3	6249507.0	11.31			P		12.24	S
	92 Glebe Street.jpg	1	92	Glebe Street	332714.0	6249511.8	11.30			P		11.87	S
	94 Glebe Street.jpg	1	94	Glebe Street	332707.6	6249516.9	10.97			P		11.49	S
	96 Glebe Street.jpg	1	96	Glebe Street	332701.5	6249521.9	11.02			P		11.54	S
	98 Glebe Street.jpg	1	98	Glebe Street	332695.1	6249526.1	11.12			P		11.62	S
	100 Glebe Street.jpg	1	100	Glebe Street	332688.2	6249530.4	11.26			P		11.69	S
106a Mitchell Street.jpg	106a Mitchell Street.jpg	1	106a	Mitchell Street	332683.2	6249548.0	12.13			P		12.58	S
106 Mitchell Street.jpg	106 Mitchell Street.jpg	1	106	Mitchell Street	332681.1	6249542.3	12.43			P		12.97	S
108 Mitchell Street.jpg	108 Mitchell Street.jpg	1	108	Mitchell Street	332675.8	6249538.8	12.72			P		13.03	S
110 Mitchell Street.jpg	110 Mitchell Street.jpg	1	110	Mitchell Street	332673.2	6249535.8	12.86			P		13.04	S
112 Mitchell Street.jpg	112 Mitchell Street.jpg	1	112	Mitchell Street	332671.0	6249531.4	12.97			P		13.04	S
623773	41 Campbell Street.jpg	1	41	Campbell Street	332693.9	6249480.7	13.00			P		13.20	S
	43 Campbell Street.jpg	1	43	Campbell Street	332691.6	6249482.1	12.93			P		13.21	S
	45 Campbell Street.jpg	1	45	Campbell Street	332688.9	6249484.2	12.94			P		13.20	S
	47 Campbell Street.jpg	1	47	Campbell Street	332685.1	6249486.6	12.85			P		13.18	S
	49 Campbell Street.jpg	1	49	Campbell Street	332681.6	6249489.3	12.94			P		13.15	S
	51 Campbell Street.jpg	1	51	Campbell Street	332676.8	6249491.6	12.99			P		13.34	S
	53 Campbell Street.jpg	1	53	Campbell Street	332675.9	6249494.0	12.98			P		13.22	S
	55 Campbell Street.jpg	1	55	Campbell Street	332673.1	6249495.9	13.10			P		13.23	S
623775	120 Mitchell Street.jpg	1	120	Mitchell Street	332653.0	6249504.8	13.09			P		14.59	S

Parcel Tags as on Council Cadastre (GIS)	Photo Name	Number of Buildings	Street Number	Street Name	Easting (m)	Northing (m)	Indicative Ground Level (mAHD)	RESIDENTIAL BUILDING			NON-RESIDENTIAL BUILDING		
								Lowest Habitable Floor Level (m AHD)	Floor Construction Pier (P) Slab (S) Other (describe)	Type Commercial (C) Industrial (I) Public (P)	Additional Comments	Name and Nature of Use/Business	Lowest Floor Level (mAHD)
520903	29 Levey Street	29		Levey Str	333338.5	6248940.7	11.35		11.76	S			
520905	31 Levey Street	31		Levey Str	333342.3	6248940.9	11.36		11.76	S			
520908	33 Levey Street	33		Levey Str	333345.8	6248941.2	11.45		11.76	S			
529100	35 Levey Street	35		Levey Str	333349.5	6248941.5	11.47		11.77	S			
529102	37 Levey Street	37		Levey Str	333353.2	6248941.8	11.56		12.11	S			
529104	39 Levey Street	39		Levey Str	333357.1	6248942.1	11.64			S			
202339	188 Chainers Street	188		Chainers S	334132.0	6248700.0	30.24		30.10	S	C		30.43
175710	1-89 Buckingham Street	61 to 89		Buckingham	334195.0	6248699.0	31.57		32.06	S	C		
175722	91 Buckingham Street	91		Buckingham	334188.6	6248690.1	31.93		32.06	P			
175723	93 Buckingham Street	93		Buckingham	334187.9	6248645.8	32.08		32.39	P			
175733	108 Buckingham Street	108		Buckingham	334207.8	6248679.8	31.74		32.43	P			
175734	110 Buckingham Street	110		Buckingham	334207.1	6248675.5	31.74		32.43	P			
528878	4-8 Kelly Street	4 to 8		Kelly Stree	333105.6	6249498.9	4.76		6.10	S			
528881	25 Kelly Street	25		Kelly Stree	333228.5	6249494.5	4.14		6.10	S			
623775	118 Mitchell Street	118		Mitchell Str	332860.1	6249523.5	13.55		14.12	S			
521900	17-31 Cowper Street	17 to 31		Cowper Str	332879.8	6249710.0	2.33		3.34	S			
520965	A Wentworth Park Road	2A		Wentworth	332887.5	6249777.4	2.33		3.33	S			
520965	D Wentworth Park Road	2D		Wentworth	332893.4	6249767.9	2.45		3.32	S			
520984	463 Wentworth Park Road	40 to 46		Wentworth	332784.0	6249927.6	2.38			S	C		2.44
522344	40 Burton Street	40		Burton Str	332310.4	6250081.6	9.70		9.92	S	I		9.92
	38 Burton Street	38		Burton Str	332314.3	6250075.7	8.51		8.92	S			
	36 Burton Street	36		Burton Str	332319.0	6250069.0	7.74		9.37	S			
520951	80 Forsyth Street	80		Forsyth Str	332278.3	6250307.1	4.46		6.51	S			
520950	78 Forsyth Street	78		Forsyth Str	332274.1	6250303.5	4.64		6.83	S			
520949	76 Forsyth Street	76		Forsyth Str	332269.8	6250300.1	4.70		6.95	S			
520948	74 Forsyth Street	74		Forsyth Str	332265.1	6250295.9	5.04		6.75	S			
520947	72 Forsyth Street	72		Forsyth Str	332260.9	6250292.7	5.18		6.77	S			
520946	70 Forsyth Street	70		Forsyth Str	332257.7	6250290.2	5.29		6.72	S			
520945	68 Forsyth Street	68		Forsyth Str	332254.6	6250287.5	5.70		6.74	S			
520944	66 Forsyth Street	66		Forsyth Str	332250.9	6250284.8	5.97		7.75	S			
520943	64 Forsyth Street	64		Forsyth Str	332247.3	6250281.6	6.24		7.80	S			
520942	29-31 Cook Street	29 to 31		Cook Street	332188.0	6250462.0	2.11		2.36	S			Level Ground floor Unit S.E Corner Property
519070	18 Oxley Street	18		Oxley Str	331943.0	6250482.0	11.74		3.14	S			Bottom Residential Slab above Garage Levels
521449	7-23 Stewart Street	7 to 23		Stewart Str	334987.0	6250476.0	11.74		9.02	S			Lowest Level Eastern Tower
608938	14 Griffin Place	14		Griffin Plac	332224.0	6250370.0	2.76		3.20	S			
519208	2 Garraan Lane	2		Garraan Lan	332188.8	6250311.2	5.22		5.44	S			Level of Lower Dwelling of Former No.3 Garraen Lane
519209	3A Garraan Lane	3A		Garraan Lan	332201.0	6250320.0	3.76		4.26	S			
187364	55 Calder Road	55		Calder Road	333041.0	6248520.0	17.36		18.43	P			
187362	53 Calder Road	53		Calder Road	333042.0	6248520.0	17.32		17.89	P			
187360	51 Calder Road	51		Calder Road	333046.1	6248521.2	17.71		18.30	S			
187358	49 Calder Road	49		Calder Road	333047.2	6248521.5	17.68		18.11	S			
187356	47 Calder Road	47		Calder Road	333053.9	6248523.7	17.67		18.11	S			
187354	45 Calder Road	45		Calder Road	333054.9	6248524.0	17.70		18.19	S			
187352	43 Calder Road	43		Calder Road	333061.2	6248526.0	17.77		18.60	S			
187350	41 Calder Road	41		Calder Road	333064.4	6248527.3	17.77		18.56	S			
202235	39 Calder Road	39		Calder Road	333066.2	6248528.0	17.87		18.56	S			
187346	37 Calder Road	37		Calder Road	333070.0	6248530.0	17.82		18.17	P			
187344	35 Calder Road	35		Calder Road	333073.0	6248531.0	17.44		18.21	P			
187342	33 Calder Road	33		Calder Road	333080.0	6248533.0	17.49		18.23	P			
202234	31 Calder Road	31		Calder Road	333083.0	6248535.0	17.49		18.23	P			
187338	29 Calder Road	29		Calder Road	333086.0	6248536.0	17.45		18.19	P			
187336	27 Calder Road	27		Calder Road	333089.0	6248537.0	17.45		18.19	P			
202233	25 Calder Road	25		Calder Road	333090.0	6248537.0	17.45		18.19	P			
526407	63 Cleveland Street	61		Cleveland	333110.0	6248774.0	13.30		13.68	P			
526410	61 Cleveland Street	63		Cleveland	333115.0	6248772.0	13.12		13.48	P			
526412	85 Cleveland Street	65		Cleveland	333116.0	6248772.0	13.02		13.50	P			
526443	95 Cleveland Street	95		Cleveland	333187.0	6248763.0	11.68		11.86	P			
533601	57-163 Cleveland Street	157 to 163		Cleveland	333447.0	6248719.0	15.80			P			Corner Abercrombie & Cleveland (Building under Construction)
194701	43-47 Vine Street	43 to 47		Vine Stree	333181.0	6248726.0	12.10		12.26	P	C		
194703	49-53 Vine Street	49 to 53		Vine Stree	333155.0	6248729.0	12.51		12.60	S	C		
194705	55 Vine Street	55		Vine Stree	333148.7	6248730.9	12.83		13.40	P			
194707	57 Vine Street	57		Vine Stree	333143.9	6248731.7	12.86		13.40	P			
202730	59 Vine Street	59		Vine Stree	333139.5	6248732.3	13.04		13.30	P			

Parcel Tags as on Council Cadastre (GIS Tag)	Photo Name	Number of Buildings	Street Number	Street Name	Easting (m)	Northing (m)	Indicative Ground Level (mAHD)	RESIDENTIAL BUILDING			NON-RESIDENTIAL BUILDING		
								Lowest Habitable Floor Level (m AHD)	Floor Construction Pier (P) (S)	Slab Other (describe)	Type Commercial (C) Industrial (I) Public (P)	Name and Nature of Use/Business	Lowest Floor Level (mAHD)
194712	63 Vine Street	63		Vine Street	333127.0	6248754.0	13.20	13.38	P				
194713	65 Vine Street	65		Vine Street	333124.0	6248735.0	13.12	13.45	P				
519440	12 Junction Street	12		Junction S	331763.0	6249192.0	14.32	11.76	S		Level Of Office at Rear of 3 Storey Building		
519440	12 Junction Street	12		Junction S	331762.0	6249178.0	14.00	10.88	S		Level Floor Old Building Rear of Site		
521860	7A Hegarty Street	1A		Hegarty St	331967.0	6249623.0	14.00	14.30	S		Bottom Floor of 3 Storey Brick Flats		
188501	16 Eveleigh Street	16		Eveleigh S	333549.1	6248647.6	18.28	18.28	S				
193153	13 Renwick Street	13		Renwick S	332986.9	6247555.6	26.48	26.96	S				
193155	17 Renwick Street	15		Renwick S	332974.6	6247553.2	26.43	26.97	S				
193156	19 Renwick Street	17		Renwick S	332968.5	6247552.0	26.36	26.99	S				
193157	21 Renwick Street	19		Renwick S	332962.3	6247550.8	26.40	26.99	S				
193158	23 Renwick Street	21		Renwick S	332956.6	6247549.7	26.40	26.99	S				
246249	25-27 Renwick Street	23	25 to 27	Renwick S	333726.3	6248579.0	26.35	26.99	S				
249952	29 Renwick Street	29		Renwick S	333726.9	6248569.0	26.29	26.47	S				
613353	35-37 Renwick Street	35 to 37		Renwick S	333724.0	6248549.7	26.51	26.72	S				
203082	82-134 Shepherd Street	132 to 134		Shepherd S	333064.0	6248657.0	14.47	14.60	S	P(COMMUNITY)			
183743	138 Shepherd Street	138		Shepherd S	333052.6	6248622.9	14.98	15.20	P	R			
183744	140 Shepherd Street	140		Shepherd S	333051.3	6248619.1	14.98	15.22	P	R			
202408	1-19 Regent Street	1 to 19		Regent Str	333724.1	6248648.0	28.22		C		Various Retail Stores	28.14	S
621684	21 Regent Street	21		Regent Str	336143.8	6248968.7	26.30		C		Various Retail Stores	26.95	S
518066	55-59 Regent Street	55 to 59		Regent Str	333772.0	6249050.0	17.81		C		Various Retail Stores	18.10	S
627845	60-65 Regent Street	60 to 65		Regent Str	333764.0	6249027.0	17.81		C		Various Retail Stores	17.81	S
515495	67-69 Regent Street	67 to 69		Regent Str	333757.0	6249020.0	17.94		C		Various Retail Stores	17.94	S
516920	71-75 Regent Street	71 to 75		Regent Str	333745.0	6249006.0	18.11		C		Various Retail Stores	19.16	S
518418	80 Broughton Street	80		Broughton	32498.2	6249935.8	6.75		S	P(COMMUNITY)	BROUGHTON ST CHILD CARE CENTRE	7.09	S
202206	12 Boundary Street	12		Boundary S	333135.0	6248876.0	13.06	13.06	P				
522340	32 Burton Street	32		Burton Str	332326.8	6250060.1	6.69	8.38	S				
522341	34 Burton Street	34		Burton Str	332324.8	6250063.4	7.37	8.82	S				
522022	27 Cardigan Street	27		Cardigan S	332508.5	6249942.3	7.53	7.61	S				
522023	29 Cardigan Street	29		Cardigan S	332500.1	6249936.4	7.01	7.18	S				
522024	31 Cardigan Street	31		Cardigan S	332501.1	6249937.1	7.01	7.18	S				
201521	36-38 George Street	36 to 38		George Str	333780.9	6248950.2	26.51		P		Carpark	26.73	S
514080	47-53 Jones Street	47 to 53		Jones Str	333146.1	6249954.8	3.12		P		School	4.42	S
521045	42 Lombard Street	42		Lombard S	33261.6	6249961.2	19.41	20.60	S				
612303	1-73 Mount Vernon	1 to 73		Mount Veri	332197.0	6249431.0	24.85	25.17	P		Level Dwelling No.146 Corner St Johns Road and Mt Vernon Lane		
613427	2-8 Wentworth Street	2 to 8		Wentworth	332903.4	6249726.3	3.07	0.47	P				

DRAFT





Blackwattle Bay Catchment Floodplain Risk Management Study and Plan

August 2013



The City of Sydney is preparing a Floodplain Risk Management Study and Plan for the Blackwattle Bay catchment area and we would like your help.

The study will tell us about the type of flood mitigation solutions feasible for the catchment and help us plan for and manage any flood risks.

Good management of flood risks can help reduce damage and improve social and economic opportunities.

Blackwattle Bay Floodplain Risk Management Study and Plan





The City of Sydney has engaged WMAwater to assist with the preparation of the Blackwattle Bay Floodplain Risk Management Study and Plan.

The Blackwattle Bay Flood Study was completed by WMAwater in 2012, giving the City of Sydney a better understanding of the nature of flooding in your area. The next step in the NSW Government Flood Management Process is the preparation of a Floodplain Risk Management Study and Plan. The purpose of this study and plan is to identify and recommend appropriate actions to manage flood risks in the Blackwattle Bay area.

This brochure is an introduction to the Floodplain Risk Management Study and Plan and its objectives.

Stages of the NSW Government Flood Prone Land Policy

1. Formation of a Committee – complete
2. Data Collection – complete
3. Flood Study – complete
4. Floodplain Risk Management Study
5. Floodplain Risk Management Plan
6. Implementation of Plan.

Study area and flooding issues

The Blackwattle Bay study area includes parts of Glebe, Ultimo, Pyrmont, Chippendale and Darlington.

Much of the flooding in this catchment occurs due to natural depressions and low points. In the past, flooding has caused property damage and posed a hazard to people and property located near drainage areas. The Floodplain Risk Management Study and Plan currently being undertaken is to manage these flood risks.

Have your say

We want your comments about previous flood experiences and potential mitigation options.

The local knowledge of residents and business operators, including your personal experiences of flooding is a valuable source of information.

The information you provide in the accompanying questionnaire will help the City of Sydney determine how to manage the floods in your area.

For more information about this project, please contact the City of Sydney or WMAwater via the details provided.

Floodplain risk management options

The following list of floodplain risk management options are examples of the type of strategies that could be considered to minimise risk and reduce the impact of flooding in the catchment. These options will be investigated in more detail during the preparation of the Management Study and Plan. There are general categories of options.

Flood modification options.

Examples include:

- Construction of detention/retarding basins to reduce the peak flow downstream;
- Upgrading of drainage systems, upgrade of existing pipes or construction of new pipes; and
- Regrading of roads to provide better overland flowpaths.

Property modification options and planning control.

Examples include:

- Building and development controls,
- Flood-proofing measures, such as flood barriers.

Response modification options.

Examples include:

- Revision of the Local Disaster Plan;
- Public awareness and education – locality-based flooding information for residents;
- Public awareness and education – flooding information for schools;
- Flood depth markers at major (flood-affected) road crossings;
- Continuation of existing public awareness and education campaigns; and
- Data collection strategies for future floods.

For more information please contact:

WMAwater
Steve Gray
Phone 02 9299 2855
Fax: 02 9262 6208
mailto:gray@wmawater.com.au
gray@wmawater.com.au

Local Resident/Land Owner Survey

The City of Sydney is carrying out a Floodplain Risk Management Study and Plan for the Blackwattle Bay catchment. Please return your completed questionnaire in the reply-paid envelope by Monday 16 September 2013. Or complete the questionnaire online at cityofsydney.nsw.gov.au

1

Please provide the following details as we may contact you to discuss some of the information you have provided us.

Name:

Address:

Contact phone number:.....

Email:

2

What is the best way to contact you?

Letter (post)

Email

Phone

3

How many people regularly live/work on this property?

.....
.....
.....

4

How many of the permanent residents/workers are in age group below:

0-4 years

5-14 years

15-64 years

65+ years

5

What is the main language spoken at this address?

English

Other (please specify)

6

Is your property (please tick)

- Owner occupied Occupied by a tenant Business
- Other (please specify)

7

What type of structure is your property/business? (please tick)

- Freestanding house.....
- Apartment.....
- Dual occupancy.....
- Industrial.....
- Commercial.....

8

How long have you lived, worked at, and/or owned this property?

Years

Months

9

Have you ever experienced flooding since living and/or working in the Blackwattle Bay catchment? (please tick relevant boxes)

- Yes, floodwaters entered my house/business
- Yes, floodwaters entered my yard/surrounds of my business
- Yes, the road was flooded and I couldn't get to my car
- Yes, other parts of my neighbourhood were flooded
- No, I haven't experienced flooding

10

Do you have any materials or photos you can provide to evidence the flooding you experienced? If yes, when did this flood occur?

- No
- Yes – the flooding occurred on:

As a local resident who may have witnessed flooding/drainage problems, you may have your own ideas about how to reduce flood risks. Which of the following management options would you prefer for the Blackwattle Bay catchment (1=least preferred, 5=most preferred)?

Proposed option	Preference
Stormwater harvesting, such as rainwater tanks — Suggested location/other comments:	1 2 3 4 5
Retarding or detention basins (these temporarily hold water and reduce peak flood flows) — Suggested location/other comments:	1 2 3 4 5
Improved flood flow paths — Suggested location/other comments:	1 2 3 4 5
Culvert/bridge enlarging — Suggested location/other comments:	1 2 3 4 5
Pit and pipe upgrades — Suggested location/other comments:	1 2 3 4 5
Levee banks or flood walls — Suggested location/other comments:	1 2 3 4 5
Strategic planning and flood related development controls — Suggested location/other comments:	1 2 3 4 5
Education of the community, providing greater awareness of potential hazards — Suggested location/other comments:	1 2 3 4 5
Flood forecasting, flood warnings, evacuation planning and emergency response measures — Suggested location/other comments:	1 2 3 4 5

Other (please specify any options you think are suitable):.....

If you have any further comments that relate to the Blackwattle Bay Flood Management Study and Plan, please write them in the space below. Feel free to attach additional pages if necessary.

Glossary

- Culvert** – a piped drain or covered channel that passes under a road or railroad.
- Levee bank/flood wall** – an embankment or wall, usually constructed from earth or concrete, built along the banks of a watercourse to help prevent overflow of its waters.
- Retarding/detention basin** – depression in the land surface that captures and holds stormwater runoff allowing it to slowly drain out of the basin into the adjoining natural drainage line or creek.
- Stormwater harvesting** – the collection, storage, treatment and use of stormwater run-off from urban areas.

Privacy notice: The information obtained from the survey will be used by staff from the City of Sydney Council and WMAwater only. The information supplied will remain completely confidential.

The Floodplain Risk Management Process

Flood Risk – What Is It?

Flooding occurs when land is inundated with water, often from a river, creek or the ocean. The flood risk of an area is a product of the severity of the flood threat (including its magnitude and likelihood) and the extent of human development in the area. For instance, a section of houses built adjacent to a creek that regularly floods will have a much higher flood risk than a single property in an elevated area.

► Properties affected by flooding



Flood Risk - Where is it in NSW?

Flood risk in NSW is spread across the entire state, with nearly all local government areas affected in some form. The threat that flooding poses ranges from coastal inundation to the flooding of creeks and rivers, to surcharge of drainage systems in urban areas



How is flooding planned for?

The flood risk in a particular area is managed through the NSW Government's Flood Prone Land Policy, which sets out a multiple stage process for managing flood risk. The process determines the flood behaviour in an area, assesses what impact a possible flood event will have on the area, and then produces a series of recommendations as to how to manage the flood risk. The stages are shown below.

► The Floodplain Risk Management Process



► Flooding on Sparkes St, Camperdown



Who has responsibility for managing flooding?

Generally speaking, Councils are responsible for carrying out the management process, with the NSW Government and SES providing assistance where necessary. Consultants with expertise in flooding are commonly engaged by the City to assist in each stage. Council's knowledge of its community, including their flood risk, is combined with a consultant's technical knowledge of flood behaviour and how to manage it, and both are guided by the NSW Government and the SES's policies, which ensures state-wide consistency.



How does the process work?

The process builds a complete picture of flooding in an area (both past and future) and then decides upon a strategy that will best manage the flood risk in the area. The process is cyclical. The last stage, implementing the chosen plan, is followed by a re-assessment of the flood behaviour, the management options, and so on. Flood threat is constantly changing, as uses evolve and the understanding of the lands hydrology grows. A better understanding of the possible impacts of climate change makes re-assessment of flood hydrology more important than ever.

Managing the Flood Risk – What Can Be Done?

The Three Types of Measure

The ideal approach to manage flood risk varies greatly between areas, and as such, many measures exist and are currently in use. The measures can be divided into three categories: **Property Modification**, **Response Modification** and **Flood Modification**. The suitability of a particular measure will depend on its benefit to the area, the cost of the measure, its negative impacts, and a range of other factors. A full description of each category is given in the Floodplain Development Manual

► Examples of the three types of measure

Property Modification Examples	Response Modification Examples	Flood Modification Examples
<ul style="list-style-type: none"> • House Raising • Flood Proofing • Zoning controls 	<ul style="list-style-type: none"> • Warning System • Evacuation Plan • Education 	<ul style="list-style-type: none"> • Drainage Upgrade • Detention Basins

Property Modification

Property modification measures refer to those that modify an existing property or place a control that limits future development. These measures include voluntary purchase of high risk properties, zoning controls in at-risk areas, house raising, flood proofing and flood access. The measures do not attempt to control the extent of the floodwaters, but rather act to lower the impact of the flood.



► House raising is an example of property modification

Property modification measures are only effective in some areas. For example, the cost of raising or purchasing a house must be balanced with the monetary benefit of that action. Similarly, house purchasing may be unpopular with landowners who value the location and intrinsic worth of their property.



► Detention basin is an example of flood modification

► Designating floodways is an important zoning measure



Response Modification

Response modification measures are those that increase the community's ability to react to floods when they occur. This typically relates to writing or amending plans used in emergency situation. Examples of plans that may be affected are those for flooding warning, the protection of an area, community education and readiness, the relief of evacuees and the post-flood recovery.



► Knowledge of flooding in an area should be well documented

While response modification measures will not alter the course of floodwaters, they have the advantage of generally being a cost-effective option. Plans such as those mentioned are typically easy to establish relative to other measures, and their benefits are immediate. A community that is well versed in the local flood risk, including their readiness, can minimize the impacts of a flood when it does occur.

Flood Modification

Flood modification measures aim to alter the behaviour of the floodwaters, be it their extent, velocity or height. These can be large scale projects, such as levees or seawalls around towns, or flood mitigation dams, or smaller modifications, such as altering the river channel, installation of sub-surface drainage, or local retarding basins. While they have the ability to re-route or diminish a river's flow, lowering the flood risk for large areas of land, modifying an area's hydrology can be both expensive and ecologically harmful. Furthermore, these structures may lead to a false sense of security, for example, that a levee or dam will protect an area indefinitely when in fact it will always fail once a large enough flood occurs.

Historical floods in Blackwattle Bay and Johnstons Creek catchments

