draft

Owain Jones[1] and Antony Lyons[2]

[1]Senior Research Fellow

Countryside & Community Research Institute

Dunholme Villa, The Park

Cheltenham, GL50 2RH

[2]Artist/Environmental Scientist

c/o Mivart St Artist Studios

Mivart St, Easton Bristol

Traces of tide and time in Bristol

Bristol is situated some 8 miles from what could be considered the coast, yet it is still, and has been even more so, a maritime city. It has a long history of connection to the wider world by international sea routes, and an equally rich local/regional trading heritage via coastal routes. The tides are what made Bristol's seafaring existence possible and so distinctive. The River Avon and Bristol Channel have the second highest tidal range in the world. At Avonmouth the maximum difference between high and low water at a Spring (equinoxal) tide is over 15 metres. The tides bring drifting daily, monthly and seasonal time/space rhythms to the city, which slowly cut across the day/night rhythm. This renders the city a hybrid time-scape. Lefebvre talks of Atlantic towns as having distinctive rhythms which are worthy of what he terms "rhythm-analysis". The tidal cultures of Bristol and the wider estuary are key, yet often unconsidered, elements of local 'ecologies of place'.

This paper seeks to consider the tidal cultures of Bristol and to begin to explore the idea of 'Deep Mapping' the tidal process and its relationship with the city and its inhabitants. This will include the tide driven rhythms of the city and how these have changed; most dramatically with the construction of the Floating Harbour in the early 19th century. Other tidal legacies will also be considered, including the Bristol Self-registering Tide-Gauge. This was located in Hotwells and kept a record of the tide for over a decade from 1837. Its contemporary equivalents are crucial in attempts to protect the city from extremes linked to climate-change and sea-level rise. Equally fundamental is the connection between the city and the sustaining ecologies of the natural world. It is suggested that tidal knowledge and awareness can have an important role to play in the reconnecting to place.

Introduction

Owain Jones, as a social scientist, is interested in landscape, nature/society relations and ecologies of place; Antony Lyons fuses a scientific background with creative public realm and landscape projects. We have set out to explore the enduring influence on the city of a powerful natural phenomenon - the tide. It is a project rooted in history, but also one that looks to a sustainable future, insofar as a community's relationship with its water environment and environmental resources are vital ingredients for a balanced existence.

Using the pervasive rhythmic influence of the tide as our central thread, there is a 'collecting' fieldwork aspect to our project (incl. film archives, academic research, folk memory etc); a 'comparator' aspect (making connections to other cities and sites which are and have been heavily influenced by extreme tidal patterns); and a 'creative/experimental' aspect, using imaginative interventions and events to explore the coming together of tidal processes and people, including those whose working lives are still tide-dominated.

Initially, we have chosen to focus on the following particular tide-related topics

a. rhythmic signature of a city; tide-time (subtle influence of the tide); 'rhythm-analysis'

b. physical tidal traces - enduring and ephemeral (the old ferry crossings, the 'grid iron', the Floating Harbour entry points, place-names, flood defences)

c. tidal work and tide-workers (bridge operators, the dredgers, pilots, Pill as the lynch-pin of Bristol's historical working tidal culture Pill 'hobblers', the lock-masters, sluice operators, ferry operators and others)

d. tide-gauges and tidal time-keeping (Hotwells tide-gauge, gauges today, former harbour clock)

e. Creative 'tidal' projects and interventions (Richard Long, Starling, Lyons/NOVA, Bunting)

[SLIDES OMITTED]

Bristol is a city of the ocean. A city of the moon. A city of brackish water. A city where rivers converge, and where silt-laden salt water - carried up the Avon in the incoming tide - mingles with fresh waters of the Avon catchment.

There is a rich history of the sea, and the tidal rhythm, embedded deeply in Bristol's past - its character, its material form and its culture. There remains an extensive tidally influenced ecology within, and on the edges of, the contemporary city - albeit diminished, confined and largely ignored. Existing to this day are remnant activities and occupations dominated and regulated by tidal movements.

PW Elkin (1988) 'Aspects of the recent development of the port of Bristol'

"Bristol has always been a port; the Avon Gorge provides shelter from prevailing south-west winds in the Severn estuary and, once mastered, the high tides of the river Avon could be used to advantage to bring vessels some seven miles inland to a defensible anchorage. Although archaeological evidence (Boon, 1949) suggest that the pill (tidal creek) near the modern village of Sea Mills, was chosen during the Roman occupation as a convenient dock and ferry point to south Wales, there were strategic advantages in bringing sea-going vessels several miles further upstream to the landward side of the gorge to where the tidal river Avon could be conveniently crossed and was more accessible

by land to the south of the region in what is now south Avon and north Somerset. This encouraged the development during Saxon times of the main trading settlement of the Region, Brycg-Stow (Bridge Place).

Apart from its inland position, there are other puzzling aspects about Bristol's old harbour, particularly in relation to its significance in terms of trade by the late Middle Ages. Viewed from the famous vantage point of the Downs on the north side of the Avon Gorge, the river Avon appears to be little more than a dismal, muddy stream rather than a major navigable waterway; the river ebbs and flows with frightening speed and ferocity through a massive tidal range, and is quite obviously too narrow for any sail- powered vessel to navigate without assistance."

"Everything on board 'ship-shape and Bristol fashion'. This phrase was first noted in Richard Dana Jr's memoir 'Two Years Before the Mast' (1840). To quote again from Elkin (1988)

"Contending with these particularly difficult tidal conditions, Bristol's mariners refined their skills of seamanship to a high degree and local shipbuilders constructed rugged and heavy-timbered vessels better able to withstand the stranding which even the best-managed vessel could expect to encounter whilst operating to and from the port. The traditional phrase 'shipshape and Bristol fashion' alludes to this combination of seamanship and solidly built craft which, in practical terms, was nothing more than a virtue born out of necessity..."

The preamble to the Act of Parliament of 1803 for the construction of the Floating Harbour illustrates that the tidal conditions had become a deterrent to foreign ships using the port:

"Whereas Ships and Vessels lying at the Quays in the Port and Harbour of Bristol, are by the Reflux of the Tide left dry Twice every Twenty-four Hours, which prevents many Foreign Vessels, and others of a sharp Construction, from frequenting the said Port and Harbour, and occasions great Injury and Damage to vessels using the said Port."

Tidal Dynamics

Tidal rise and fall is an expression of the dynamism of the planet's surface. Caused by the intricate dance of the sun moon and earth, and embellished by all manner of other forces and factors (coastal form, weather etc) it brings a powerful set of rhythms to the oceans, and especially to coasts, estuaries, tidal reaches of rivers, and to the landscapes and communities which live by them.

The sun and moon exert "tractive" force on the oceans, drawing the waters towards their ever moving "sublunar" and "subsolar" points. As a result of this, in combination with other forces, there is a basic tidal rhythm - a continuing cycle of *low water*; *the flood* (tide rising); *high water; the ebb* (tide falling); and *low water* again, the timings of which are constantly varying and migrating round the oceans and their coasts. Variously, around the world's coasts, the all-important sea level continually rises and falls to make either microtidal coasts (under 2 m range); mesotidal coasts (2–4m); or macrotidal coasts (4m and higher) [Haslett 2008]. Tidal areas can be diurnal (tides rise and fall roughly once every 24 hours e.g. Gulf of Mexico), semi-diurnal (tide rises and falls roughly twice in 24 hours e.g. Atlantic coasts of Europe and North America), or mixed, where the rhythm is more syncopated as in one low tide followed by two higher tides (e.g. west coast of Canada and the United States).

Movement of water caused by meteorological effects (for example winds and atmospheric pressure changes) are called surges. These are not easily predictable and require powerful computers and sophisticated software to predict even 36 hours in advance. It is the combination of these two - the tide and the weather - that can lead to severe flooding.

The timings of high and low tide do not synchronise in any regular way with that other great natural pulse of life – the day and night of the solar cycle, which is circular and unchanging. Rather, times of high and low tide slowly migrate across the 24 hour grid of each day. Thus tidal landscapes in terms of rhythms of life – including rhythms of work and recreation and all manner of physical systems – are different to those landscapes more fully geared to day/night alone.

The Bristol Channel, Severn Estuary, and the tidal rivers and ports around it, have the highest tidal range in Europe and the second highest in the world. At Avonmouth Dock, the highest tides cause sea level to rise and fall more than 14m in the space of 12 hours. It is a true wonder of nature and a remarkable spectacle to behold.

Tidal Culture: a liquid state of mind

The tidal ebb and flow has a variety of profound consequences for both natural and social systems in and around tidal areas. As the noted thinker on "the production of space", Henri Lefebvre has pointed out that Atlantic cities have a different rhythmic signature to cities on the Mediterranean coast (where tides are much lower in range)

> *"We shall [ ] begin by indicating briefly certain contrasts between Mediterranean and oceanic towns. The latter are governed by the cosmic rhythms of tides – lunar rhythms! With regards to Mediterranean towns, they lie alongside a sea with (almost) no tides; so the cyclical time of the sun takes on a predominant importance there. Lunar towns of the oceans? Solar towns of the Mediterranean? Why not? (Lefebvre 2004: 91)*

Deleuze + Guatari call the '*chaosmos*' the interlocking relationship or space of rhythm and chaos; the border zone between the two intervals in a differentiated system (the chaosmos of night and day, or of living and dying). Rhythm and melody together form the refrain, which as motif (and in combination with other motifs) draws the landscape and the territory. (Bonta, 2004).

Bristol's Tidal Culture

In Defoe's Treasure Island

> *"All that night we were in a great bustle getting things stowed in their place, and boatfuls of the squire's friends, Mr. Blandly and the like, coming off to wish him a good voyage and a safe return. We never had a night at the Admiral Benbow when I had half the work; and I was dog-tired when, a little before dawn, the boatswain sounded his pipe and the crew began to man the capstan-bars. I might have been twice as weary, yet I would not have left the deck, all was so new and interesting to me--the brief commands, the shrill note of the whistle, the men bustling to their places in the glimmer of the ship's lanterns."*

Even in living memory, pubs and shops were open late at night and in early hours of the morning to serve the dock workers whose shift times were tide-dependent.

There is still some special group of workers whose lives are completely governed by the tide - the bridge operators of the Plimsoll Bridge (who are hidden away in a little glazed compartment under the

bridge) and the Lock-master, whose hut/office is nearby. These workers are on-duty from three hours before high water until 48 minutes after, primed to swing the huge bridge (and operate the harbour entrance lock) if necessary. This is not 9-to-5 solar working; it is 'tide-table' (lunar) working.

From the Harbour Authority website: *"Vessels arriving on stopgate tides and intending to proceed directly through into the Floating Harbour should arrive in time for the first inward locking with a predicted height above Cumberland Basin still in excess of 10.1m. On such tides there will normally be sufficient time to swing Junction Lock Bridge after the stopgates are reopened. Vessels arriving after the first locking must expect to wait in Cumberland Basin until the start of the following tide unless special prior arrangements have been made....If you arrive at the Cumberland Basin entrance too late to be locked-in you have the following alternatives:*

1. *Go aground in soft mud alongside pontoons,*
2. *Go aground on soft mud on North Wall, bow abreast ladder at No. 4 Survey Mark.*

(These procedures have not essentially changed much in the last 200 years.)

[SLIDE OMITTED]:The 'Grid-Iron' and The Dolphins

[SLIDE OMITTED] The tidal water level is monitored at the entrance lock - still using an old style analogue pen device, drawing on a circular card.

[SLIDE OMITTED] The Hotwells tide machine.

From Elkins (1988) again:

"Observing a modern motor vessel navigating the Avon with comparative ease can obscure the fact that, before the advent of steam-power, no vessel of any significance could normally sail unaided along this narrow, winding river between the old port and the anchorage called Hungroad, barely two miles upstream from the river mouth (Fig 4.1). Every ship had to wait for the tide and rely on hobblers

in rowing boats to tow the vessel round bends in the river and to counter cross-winds and currents that would, in moments, drive it off course from the narrow navigable channel and aground on one of the steeply sloping banks. Even the judicious use of topsails to help power a larger vessel along straighter reaches of the river, as often depicted by local artists, was fraught with difficulties further upstream, where the tide and the towing power of the hobblers were the only satisfactory means of reaching the quays (Fig 4.3). Smaller vessels might use animal power working from towpaths through the Avon Gorge, but this was a strictly limited alternative, given the local topography. Use of the hobblers was mandatory for a cargo-carrying vessel of any consequence.

The inhabitants of Pill, a village on the south bank near the mouth of the river, traditionally rendered service as hobblers. With the introduction of steam- powered tugs their role changed somewhat; most of the tug crews came from Pill and in the later years of commercial navigation on the Avon, a hobbler would often be carried on board larger vessels as pilot and helmsman specifically for the voyage up or down the Avon. Hobblers also became responsible for the securing of mooring lines and the Pill Hobblers Association continues to supply quayside workers to the Port of Bristol Authority to dock and moor vessels, providing an interesting link with the past."

[SLIDES OMITTED]

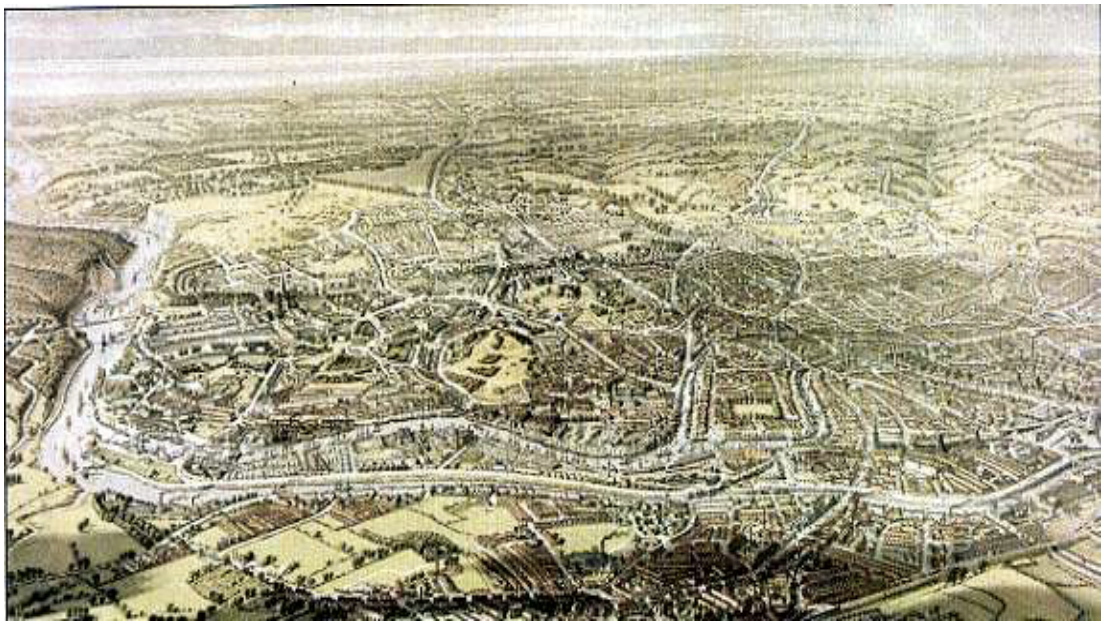
Disconnection and Re-connection

Perhaps inevitably, contemporary society has become increasingly disconnected from this tidal rhythm, and from aquatic dependencies. However, as we have shown, tidal rhythms and practices related to them, have not completely disappeared from the city. They remain important 'traces' in city life, and will become increasingly important according to climate-change predictions.

The tidal dynamic produces estuaries teeming with life, and the diurnal rhythm once gave Bristol its core 'pulse'. The move to banish the tide from the city's centre - by creating a non-tidal harbour co-incided with the advent of an era characterised by large-scale efforts to 'control' nature and tame natural processes. It could be argued that the tidal culture of Bristol is therefore suppressed. The Floating Harbour erased the old tidal geography, and radically altered the rhythms of the city (but not completely). Throughout the second half of the 18th century, the Society of Merchant Venturers commissioned and debated several dozen schemes to create a non-tidal harbour for Bristol that would incorporate the previously tidal stretches of the Avon and Frome alongside which the established quays were located. Smeaton made the first proposals in January 1765, but 37 years were to elapse before a plan by William Jessop was finally accepted and a Bristol Dock Company was formed to build and operate the new 'Floating Harbour'.

"The name was derived locally as if to emphasise that Bristol had overcome all the difficulties of its tidal port which, of course, it had not; the notorious river approach to this new harbour remained unchanged and it would never revive the failing fortunes of the old port." Elkin P.W.

LAVARS 1887 perspective drawing:



[SLIDE OMITTED] High tide as spectacle – greeting the spring tides.

[SLIDE OMITTED] Low tide as 'revealer', as opportunity; the exposed Rownham stone slip.. also slips at Gaol Ferry etc, When Cumberland Basin is drained down at low tide, much is revealed.

[SLIDE OMITTED] Fishing at Shirehampton: People fishing as the tide was coming in. They said they were fishing for cod and bass coming in on the tide. They knew that high tide was 3.59 pm. They said a Servern Barrage would ruin the fishing and change the nature of the water in terms of flows, sediment, salinity etc.

[SLIDE OMITTED] Reconnection via the re-establishment of reed-beds etc in the Harbour, biodiversity, ecosystems and nature

[SLIDES OMITTED] Artists and the tides (Starling, Long, Heath Bunting, NOVA/Lyons)

Deep Mapping + Creative/Experimental Geography

> *"Reflecting eighteenth century antiquarian approaches to place, which included history, folklore, natural history and hearsay, the deep map attempts to record and represent the grain and patina of place through juxtapositions and interpenetrations of the historical and the contemporary, the political and the poetic, the discursive and the sensual; the conflation of oral testimony, anthology, memoir, biography, natural history and everything you might ever want to say about a place …"*

Mike Pearson and Michael Shanks, Theatre/Archaeology (2001)

Deep Mapping is

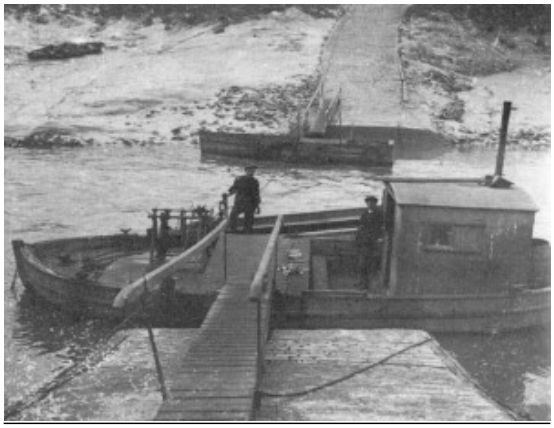
- Interdisciplinary, relational and long-term

- Artistic and scientific, involving professional and lay-person, human and non-human
- Stresses process (is ongoing and grows, rather than seeking fixed end points)

Experimental Geography: Coined by the geographer and artist Trevor Paglen, the term "experimental geography" can incorporate aspects of cartography, of printmaking, of activism, and even of theatre. *"It's an abstract idea, and necessarily so – it has to operate at a certain level of abstraction...The task of experimental geography, then, is to seize the opportunities that present themselves in the spatial practices of culture. To move beyond critical reflection, critique alone, and political 'attitudes', into the realm of practice. To experiment with creating new spaces, new ways of being"*

Some other aspects and traces of Bristol's Tidal Cultures

a. Ferry crossings



b. Placenames, Palimpsest and Oral History

"Names like Canon's Marsh and Marsh Street are a reminder that Bristol was built on a ridge of high ground amid the marshland that bordered the Rivers Frome and Avon. Over the centuries the city spread out over the Avon flood plain. The dangers of that broke upon Bristol in November 1703, when a great storm swept over England. The tide thrust up the Avon with such force that it submerged half of Bristol." http://www.buildinghistory.org/bristol/floods.shtml

c. Mud circulation, Dredging and Piloting

[SLIDES OMITTED] WURZELS - VIDEOS etc)

Pill, Pill

When the nights are dark and stormy
And the bitter north wind blows

Cross the fields from Shirehampton
Where the muddy Avon flows
Where the Pillites gaily ride
Over on the ferry from the other side
The boat starts swingin, you'll hear them singin'
Float in on the tide!

Chorus:

Pill, Pill, I love thee still
Even though I'm leaving
Pill, Pill, I love thee still
When the ferry boat starts heavin
When the rain down pours, the thunder roars
The lightnin flashes bright
I'll be better by far in The Duke or The Star
Than on the Old Pill Ferry tonight

Wurzels: “This is Adge's song about the Pill Ferry, which used to run from Pill in North Somerset across the River Avon to Lamplighters and Shirehampton on the eastern bank. This was a vital line of communication across the river - in the days before the M5 viaduct - which had probably run since medieval times, and was eventually discontinued in 1973 (several years after Adge wrote the song). The ferry has gone but the two pubs mentioned in the chorus (the Duke [of Cornwall] and the Star) are still there. There is a nice article about Pill with pictures of the ferry on the Dorset Rare Books website.

Pill, Pill was recorded at the Royal Oak session in 1966, and included on Adge's first album.

From ‘River Avon Trail “The Pill Pilots)

The village of Pill was famous for the skill of its pilots, who used their knowledge of the tides and currents of the Bristol Channel to guide ships safely to the mouth of the Avon. But the journey up the river to Bristol was no less arduous. Ships had to be towed upriver on the rising tide and safely moored before the ebb. At low tide ships had to rest on the river bed. The journey for a ship being towed from Pill to Bristol could take a week.

The Pill Hobblers

The cargoes of some larger ships were transferred to smaller craft to make the journey up to Bristol. The big ships were moored at Pill's Hung Road and the Pill Hobblers hauled the smaller boats upriver using the towpath and sometimes horses. The hobblers also towed ships into Bristol with rowboats. Steam tugs eventually took over, but Pill still has its Hobblers who do the same job they have done for centuries.”

Before the pilots amalgamated early this century the only certain way to ensure work was to "seek" as far west as Lundy or further, there are reports of pilot cutters waiting off Liverpool to intercept ships bound for Bristol. The westernman would board the pilot onto the ship and then sail back with the help of a boy.

The hobblers had two jobs, to row the fleets of boats that towed the sailing boats up from King Road, beyond the mouth of the river and then to secure the mooring ropes in port.

Climate Change and Flood Risk

[SLIDES OMITTED]

The City is spending 12 million on refurbishing dock infrastructure (in part to secure against flooding at extreme high tide)

Bristol City Council Flood Plan (February 2010):

Due to climate change, both the likelihood and consequence of flooding are increasing. Sea level rise, more frequent and higher storm surges, increased winter rainfall, and more intense summer rainfall will add to existing risk and it may not prove possible to improve fixed defences sufficiently to maintain or raise protection standards.

Floods are normally natural events that result either from excessive rainfall that leads to surface water flooding (pluvial), rivers overflowing their banks (fluvial), or from tidal storm surges on the coast or in estuaries...The combination of unusually high tides and adverse weather conditions can cause storm surges and wave overtopping of defences.....Within the Bristol area, communities along the coast are largely defended to at least a 1 in 200 year standard. There are approximately 3002 1 (1.4%) properties at risk from a 1:200 year tidal flooding event (Flood Zone 3) 2 and 5260 (2.5%) properties at risk from a 1:1000 year tidal flooding event (Flood Zone 2) within the Bristol area.

The Environment Agency (EA) will monitor and warn for tidal flooding where systems and procedures are in place...

For coastal and tidal flooding there can be a longer warning time of up to 6 hours because of the relatively predictable nature of the tidal cycle. However if high tide coincides with an unusually low atmospheric pressure a “storm surge” is caused increasing in the height of the water.

Areas at risk (from severe floods in Bristol Floating Harbour and the River Avon at Bristol): Netham, including Avonside and St Vincents Trading estates, St Philips Marsh, including Feeder Road, Avon Street, Chapel Street, Albert Road, Sparke Evans Park, Stanhope Street, Short Street, Albert Crescent and Silverthorne Lane, the Redcliffe area including Clarence Road, Central Bristol including Temple Back, Redcliffe Street, Victoria Street, Welsh Back and Pero’s bridge areas, and Harbourside locations including the Redcliffe Wharf, Bathurst Basin, Princes Wharf, Western Wharf, Wapping Railway Wharf, Wapping Dockyard, SS Great Britain, Baltic Wharf, Pooles Wharf, Bristol City Docks and Cumberland Basin areas.

(Severe Flood: Low Lying areas on the Severn Estuary from Aust to Avonmouth, including Severn Beach, and The Somerset Coast at Pill): Overtopping of the tidal defences, causing widespread flooding at Severn Beach, Passage, Aust and the industrial complex at Avonmouth; Watchouse Road, Shirehampton, Bath Road Industrial Estate, Avon Crescent, Portway and Seamills.

EA projection: “a total sea level rise of 1,000 mm by the year 2100. This will increase the probability of tidal flooding on the lower reaches from Avonmouth to Keynsham and increase the length of time watercourses will be tide locked...The sensitivity testing undertaken has shown that the main drivers

of change to flood risk in the Bristol Avon catchment to be climate change and in some locations, urban development.

draft.