

Brisbane Watershed



Design Charrette

Key organisers

JAMES DAVIDSON ARCHITECT

James Davidson
Sam Bowstead

bosch slabbers
LANDSCAPE + URBAN DESIGN

Stijn Koole
Steven Slabbers
Clim Sorée

Contributors

 Washington
University in St. Louis

John Hoal
Derek Hoeferlin

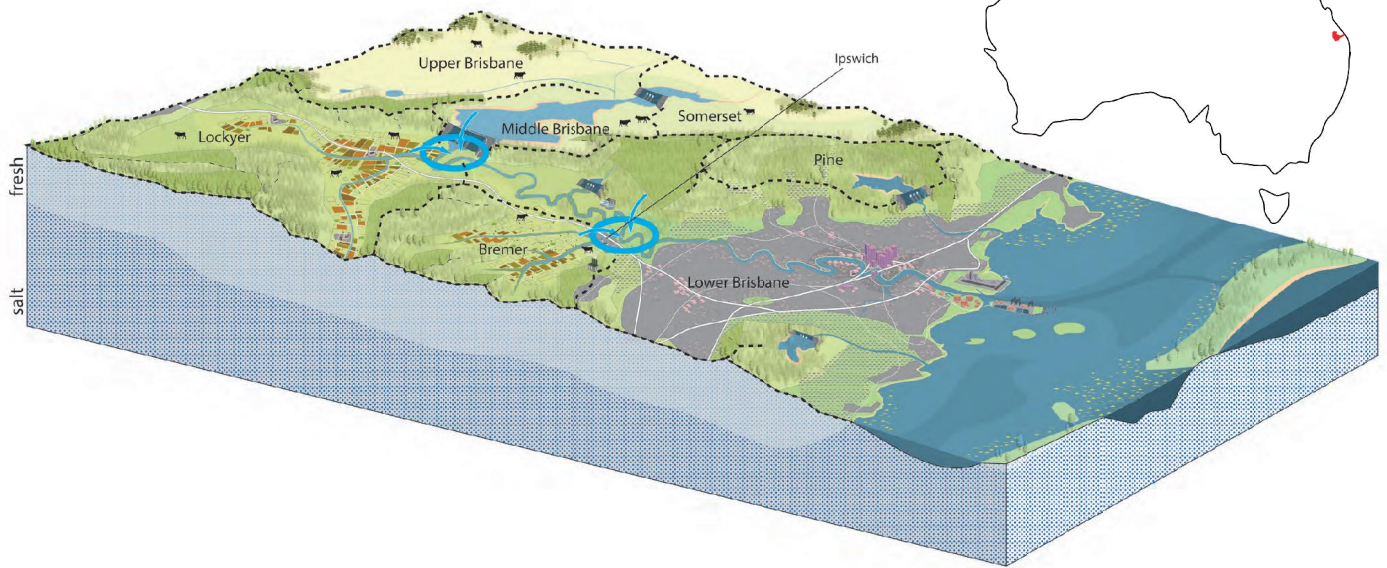
Deltares
Enabling Delta Life 

Ferdinand Diermanse

Design Charrette as a tool

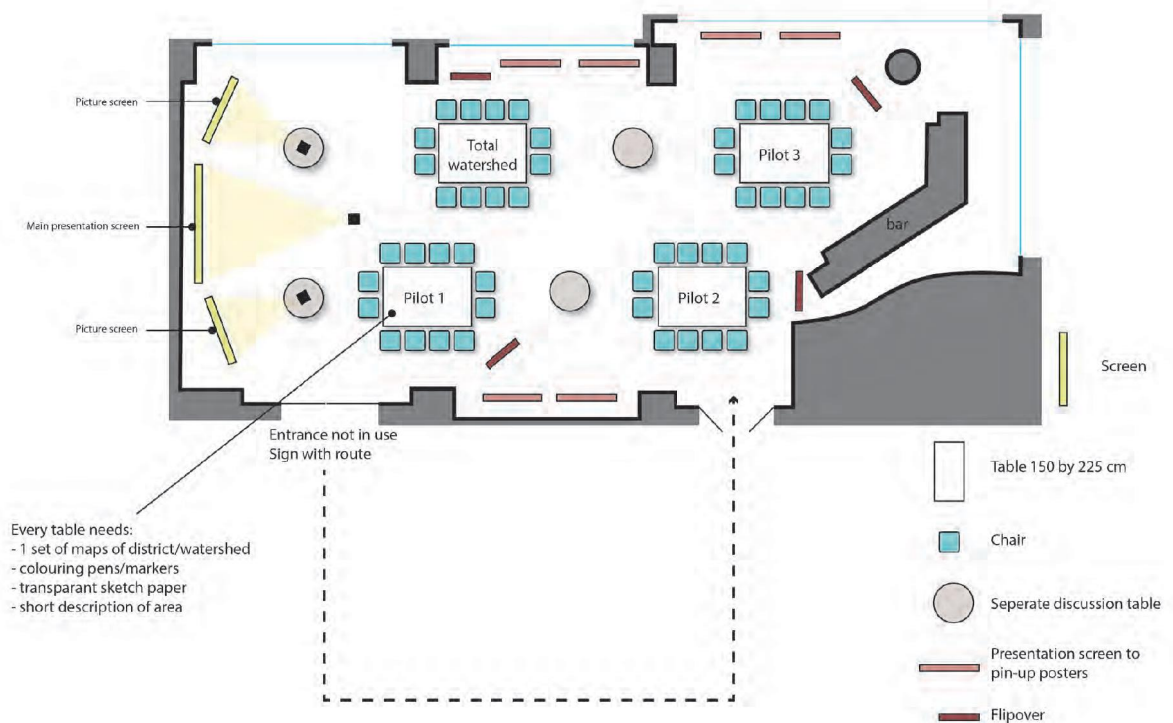
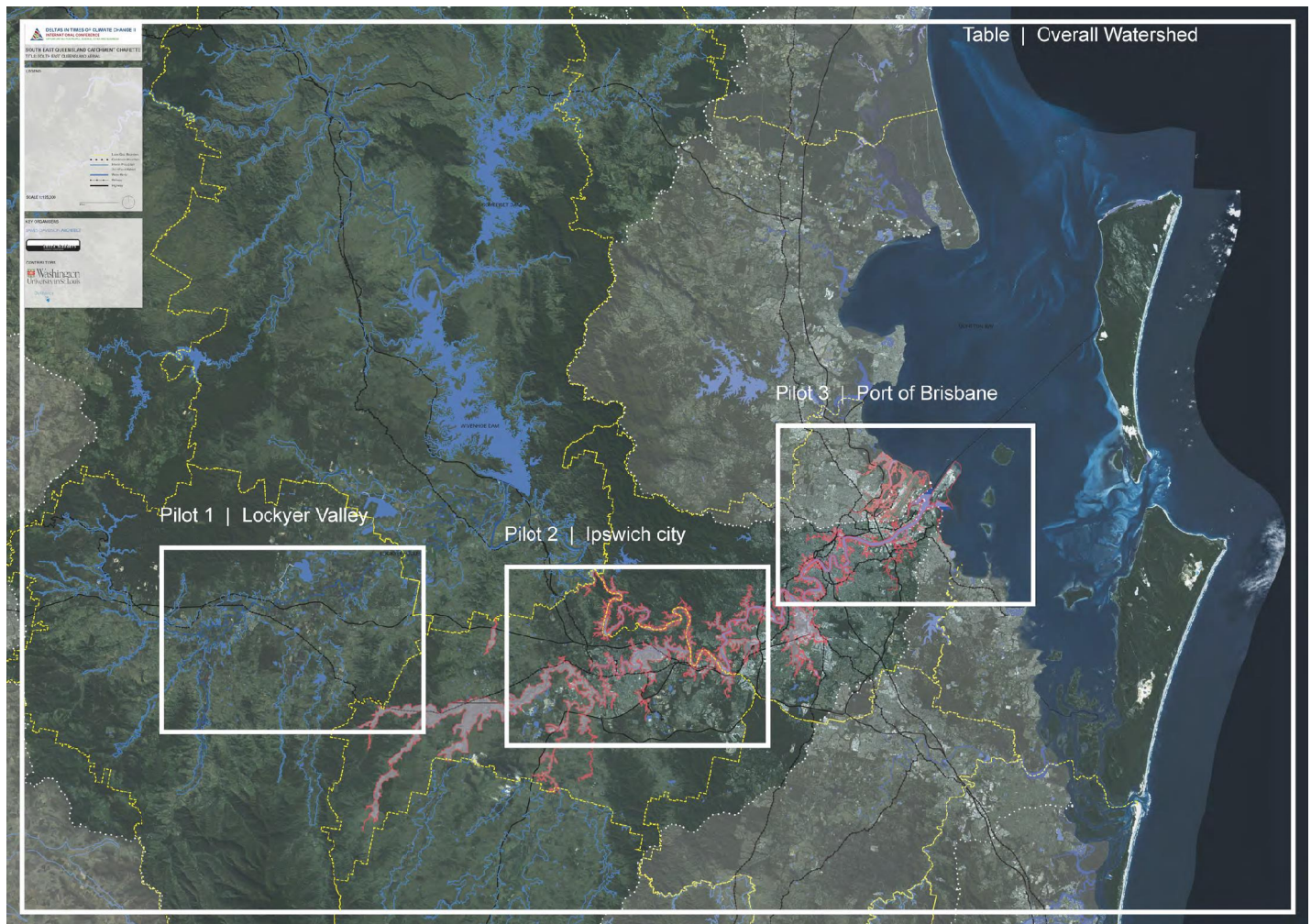


Looking at whole watershed



Kickstarting a local initiative





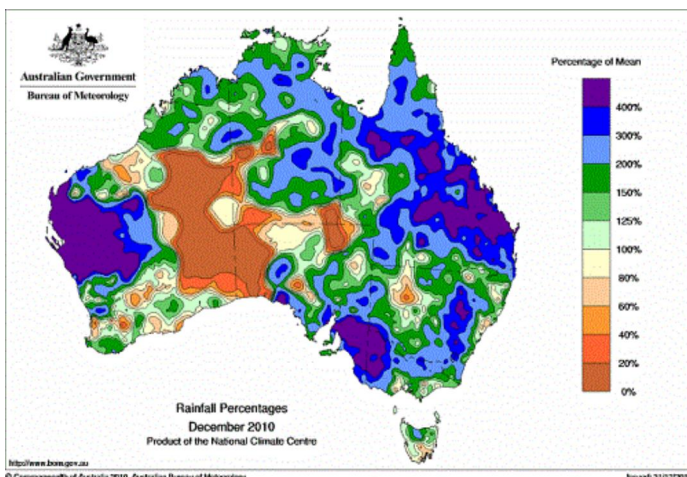
3 tasks for this afternoon | per group

1. make a drawing and a list of issues ½ hour
2. define the 2050 'goals and principles' for your group ½ hour
3. develop 3 strategic directions on the table 1½ hour
 - spatial strategy
 - implementation timeline
 - financial statement.

Each group has a local expert and a facilitator

Conclusions: every group has 10 minutes to conclude their work by presentation

Wrap up!





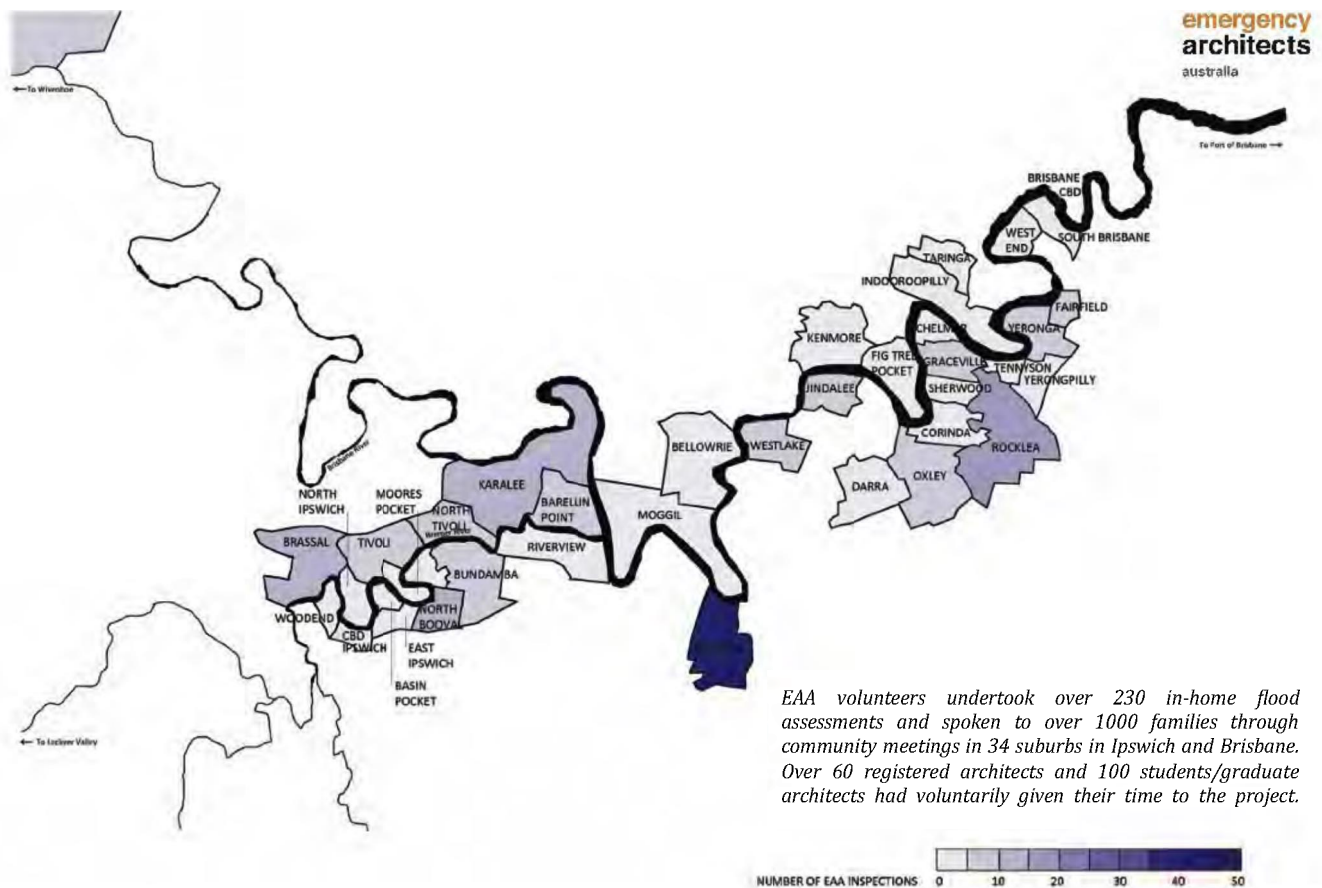
JAMES DAVIDSON ARCHITECT



JAMES DAVIDSON ARCHITECT



JAMES DAVIDSON ARCHITECT



JAMES DAVIDSON ARCHITECT



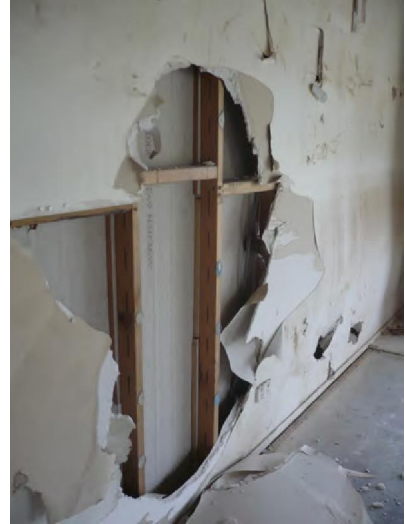
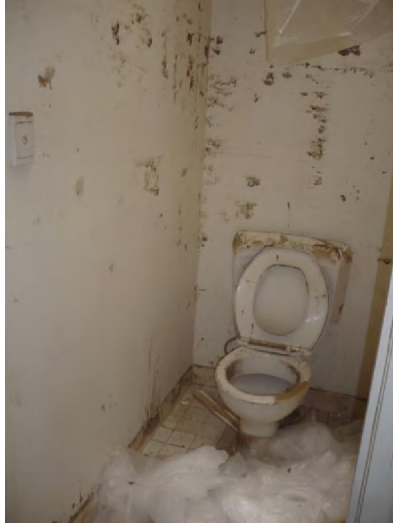
TYPE OF DAMAGE SEEN DURING EAA ASSESSMENTS

EAA assessments were geared towards providing a sense of direction for occupants in wading through not only rebuilding but also the planning process associated with reconstruction, something which the majority of homeowners had never faced previously.

JAMES DAVIDSON ARCHITECT



JAMES DAVIDSON ARCHITECT



JAMES DAVIDSON ARCHITECT

emergency
architects
australia

BUILDING ASSESSMENT REPORT 2011 No: 0024

Emergency Architects Australia architects are assisting homeowners to assess the building damage caused to their houses by the flood, in order to help them organise affordable and functional repairs.

The volunteer architects will look over the house with the owners, help the owners get a good understanding of the full extent of damage (both apparent and perhaps hidden), and discuss options and opportunities for the repair work. They will also indicate any areas of concern which might need further assessment by other tradespeople or professionals before repairs are undertaken.

Report of Apparent Damage

Date of Visit: 26/02/2011
Building address: Unit 6, 5 Spalding Court, Goodna
Local Authority: Ipswich council
Owner's Name: Wayne McIntosh
Occupant's Name: Wayne McIntosh
Phone Contact: 0407 017 123
Email Contact: wmcintosh@hotmail.com
Occupancy Description: 3 Bedrooms # 1 Bathrooms # 1 Living Areas #
Insurance Details: Body corporate covers structure - but this only covers bricks
GPS Co-ordinates: S 27° 36' 45.5" E 152° 54' 02.4"

1.0 TYPE OF BUILDING/CONSTRUCTION

- 1.1 Type: ☐ Housing ☐ Office ☐ Shop
☐ Detached ☒ Townhouse ☐ Apartment
1.2 Construction: ☐ Timber Clad ☒ Brick Veneer ☐ Cavity Brick
☐ Elevated Frame ☒ Slab on ground ☐ Other
1.3 Number of storeys: 1
1.4 Height of floors above ground: approx. 1995
1.5 Date/s of construction: Very late 11/01/11
1.6 Heritage Status: ☐ Heritage Listed ☐ Character ☒ None ☐ Unknown

2.0 FLOOD DAMAGE DATA

- 2.1 Height of flood above floor level: 3.6m
2.2 Length of inundation: 4 days
2.3 Date of initial inundation: Very late 11/01/11
2.4 Number of people displaced/evacuated during flood: age 0 to 5: , age 6-17: , age 18 to 70: 2 , age 70+:

Project Supporters



Project Sponsors



EAA Major Sponsors



	Yes	No	N/A	?
3.0 Building Clean-out Status				
3.1 Is the building clean of mud, silt and water?	x			
<small>If No: We recommend a full secondary clean of all mud, silt and water. Make sure to check on tops of the building frame if possible (beams, trusses, posts, etc.)</small>				
3.2 Has the building finished drying out?		x		
<small>See Summary of Recommendations at end of document - subheading "Internal linings/external cladding"</small>				
3.3 Have possessions, furnishings, linings, joinery, etc. been removed?	x			
<small>If No: All affected materials need to be removed. This includes all kitchen and bathroom cabinetry. All plasterboard. All carpets, vinyl, etc. Underneath all linings needs to be thoroughly cleaned and then dried. This is to decrease the chance of mould once linings have been removed.</small>				
4.0 Asbestos and lead paint				
4.1 Is the house built prior to 1990? If yes, it may have asbestos.		x		
4.2 Are there any potential signs of asbestos? If evident, advise owner to seek appropriate advice.		x		
<small>If Yes: If you suspect asbestos is present do not cut, sand or displace any material sheeting. Contact an asbestos expert 1300 QH INFO.</small>				
4.3 Is there potential encapsulated non-visible asbestos lining (eg. under floor tiles)?		x		
<small>If Yes: If you suspect asbestos is present do not cut, sand or displace any material sheeting. Contact an asbestos expert 1300 QH INFO.</small>				
4.4 Recommend testing for lead paint?		x		
<small>If Yes: Be aware there health risks related with lead paint. Avoid sanding and wear protective clothing and masks during clean up. Seek further advice if need be.</small>				
<small>Note: A person removing > 10m2 of asbestos must have an 'A' or 'B' class WHS license</small>				
5.0 Structure				
5.1 Has the water visibly shifted the house structure?		x		
<small>If Yes: A structural engineer will determine the extent of structural damage and advise as to the necessary initial step of securing the structure. Do not proceed in any renovation work until the engineer has cleared the building.</small>				
5.2 Has there been visible subsidence or cracking in the sub-structure?		x		
<small>If Yes: A structural engineer will determine the extent of sub-structural damage and advise as to the necessary initial step of securing the structure. Do not proceed in any renovation work until the engineer has cleared the building.</small>				
5.3 Have floodwaters scoured out soil around footings/foundations (remove silt to see)?		x		
<small>If Yes: An engineer will advise as to the necessary steps to secure the foundations.</small>				
5.4 Are there any cracked or broken structural members?		x		
<small>If Yes: An engineer will advise as to the necessary steps to repair the affected structure.</small>				
5.5 Are there any affected laminated beams, or other composite members in the structure?	x			
<small>LVL lintel above sliding glass door to patio. We recommend structural engineer look at the LVL in one or two townhouses in the development and advise whether all the LVLs are ok (see summary of recommendations) - since all townhouses have the same lintel and were inundated for the same amount of time</small>				
5.6 Are all flooring members adequately seated and bared? Including sub-structure?	x			
<small>If No: An engineer will advise as to the necessary steps to secure floor framing</small>				
5.7 Did water inundate areas of steel posts?		x		
<small>If Yes: Posts may have filled with water from holes in the top. If necessary drill a very small hole at base of the post to allow water to escape.</small>				
5.8 Did water inundate areas of steel framing?			x	
<small>If Yes: Make sure that all steel is clean and dry from water and silt.</small>				
5.9 Are there any structural brick walls affected?	x			
<small>If Yes: Brick cavities and cores may have filled with water. If possible check if water has flowed into cavities through gaps in the top or vents in the side. Take note to advise future builder and engineer.</small>				

JAMES DAVIDSON ARCHITECT

14.0 OVERALL EVALUATION AND SUMMARY

14.1 Visual opinion of extent of structural damage: Scale 1 (low damage) to 10 (high) **1**

14.2 Visual opinion of extent of superficial damage: Scale 1 (low damage) to 10 (high) **8**

14.3 Extent of works required: ☐ Major (Items 3,4,5,9,12) ☒ Minor (Items 5,6,7,8,10,11,13)

14.4 Recommended further advisors:

<input checked="" type="checkbox"/> Structural Engineer	<input type="checkbox"/> Archcentre Inspector	<input checked="" type="checkbox"/> Pest Inspector
<input checked="" type="checkbox"/> Lic. Plumber	<input type="checkbox"/> Town Planner	<input type="checkbox"/> Asbestos Inspec.
<input checked="" type="checkbox"/> Lic. Electrician	<input type="checkbox"/> Building Certifier	

NOTES: Do not need a structural engineer to inspect every townhouse - all residents could contribute to get an inspection of one each townhouse type (middle, end/2bed, 3bed). See summary of recommendations, p 10

14.5 Future Direction:

Recommended items to be removed: see Summary of Recommendations

Recommended items to be cleaned: see Summary of Recommendations

Additional services required: Plumber, Electrician, Termite Control (see summary of recommendations)

Items which can be replaced now. Eg. Tiles, internal doors, cabinets:

Items to be replaced after further approvals. Eg. Lights, switches, internal wall lining:

NOTE: If a Structural Engineer's advice is required, no further action should be taken until the engineer's assessment has been made.

15.0 STATUS

	Y	N	N/A	?
15.1 Is the power back on?		x		
15.2 Is water connected?	x			
15.3 Is gas connected?		x		
15.4 Is the sewer connection functioning?	x			
15.5 Is the stormwater system functioning?		x		
15.6 Have occupants returned to house?		x		
15.7 Extent of re-occupation (eg. upper level only):				

17.0 CERTIFICATION

Wayne McIntosh

Mark Jones

Date: 26/02/11

Date: 26/02/11

DISCLAIMER

Emergency Architects are providing advice to individuals affected by the recent floods in Queensland. Emergency Architects are delighted to provide this service without charge as part of their "not for profit" mission.

Emergency Architects will give advice on the choices available to those individuals for rebuilding on their properties. This advice will be on a preliminary basis only and will be intended to enable the affected individuals to identify options available to them that may be worth exploring in greater detail.

Any options identified by Emergency Architects will need to be tested later against other specialist advice, including for example, advice from soil and drainage engineers. The preliminary advice will also need to be reviewed and developed into formal plans by design and project architects selected for the purpose once a preferred option is identified.



Elevational Photo Units 5,6 (6 on right)
GPS marker: 149
Coordinates: S 27° 36' 45.5"
E 152° 54' 02.4"
Water level went to 3.6m from ffl



Recommend removal of all eaves soffits for cleaning. When these are replaced/re-instated, place some perforated panels/grilles in the eaves to help ventilate the cavity and prevent growth of mould etc.

Photo 3

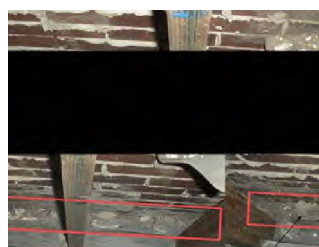


Photo taken from ladder looking down at base of external wall. Recommend cleaning debris out from under and on top of Damp Proof Coursing

JAMES DAVIDSON ARCHITECT



Recommendation: Bracing & Tie-down

Units at 5 Spalding Crescent – Summary of Recommendations:

Note – this section begins with a compiled summary of recommendations relevant to all the townhouses inspected at 5 Spalding Crescent. Notes of additional concerns specific to your unit (if any) are at the end.

Cleaning:

- Give the stripped-out interior a further clean: concentrating especially on the structural members above ceiling level. Use a cloth with water and some kind of disinfectant (e.g. chlorine)
- Treat with a mouldicide product afterwards.
- Clean out under and on top of the edge of the damp-proof coursing at the bottom of the exterior walls (see photo on page 8).

Additional (Optional) Suggestion:

- Remove soffits at eaves and clean out.

Structural:

- All home-owners in complex could get together and seek an engineer to inspect one of each type of townhouse (end, middle) for the same 3 issues: 1) checking the LVL lintel above the sliding glass door onto the back patio; 2) all bracing ply and tie-downs (or lack of); 3) any cracks in the concrete blockwork party walls between units.
- All bracing ply to be replaced (unless otherwise stated by engineer). Remove existing ply where possible and clean behind.

Potential Option for Replacement: fix metal straps with triple grips to the top and bottom of studs around doors and windows; AND fix new bracing ply sheets to studs on the interior face of stud wall where the existing bracing ply sits (see photo on page 9). Removal of existing ply sheets before doing so optional: preferable as it allows cleaning out of any muck behind. Consult engineer also.

Roof:

- On visual inspection from the ground, roof seems to be in a reasonable condition.
- Roof structure seems to be intact and has not shifted which is positive.
- Clear all gutters of mud and debris.
- Fix/replace all damaged downpipes. Reseal downpipes at the top where they meet the gutter.
- Replace roof insulation: Install batt insulation above ceiling. Run Sarking (foil lined waterproofing membrane) between trusses and drain to eaves where possible.
- Have roof inspected by licenced roofing contractor. Replace broken tiles/repoint where necessary

Additional (Optional) Suggestion:

In the cleaning section, we have recommended the removal of all eaves soffits for cleaning. When these are replaced/re-instated, place some perforated panels/grilles in the eaves to help ventilate the cavity and prevent growth of mould etc. Also, replacing some of the bricks in the external walls (non-structural) with air bricks will assist in ventilating the wall cavity. This will help prevent growth of mould etc in the cavity and help in preventing odours produced by any mud in the cavity.

Party wall (structural concrete block wall between units):

- Have any cracks in this wall checked by a structural engineer
- Party walls should be fireproof, but currently are not. Seal any penetrations in the wall (i.e. hole where a power socket to both units either side of the wall existed). One option is to fill the penetrations with a fire-retardant, expanding foam product. Another option, if the power points are to be kept, is to seek advice from a licenced electrician.
- Where it had been inundated by water, replace the layer of fire-insulation ('Firestop' or a similar product) located where the party wall meets the roof

JAMES DAVIDSON ARCHITECT

Date of Visit: 04/03/2011 (Day/Month/Year)

EAA Building Assessment 2011 Job No. 0093

Building address:

No. 80.....Pegg Road.....

Suburb.....Rocklea.....State.....QLD.....Post Code.....4106.....

	Y	N	N/A	Notes
Check details of house construction as noted in architects inspection form. <i>Attach to this checklist.</i>	X			
Before entering property, check that power is off, or property has been signed off as safe by qualified electrician.	X			
Before entering property, check whether property has been determined to be asbestos-free. <i>If not, proceed only in accordance with Arup SWMS if certain that any asbestos is bound and undisturbed.</i>	X			Potential Asbestos observed along the eaves lining at the rear of the property
Before entering property, ensure that appropriate clothing and PPE worn e.g. boots, gloves, eyewear, hardhat, protective clothing, amscreen	X			
Record the extent to which structure is visible and accessible House has been largely cleaned. Only the main interior wall sheeting has been stripped. Kitchen carpentry still remains and is not in a state to be reused.				
<u>View each elevation of the house.</u> Is there any perceptible out of plumb or square in any posts, walls or door or window openings?	X			
Is there any visible cracking or opening up of joints? Is there any perceptible bulging of walls?	X			Horizontal cracking observed on the exterior brick wall on the front face of the residence.
If so, look for evidence to try to determine if misalignment is due to flood affects (recent subsidence, scour or lateral water loading) Notes: Leveling of the house with additional timber packers suggests that the property has had previous history with settlement issues. Increased water content to the soil beneath the property could have caused increased subsidence to the foundations of the brick work wall resulting in the cracks observed on the brick work. <u>View inside house</u>				
Are there any out of plumb or square posts, walls, doors or window openings?	X			
Are there any significant out of level floors?	X			The brick work flooring to the south western side of the property appears to have subsided.

Is there any visible cracking or opening up of joints?	X			Vertical and horizontal cracks are observed in the south and north western corners of the brick flooring area. To the rear of the property, owner has recently put in a new extension to the property. The connection detail between the timber bearings and the fascia of the main property is not good practice and should be rectified.
If found try to determine source – deflection of floor or roof beams, timber decay, <u>foundation movement</u> etc.				
Notes: The source of brick work cracking and floor subsidence is likely to be as a result of foundation movement beneath the brick work due to increase settlement in the soil from the floods. The reason why defects are observed only within the western section of the property is because the brick work only provides a support base to the western section of the property, which is separate to the support base to the rest of the property. The rest of the property is predominantly supported by adjustable steel stumps and any settlement issues can be counteracted by adjusting the steel level to suit.	X			
Look for wall bracing (ply, hardboard or diagonal braces) Are there any signs of racking or damage?				
Notes: Ply appears to be in good condition.....	X			
<u>View outside house</u> Are there any signs of damage or misalignment of foundations stumps, post bases, floor slabs?	X			Brick work has evidently subsided in the south western corner of the property.
Are there any signs of damage or misalignment of foundations for the external stairs?	X			
Look for the downs Is there any presence of water pressure lifting house off foundations or laterally displacing house relative to foundation location?	X			
What is the condition of the tie downs?				Ok
For masonry walls, are there any cracks apparent? <ul style="list-style-type: none">Crack widths?Retaining WallCaused by brick or growth/foundation movement?	X			0.5mm cracks observed in brick work.

JAMES DAVIDSON ARCHITECT

EAA Structural
Assessment ChecklistEAA Structural
Assessment Checklist

	Y	N	N/A	Notes
<u>View the upper level of the house (if applicable)</u>			X	
Try to ascertain flooring type			X	
In the case of suspended timber floors. If flooring is not solid timber, is there any evidence of water damage of particleboard, ply etc.			X	
If visible and safely accessible, view floor framing and confirm whether there are any signs of damage, <u>deflections</u> and tie down			X	
Note down any and all observations likely to have any structural significance, with photographs where required				
Notes: Subsidence in the brick work towards the South western corner of residence resulting in cracking of the brick work wall.				
Are there any signs of corrosion caused by flood?		X		
Where any signs of structural movement or distress or inadequacy are observed or suspected that cannot be reliably diagnosed and understood (and for which any required rectification can be readily described), recommend further structural engineering inspection/checking.				
Notes: There are no immediate concerns structurally with the property in the temporary case, however we recommend that the crack widths of the brick work be monitored over time and if want to be dealt with in the short term, the brickwork bed joints could be filled with a flexible filler to allow for future movement.				
The owner has stated that they are looking to potentially raise and extend this property above the flood level. The structural issues nominated within this assessment could be rectified during the raising process by replacing the brick work flooring and foundations of the western section.				
Should the owner consider improving the ground conditions to counter the settlement issues of the property further advice could be obtained from a geologists or an assessment by a certified hydrologist of the water flow through the property.				
Inspected by Dylan Smith Associate Evan Lo Engineer Date: 11/3/2011.....				

Disclaimer:

This checklist has been created as part of the Emergency Architects Australia (EAA) flood assessment work and is the copyright property of Arup Pty Ltd. Advice applied by Arup is provided to EAA for the sole purpose of providing an engineering assessment and is not to be used for any other purpose aside from recording the general assessment of the structural integrity of the dwelling, based on what is visible or evident at the time of inspection. This assessment should not be used for any other purpose other than making a judgement regarding future investigation or further assessment required by others.

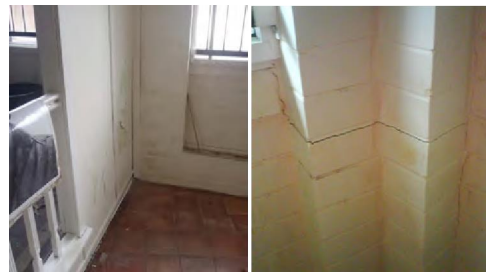


Figure 1: Subsided flooring and cracking on the south western corner of the property

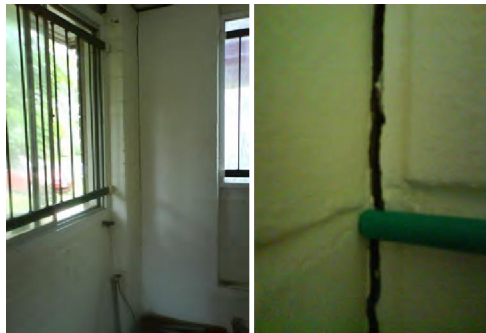
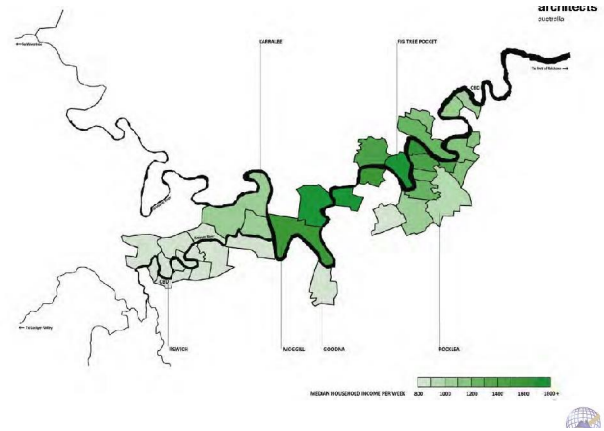
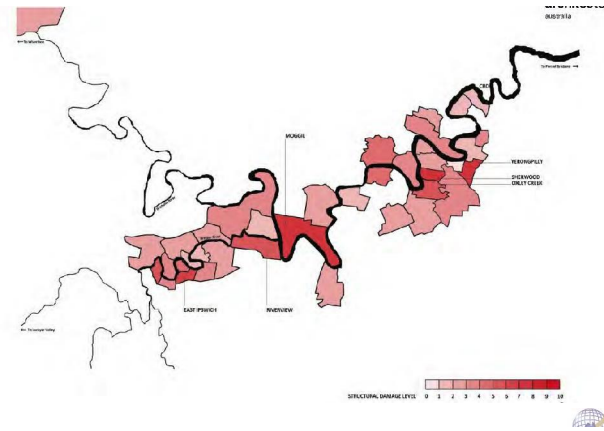
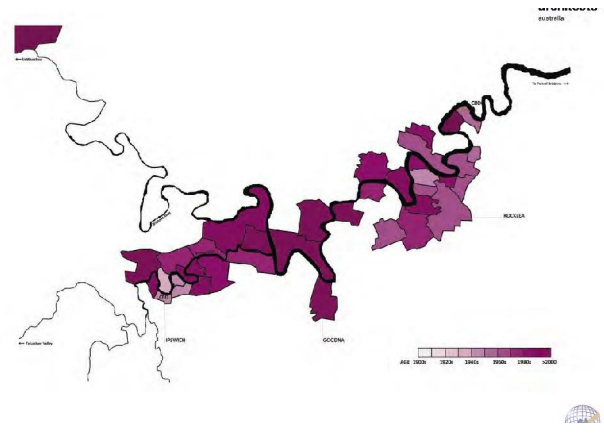
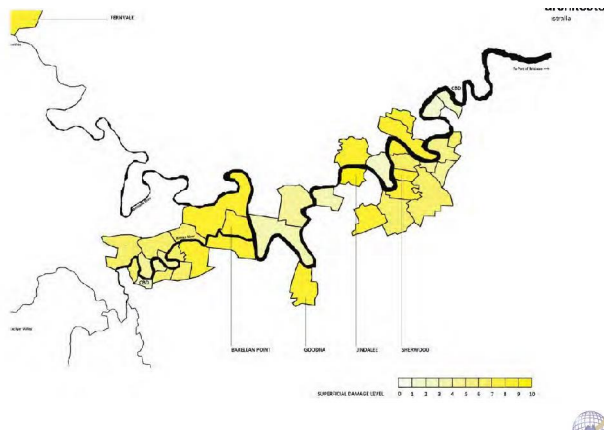


Figure 2: Cracking on the north western corner of the residence.

JAMES DAVIDSON ARCHITECT



JAMES DAVIDSON ARCHITECT



Hmmm... traditions developed here in Queensland versus those which evolved elsewhere.

I know which I prefer...

JAMES DAVIDSON ARCHITECT

Great idea! Let's keep building affordable housing projects on cheap land in flood plains.



Financial insurance for such events should be a right, not a privilege.

JAMES DAVIDSON ARCHITECT



Streetscape? Community? Ideas?

JAMES DAVIDSON ARCHITECT



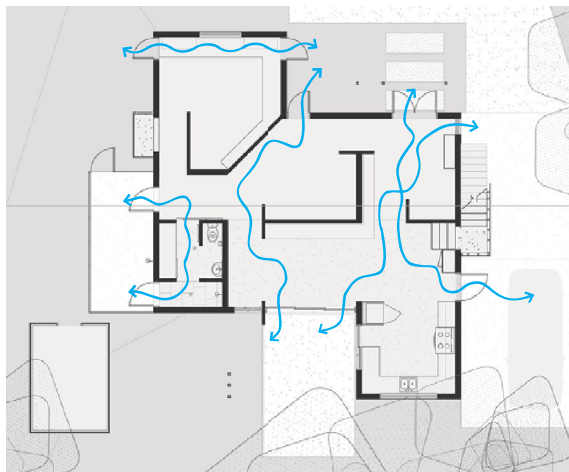
ORIGINAL HOUSE
JDA ©2011



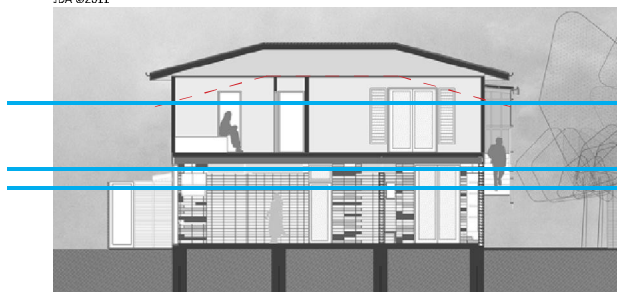
RENOVATED HOUSE
JDA ©2011

Reactionary planning exacerbates the personal and financial burden already faced by disaster-affected home-owners, while designed resilience assists in mitigating these impacts.

JAMES DAVIDSON ARCHITECT



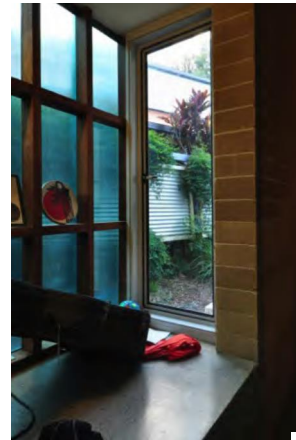
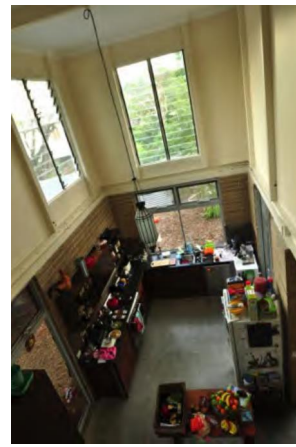
GROUND FLOOR PLAN
JDA ©2011



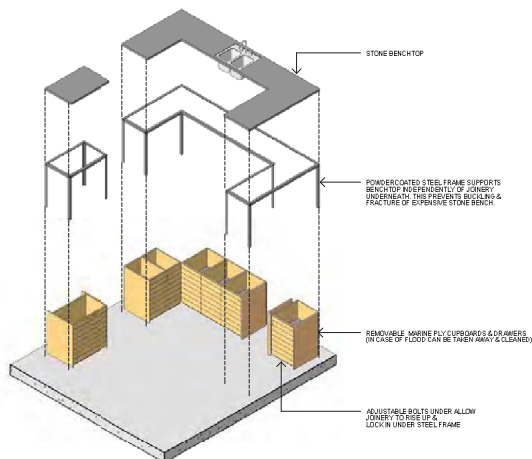
SECTION
JDA ©2011

1893 FLOOD LINE
EXISTING HEIGHT OF BUILDING
1974 FLOOD LINE
2011 FLOOD LINE

JAMES DAVIDSON ARCHITECT



JAMES DAVIDSON ARCHITECT



KITCHEN DETAIL
JDA ©2011



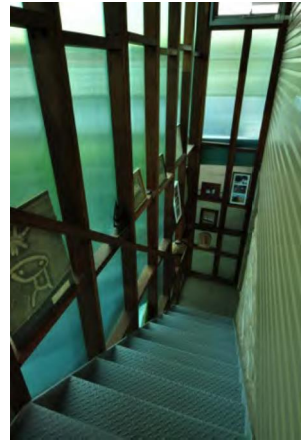
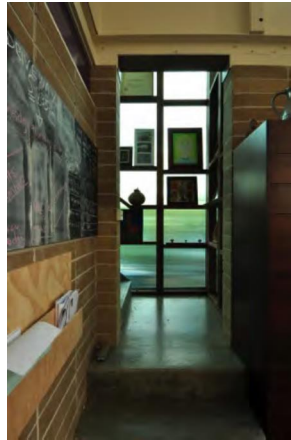
COMPLETED KITCHEN
JDA ©2011

*Designing for resilience should assist in lowering insurance premiums.
The problem will be getting insurance companies to accept this as a logical idea.
I'm not holding my breath...*

JAMES DAVIDSON ARCHITECT



JAMES DAVIDSON ARCHITECT



JAMES DAVIDSON ARCHITECT



SCALE? What scale? Streetscape anyone?

JAMES DAVIDSON ARCHITECT



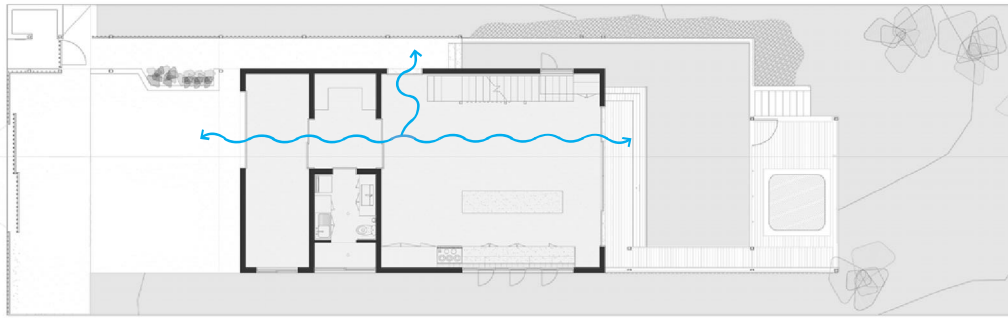
BEFORE RAISE
JDA©2011



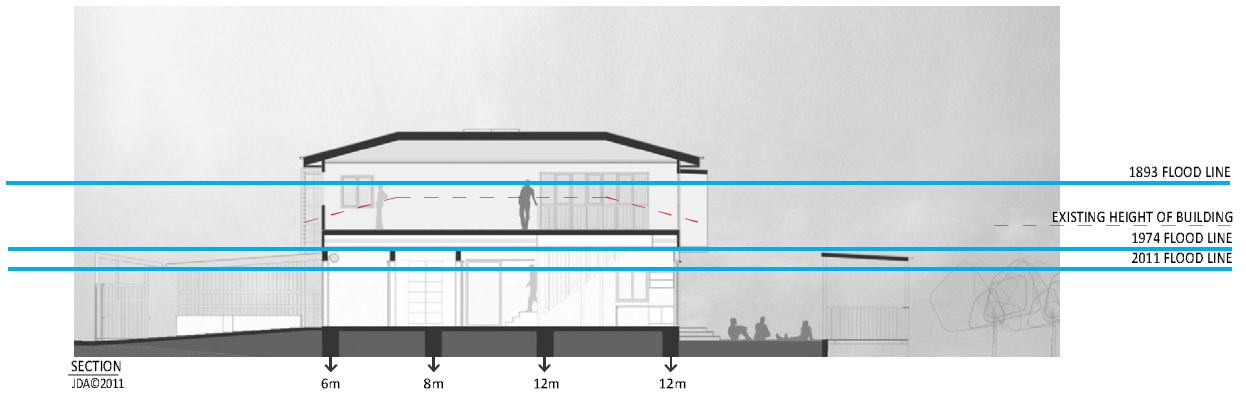
AFTER RAISE
JDA©2011

Knee-jerk reactions by planning authorities in the wake of the 2011 floods imposed restrictive and prohibitive guidelines for post disaster reconstruction and recovery which will have long-term financial consequences on those who can least afford it – the victims of disaster.

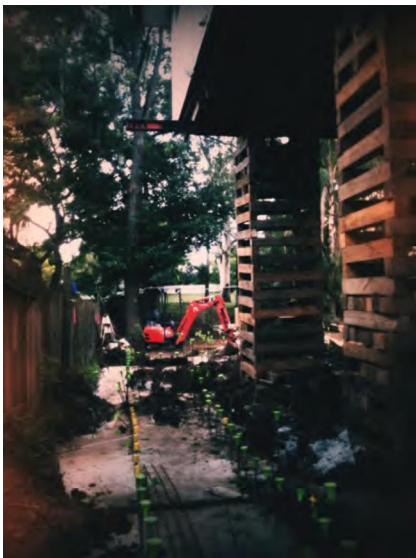
JAMES DAVIDSON ARCHITECT



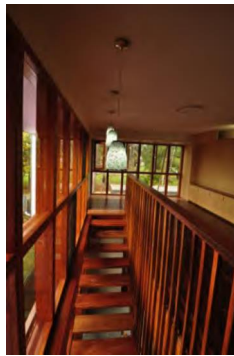
GROUND FLOOR PLAN
JDA@2011



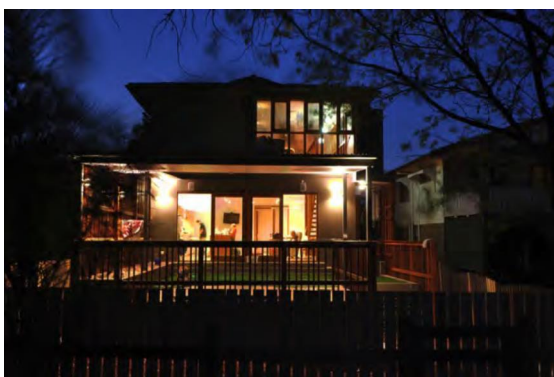
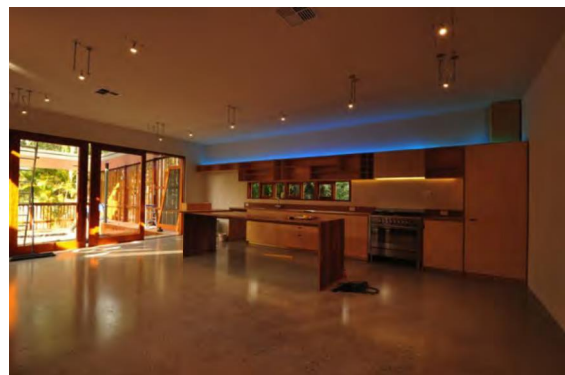
JAMES DAVIDSON ARCHITECT



JAMES DAVIDSON ARCHITECT



JAMES DAVIDSON ARCHITECT



Often the requirements of the TLPs were irrational and resulted in unnecessary additional costs being passed on to homeowners already suffering undue stress; eg. the exuberant raising of existing buildings above arbitrary flood levels.

JAMES DAVIDSON ARCHITECT



BEFORE RAISE
JDA©2011



AFTER RAISE
JDA©2012

The scary thing is we could have legally gone 1 metre higher than we have.

100mm of raise = \$8,000 to \$10,000

JAMES DAVIDSON ARCHITECT



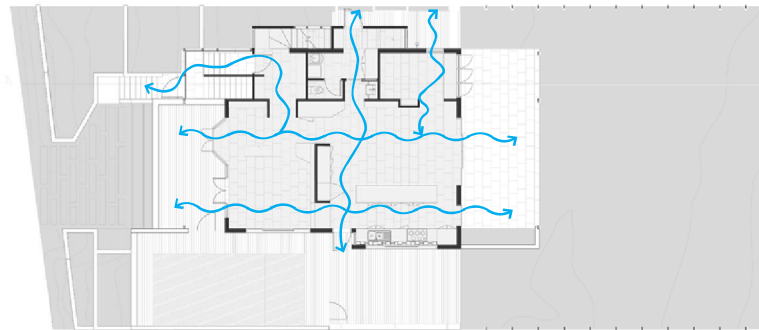
WEST END FLOOD HOUSE

The correct way to do things is to consider each project on it's own merits – flood datum lines are subjective – so mandating one height over another will become meaningless in the next flood event as no two events are the same.

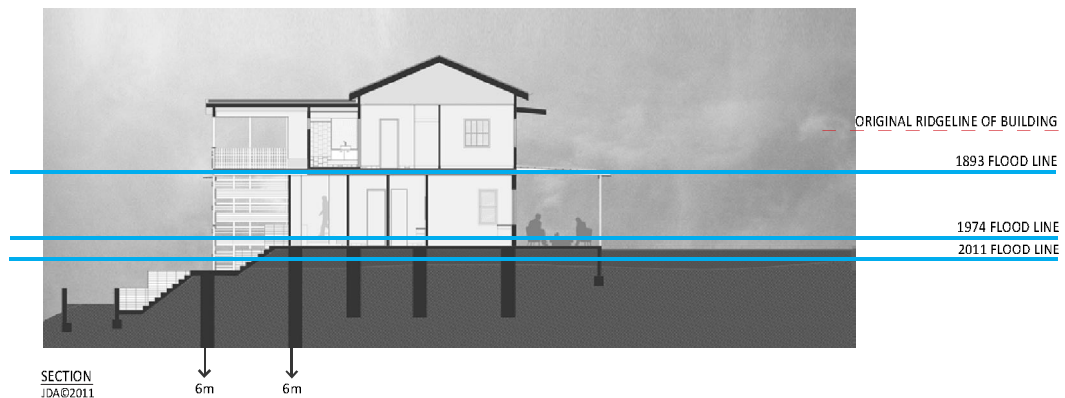
JAMES DAVIDSON ARCHITECT



JAMES DAVIDSON ARCHITECT



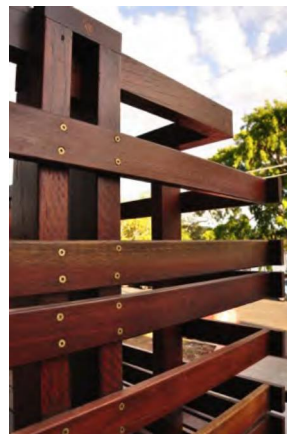
FIRST FLOOR PLAN
JDA©2011



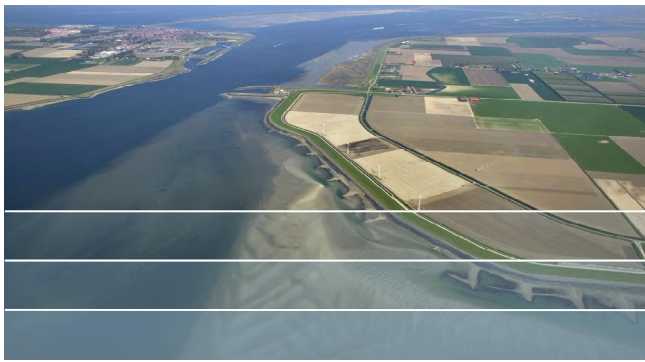
JAMES DAVIDSON ARCHITECT



JAMES DAVIDSON ARCHITECT



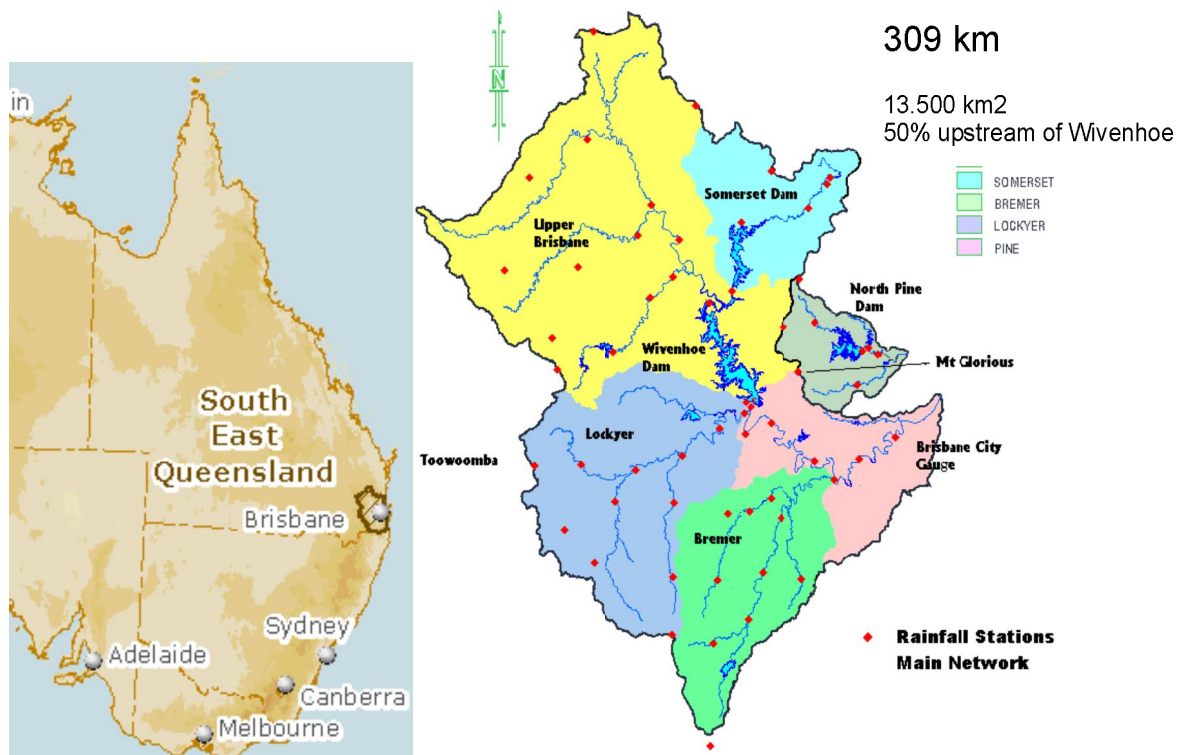
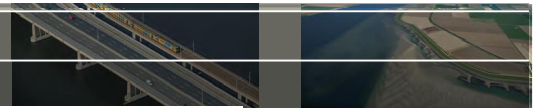
JAMES DAVIDSON ARCHITECT



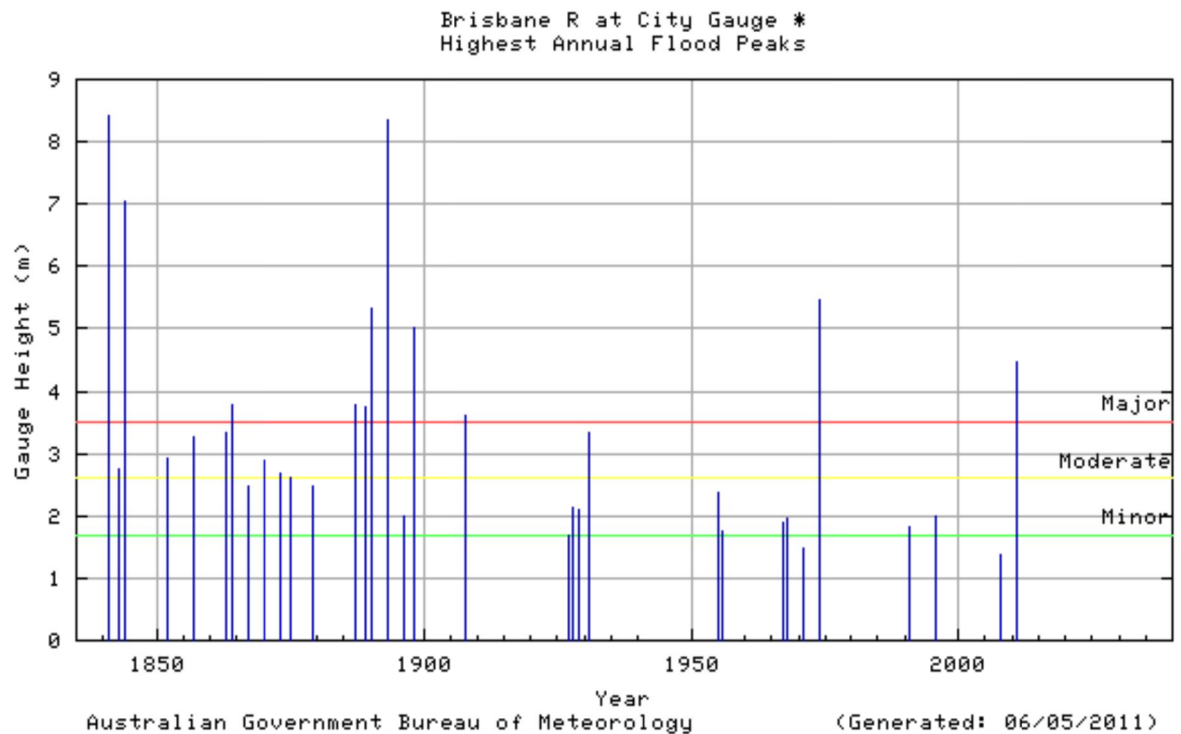
Brisbane River catchment charrette: a brief hydrologic perspective

Ferdinand Diermanse, Deltares

Brisbane river catchment:



Historical Flood Peaks, Brisbane City



Deltares

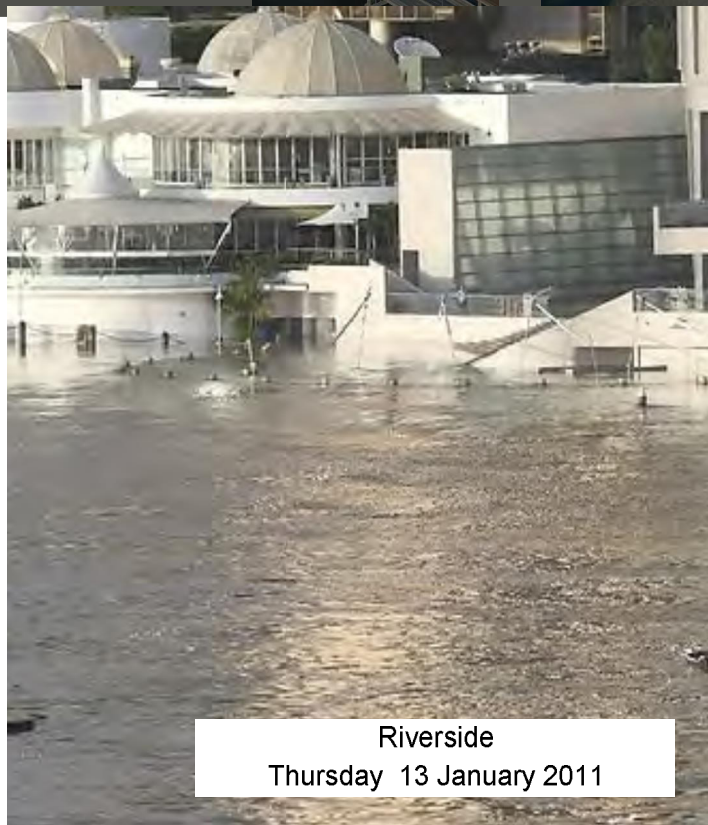
2011 events Brisbane City

Estimated 26,600 houses and 5,000 businesses affected during the flood. (Source BCC)

Estimated 12,500 properties were inundated by flood waters. (Source BCC)

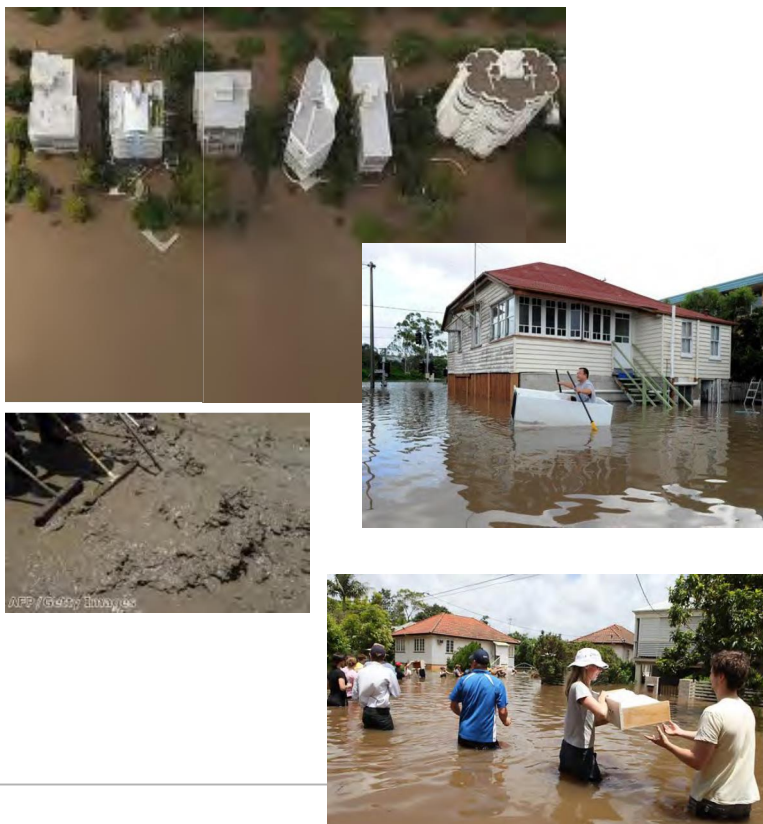
Above major flood level
(3.5m) from 12/01/2011 to
13/01/2011

Remained above minor flood level
(1.7m) from 11/01/2011 to
14/01/2011.



Deltares

Flood Impact – Lower Brisbane area



University of Queensland
13 January 2011

Deltares

Lockyer Valley flash flood

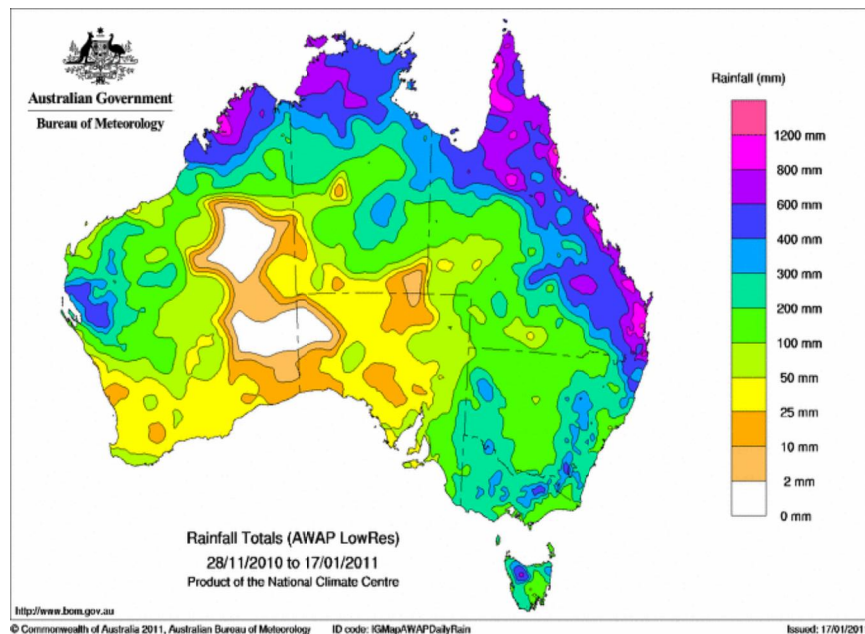


Deltares

Record Rainfall Totals

December 2010 Rainfall
Deciles – Highest on
Record

January 2011 Rainfall
Deciles – Very Much
Above Average

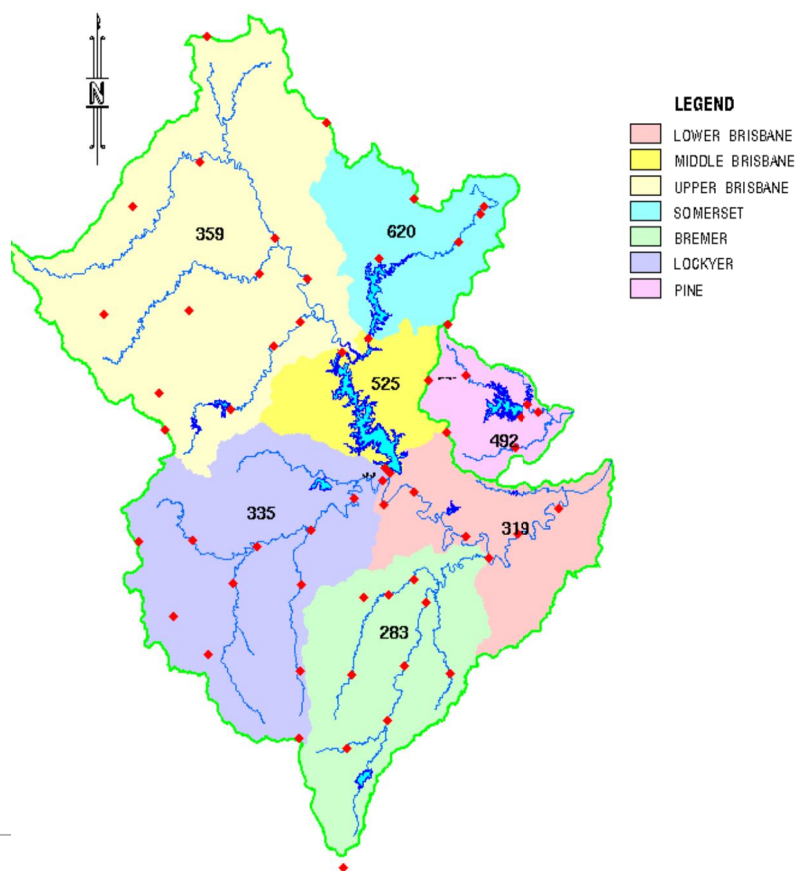


☐ Rainfall 28 November to 17 January

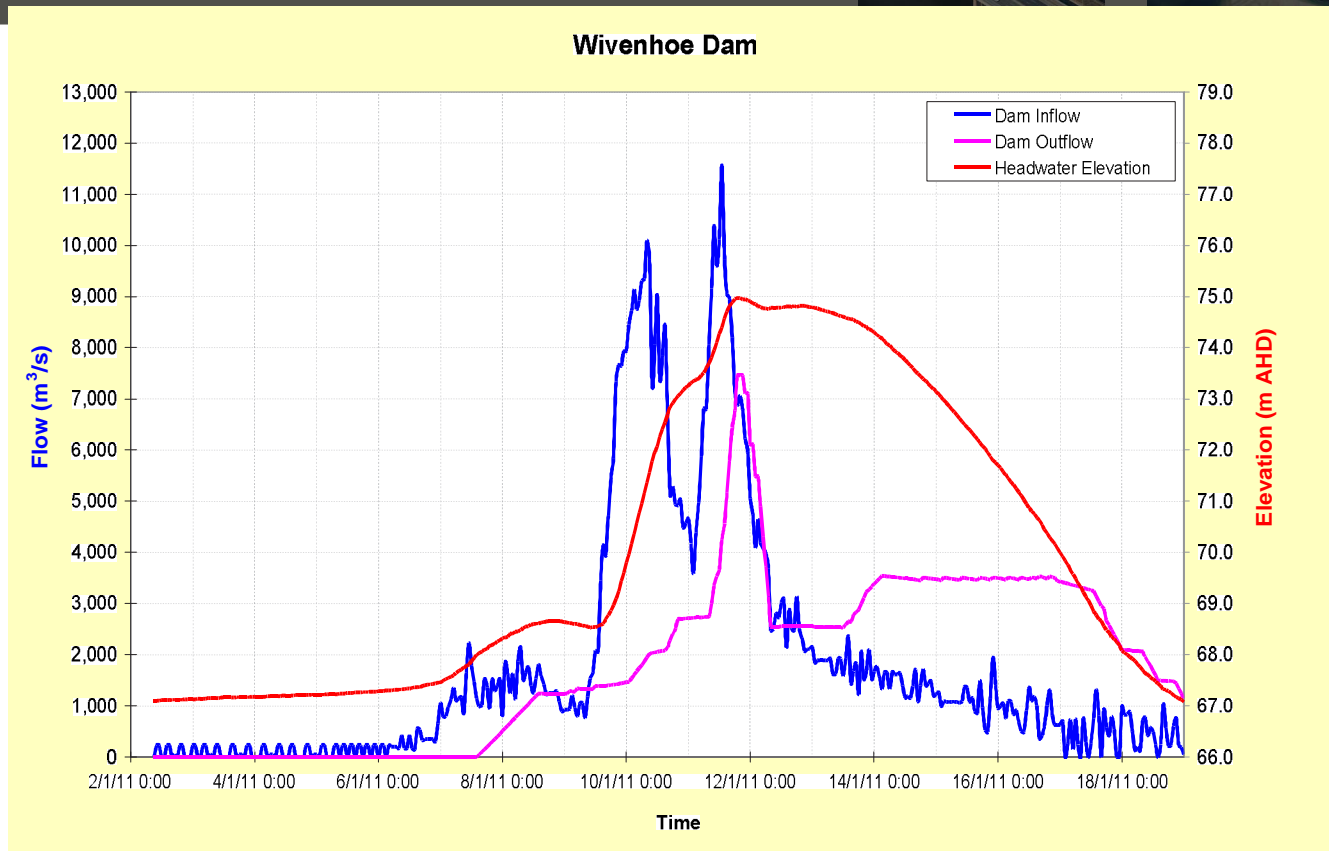
Deltares

Catchment Rainfall Totals – January 2011

6 Day Rainfall Totals
Fri 7 Jan to Thu 13 Jan 2011



Wivenhoe Dam Inflows and Releases



Deltares

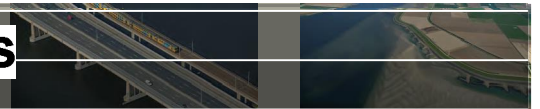
Major spilling was required for dam safety purposes



□ Wivenhoe Dam
□ Wednesday 12 January 2011

Deltares

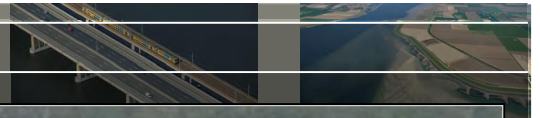
Mitigation effect of Dams



Wivenhoe Dam
Wednesday 12 January 2011

Deltares

Wivenhoe Dam



Deltares

Wivenhoe Dam



Deltares

Wivenhoe Dam



Deltares

Gate Operating Strategies – Wivenhoe Dam

W1 – Minor Flood

Combined flows of Lockyer Ck and Wivenhoe Releases do not submerge bridges prematurely

W2 – Minor/Moderate Flood

Transition Strategy - Depends upon location of rainfall

W3 – Moderate/Major Flood

Optimize the protection of urbanized areas



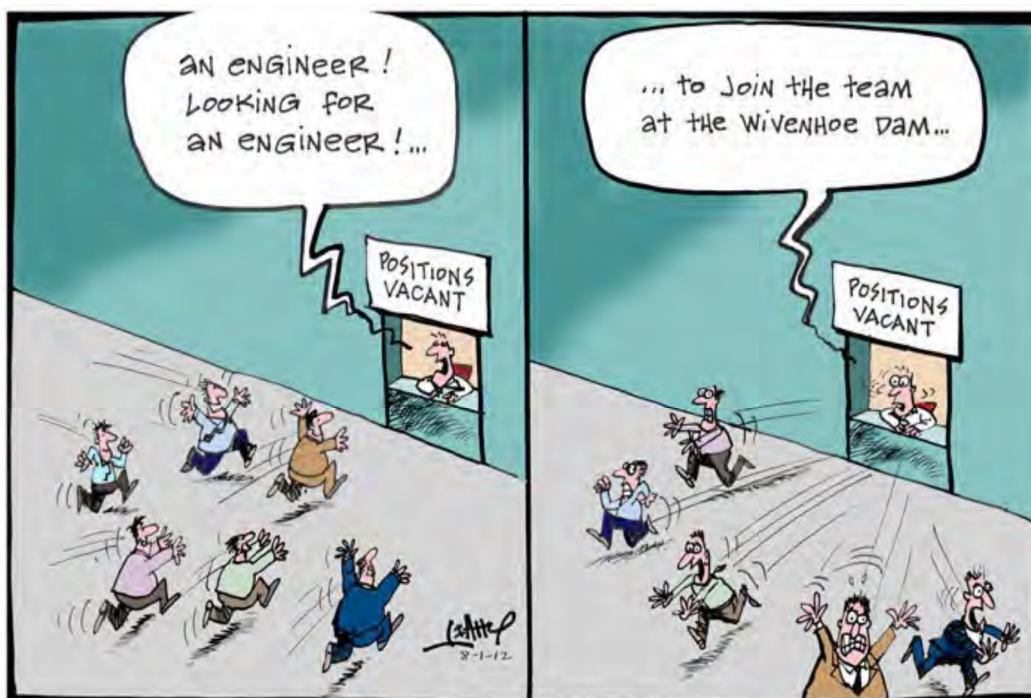
Burtons Bridge February 2001

W4 – Major Flood

Ensure the Structural Safety of the Dams

Deltares

Dam operation was heavily criticised

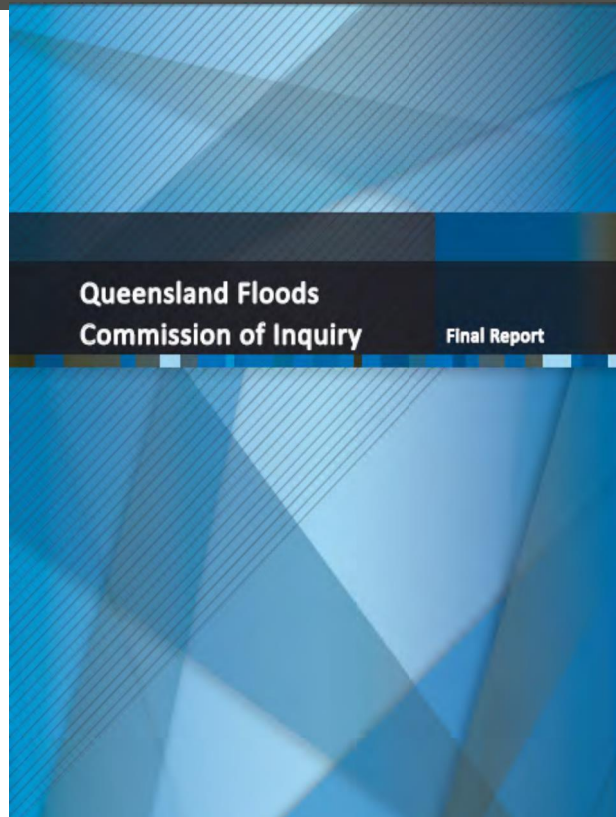


Deltares



Deltares

Flood inquiry



Flood Study
-Hydrology
-Hydraulics

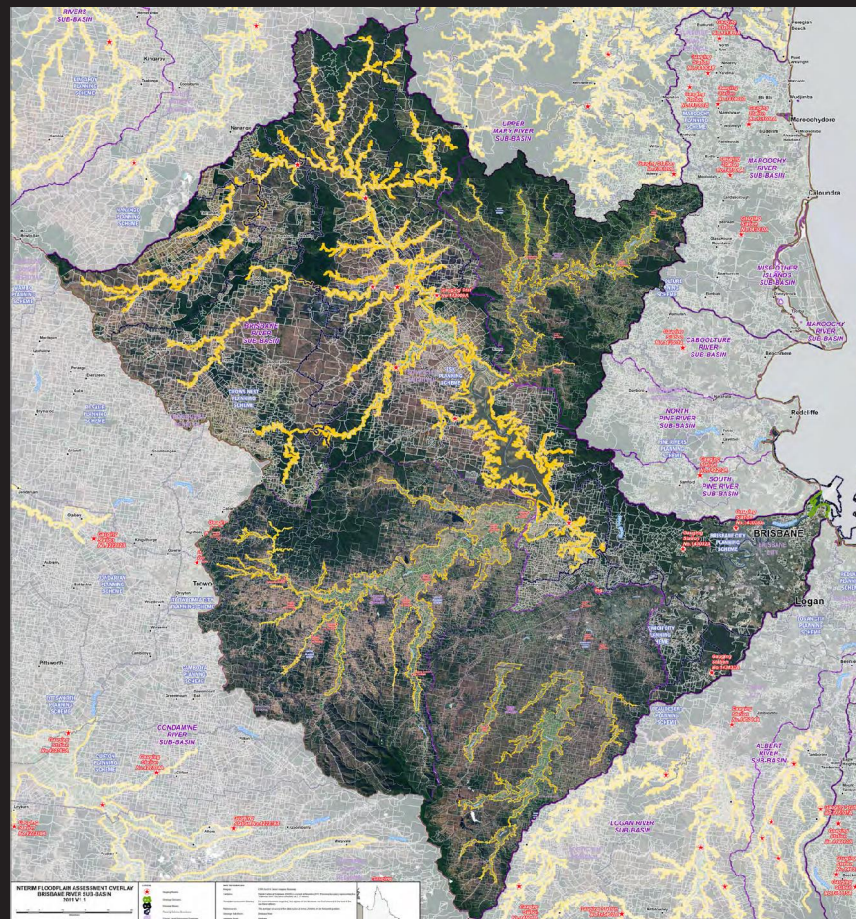
Flood management study

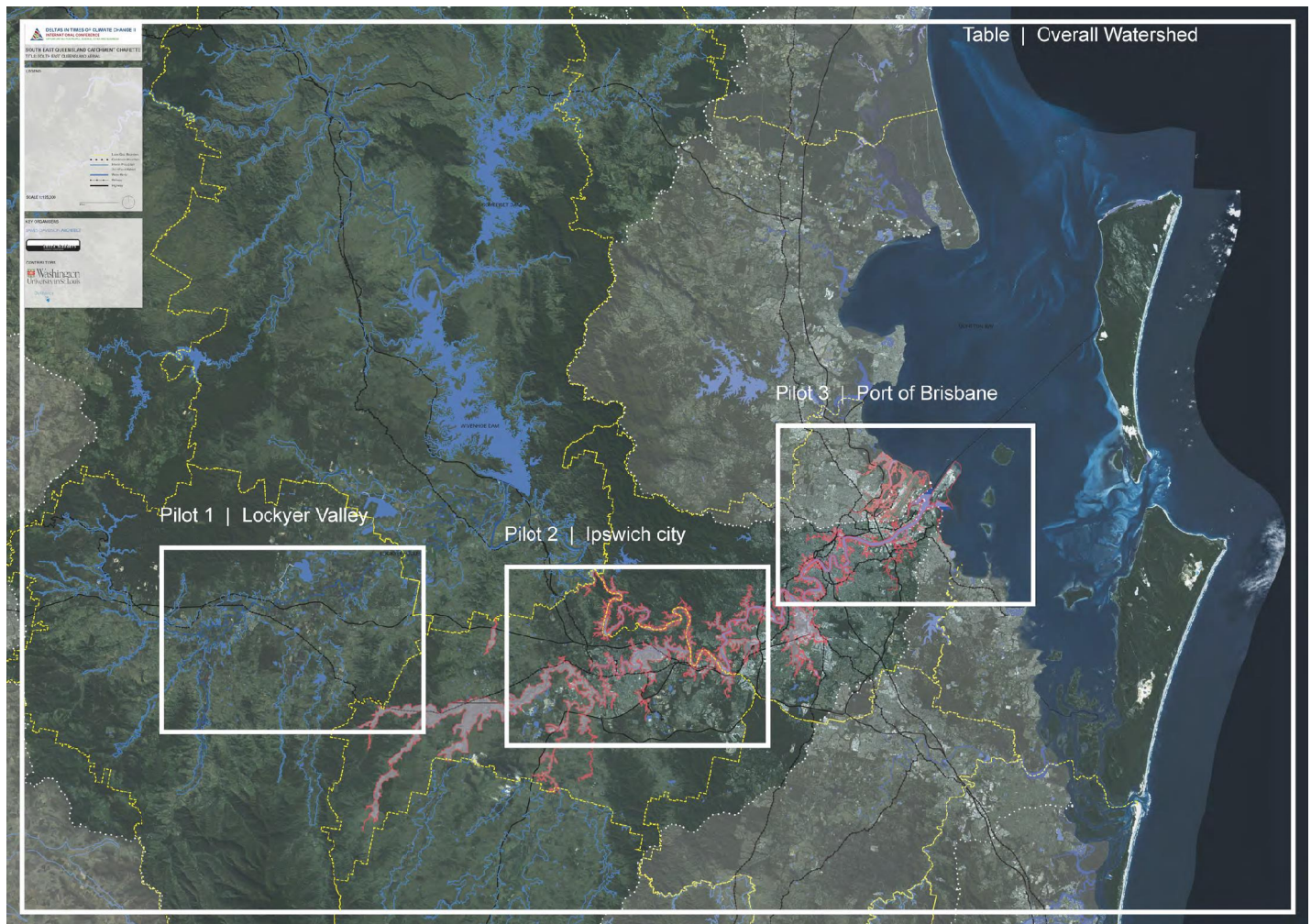
Flood management plan

MISI-ZIIBI

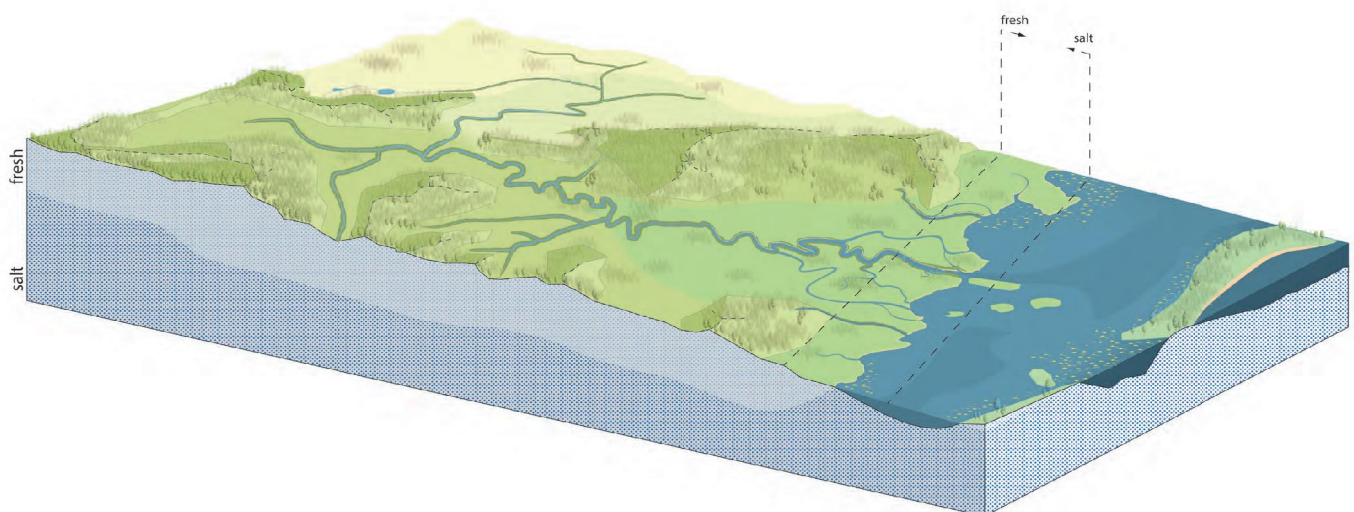
workshop

Total Watershed



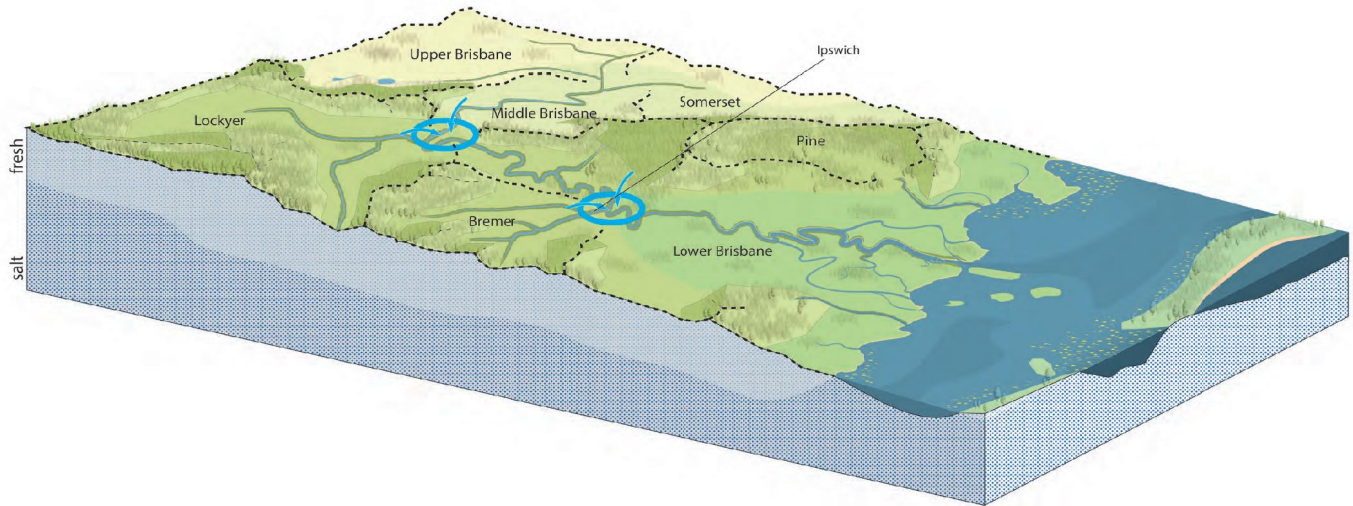


Overview of Brisbane watershed



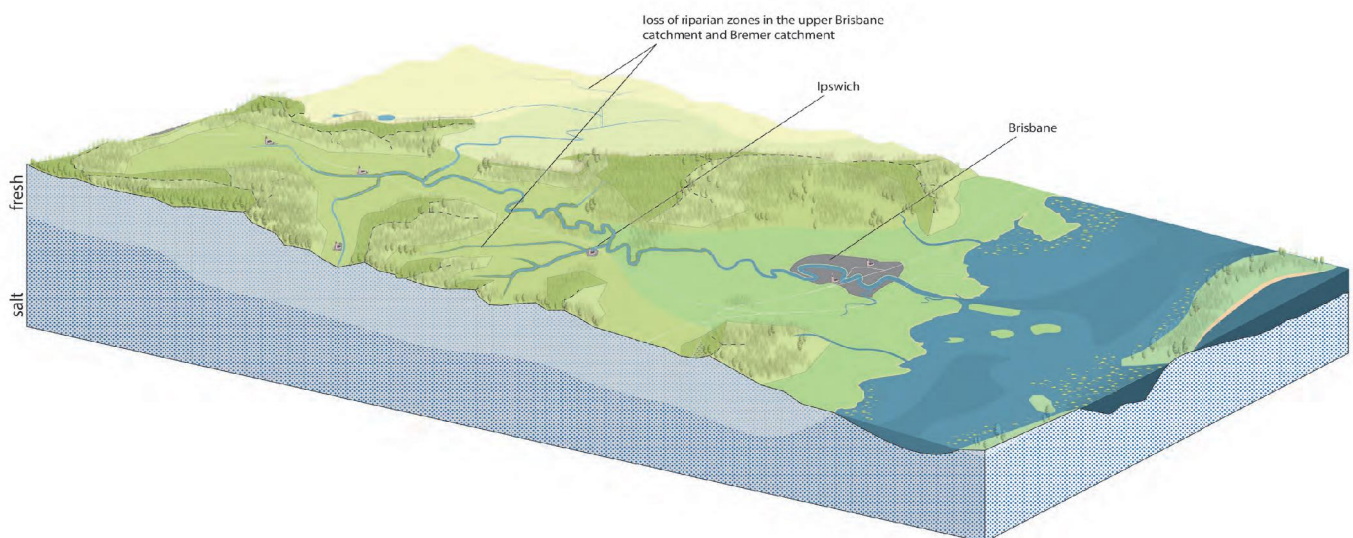
A natural water system with broad floodplains,
which empties into Moreton bay

Overview of Brisbane watershed



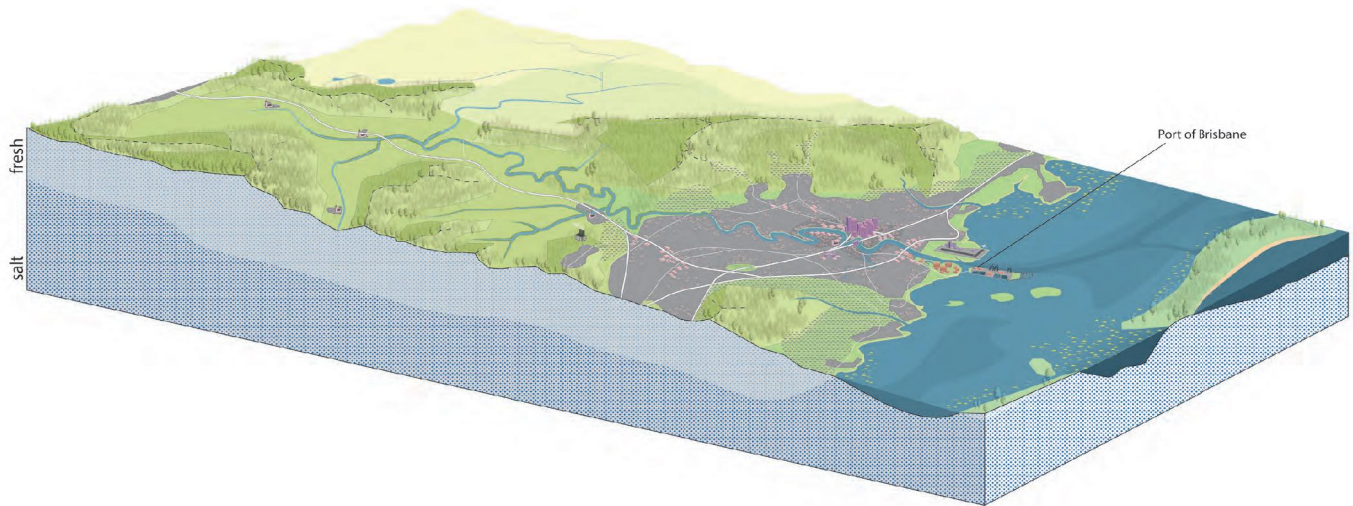
Subcatchments and confluence points

Overview of Brisbane watershed



The water system is analysed
Loss of riparian zones in upper catchments

Overview of Brisbane watershed



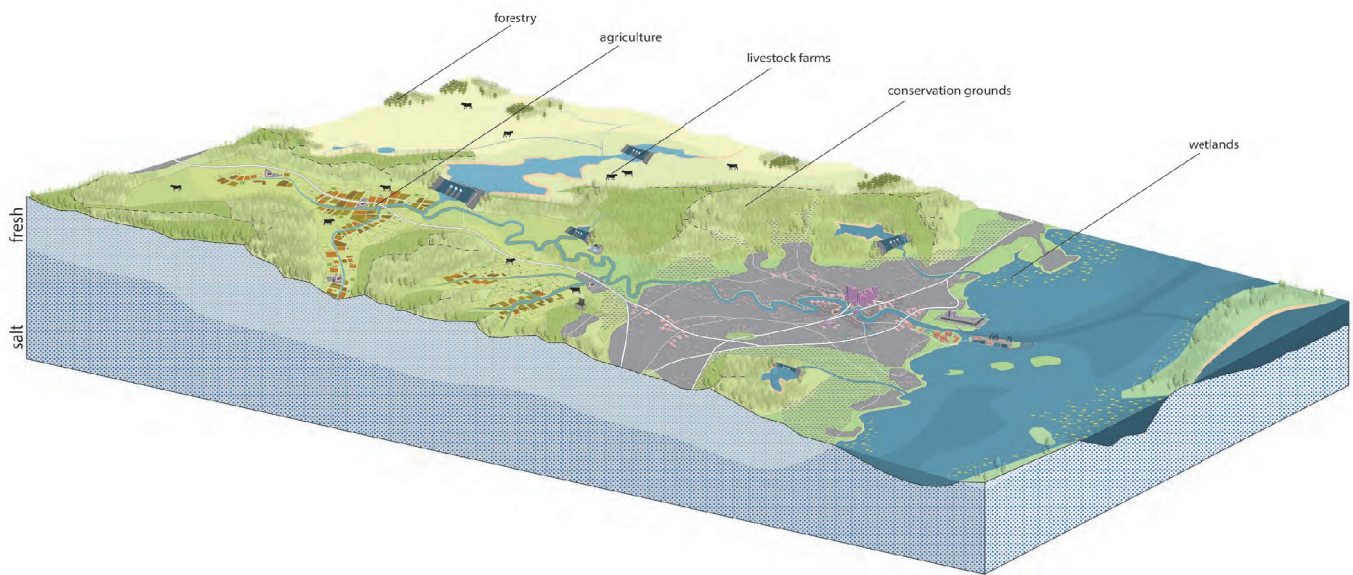
Urban development surrounds the mouth of Brisbane river

Overview of Brisbane watershed



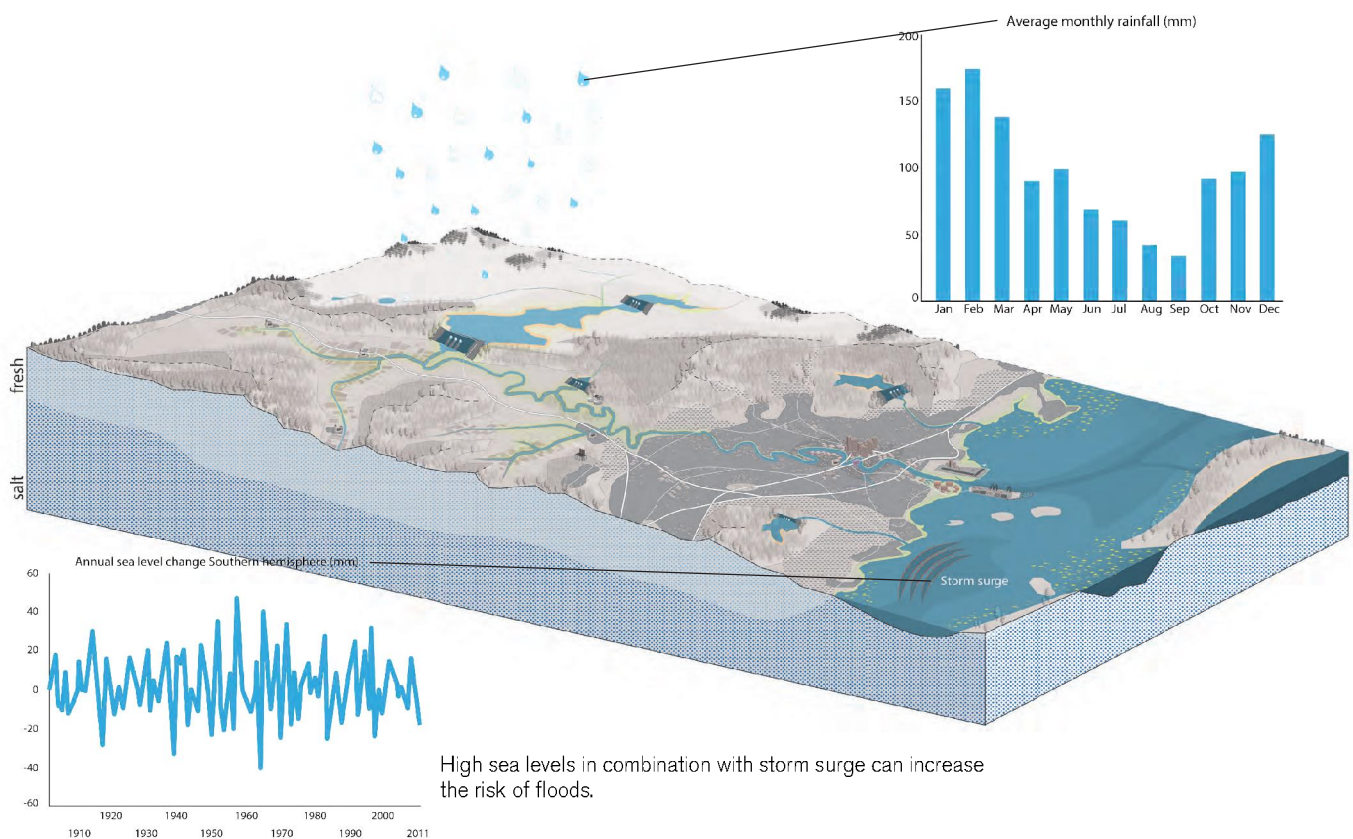
Dams create water reservoirs for the city

Overview of Brisbane watershed

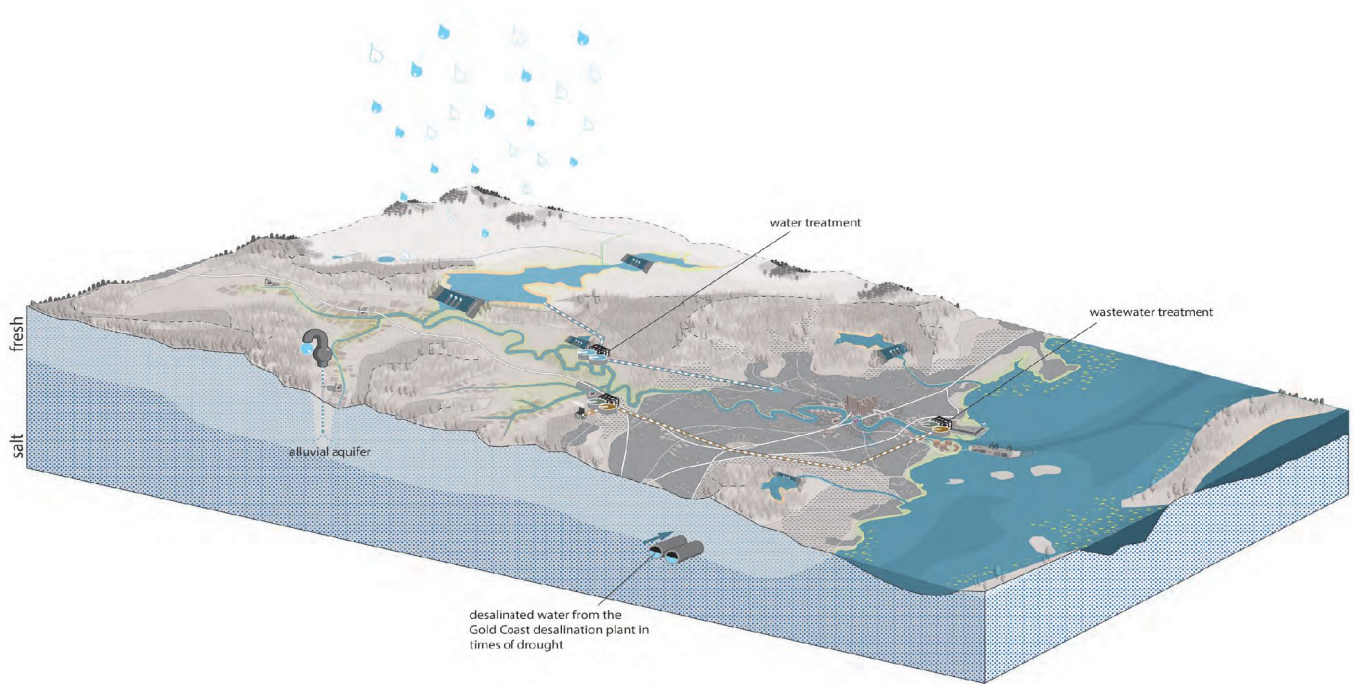


Agriculture is strongly connected to Lockyer River and Bremer River.
Livestock and forestry on dryer grounds of the upper catchments.

Brisbane water system

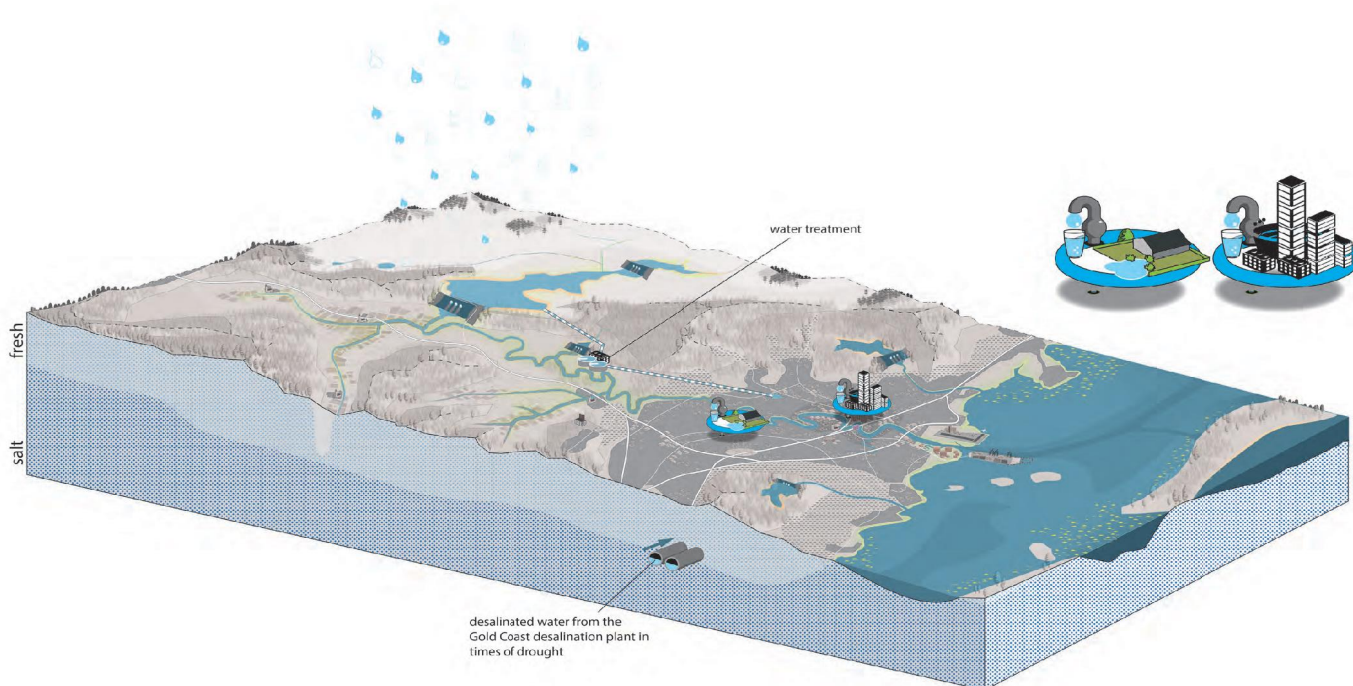


Brisbane water system



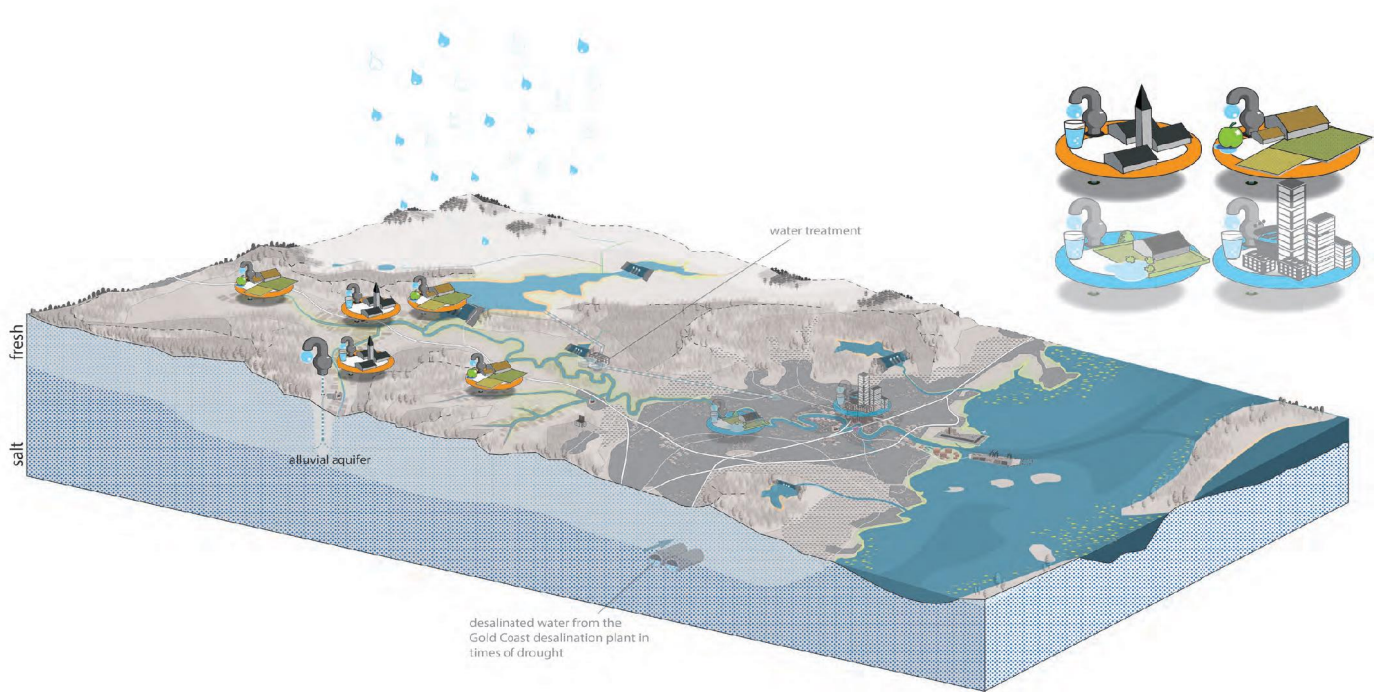
Water production by dammed reservoirs, wastewater treatment and alluvial aquifers
 Desalination plant in Gold Coast is only used in times of drought

Brisbane water system



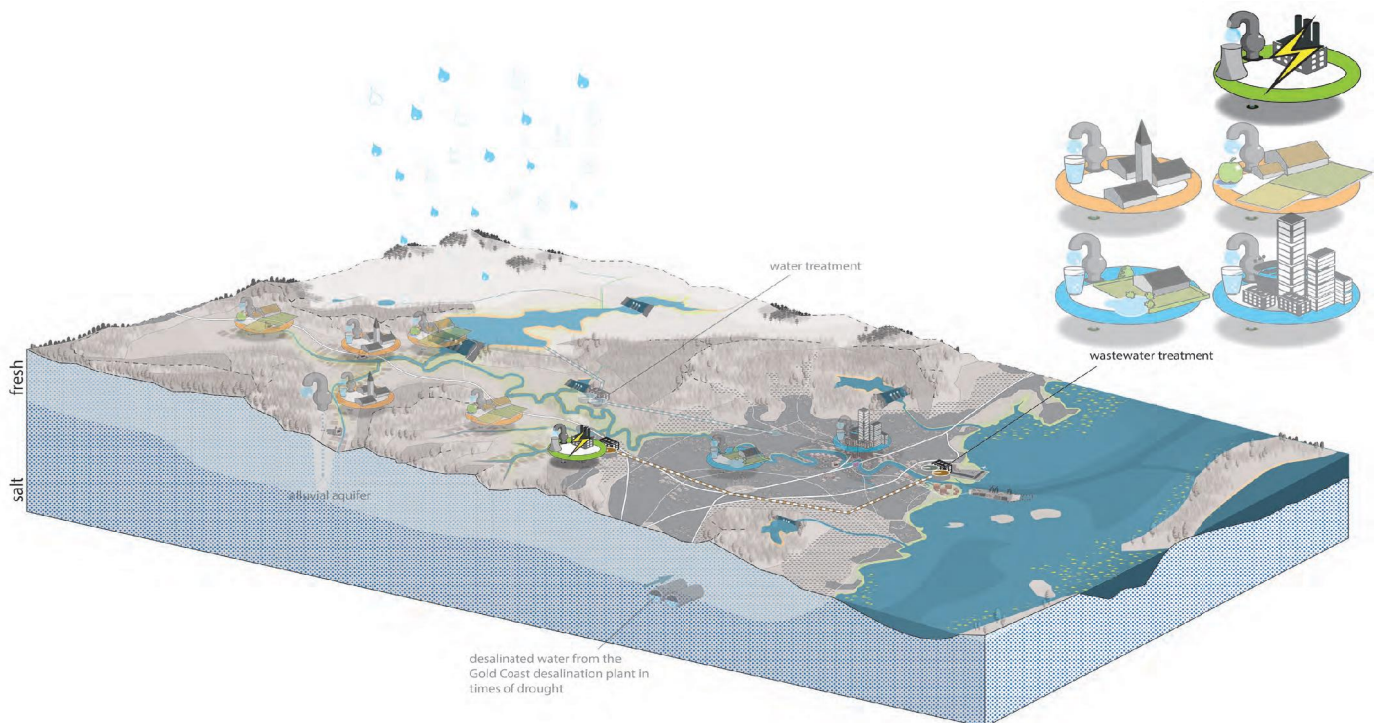
Water for the urban area originates from the water reservoir

Brisbane water system



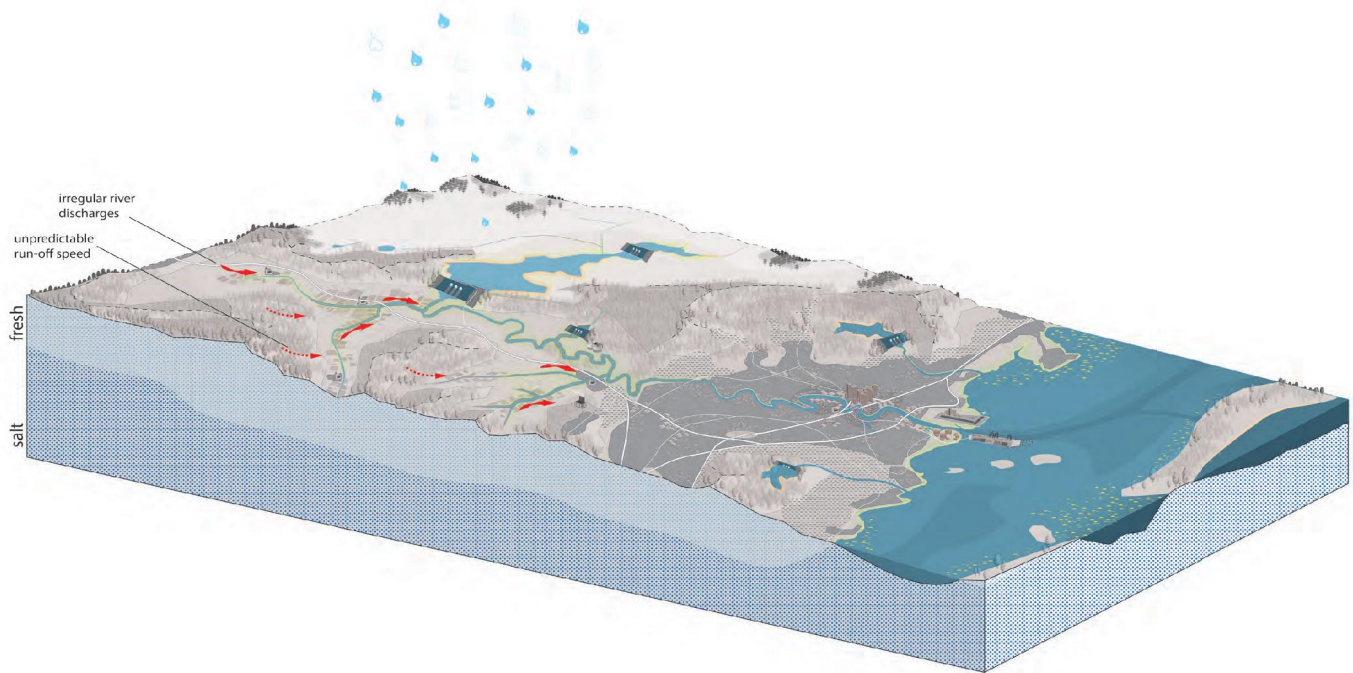
stream in the watershed
villages and farms
make use of alluvial aquifers

Brisbane water system



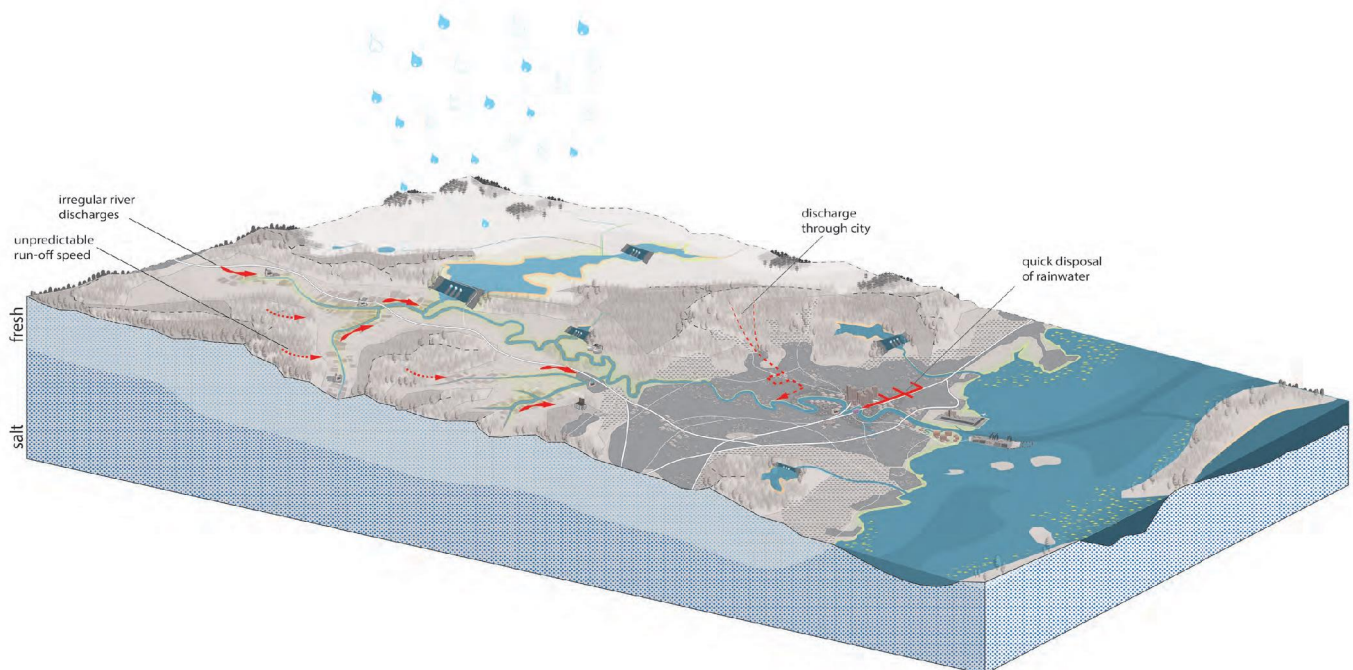
the lower plant makes use of recycled water
from the wastewater treatment plants

Brisbane watershed under threat



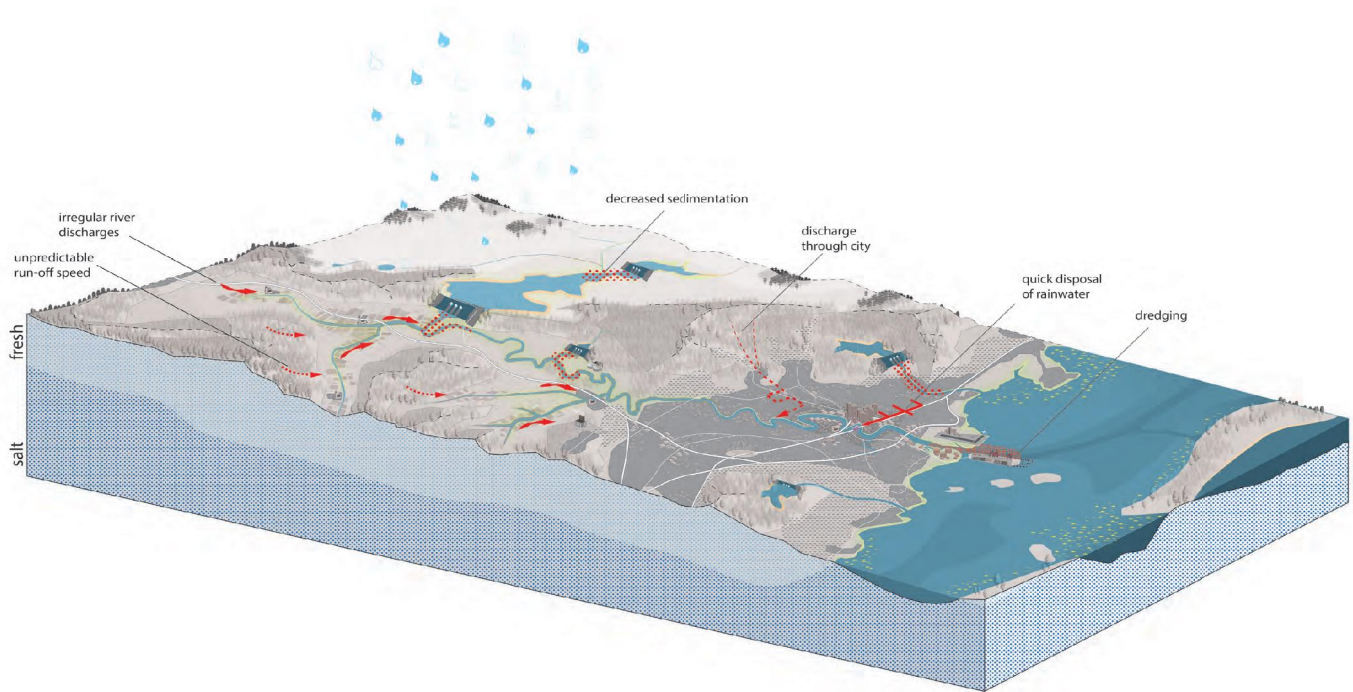
Increased precipitation leads to irregular river discharges
 - The run-off speed and quantity of precipitation seems difficult to predict.

Brisbane watershed under threat



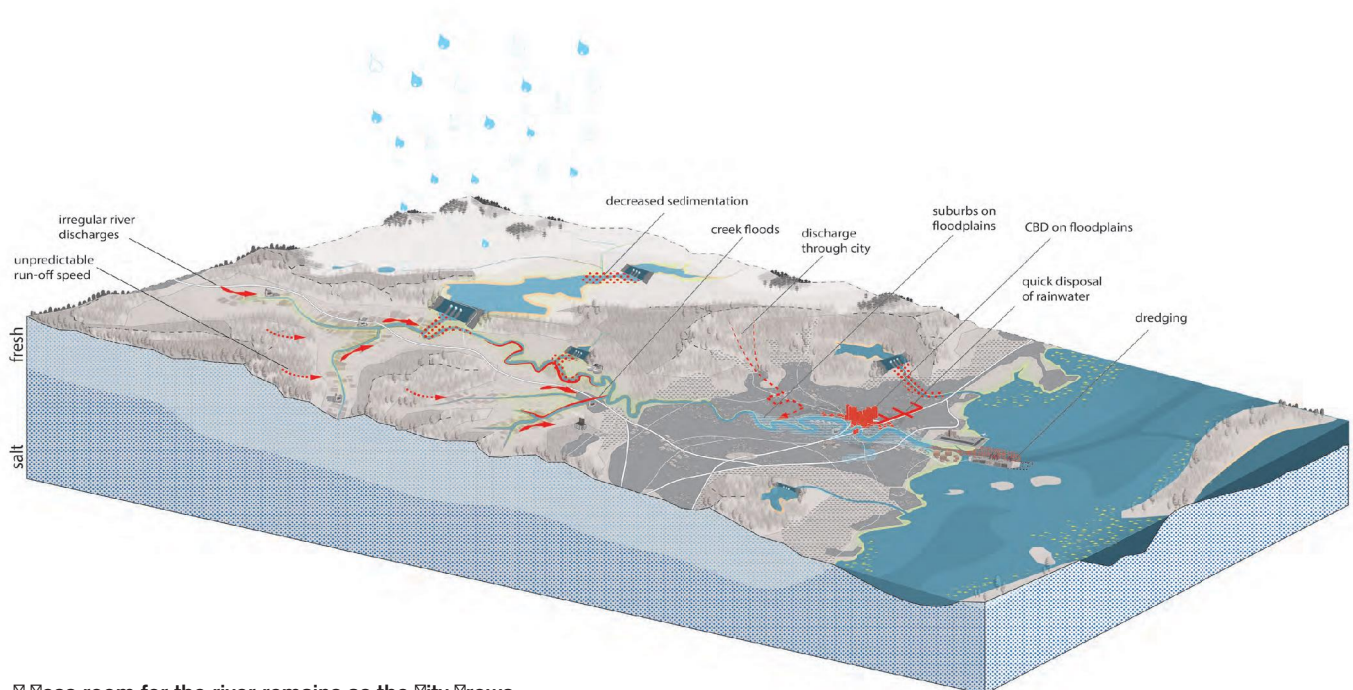
Discharge through the city
 Current design will dispose of rainwater

Brisbane watershed under threat



Decreased sedimentation caused by measures taken upstream in the backyard of the city
 Red in of the harbour area

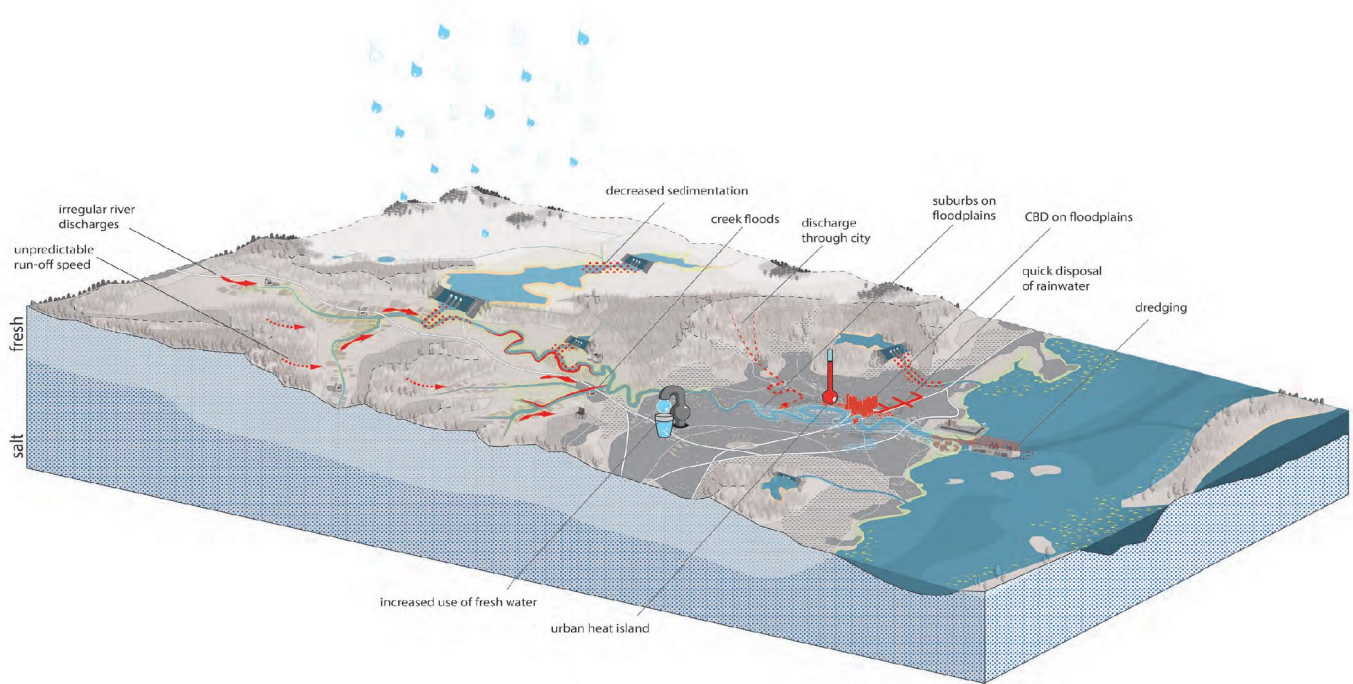
Brisbane watershed under threat



Less room for the river remains as the city grows

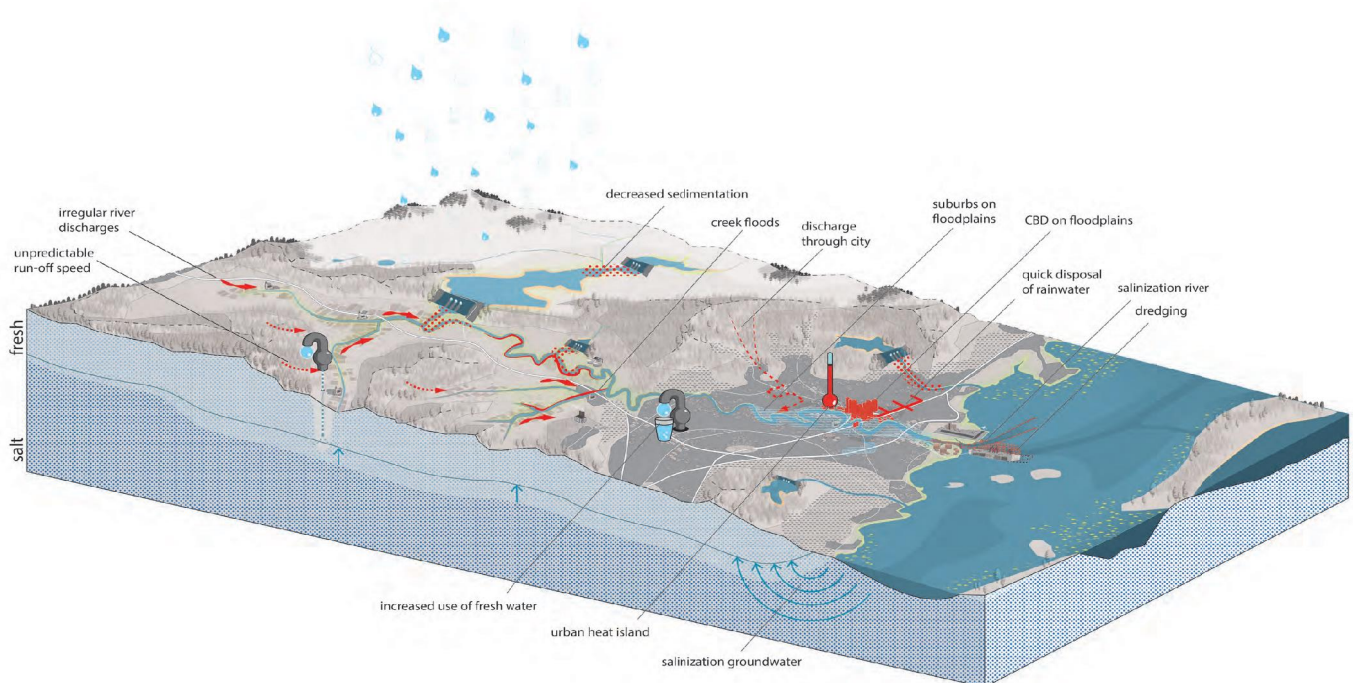
- Decrease of infiltration capacity
- Building in floodplains
- Reducing the size of floodplains: measures to protect new developments on floodplains cause higher risk of floods in unprotected areas

Brisbane watershed under threat



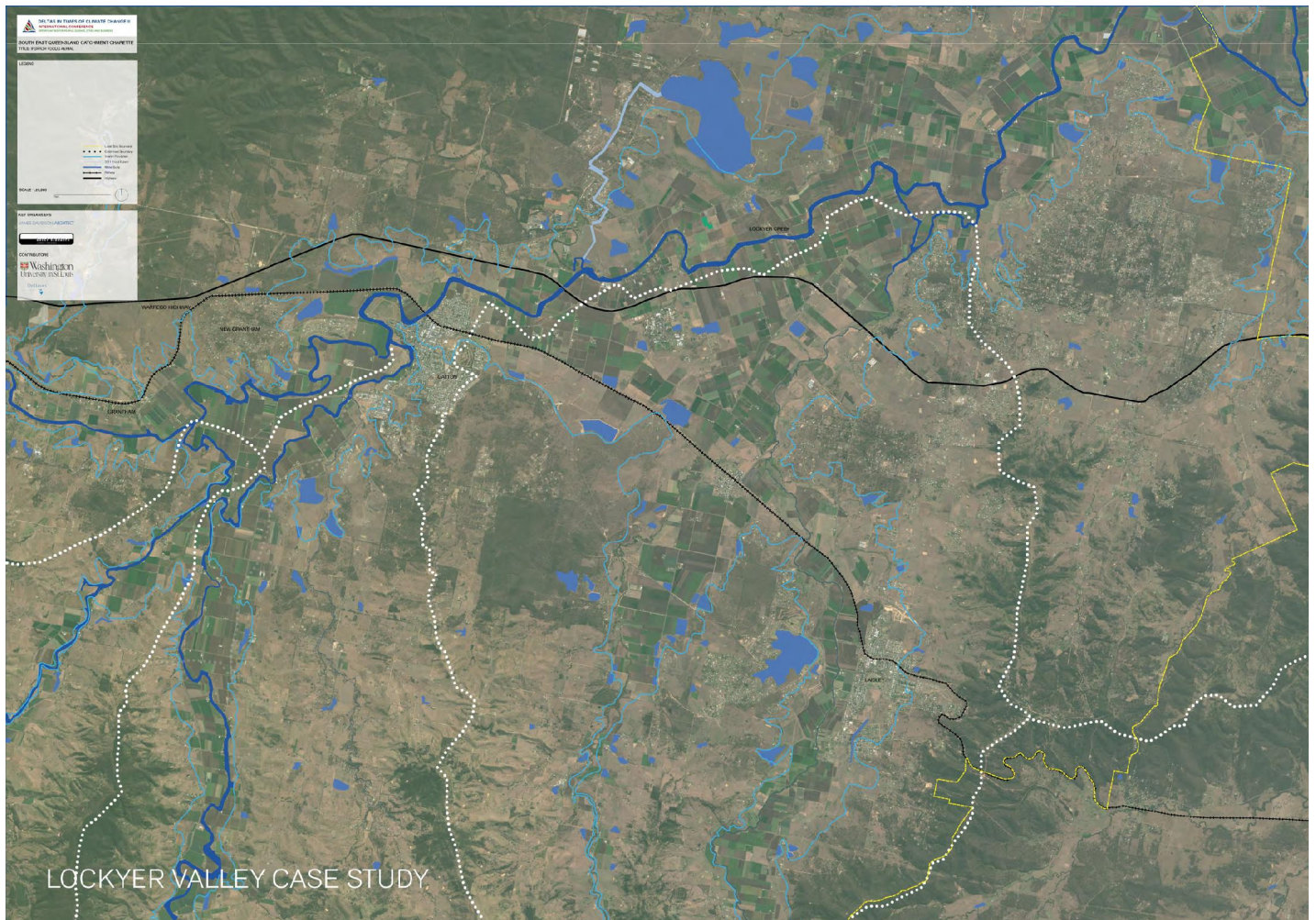
- Urban growth enhances sensitivity for heat stress
- In the new low-density suburbs a lot of water is used for the watering of gardens
- The increasing use of fresh water leads to more droughts

Brisbane watershed under threat



- Salt intrusion in groundwater and river water

Lockyer Valley

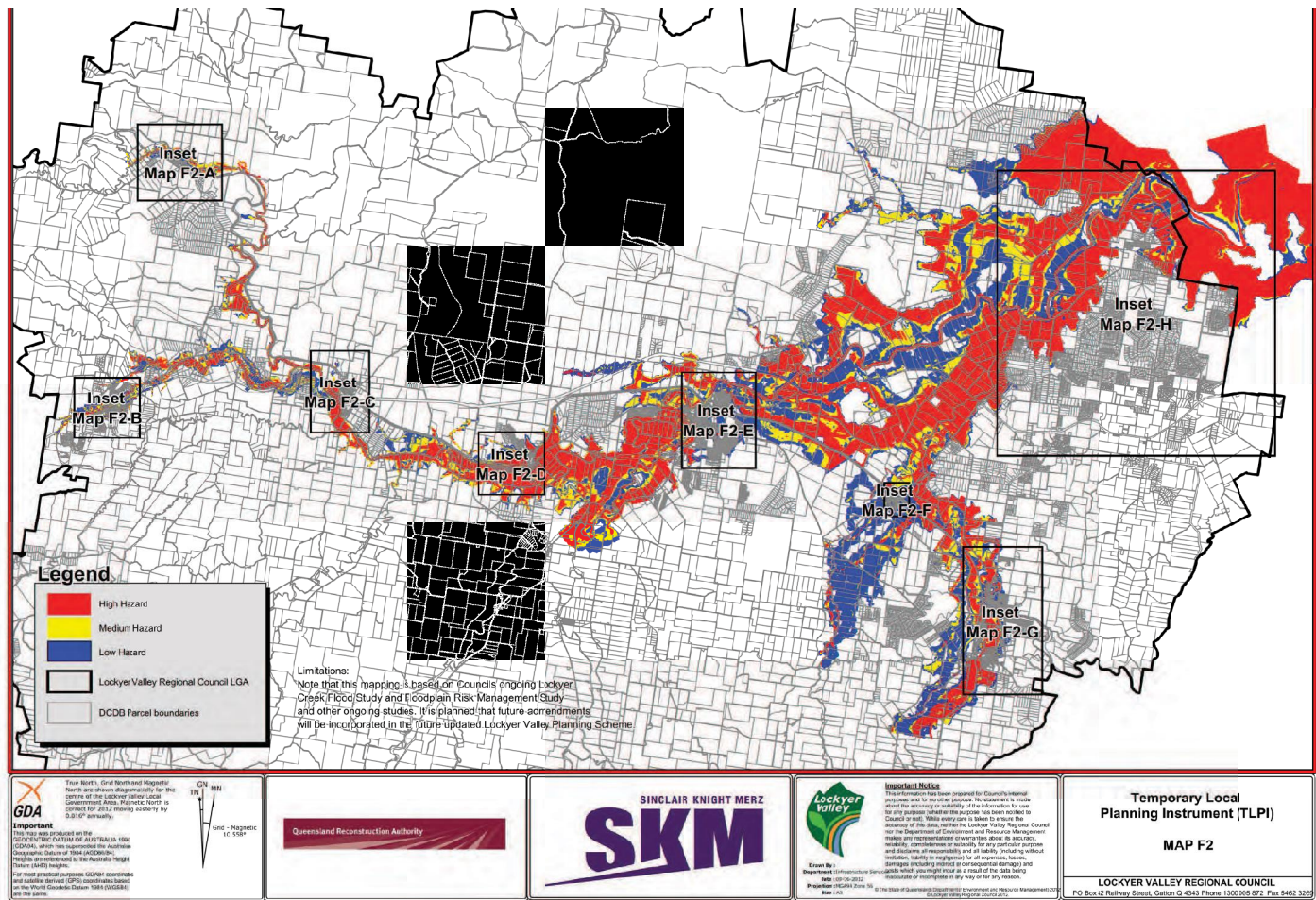


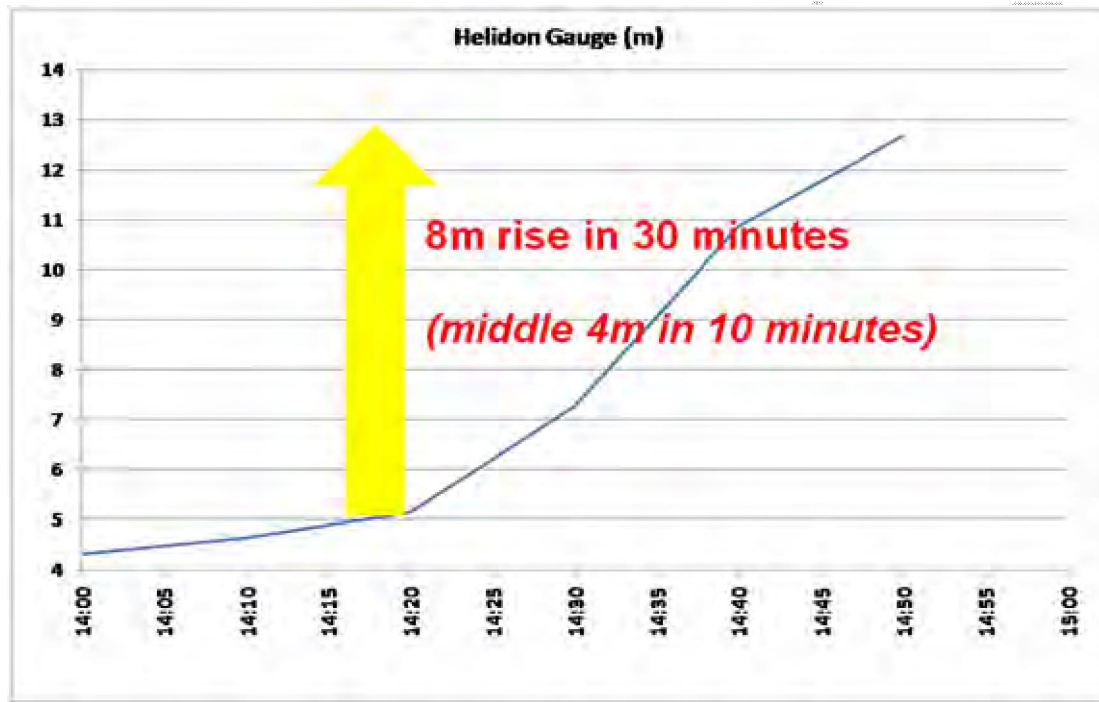


LAIDLEY CREEK BRIDGE

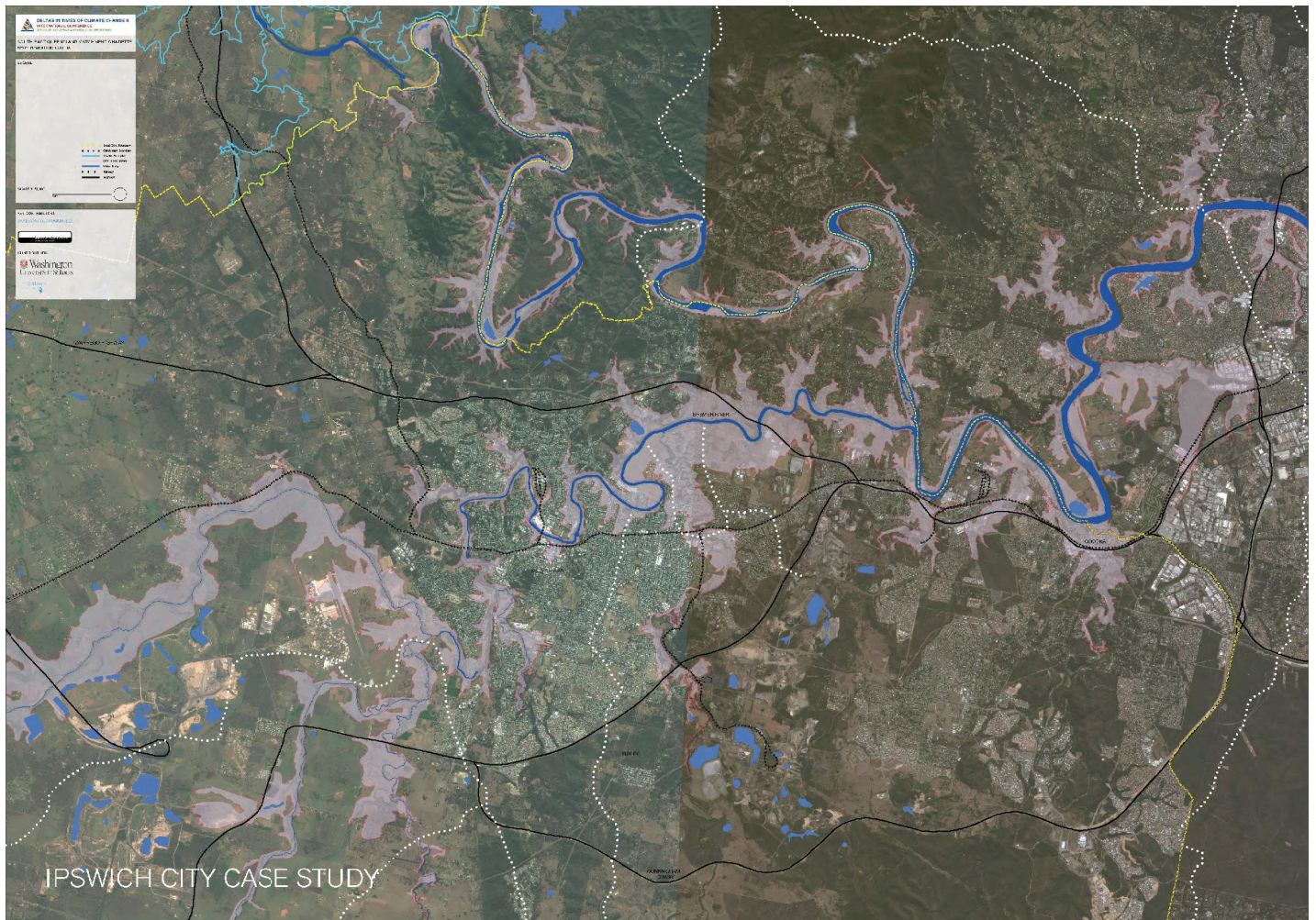








Ipswich City







GOODNA IPSWICH CITY - PRIOR TO 2011 FLOOD



GOODNA IPSWICH CITY - DURING 2011 FLOOD



BXXXXX XXXXX XXXXXXX



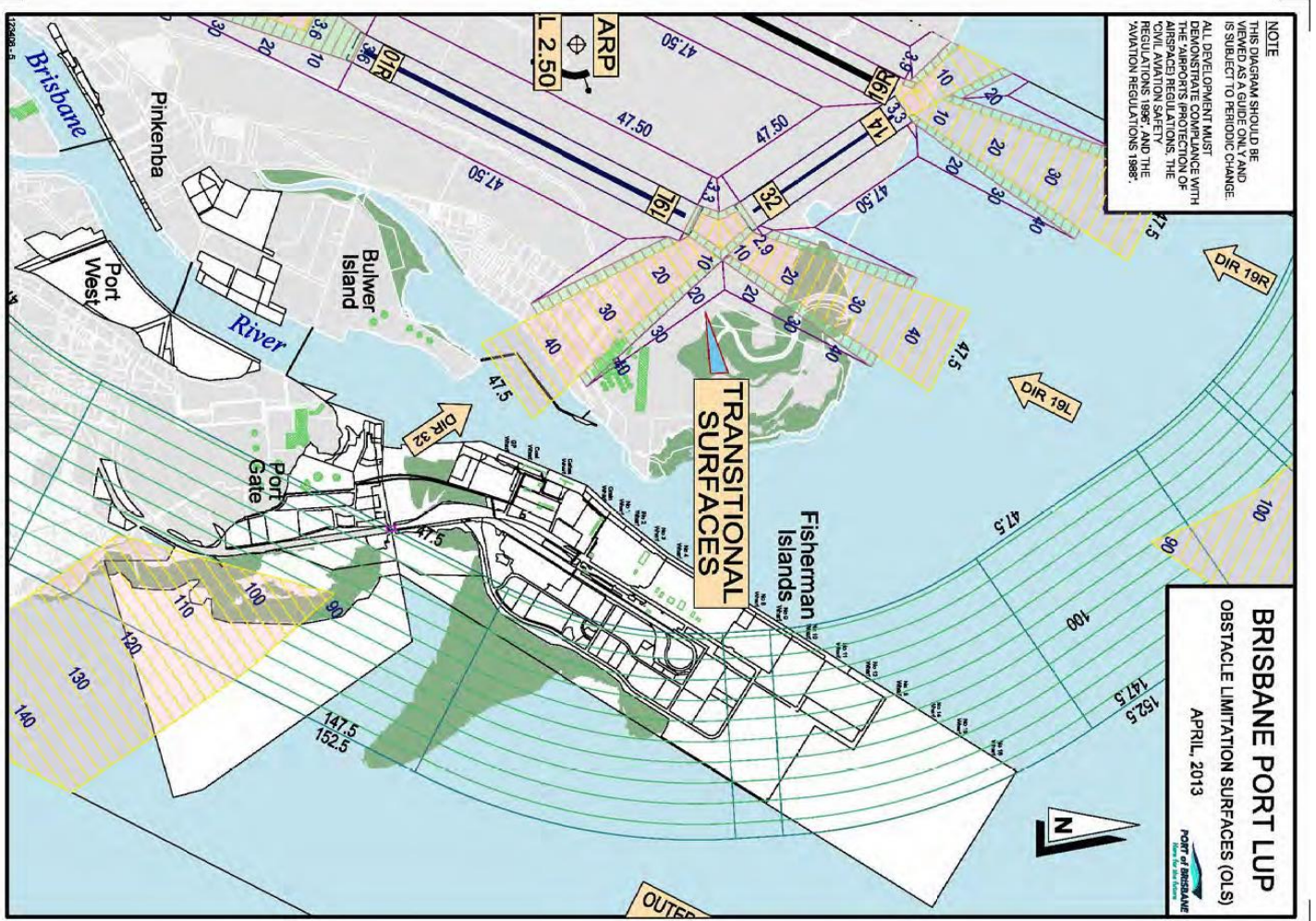
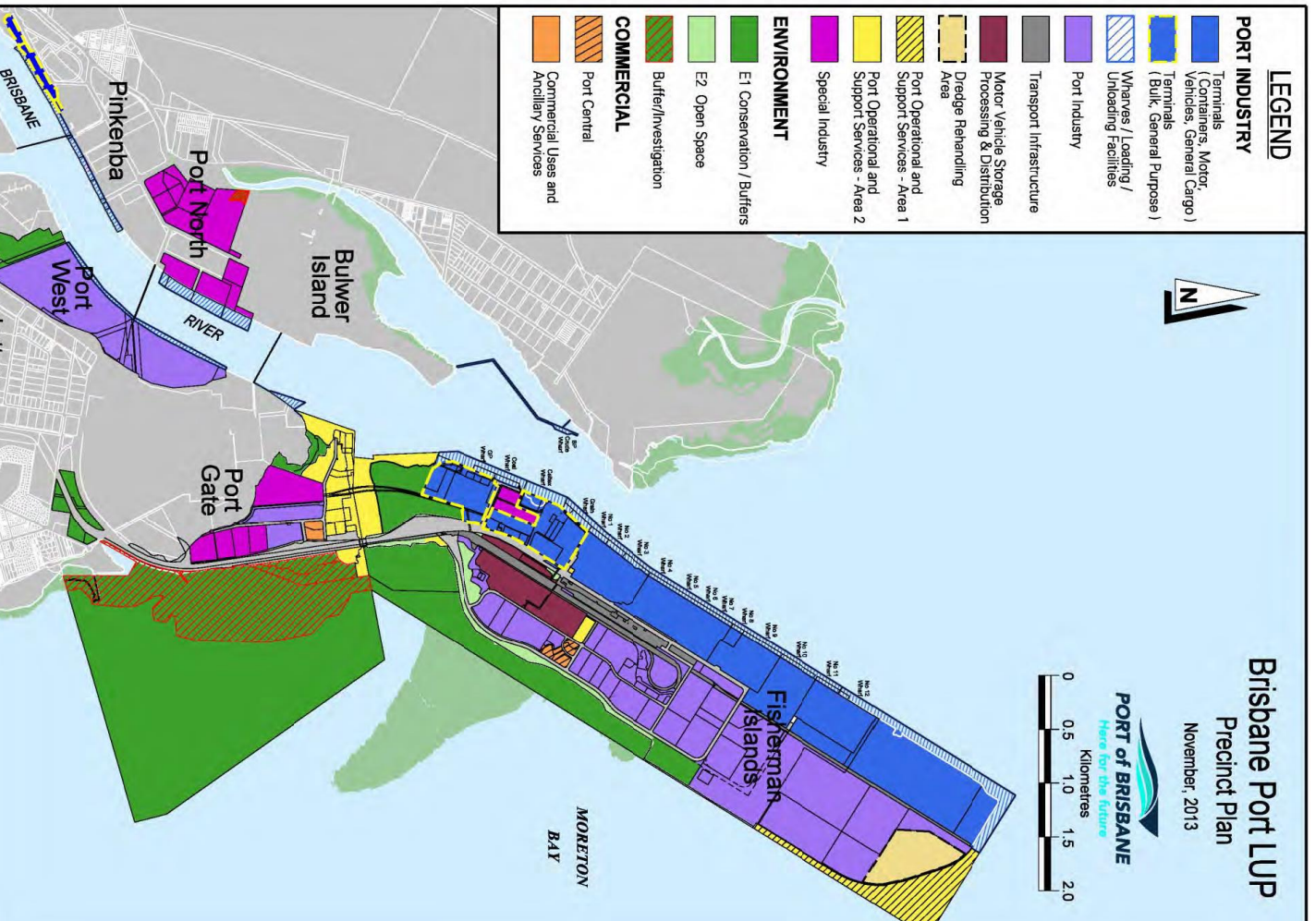
BXXXXX XXXXX XXXXXXX

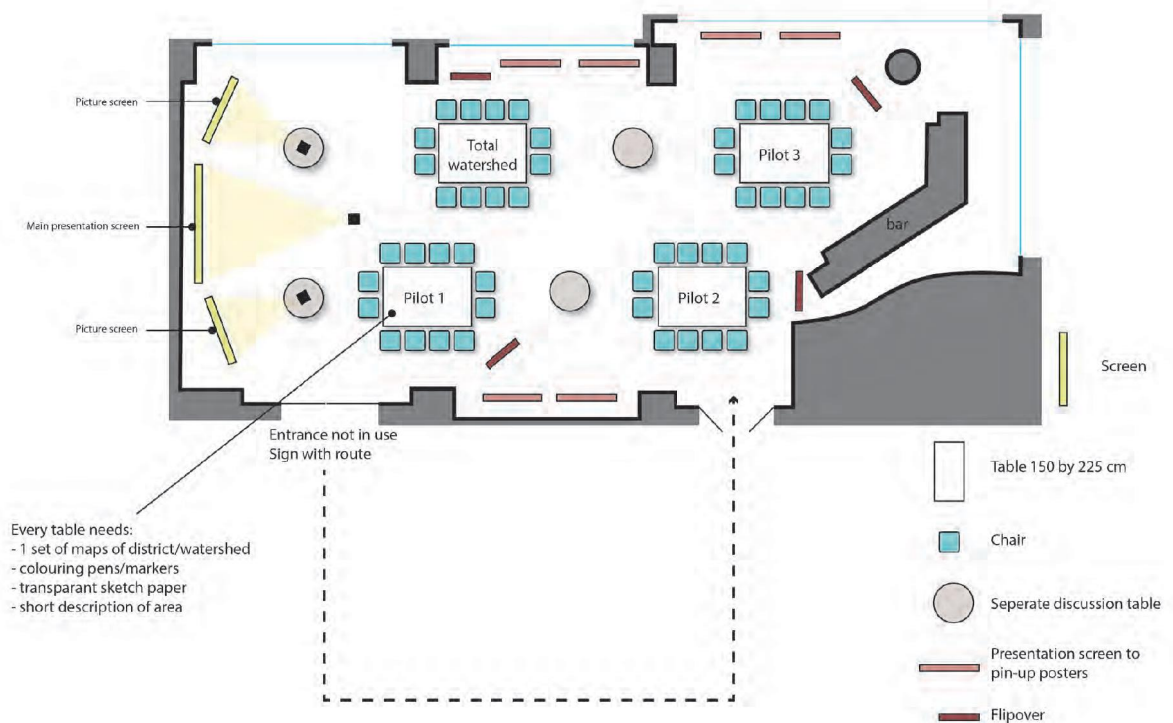
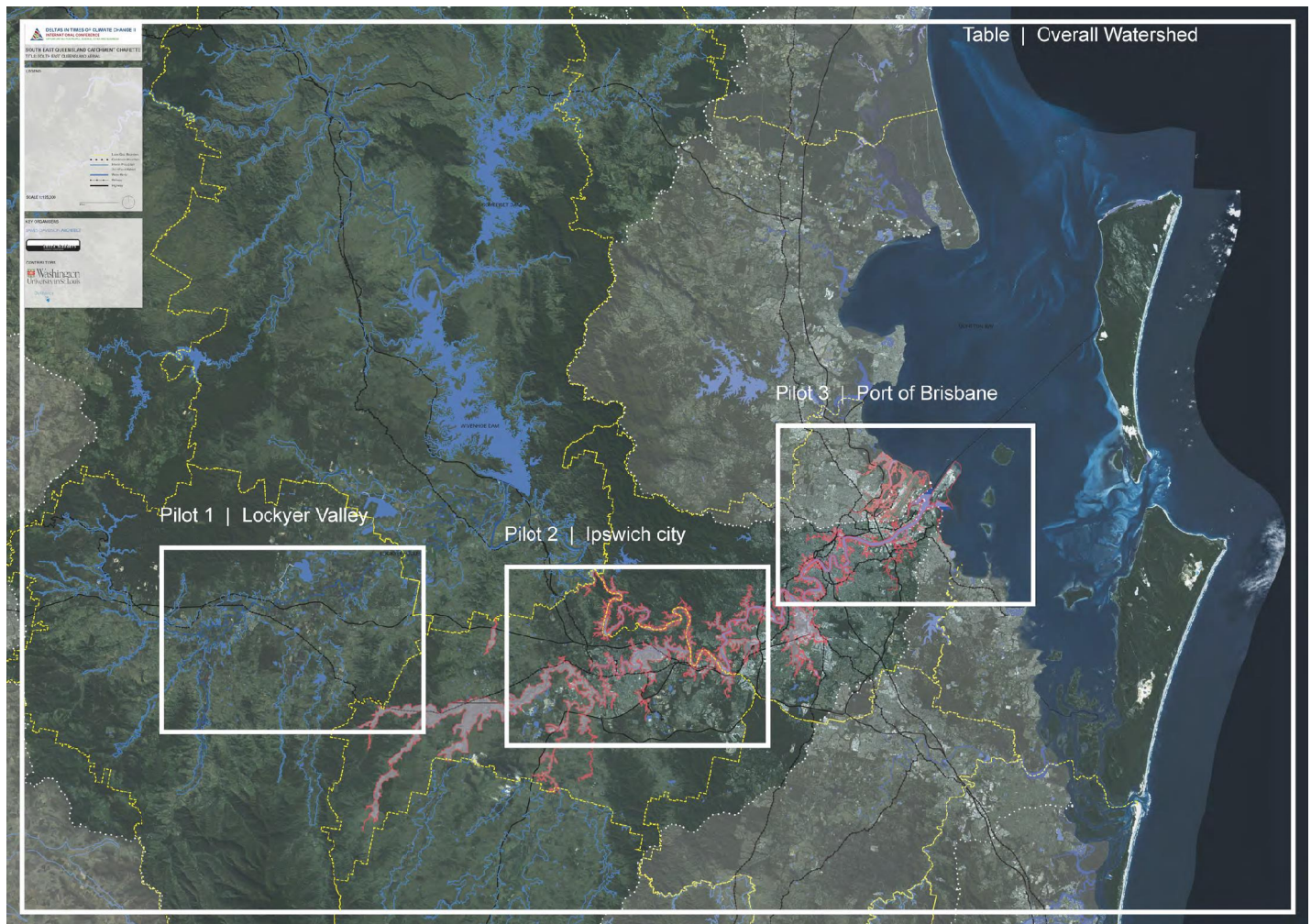


Port of Brisbane









Tasks for this afternoon

Make a drawing and a list of issues *½ hour*

2. define the 2050 'goals and principles' for your group *½ hour*

3. develop 3 strategic directions on the table *1½ hour*
- spatial strategy
- implementation timeline
- financial statement.

Each group has a local expert and a facilitator

Conclusions: every group has 10 minutes to conclude their work by presentation

Wrap up!