

City Centre Action Plan

Flood Risk
Background Paper

August 2013
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Flood Risk Background Paper

This background document accompanies the Submission Documents and outlines some background in relation to the section on flood risk. This document is not on deposit for consultation and is background evidence.

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Note: This paper was first published for the proposed submission consultation in September. It is now reissued with one addition; section 7: a summary of the surface water management plan.

1. Policy Framework

1.1 National Planning Policy Framework

1.1.1 The NPPF sets a presumption in favour of sustainable development. Paragraph 17 explains that planning should:

- Proactively support sustainable economic development;
- Promote the vitality of the main urban areas;
- Take full account of flood risk;
- Encourage the efficient use of previously developed land;
- Locate growth to make the fullest possible use of public transport, walking and cycling.

1.1.2 Planning should positively support economic growth (section 1) and city centre growth (section 2).

1.1.3 Paragraphs 93 and 94 explain that there should be a positive strategy to adapt to climate change, including flood risk over the longer term (reducing vulnerability and increasing resilience).

1.1.4 Paragraphs 100 – 104 set out the approach to flood risk:

- “Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere” (para 100).
- Local plans should:
 - Be based on a strategic flood risk assessment (SFRA) and manage flood risk from all sources.
 - Locate development to avoid flood risk where possible, and manage any residual risks by applying the sequential test and if necessary the exceptions test.
 - Safeguard land from development that is required for flood management.

- The aim of the sequential test is to avoid allocating sites for development where there are reasonably available alternative sites in areas with a lower probability of flooding.
- If following the sequential test, it is not possible consistent with wider sustainability objectives for the development to be located in lower risk zones, the exceptions test can be applied, which must demonstrate the development:
 - Provides wider sustainability benefits that outweigh the flood risk;
 - Will be safe for its lifetime taking account of the vulnerability of its users, without increasing and where possible reducing flood risk elsewhere.
- In addition when determining planning applications it should be demonstrated that:
 - Within the site the most vulnerable uses are located in the areas at lowest risk, unless there are overriding reasons;
 - The development is appropriately flood resilient and resistant, including safe access / escape where required; that residual risk is managed (including by emergency planning), and gives priority to sustainable drainage systems.

1.2 Technical Guidance to NPPF

1.2.1 This sets out more detail on:

- The vulnerability of different uses to flood risk (eg residential and bars are 'more vulnerable'; retail and office are 'less vulnerable').
- Subject to demonstrating the sequential test, which uses are appropriate in which flood zones with or without applying the exceptions test.
- Projected increase in sea and storm levels.
- Resilience and resistance measures.

1.3 South Hampshire Strategy (2012)

1.3.1 This is a non statutory document prepared by the Partnership for Urban South Hampshire (PUSH), consisting of all the local Councils, and helps meet the 'duty to co-operate'.

1.3.2 Paragraph 1.7 sets out the spatial planning principles:

- Prioritise sustainable development in the cities and major urban areas;
- Plan for new / improved infrastructure alongside new urban development to enhance economic performance and ensure impacts of new development can be mitigated.
- Ensure full range of shopping / leisure facilities are focussed on city / town centres.
- Encourage South Hampshire to be more sustainable and resilient to climate change, by balancing economic with social and environmental considerations.

1.3.3 Policy 1 – Southampton and Portsmouth will be the dual focus for investment and development as business, retail, leisure, education, and cultural centres for the sub region, and a major focus for residential growth.

1.3.4 Policy 2 – Urban regeneration. In Southampton the aim is to attract major office, retail, education, residential, leisure and cultural development; create a new business district and (in the longer term) retail expansion on the western side of the city centre; enhance the Central Station; regenerate the waterfront at Royal Pier, Town Depot and Ocean Village. Flood defences will need to be improved in tandem with further development.

1.3.5 Policy 13 – the need for new and improved infrastructure should be considered in local plans and with new development. PUSH and its partners will work to increase investment. Priority should be given to 7 categories of infrastructure to enable economic growth and new homes, including flood defences.

1.3.6 Policy 17 – Managing flood risk, by providing flood defences and ensuring new development is located and designed to minimise the risk of flooding. Para. 12.2 recognises the sequential test and recognises that PUSH's 'cities first' policy of sustainable regeneration will require substantial new development in the flood zones.

1.4 Southampton Core Strategy (Adopted 2010)

1.4.1 Policy CS23 explains that Government guidance on flood risk will be taken into account, and where necessary balanced against other Government guidance, in determining planning applications and preparing subsequent plans. The City Centre Action Plan will be informed by a more detailed assessment of flood risk, and will set out the range of options for managing flood risk in new development

incrementally over time. Development will achieve an appropriate degree of safety; and developer contributions will be sought for flood risk infrastructure.

- 1.4.2 The supporting text explains that Southampton's development needs cannot be fully accommodated in flood zone 1. There is a need for development in flood zones 2 and 3, particularly in the city centre. It is important to promote this city centre development to meet sustainable development, economic and regeneration objectives.
- 1.4.3 The City Centre Action Plan will set out development site allocations. It will be informed by a detailed assessment of flood risk (the SFRA2) to consider further the sequential approach, the range of flood risk management measures needed, and wider planning / regeneration benefits.
- 1.4.4 The Core Strategy Flood Risk Background Paper set out an assessment of the sequential approach, and a preliminary assessment of whether development sites could be delivered safely.
- 1.4.5 The Core Strategy Inspector's main conclusions in relation to flood risk were:
 - The city centre is clearly one of the two most sustainable locations in South Hampshire for development (IR para 4.152);
 - Sea levels are only predicted to rise marginally over the plan period, allowing time to address the more serious longer term effects, including through the coastal defence strategy and SFRA2, which are or will shortly be commenced (IR para 4.152);
 - The identification of the Major Development Quarter (MDQ) for mixed use development is appropriate, given residential uses will not be allowed on ground floors and is expected to be limited to about 500 units (IR para 4.153);
 - The PPS25 sequential test has been effectively applied at the strategic level and will now be applied at a more local level in subsequent plans (IR para 4.154);
 - There is sufficient evidence to justify the Council's approach to flood risk (IR para 4.155)
 - "[The City Centre Action Plan] should now be able to incorporate the necessary detailed policies and proposals to help the city adapt suitably and safely to the anticipated rise in sea levels over time, following on from the overall strategic level approach laid down in the Core Strategy" (IR para 4.156).

2. Emerging CCAP, SEA / SA, Comments Received

2.1 The draft City Centre Action Plan (January 2012) included a policy on flood resilience (policy 13). This policy:

1. Stated that strategic contributions will be sought from developers towards a flood defence, in line with the Council's CIL policy.
2. Defined a 'flood defence search zone', the area within which the strategic flood defence will be located; and ensured that development within this zone is designed to facilitate the delivery of that defence.
3. Required that development within flood zones 2 and 3 are accompanied by a flood risk assessment and designed to be safe.
4. Explained that the strategic flood defence and individual site measures will where practicable be well designed and achieve public access to the waterfront.

2.2 Further detail on these policy provisions are set out in the relevant sections below.

2.3 The draft Plan was published for public consultation in January – March 2012. The main comments on the flood resilience policy were as follows:

- Environment Agency: Support the policy, welcome the incorporation of previous comments, strongly support the further work being undertaken.
- ABP: confirm that the location of the flood defence search zone reflects their position as set out during the Coastal Flood and Erosion Risk Management Strategy process.
- Tarmac / Hanson / Cemex (the mineral wharf operators): The wharves are not particularly vulnerable to flood risk, and their layout and operation can be arranged to manage the risk. The operators do not wish to fund a flood defence. Development which constitutes an upgrade to the existing wharf should not be required to contribute. It is not feasible to raise the wharves or even their frontage: this would have a considerable operational and financial impact which would close the wharves and is strongly resisted.

2.4 In the light of the general support, the proposed submission Plan (September 2013) makes little change to the policy on flood resilience

(now policy AP15). The reference to developer contributions via CIL is strengthened: they will be “received” rather than “sought”. However in response to the concerns of the mineral operators:

- The flood defence search zone is extended to cover not only the wharves but the road behind (Marine Parade), to recognise the potential need for flexibility regarding the alignment of the flood defence.
- The supporting text was not intended to imply that existing sites within the flood defence search zone will be raised prior to redevelopment. However the wording could be clearer and so is clarified to explain that land raising will only apply “where development is proposed”.
- The supporting text explained that minor development associated with an existing use may be appropriate in the flood defence search zone. This reference is strengthened to one of support, and expanded to any minor development which does not prejudice the future provision of a flood defence; and to development which maintains or improves the operation of the wharves.

- 2.5 The Plan includes cross references in each of the development sites affected by flood risk to the general flood resilience policy.
- 2.6 The Sustainability Appraisal raised no significant issues.

3. Flood Risk

- 3.1 Tidal flood events in the city occur as a result of extreme water levels caused by very high tides combined with storm surge conditions. As mean sea levels rise over the next 100 years (primarily as a result of climate change), such events generate higher extreme water levels. Unless flood mitigation measures are put in place, this creates a greater and more widespread flood risk.
- 3.2 The detailed strategic flood risk assessment (SFRA2) was completed in 2010; and the Coastal Flood and Erosion Risk Management Strategy (CFERMS) was completed in 2012. These give a more detailed picture of the nature of the flood risk in Southampton. The CFERMS Strategy provides the most accurate information on flood risk, as it is based on a more detailed survey of existing ground levels. This shows that the flood risk at present is less severe than was assumed during the preparation of the Core Strategy and by the SFRA2. However in 100 years time the overall flood risk (with sea level rise) is broadly the same as previously assumed. Whilst the CFERMS is more accurate, the SFRA2 does provide additional

information on the level of flood hazard, and this is set out below to add to the general picture.

- 3.3 The CFERMS sets out the areas subject to a 1 in 200 annual probability of tidal flood over successive years based on a 'do nothing' scenario (ie no new flood defences) (figures 6.1 – 6.4, pages 33 - 36).
- 3.4 It shows that at present (2010) only small areas of the city centre are at risk of flooding. These are in the eastern city centre around Town Depot, and with a flow path through to Queens Park. The depth of flooding at the 1 in 200 event appears to reach a maximum in places of around 1 metre.
- 3.5 By 2030 and 2060 the picture is broadly unchanged. The area at risk and the depth of flooding in the Town Depot / Queens Park area has increased slightly. The Mayflower Park area starts to be affected as well.
- 3.6 By 2110 the picture changes significantly. About half the city centre is at risk of flooding. This includes all the lower lying areas: the western city centre (the whole of the MDZ); the southern waterfront; and the eastern city centre. Whilst the depth of flooding at the 1 in 200 event generally reaches a maximum of around 1 metre; in parts of the eastern area and around the Central Station it reaches a maximum of around 2 metres.
- 3.7 CFERM Table 8-2 (page 57) illustrates the onset of flood risk in different flood units. At present (2010) the only areas in the city centre at moderate risk are the 'St Marys Wharves' and 'Cross House / Town Depot' units. Between 2010 and 2030 the risk at 'Crosshouse / Town Depot' becomes significant. The risk in most of the other areas of the city centre becomes significant in the 2060 – 2110 period.
- 3.8 The SFRA2 provides an indication of the tidal flood hazard. The greater the depth and velocity of flood water, the greater the flood hazard. It indicates that the flood hazard at present is generally low. However by 2055 parts of the eastern city centre (ie Town Depot) become affected by a significant flood hazard. By 2070 – 2110 most of the areas at risk of flooding are subject to significant flood hazard. (SFRA2 Maps Figures 4.4 and 5.4).
- 3.9 In terms of the Plan's development allocations, parts of the Town Depot site is at risk of flooding now and this risk will increase. The other sites are not affected until after 2060. (SFRA2 Maps Figures 10.3 and 10.4)
- 3.10 It is possible to give warning of a tidal flood event, usually about 12 hours in advance. The duration of flooding is likely to be less than 6 hours at a time in most cases (eg consistent with the high tide).

4. Why Development is Needed in the Flood Risk Zones

4.1 There are two reasons why development is needed in the flood risk zones:

1. To promote city centre regeneration.
2. To identify sufficient sites to meet the city's development targets (the 'strategic sequential approach').

4.2 City Centre Regeneration

4.2.1 The Core Strategy Inspector recognised that the city centre is clearly a sustainable location for development. It is important to promote major development in the city centre for the following reasons:

- To locate development in a location which is highly accessible by non car modes of travel, to encourage a shift away from car use. This reduces congestion and benefits the economy and environment. The city centre is a major focus for rail services from the wider South Hampshire area and beyond; for bus services from around the city; and for ferry services from the Isle of Wight and Hythe. The city centre is also within walking or cycling distance of a large number of people within inner Southampton (just over 50,000 people¹). This will increase with further major residential development in and around the city centre.
- To locate development so that it is accessible by public transport, cycle or on foot from Southampton's priority neighbourhoods, aiding access to jobs and services, promoting social inclusion.
- To locate development in areas which will enable major physical regeneration, the efficient re-use of previously developed land, the improvement of older urban areas, the promotion of more vibrant quarters and make the most of the city centre's assets (eg waterfront, parks, heritage, etc). This will fundamentally enhance the city centre, enhancing its regional role. The strategy includes promoting major development to enhance the area around and links to the Central Station and the Major Development Zone (MDZ, formerly MDQ); to reconnect the city centre to the waterfront, at Royal Pier, Ocean Village and Town Depot; and on a wide range of other sites.

¹ 51,543 people in Bargate, Freemantle and Bevois wards, within approximately 2km of city centre. 2011 Census.

- To locate further retail and leisure development in and adjacent to the existing shopping area, maintaining and enhancing the vibrancy of the centre and supporting its regional role.
- To locate further office development close to an existing concentration of businesses, facilities, and Universities, to promote business synergies.
- To locate development in an area where it can benefit from the existing concentration of infrastructure, and connect to the city centre district energy network. (The carbon emissions from developments connected to this system are significantly reduced).
- To avoid out of centre development which would be less accessible by non car modes, undermine the success of the city centre, and potentially put pressure on the countryside.

4.2.2 These benefits deliver the aims of the NPPF as set out above.

4.3 Sequential Approach

4.3.1 There are 3 flood zones:

		Annual probability of tidal flooding:
Flood Zone 1	Low risk	Less than 1 in 1,000
Flood Zone 2	Medium Risk	Between 1 in 200 and 1 in 1,000
Flood Zone 3	High Risk	1 in 200 or greater

4.3.2 The NPPF seeks that where possible development is located in the areas least at risk of flooding (ie flood zone 1). This is known as the 'sequential approach'.

4.3.3 The Core Strategy sets targets for city wide residential development and city centre retail and office development. The Core Strategy Background Paper on Flood Risk (2009) demonstrated that there were insufficient sites to meet these targets solely in flood zone 1, and that therefore substantial development would be needed in flood zones 2 and 3, primarily within the city centre. The Inspector agreed that the sequential approach had been effectively applied at this strategic level.

4.3.4 There are a number of additional factors to take into account since this assessment was undertaken. The Core Strategy's office and retail targets have been reduced; the City Centre Master Plan has provided a further assessment of sites; and the Strategic Housing Land Availability Assessment (SHLAA) has been updated. Appendix 1 provides an update. This demonstrates that the overall position has not changed; namely that there are insufficient sites to meet the

targets solely in flood zone 1, and that therefore substantial development is needed in flood zones 2 and 3 within the city centre.

4.3.5 Appendix 1 also includes an assessment of the CCAP's site allocations which are within flood zones 2 and 3. The sites are:

- Station Quarter;
- Heart of City – Harbour Parade;
- Western Gateway;
- Royal Pier Waterfront;
- Town Depot;
- Fruit and Vegetable Market;
- College Street / Duke Street / Richmond Street;
- Ocean Village.

4.3.6 It demonstrates that the individual sites are important to the delivery of the Plan's overall strategy, bringing benefits which cannot be met on sites elsewhere. This assessment has been supported by the Environment Agency. In summary these sites are creating development adjacent to the station or waterfront, enhancing strategic links within the city centre, and / or are accommodating a scale of development that cannot be located in flood zone 1.

4.3.7 The City Centre Action Plan explains that this completes the sequential approach assessment for both site allocations, and sites identified in the SHLAA. This development is needed in flood zones 2 and 3 to promote city centre regeneration, meet the city's overall development targets, and deliver the benefits associated with developing the specific sites.

4.3.8 A number of 'windfall' developments are also likely to come forward during the plan period. These are sites which were not identified at the time of plan preparation so are neither allocated nor identified by the SHLAA. They are usually small sites. City centre windfall sites will deliver the same strong planning benefits as city centre development in general, as set out above. They may also offer benefits distinctive to that site. It is difficult in practice to assess whether alternative windfall sites may exist in areas at less risk of flooding, as by definition these sites are unidentified. However, windfall sites are needed to help meet the overall housing target. Therefore the Plan takes a proportionate approach: windfall developments in the city centre will be deemed to have passed the sequential approach provided the benefits of the development are not

outweighed by a high flood risk on that site. This approach has been supported by the Environment Agency. Given the benefits of city centre development, it is expected that this will be the case for most sites. However if a site is in an area of particularly high risk it is likely that it will need to explicitly consider the sequential approach.

- 4.3.9 The CCAP also requires proposals to locate the more vulnerable uses, such as residential uses, within the areas of a site which are least at risk of flooding; or provide a clear justification as to why this would not be practical, viable or appropriate in planning and design terms. This balance is best considered at the planning application stage. However the assessment of individual sites in the section below includes a preliminary consideration of this issue.
- 4.3.10 It is important to stress that once development has passed the sequential approach, it will still be required to be designed and operated to meet an appropriate degree of safety.

5. Flood Risk Measures

5.1 Where development is located within the flood zones, there are two ways to reduce the risk:

1. Implement a strategic shoreline flood defence. This creates a barrier designed to prevent an inundation of flood water. It protects not only new development but all existing areas and communities behind the defence, and is therefore the favoured approach. A strategic defence is planned for Southampton, which will be implemented on a phased basis over the longer term, given that most areas are not affected by a flood risk for 50 years and given the practical issues in delivering the scheme.
2. Site specific measures for new development. These form part of the design or operation of the development. They include the creation of safe access routes or refuges, locating more vulnerable uses on upper floors, constructing development to be resistant and resilient to flooding, and warning / evacuation procedures. These measures generally protect the immediate development rather than the wider area. Nevertheless these measures provide important additional protection. First prior to the completion of a strategic flood defence. Whilst most sites are not at risk of flooding in this time, there is still a slight risk from a rare event. Second after the completion of a strategic defence, the residual risk from any 'overtopping' during an extreme rare event, or of a 'breach' or failure of the defence.

6. Strategic Shoreline Flood Defence

6.1 This section sets out how a strategic shoreline flood defence will be implemented, based on a hierarchy of 3 strategies:

- The North Solent Shoreline Management Plan (2011). This sets a policy of 'Hold the Line' in Southampton over the next 100 years, and so establishes the need for a defence.
- The Southampton Coastal Flood and Erosion Risk Management Strategy (CFERMS) (2012). This identifies measures to implement the 'hold the line' policy.
- Detailed design and feasibility studies for specific sections of the defence. The first of these, for the River Itchen frontage, is about to commence.

6.2 The Southampton Coastal Flood and Erosion Risk Management Strategy (CFERMS)

6.2.1 The CFERMS was completed in 2012 by URS for the Council, and has been approved by the Environment Agency. It covers a defence for the city's River Itchen (west) and Test frontages, to protect Southampton west of the Itchen (including the city centre).

6.2.2 Its aim is to identify measures to 'hold the line' and protect people and property, taking account of:

- Climate change and sea level rise;
- Technical feasibility;
- An economic appraisal;
- Social considerations (eg prioritising vulnerable communities);
- Environmental considerations (eg including the Habitats and Water Framework Directives);
- The Council's objectives for regeneration and economic development, recreation and tourism;
- A robust design which would be sympathetic to the urban environment and reconnect the city centre to the waterfront, and integrate with new developments.

6.2.3 The CFERMS is based on providing flood defences which will protect against the predicted 1 in 200 annual probability flood event in the year 2110. This incorporates a 0.86 metre rise in water levels over the next 100 years for that event. This is based on the Environment Agency's advice on projected sea level rise (ie taking the 'medium emissions' scenario upper end); and on the increase in storm surges.

6.2.4 There are no formal tidal flood defences in the city at present. Existing quay walls provide short term protection to varying degrees and are generally in a fair to good state of repair. However as extreme water levels rise, these defences no longer protect the city.

6.2.5 The CFERMS considers the full range of flood defence options, as follows:

Steel sheet front line defence	Relatively low cost and suitable for operational quaysides; but unattractive and subject to corrosion.
Flood walls (eg brick, concrete,	Could be located behind the 'front line' where necessary.

sheet pile)	
Earth embankment	Relatively low cost and sympathetic to some environments; but requires significant 'land take'.
Road raising	Relatively low cost; but depending on the height of road raising required, it can be difficult to connect to access roads in a tight urban environment.
Land raising	This creates the most robust form of defence (with a minimum width of 40 – 50 metres required). It has very little scope for failure and no maintenance costs. It creates a development platform, fits in to the urban environment, and aids connectivity to the waterfront. It reduces surface water flood risk and minimise the need for property based resistance / resilience measures. It can only be implemented incrementally over time as sites are redeveloped. It also has a relatively high cost.
Ramps, demountable defences, flood gates	Used to provide access through a flood wall where needed. A ramp provides the most robust solution. Demountable defences / gates require clear responsibilities for operation.

- 6.2.6 The CFERMS divides the study area into 3 flood cells, and subdivides these into a series of flood units. Within each cell a continuous flood defence is needed by 2060 to protect that cell and prevent flooding via 'the back door'. The city centre lies within flood cell A which extends from Bevois to the Western Docks, and is made up of flood units 2 to 10.
- 6.2.7 The CFERMS considers the appropriate defence options for each flood unit. It discounts those options which are clearly inappropriate, and assesses the remaining short list to establish a preferred option. This process was undertaken in consultation with the public and with key stakeholders (eg ABP, the mineral wharf operators, Network Rail, the Royal Pier developer and utility companies).
- 6.2.8 The CFERMS is based on the phased provision of a continuous flood defence. The first phases are for those sections which are lower lying so would flood first if undefended. These first phases provide a comprehensive defence for the short to medium term, as adjoining flood unit frontages are at a higher level so will not be inundated until the longer term.
- 6.2.9 The aspiration for each flood unit is generally to secure land raising as this provides the most robust form of defence. However this depends on the relevant sites being redeveloped, which in some cases is unlikely to occur until the longer term. In these cases an interim flood wall is proposed to provide sufficient protection until 2060, by which time redevelopment and land raising is likely to have been implemented.

6.2.10 The preferred approach for flood cell A is as follows. The commentary combines points from the CFERMS and SCC to give an up to date picture.

Unit 3	Meridian
Unit 4	Northam
Unit 5	St Marys Wharves
Unit 6	Town Depot
Preferred Approach	
By 2015	Land raising of known development sites (ie Meridian, Drivers Wharf, Town Depot. Interim low flood wall elsewhere (typically 0.7 – 0.9 metres above ground levels).
By 2060	Land raising of remaining areas.
Commentary	
<p>The redevelopment and hence raising of the Meridian site is likely to occur before 2026 (before the inundation of the wider area behind the site beyond 2060). The Montagu Evans study demonstrates that the Town Depot site can deliver land raising as part of a viable development scheme. The interim low flood wall can be delivered through rear service yard areas and will be low enough to avoid significantly affecting wharf operations. In so far as can be determined looking 50 years ahead it is considered reasonably likely that many of these remaining areas can be redeveloped and raised before 2060. The Council is in the early stages of preparing a master plan for the area. Where areas are not raised by 2060 the flood wall will need to be raised further.</p>	

Unit 7	Ocean Village
Unit 8	Eastern Docks
Unit 10	Western Docks
Preferred Approach	
By 2060	A flood wall (0.2 – 1.1 metres above ground levels).
Commentary	
<p>In Ocean Village the flood wall would be relatively low and could be integrated into the existing public realm. ABP do not require the port to be defended and so the flood wall would be constructed on the port's landward boundary or on adjacent public highway / open space land. Road and rail access to the port through the wall would be achieved at various points via an existing bridge, a new ramp, or by flood gates / demountable defences. The latter are acceptable given that the dock gates are permanently staffed and the risk is relatively infrequent.</p>	

Unit 9	Mayflower Park / MDQ
Preferred Approach	
By 2030	A flood wall (0.2 – 0.8 metres above ground levels).

Commentary
<p>The CFERMS aspires to redevelopment and land raising but given the perceived uncertainties proposes a low flood wall. This could be delivered within a landscaped scheme on Mayflower Park and elsewhere along highway / rear service area land. However in reality the Council considers land raising is likely to be achieved:</p> <p>Mayflower Park / Royal Pier: the developer's emerging concept is based on creating a raised development platform.</p> <p>MDQ / Western Gateway: whilst some redevelopment may occur before 2026, comprehensive redevelopment of the area is more likely to occur in the period after. However flood inundation across the Western Gateway will only occur beyond 2026, by which time a comprehensive development is likely to have been achieved.</p>

6.2.11 The CFERMS costs the implementation of the preferred options on the following basis:

- Applying standardised unit costs for the type of defence to a detailed analysis of the necessary flood defence height at regular intervals along each flood unit.
- Where land raising is envisaged, raising 50% of the development area (ie greater than the minimum 40 – 50 metre width required).

6.2.12 The capital cost of the whole defence (flood cells A – C) is £35 million², and the 'whole life cost' (including maintenance) is £39.5 million². (The capital cost of flood cell A is £30 million²).

6.2.13 The CFERMS then undertakes a cost benefit analysis on the following basis:

- Increasing costs by 60% (ie applying an optimum bias in line with HM Treasury advice);
- Identifying the number of properties at risk;
- Calculating the cost of flood damage avoided if defences are implemented (applying a standardised cost based on the predicted depth of flooding in each property, recognising there will still be some more limited flood damage costs after a flood defence is implemented as a result of residual risks);
- Estimating indirect costs (eg economic costs associated with disruption to the port, railway and waste water treatment works).

² Cash costs, present day values

- 6.2.14 Flood Cell A has 1,924 residential and 1,279 commercial properties at risk. The total cost of flood damage in flood cell A would be £1,063 million². (Approximately 96% of this cost would be avoided with a flood defence).
- 6.2.15 The cost benefit ratio is based on the cost of public investment (deducting £4.5 million of the total cost which it is assumed will come from developers via CIL). The CFERMS calculates that the cost benefit ratio for the flood cell A defence is 13.8 (ie the benefits are 13.8 times greater than the cost), and describes this as a robust ratio. The CFERMS calculates that without the CIL funding the cost benefit ratio would still be 9.4, which it describes as remaining strongly positive³.
- 6.2.16 The CFERMS has also assessed the flood Cell A scheme required by 2015 (ie the flood wall along the River Itchen, units 3 - 6) based on the Environment Agency's Outcome Measure (OM) targets. These are used by the EA to make funding decisions. They incorporate the cost : benefit ratio, and give a higher score where the risk is reduced for households in deprived areas. The EA indicate that a scheme should achieve an OM score of 120% to achieve funding. The Cell A scheme, after developer contributions of £3.12 million, achieves an OM score of 171%. (Without any developer contributions the OM score would be 136%). The high score is due to the large numbers of properties affected, the level of deprivation and the significant flood risk. The scheme is therefore likely to be eligible for EA funding.

6.3 Likely Deliverability of the Strategic Defence

- 6.3.1 The deliverability of the strategic flood defence depends on the ability to physically implement it on the ground, and the ability to secure the finance to fund it.
- 6.3.2 The commentary above demonstrates the likely ability to physically implement the defence, either because redevelopment and hence land raising is likely to occur, or because there is the physical space to implement a flood wall.
- 6.3.3 The CCAP helps to enable this by ensuring that new developments close to the defence facilitates its provision. This is consistent with the CFERMS in the following respects:
- The CCAP identifies a 'flood defence search zone' which follows the same alignment; and whose default width is 40 metres (the minimum width of land raising specified for a robust defence). (This width is widened to encompass the whole of Royal Pier / Town Depot, where redevelopment is anticipated in the short to medium term; and the whole of the mineral

³ The costs and benefits are based on present day discounting

wharves and the road behind, to facilitate flexibility; and narrowed at the Ocean Village / Eastern Docks to reflect the preferred option of a flood wall).

- The CCAP states that within this zone development facilitates the provision of the defence by raising the site; and only where this is not achievable by providing a 'front line' defence (eg flood wall) where necessary (eg in the Town Depot area at imminent risk, or where it is important to integrate the wall into the design of waterfront development). If this is not necessary, land can be safeguarded for the defence.

6.3.4 There are two main sources of funding for a flood defence:

- Defra grants. Defra capital investments fund new flood defences and enhancements to existing defences. In 2012 / 13 Defra capital investment was running at £266 million; rising in 2013 / 14 to £294 million and 2014 / 15 to £344 million. This current level of spending is likely to represent a 'worst case' scenario reflecting the present public spending restraints. Over the next 50 years it is considered likely that funding will increase as economic growth and the health of public spending budgets improve, and as flooding rises up the political agenda with an increase in the frequency of events. The Government spending review (2013) has already announced an ongoing real terms increase in flood defence funding every year to 2020. However even under the current assumed 'worst case' scenario, the capital cost of Southampton's flood defence (£35 million) represents only 10% of 1 year's funding (at 2014 / 15 levels). The defence can be implemented over a 50 year period, and so on this basis 10% of 1 year's funding needs to be found at over 50 years, or 0.2% of total funding over 50 years. Whilst the Government will need to fund a range of defences across the country, Southampton is one of the important centres which will need protecting. Furthermore the CFERMS analysis of cost benefit ratios and EA Output Measure scores suggests that the EA will view schemes within Southampton favourably. The Environment Agency have already demonstrated an initial financial commitment by funding the CFERMS and the River Itchen Flood Alleviation Scheme study.
- Developer contributions. The Town Depot viability appraisal (Montagu Evans), and the emerging plans from the Royal Pier developer, illustrate the likelihood that developers will be able to bear the costs of land raising their sites. In addition all developers will be charged CIL. The CIL is expected to raise nearly £33 million between 2013 – 2026. This will be used to fund a variety of projects, although it is anticipated that flood defences will be one of the areas which receives significant

funding. The CFERMS cost benefit analysis assumed CIL funding of around £3 - £4 million, a relatively small proportion of anticipated CIL receipts. Nevertheless this is sufficient to reduce Government funding and increase the cost benefit ratio to a high level, increasing the likelihood of receiving Government funding.

6.3.5 In short it is considered likely that a strategic defence will be delivered in phases over the medium and longer term to provide the necessary protection for the city centre.

6.4 The River Itchen Flood Alleviation Scheme

6.4.1 This scheme will defend the frontage the CFERMS identifies at most imminent risk of flooding: from Meridian to Town Depot (flood cells 3 to 6 inclusive).

6.4.2 The Environment Agency has indicated it will fund a preliminary study of the scheme, costing £457,000. This will take forward the CFERMS preferred option. It will undertake a more detailed assessment to provide greater certainty of the costs, the risks and their mitigation. It will identify a feasible scheme which can then progress to a final detailed design and construction.

6.4.3 Through the CFERMS process discussions were held with 90% of the land owners / operators along this frontage and there was a positive response to the preferred option. This option does present technical challenges and detailed comments were made regarding ground conditions and operator access requirements.

6.4.4 The study will assess the suitability of existing ground conditions and structures; the mitigation of drainage impacts; access requirements; the proposed alignment; environmental impacts (EIA, habitat designations, archaeology, contamination, water quality); the 'whole life' costs of the scheme; and potential funding sources. The study will be prepared in consultation with landowners, operators and the public. The study will commence in Autumn 2013 and be completed in the Spring of 2015.

7. **Surface Water Management Plan 2011**

7.1 Surface water flooding in Southampton is a result of increased urbanisation (eg non permeable surfaces, culverted streams, etc), and the effects of tide locking (eg the 'backing up' effect during extremely high tides where the drainage outflow is below this level).

7.2 The Surface Water Management Plan (SWMP) identified 5 'hot spots' in the city centre:

		Risk	Code
1	Central Station	High	FH21
2	West Quay Retail Park	High	FH26
3	Commercial Road	Medium	FH20
4	Charlotte Place	High	FH24
5	Platform Road	High	FH25

7.3 The SWMP identifies specific measures to address ‘hot spots’ 1 – 3. These are the introduction of measures at Southampton Common (a sustainable drainage – SuDs scheme) and at Roles Brook (deculverting, attenuation, introduction of meanders). Feasibility work on these schemes is currently underway. Funding could come from a mixture of DEFRA grants and CIL.

7.4 The SWMP also identifies general measures to address all ‘hot spots’: emergency planning; examination / clearance of drains and sustainable drainage (SuDs) measures. Within the urban area SuDs are likely to include measures such as permeable surfaces, pavements, green roofs, and rain water recycling. The Government is intending to make it a statutory requirement that developers take all practical steps to minimise the surface water runoff from their sites (eg using SuDs techniques). The Council will become the SuDs approval authority. The intention at present is this will commence in April 2014, although this has yet to be confirmed. Core Strategy CS20 requires SuDs where practicable.

8. Site Assessments

8.1 Introduction

8.1.1 This section sets out, for each of the Plan’s site allocations, a commentary on potential solutions to ensure safe development. This commentary draws from the SFRA2, and also from the Plan’s policy approach.

8.1.2 The commentary sets out how sites might be delivered; it does not set out a definitive assessment or prescriptive approach. The final approach will be determined at the planning application stage in the light of a site specific flood risk assessment undertaken by the developer.

8.2 The Plan's Approach

8.2.1 The detailed design of flood measures for individual developments should be proportionate to the level of risk. Most sites are not at risk of flooding until after 2060, by which time a strategic flood defence is likely to have been implemented to provide a high level of protection. Where sites are at risk from an earlier date, the strategic flood defence is likely to have been implemented earlier, to promote the necessary protection on a phased basis. By 2110, even in the absence of a strategic flood defence, the frequency of flood events generating a significant risk is likely to be relatively low. There is likely to be a 12 hour warning of a flood event, whose duration is likely to be no more than 6 hours at a time.

8.2.2 However the appropriate site based measures should be secured to:

- Protect those sites which already experience a higher level of risk;
- Protect against the remaining risks from extreme events both before and after the strategic flood defence is implemented;
- To minimise the risk to personal safety and property.

8.2.3 In line with this proportionate approach, the Plan requires measures which are 'must haves':

- Development will remain structurally sound*

8.2.4 Or are an easy way to deliver a significant reduction in risk:

- Locating more vulnerable uses (ie residential / hotels) on upper floors;
- Providing a flood plan with methods of warning and evacuation;
- Not increase flood risk elsewhere (eg implement sustainable urban drainage systems);
- Provide a safe refuge if safe access cannot be achieved.*

8.2.5 And seeks further measures where possible (requiring them unless it is not practical, viable or appropriate in planning / design terms to do so):

- Safe access;
- The site based sequential approach: locating more vulnerable uses on the parts of the site least at risk.

(These measures should be designed to mitigate against a 1 in 200 annual probability flood event in 2110 in the absence of a strategic flood defence; except for those marked * which the standard is a 1 in 1,000 annual probability event).

8.3 SFRA2

8.3.1 The SFRA2 recommends a number of general measures for all development sites. These are as follows and are generally reflected in the Plan's approach:

- The site based sequential approach.
- Flood resistance / resilience measures.

8.3.2 To manage tidal flooding:

- Occupiers should be signed up to the Environment Agency's flood warning system and receive an information pack setting out the risks and appropriate actions.
- The developer should prepare a flood emergency plan setting out evacuation procedures. This should be prepared with reference to the multi agency flood plan and in consultation with the Council's emergency planner and the emergency services.
- Emergency service vehicles should have the ability to access the site. (They can deal with more significant levels of flooding than would be regarded as acceptable for 'safe access' for the public).

8.3.3 To manage surface water flooding:

- Attenuation of water surface flows across the site where possible, creating ponds / wetlands in areas of open space, and maintaining overland flow routes. Space constraints on city centre sites is likely to limit this approach in a number of cases.
- At source control measures to limit the discharge of surface water from the site using SUDS techniques. This would include green roofs, rain water harvesting / water butts; permeable pavements / public realm / car parks; and open space swales.
- Finished floor levels should be 300mm above ground surface levels.

8.3.4 It is considered that the general requirements of the Plan and the SFRA2 are likely to be achieved on all sites. Where deliverability is potentially less certain (safe access and site based sequential approach), the Plan provides appropriate flexibility.

8.4 Specific Site Assessments

8.4.1 This assessment considers the additional measures required for each specific site, encompassing:

- A summary of the SFRA2, including the level of flood risk on the site and potential measures to address it.
- An analysis by the Council of potential safe access routes, informed by more accurate ground levels data than was available for the SFRA2.
- A conclusion on the deliverability of the measures and how they meet the Plan's approach.

8.4.2 The assessment of flood risk is based on the 1 in 200 annual probability flood event in 100 years time in a 'do nothing' scenario (eg with no strategic defence).

8.4.3 The SFRA2 approach is based on 3 options for the provision of on site measures:

- Strategic Precautionary Approach – the measures needed assuming a strategic shoreline defence is implemented now.
- Site Specific Measures – the measures needed assuming no strategic defence is implemented.
- Managed Adaptive – the measures needed to protect the site until 2070, when it is assumed that a strategic defence will have been implemented.

8.4.4 In broad terms the Plan adopts the 'managed adaptive' approach, and so the conclusion focuses on this approach.

8.4.5 Safe access is defined as either dry access or access traversing 'low hazard' flooding as defined by the Environment Agency (eg low depths / velocity of flooding).

8.4.6 The SCC analysis is based on city wide Lidar data captured in mid 2011. Unlike the data used for the SFRA2 (which was collected at different times), it is a fully comprehensive and consistent data set and

based on a finer scale of data points, so is more accurate at specific points.

- 8.4.7 The maps referred to in the SCC analysis appear at Appendix 3.
- 8.4.8 In many cases the SFRA2 identifies that commercial development would only have an expected lifespan of 60 years. The study was undertaken in 2010 and so on that basis the development would last until 2070. Flood risk will only commence after 2070 on many sites and so the SFRA2 concludes that no significant additional measures would be required. However it is recognised that if the development is proposed towards the end of the plan period, in 2026, then it could be expected to last until 2086, by which time a flood risk would have arisen. In these cases some additional measures may be required, although these are likely to be less than required for more vulnerable residential / hotel development.

8.5 Site Based Sequential Approach

- 8.5.1 The Plan requires that more vulnerable uses are located within those parts of the site at lower risk, or provide a clear justification as to why this is not practical, viable or appropriate in planning and design terms.
- 8.5.2 An initial consideration of each site indicates that some more vulnerable (eg residential) uses are likely to be required on higher risk parts of the site; and that there is a clear justification for this approach, as follows:
- 8.5.3 All sites:
- The strategic flood defence is likely to be implemented on a phased basis to ensure that each site is protected prior to its redevelopment.
 - Residential development is needed to secure a wider mix of uses, to maximise the use of the site, and to ensure the development is viable.
 - Residential development will be located on upper floors (so in this sense is located outside the area of higher risk). Safe access is likely to be achieved.
- 8.5.4 Royal Pier and Town Depot:
- Some residential development should overlook the water, to generate the significantly higher values necessary to secure the viability of the development and associated flood risk infrastructure. (In any case this is a hypothetical assessment:

both sites will be raised above the flood levels, to make them sequentially preferable).

Station Quarter:

- There is unlikely to be a development site available in the area at lower risk.

8.6 Site Measures

8.6.1 The assessment of each site is set out in Appendix 2 and summarised below by groups of sites for which similar measures are needed.

Central Station		
MDZ		
Fruit and Vegetable Market		
Flood risk	A significant risk does not emerge until after 2070.	
Approach	Additional Significant Site Measures needed	
Strategic Precautionary	None	
Site Specific	Commercial (less vulnerable)	None
	Hotel (60 year lifespan)	None
	Residential	Safe access; and / or located in sequentially preferable areas on upper floors
Managed Adaptive	None. (Locate habitable rooms on upper floors).	
Safe Access (SCC Analysis)	Existing routes are 'low' hazard or require only limited road raising	
Conclusion	The managed adaptive approach requires only limited additional measures. Safe access is also likely to be achieved. It is likely that all the measures set out in the Plan and SFRA2 can be incorporated, creating a robust response to flood risk.	

Town Depot		
Royal Pier		
College St		
Flood risk	Town Depot: A significant flood risk affects small parts of the site now, and this will increase. Royal Pier / College St: A significant flood risk emerges after 2055 and 2070.	
Approach	Additional Significant Site Measures needed	
Strategic	See 'Managed Adaptive'	

Precautionary		
Site Specific	For all uses	Raise the site: Town Depot - up to 1.5 metres; Royal Pier – up to 1 metre; College St – habitable rooms on upper floors and safe access.
Managed Adaptive	All: Residential uses should be located on upper floors given the significant hazard from the residual risk. Town Depot: Raise the site (to ensure buildings remain structurally sound).	
Safe Access (SCC Analysis)	Town Depot – the site will be raised above flood levels, and so safe access will be achieved via the Itchen Bridge. Royal Pier / College St - Existing routes are 'low' hazard or require only limited road raising.	
Conclusion	Emerging developer schemes and viability appraisals indicate that the sites can be raised. The managed adaptive approach requires only limited additional measures. Safe access is also likely to be achieved. It is likely that all the measures set out in the Plan and SFRA2 can be incorporated, creating a robust response to flood risk.	

8.6.2 At Ocean Village the likely development sites have already received planning permission.

9. Conclusions

- 9.1 The risk of flooding in the city centre at present is limited to specific areas, but over the next 100 years around half the city centre will become affected by a significant flood risk from extreme events.
- 9.2 The Town Depot site is already at risk of flooding, and over time is likely to experience flood events of increasing regularity and severity. The other sites are not at risk of flooding until after 2055 or after 2070, and in some cases are only likely to experience occasional or slight flood events. A warning of typically 12 hours can be provided for tidal flooding; the duration of which is likely to be less than 6 hours in most cases.
- 9.3 This paper demonstrates that in terms of funding, physical geography, and the Plan's approach to safeguarding, a flood defence is likely to be implemented by 2070. This would be on a phased basis to defend frontages before the flood risk starts to affect significant areas of the city.
- 9.4 There would still be a residual risk from the defence being breached, or overtopped (by a severe flood event or from higher than anticipated sea level rise). However given the potential for a defence which is robust and flexibly designed, the risk of these events occurring is considered to be low. In any case such an event would generally

generate a less significant or widespread flood event than if there were no flood defence.

- 9.5 This paper demonstrates that the strategic sequential approach can be met: that development is needed in the flood risk zones to meet the overall development targets, promote city centre regeneration, and the particular benefits of developing individual sites. Some flexibility may be needed regarding the location of uses within sites, provided this can be justified.
- 9.6 Notwithstanding the strategy to implement a strategic defence, it is still important to provide site specific flood risk measures to protect against the residual risks. This is a proportionate response to ensure that critical measures are provided, and other measures where they are easy to provide.
- 9.7 This approach will provide a robust response to minimise flood risk and enable city centre development to be delivered, bringing significant wider sustainability benefits in line with the NPPF.

Appendix 1: Sequential Approach

10.1 The sequential approach is assessed as follows:

- An update of the 'city wide' or 'city centre wide' strategic sequential approach: an assessment of whether the development targets can be accommodated on sites solely in flood zone 1.
- An overview of the likely development capacity of flood zone 1 within the city centre, quarter by quarter.
- The development sites allocated by the Plan in flood zones 2 and 3: an assessment of whether the development concept can be delivered on an alternative site elsewhere.

Appendix 1a: The ‘City Wide’ or ‘City Centre Wide’ Strategic Sequential Approach

- 10.2 The Core Strategy sets a city wide target to deliver 16,300 dwellings; and a city centre target to deliver 110,000 sq m of offices and 100,000 sq m of retailing. There is a policy imperative to deliver office and retail development in the city centre, and so the strategic sequential approach is considered at the level of the city centre for office and retail development. There are policy benefits to delivering housing in the city centre but the imperative is not as strong. It is the ‘city wide’ target which contributes to meeting strategic needs (the ‘duty to co-operate’). Therefore the strategic sequential approach is considered at a city centre level for residential development. This approach is consistent with that taken in the adopted Core Strategy.
- 10.3 The analysis below indicates a need to deliver office and retail development in flood zones 2 / 3. This displaces capacity to locate more vulnerable residential development in these flood zones, so contributes in a broader sense to meeting the sequential approach.

City Centre Offices

- 10.4 The CSPR includes a target to achieve an additional gain in offices of 110,000 sq m in the city centre from 2006 – 2026. This relates to new development totalling 160,000 sq m and a loss of offices totalling 50,000 sq m. Of the need for new office development, 53,000 sq m has been completed (2006 – 2012), leaving a need for 107,000 sq m (2012 – 2026). Table 1 illustrates that only 11,735 sq m of this target can be accommodated in flood zone 1 in the city centre. The remaining development needs to be accommodated in flood zones 2 and 3, including at the major office locations at Royal Pier and the Station Quarter.

Table 1

Site	Size (sq m)	Notes
Office Target (2012 – 2026)	107,000	
Sites in flood risk zone 1 at 2110		
Small sites	2,165	Various. Assumed to be in flood zone 1.
Cumberland Place	9,570	
Total	11,735	
Remaining Office Target	95,265	
Sites in Flood Risk Zones 2 / 3 at 2110		
Aqua	5,627	
Royal Pier	73,036	
Station Quarter	17,446	

City Centre Retail

- 10.5 The CSPR includes a retail floorspace target of 100,000 sq m for the city centre from 2006 – 2026. Of this target, 35,500 sq m floorspace was delivered at IKEA therefore the remaining target is 65,000 sq m 2012-2026.
- 10.6 Table 2 sets out the retail sites in relation to the flood risk zones. Policy AP6 focuses retail development on the primary shopping area (PSA) before considering an expansion of the PSA. Many of the sites in the PSA are in flood risk zone 1. However, Watermark WestQuay and the Major Development Zone (of which the existing retail warehouse buildings are within the PSA) are in flood zones 2/3. Planning permission has recently been granted for Watermark WestQuay. The table demonstrates that of the target of 65,000 sq m, only 19,414 sq m can be accommodated in flood zone 1 within the city centre; leaving 45,586 sq m which need to be accommodated in flood zones 2 and 3.

Table 2

Site	Size (sq m)	Notes
Retail Target (2012 – 2026)	65,000	
Sites in flood risk zone 1 at 2110		
Existing Primary Shopping Area		
Above Bar St / Bargate St	2,420	
Above Bar St / Pound Tree Lane	6,254	
West Quay III Eastern Site	420	
Bargate Centre / Hannover Buildings / Queens Way	4,875	Small part of Queens Building in flood zones 2 / 3
Above Bar St / Civic Centre Rd	5,445	
Other retail frontages ¹	See below	
Total	19,414	
Remaining Retail Target	45,586	
Sites in Flood Risk Zones 2 / 3 at 2110		
Watermark WestQuay (phase 1)	2,765	
Royal Pier	Unknown	
Major Development Zone	40,000	

¹ St Marys Street, Bedford Place, London Road, High Street, East Street and Queensway

Residential

- 10.7 Table 3 sets out the residential sites identified in the SHLAA (2013) in relation to the flood risk zones. This includes all the development sites allocated by the CCAP for residential / mixed use.
- 10.8 The Core Strategy sets a target to deliver 16,300 dwellings city wide (2006 – 2026). The table illustrates that of these, 10,511 dwellings have been completed or permitted, a further 2,570 dwellings can be accommodated in flood zone 1, and a further 71 dwellings predominately in flood zone 1. This totals to 13,152 dwellings which have been completed, permitted or can be located in flood zone 1. This leaves a potential need to identify sites to accommodate 3,148 dwellings in flood zones 2 and 3.
- 10.9 This figure is likely to reduce to some extent because two of the remaining categories of sites are generic and are likely to deliver some additional dwellings in flood zone 1:
- City centre office conversions: 500 dwellings.
 - Small windfall sites: 2,035 dwellings.
- 10.10 By way of a broad example, the office conversions could deliver around 250 dwellings in flood zone 1, and the windfall sites could deliver 1,343 dwellings if two third were in flood zone 1. If so this could total an additional 1,593 dwellings in flood zone 1.
- 10.11 This would still leave a need to deliver 1,555 dwellings in flood zones 2 and 3.
- 10.12 The CCAP and SHLAA identify 1,441 dwellings in flood zones 2 and 3 to meet this need. 834 of these dwellings are on allocated sites. This demonstrates that these allocated sites are needed in terms of the strategic sequential approach.

Table 3

Category	Flood Zone (2110)	No. of dwellings	% Target	Cumulative No. dwell	Cumulative % of target
Completions and Sites with Planning Permission					
Completions 2006 – 2008	Various	2,167	13%	2,167	13%
Completions 2008 - 2012	Various	3,012	19%	5,179	32%
Small sites with plan perm	Various	561	3%	5,740	35%
Dwellings permitted*	Various	4,771	29%	10,511	64%
Future Supply (10+ dwellings) In Flood Zone 1					
Sites not permitted	Zone 1	2,570	16%	13,081	80%
Sites not permitted	Zone 1 but just clipped by 2 / 3	71	0.5%	13,152	81%
Future Supply (10+ dwellings) In Flood Zone 2 / 3					
Sites not permitted	Zone 2	80	0.5%	13,232	81%
Sites not permitted	Zone 2 / 3	1,361	8%	14,593	90%
Sites not permitted	Zone 3	0	0%	14,593	90%
Other Future Supply (Various Flood Zones)					
City centre office conversions	Various	500	3%	15,093	93%
Small windfall sites	Various	2,035	12%	17,128	105%

*- under construction; permission (outline or full) including those subject to s106 (as at end of December 2012)

SHLAA Sites in Flood Zones 2 / 3

See Maps below

		Number of dwellings by 2026 in flood zones 2 / 3	Allocated in CCAP?	Permitted?
City Centre Sites				
CC 2	Royal Pier/Town Quay	311 (all)	Yes	No
CC 3	Land around Bargate	40 (est)	Yes	No
CC 5	Corner of Albert Road South / Canute Road and Royal Crescent Road	88 (all)	No	Yes
CC 7	Admirals Quay	299 (all)	Yes	Yes
CC 10	Fruit & Vegetable Warehouses and Brunswick Square	48 (est)	Yes	No
CC 12	College Street car park	80 (all)	Yes	No
CC 19	165 St Mary Street and former Chantry Hall	60 (all)	No	No
CC 27	Watermark West Quay	241 (all)	Yes	Yes
CC 31	City Industrial Park, Southern Road	60 (all)	Yes	No
CC 33	Central Station	20 (est)	Yes	No
CC 44a	Aviation Museum	45 (all)	No	Yes
CC 44b	24-32 Canute Road And 157-159 Albert Road South	25 (all)	No	Yes
CC 47	College Street/Richmond Street (Empress Heights)	97 (all)	Yes	Yes
CC 54	Town Depot	150 (all)	Yes	No
CC 55	Car Park adj 14-18 College Street	25 (all)	Yes	No
CC 56	Richmond House	40 (all)	Yes	Yes
CC 57	135-141 Albert Road South	10 (all)	No	Yes
CC 58	Cedar Press	122 (all)	No	Yes
CC 59	The Promontory	66 (est)	Yes	Yes
CC 60	American Wharf	23 (all)	No	Yes
CC 72	Western Gateway - non	100 (all)	Yes	No

	City Industrial Estate			
	Total	1,950		
Sites Outside the City Centre				
N 31	468-480 Portswood Road	15 (est)		No
C 4	Drivers Wharf	100 (all)		No
C 5	Meridian	300 (all)		No
C 42	30-68 Bevois Valley Road	18 (est)		Yes
C 45	110-132 Bevois Valley Road	2 (est)		No

City Centre Sites Not Permitted

Allocated = 834 dwellings

Not allocated but identified in SHLAA = 60 dwellings

Non city centre sites not permitted = 417

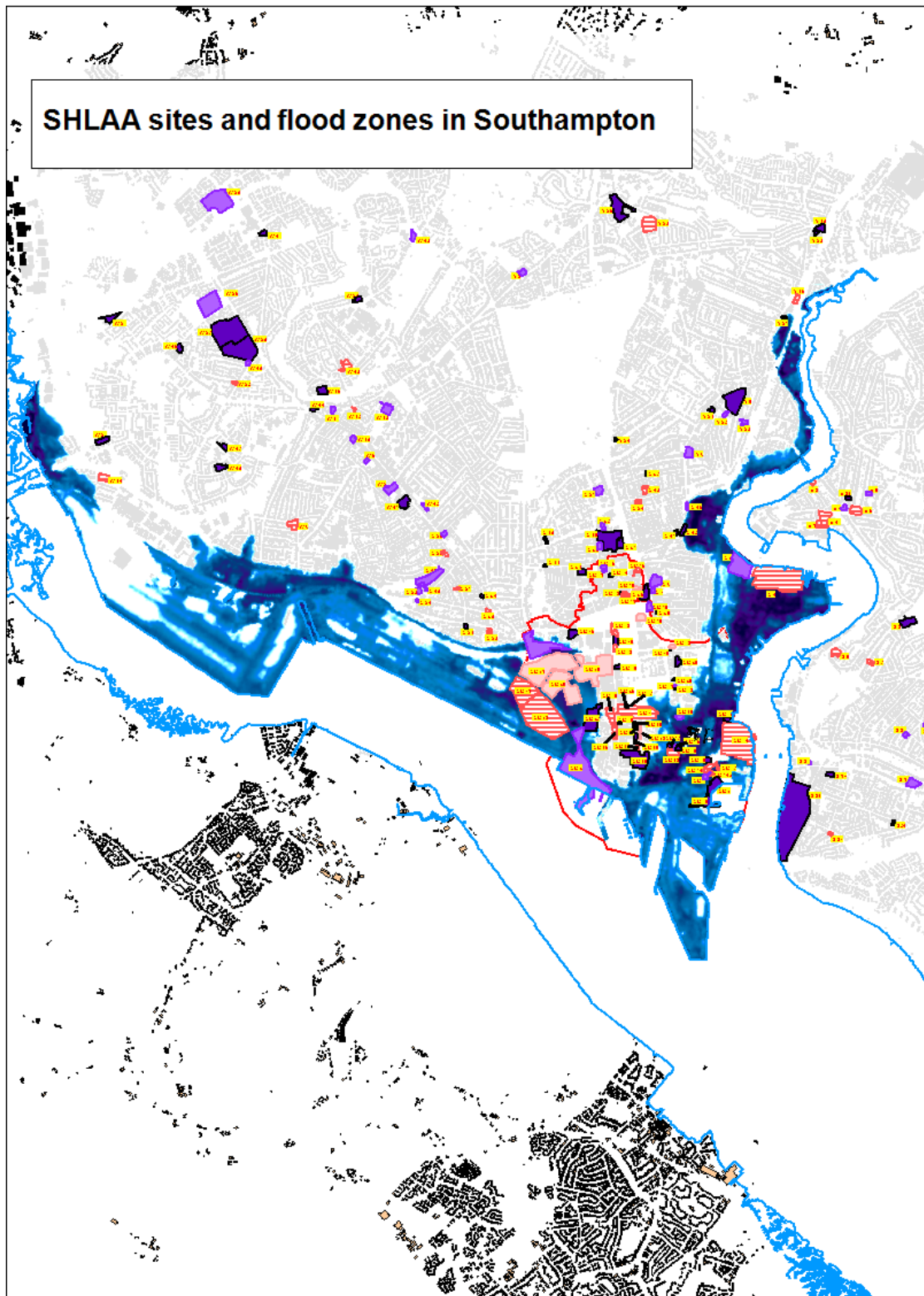
Indicative dwelling yield from city centre SHLAA sites by 2026 = 4,306

Estimated numbers in flood zone 2 & 3 = 1,950

Indicative dwelling yield from all SHLAA sites by 2026 = 9,353 dwellings

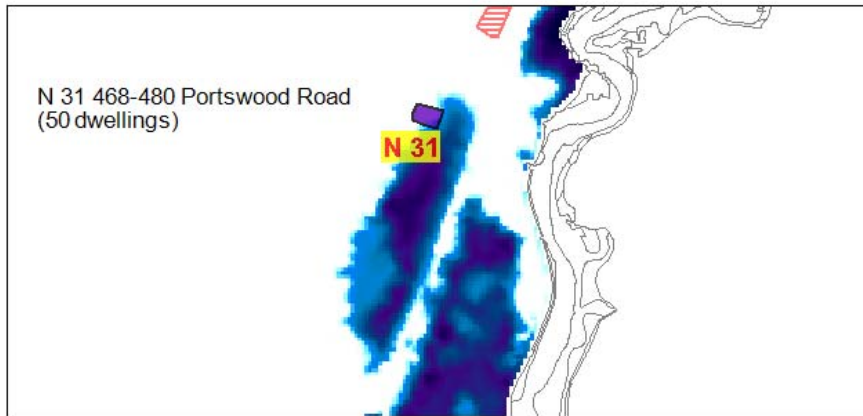
Estimated numbers from all SHLAA sites in flood zone 2 & 3 = 2,635 dwellings

Maps of flood zones and SHLAA sites

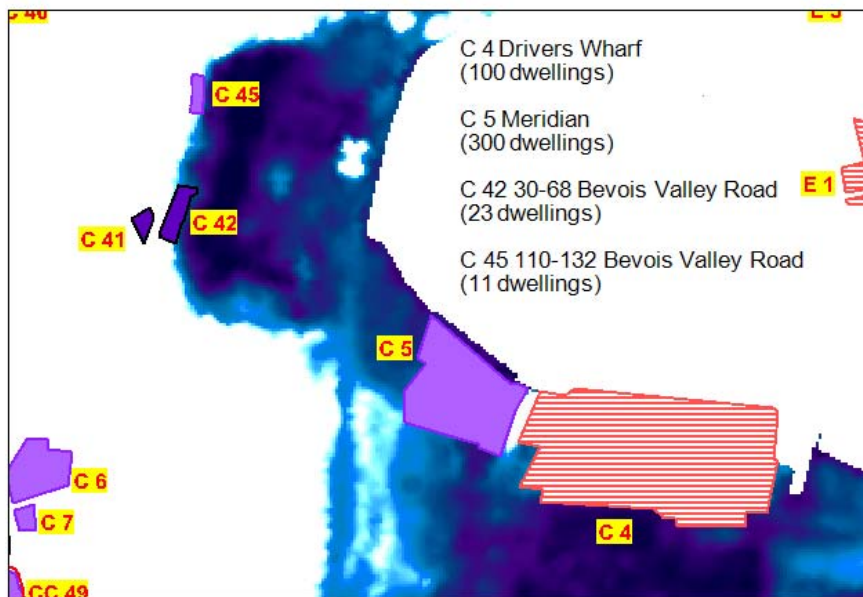


SHLAA sites in the flood zone outside the City Centre

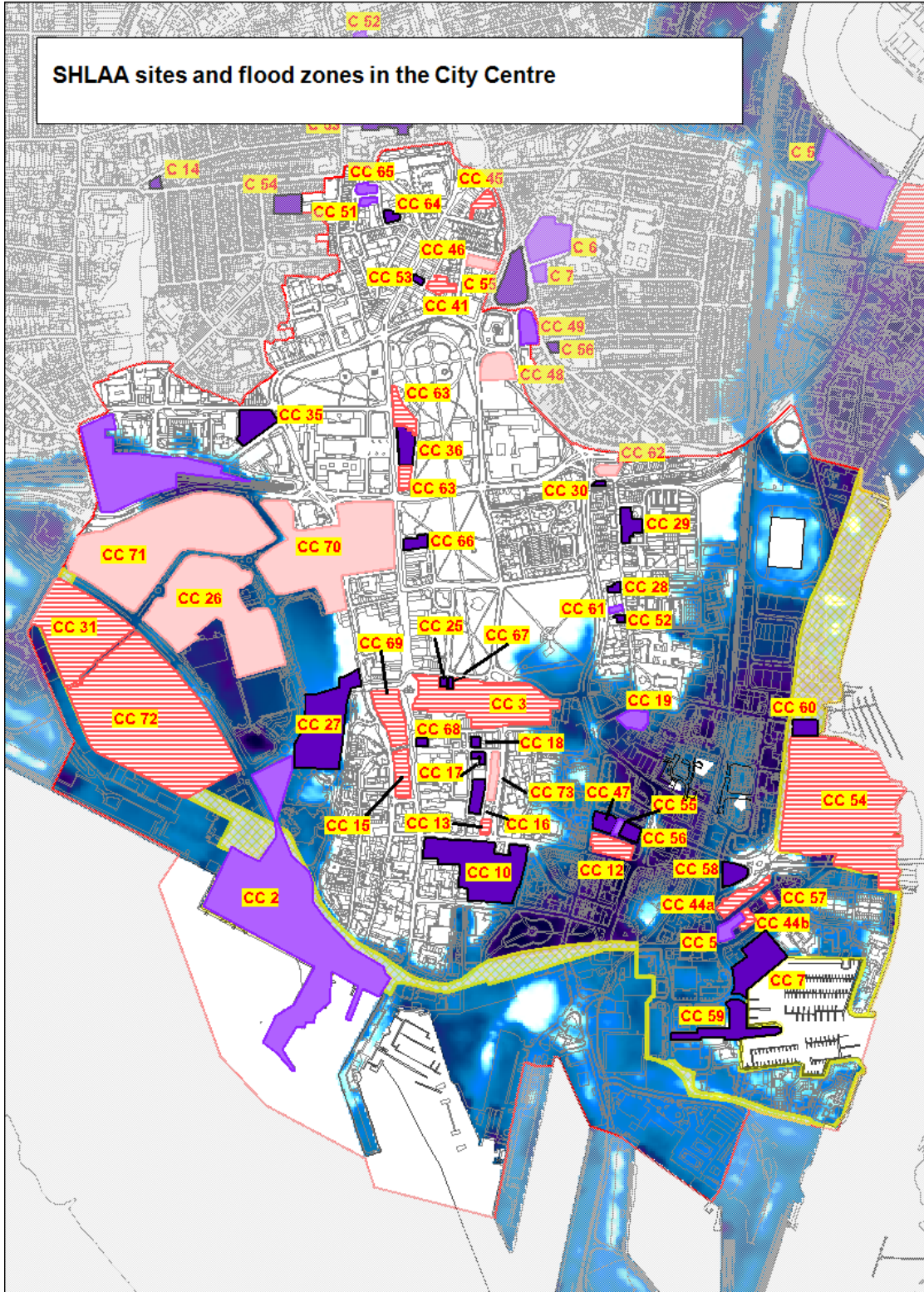
North



Centre



SHLAA sites and flood zones in the City Centre



Appendix 1b: Overview of Development Capacity in Flood Zone 1 within the City Centre.

- 10.13 The following provides an overview of the likely development capacity in those parts of the city centre in flood zone 1. The assessment is undertaken for each quarter. The development sites identified have been factored into the strategic sequential approach (see section above). The assessment below demonstrates that there is unlikely to be any additional significant development capacity in these areas.

Heart of the City

- 10.14 Development sites in flood zone 1:
CCAP allocations:
-East Street Shopping Centre and Queens Buildings (Debenhams)
Other sites in retail background paper:
-Above Bar St / Bargate St
-Above Bar St / Pound Tree Lane
-Above Bar St / Civic Centre Rd
Other sites in SHLAA:
-CC66: Park House
- 10.15 The eastern half of this area lies within flood zone 1. This consists of the primary shopping area, and includes 4 shopping malls and the main shopping street. The first priority is to promote further retail development. There is some additional development potential, as identified above. However the area is fully developed as a retail area, which limits the potential net gain of retail development. The potential for further development is constrained by existing land values and ownerships.

Station Quarter

- 10.16 The northern part of the Station Quarter is within flood zone 1. The area includes generally modern office blocks along Commercial Road; and residential flats at Wyndham Court; which offer little or no development potential. The Nelson Gate area consists of older office blocks. The Plan protects this area for office use. There may be scope for redeveloping some of these offices, which could include a limited element of residential development. The SHLAA includes an allowance for converting some office to residential space.

Old Town

- 10.17 Development sites within flood zone 1:
CCAP allocations:
-Fruit and Vegetable Market
-Bargate sites
-Albion Place and Castle Way car parks
-144 – 164 High Street

Other sites in SHLAA:

-6 sites in High Street, East Street, Canal Walk, Queensway area (CC 13, 16, 17, 18, 68, 73)

- 10.18 The majority of the area lies within flood zone 1. The Old Town is a conservation area, with a range of listed buildings and structures. This constrains the ability to provide further major development beyond the sites listed above.

Cultural Quarter

- 10.19 Development sites in flood zone 1:

CCAP allocations:

-Northern Above Bar

Other sites in SHLAA:

-CC35: Mayflower Halls

- 10.20 The area lies within flood zone 1. Significant parts of the area have little or no development potential. The Civic Centre / Guildhall have established occupiers and are listed buildings. The BBC studios and Mayflower Theatre also have established occupiers.

University

- 10.21 Development sites in flood zone 1:

CCAP allocations:

-East Park Terrace

-St Marys Road

- 10.22 The area lies within flood zone 1. The University are preparing a master plan for their campus, incorporating the East Park Terrace site. This area is likely to accommodate University uses, although there may be some surplus land for general development. The Charlotte Place area consists of a recently completed office / hotel complex, with no further development potential.

St Marys

- 10.23 Development sites in flood zone 1:

CCAP allocation:

-St Marys Street / Old Northam Road

- 10.24 Significant parts of the area lie within flood zone 1. Most of this area within flood zone 1 offers little development potential, consisting of established residential estates, Southampton College and St Marys Church. There is some potential for small scale redevelopment along St Marys Road and Old Northam Road, which may yield some further residential development, although the additional numbers of residential units are likely to be modest. Sites have already been identified in the SHLAA.

Bedford Place

- 10.25 Development sites in flood zone 1:
- 10.26 Sites in office background paper:
-Cumberland Place
Sites in SHLAA:
-8 small sites (CC 41, 45, 46, 51, 53, 55, 64, 65)
- 10.27 The area lies within flood zone 1. The southern part of the area along Cumberland Place consists predominately of major purpose built office developments. The Plan protects these areas for office uses. There may be scope for redeveloping some of these offices, which could include a limited element of residential development. The SHLAA has included an allowance for conversion from offices to residential.
- 10.28 London Road and Bedford Road are shopping streets. There may be scope for limited redevelopment. However they are unlikely to offer major development potential.
- 10.29 Carlton Crescent is occupied mainly by offices and is in a conservation area. It is unlikely to offer any development potential.
- 10.30 The remaining 'backland' areas consist of a mix of development. This area is likely to offer some development potential for residential uses, and some proposals have been made. A number of sites have already been identified in the SHLAA.

Central Parks

- 10.31 The area lies within flood zone 1. The area is protected parkland and offers no development potential.

Appendix 1c: Development Sites Allocated by the Plan in Flood Zones 2 and 3

Station Quarter

Type of use envisaged

Offices	-	<i>Less Vulnerable</i>
Residential (to upper floors)	-	<i>More Vulnerable</i>
Open space (civic plazas)		<i>Water-compatible Development</i>

Planning Concept for this site

- 10.32 As one of the key arrival points into the city centre the aim is to develop a hub of office development with an enhanced railway station. High density in nature, the developments will also include residential elements to upper floors. The public realm will be improved by providing civic plazas north and south of central station, facilitating significantly improved links with the city centre and MDQ.

Can the concept be met elsewhere? (could the proposals be redirected to Zones 1 or 2)

- 10.33 Central Station is the only railway station in the city centre and also provides good bus links to the rest of the city and connections to the cruise terminal; as such it represents the only option to deliver a high density development located at a sustainable transport hub. There are no alternative transport hubs or quarters to consider taking forward.

Heart of the City

Type of use envisaged

Retail	-	<i>Less Vulnerable</i>
Restaurants	-	<i>Less Vulnerable</i>
Offices	-	<i>Less Vulnerable</i>
Bars	-	<i>More Vulnerable</i>
Residential (to upper floors)	-	<i>More Vulnerable</i>

Planning Concept for this site

- 10.34 In the near term the main objective for this area is the enhancement of retail uses; redevelopment will take place in some blocks with retail and leisure promoted, whilst other mixed use developments will be encouraged to improve the vitality of the city centre. In the longer term there will be an expansion of the shopping area westwards into the MDQ to include redevelopment of the retail warehouse park.

Can the concept be met elsewhere? (could the proposals be redirected to Zones 1 or 2)

- 10.35 Alternative sites in Zones 1 and 2 were considered and dismissed as being too small for the change required for the Heart of the City. The scale of retail use in this area is critical to the economic health of the city centre, and alternative areas elsewhere in the city centre are too small or do not have the critical level of retail development or geographical benefits required.

Western Gateway

Type of use envisaged

Open space (e.g. civic squares) -	<i>Water-compatible</i>
Restaurants -	<i>Less Vulnerable</i>
Retail -	<i>Less Vulnerable</i>
Offices -	<i>Less Vulnerable</i>
Residential (to upper floors) -	<i>More Vulnerable</i>

Planning Concept for this site

- 10.36 The area offers opportunities to create office and leisure developments, some of them fine grained in nature, as part of a renewed 'gateway' to the city centre with new connections from the Central Station to the waterfront at Royal Pier.

Can the concept be met elsewhere? (could the proposals be redirected to Zones 1 or 2)

- 10.37 Alternative sites were considered and dismissed as being too small for the required change envisaged for the Western Gateway. The site enables a large-scale change. The only alternative sites able to deliver this scale of change are the MDZ and Royal Pier, both in the flood zones themselves.

Royal Pier

Type of use envisaged - PPS25 Flood Vulnerability Classification

Open space (Mayflower Park) -	<i>Water-compatible</i>
Marina -	<i>Water-compatible</i>
Cruise and ferry terminals -	<i>Water-compatible</i>
Restaurants -	<i>Less Vulnerable</i>
Retail -	<i>Less Vulnerable</i>
Lorry and car parking -	<i>Less Vulnerable</i>
Offices -	<i>Less Vulnerable</i>
Bars -	<i>More Vulnerable</i>
Hotels -	<i>More Vulnerable</i>

Planning Concept for this site

- 10.38 This area represents the largest area of publically accessible waterfront in the city centre, with the objective of drawing people from the heart of the city through the old town, and from Central Station

through the MDQ. Redevelopment on the waterfront will transform this area into a high quality destination reconnecting the waterfront to the city. A mix of uses are envisaged. Proposals include development fronting Town Quay road and on the site of the dilapidated Royal Pier; relocation of the ferry services; a landmark building; improved access to the waterfront and links through and to the site.

Can the concept be met elsewhere? (could the proposals be redirected to Zones 1 or 2)

- 10.39 The waterfront location adjacent to the heart of the city centre is critical to delivering the concept for the site and is of wider strategic importance for the city. This can not be delivered on alternative non waterfront sites.

Town Depot

Type of use envisaged

Restaurants	-	<i>Less Vulnerable</i>
Offices	-	<i>Less Vulnerable</i>
Bars	-	<i>More Vulnerable</i>
Residential (to upper floors)	-	<i>More Vulnerable</i>
Hotels	-	<i>More Vulnerable</i>

Planning Concept for this site

- 10.40 The concept is a comprehensive redevelopment of the Town Depot site for a mixed use scheme that improves access to the water, high quality public realm and active leisure uses along the frontage. Continuous waterfront access should be created from Ocean Village, and (in the longer term) towards the football stadium.

Can the concept be met elsewhere? (could the proposals be redirected to Zones 1 or 2)

- 10.41 The waterfront location adjacent between Ocean Village and the football stadium, and with links back to the city centre, is critical to delivering the concept for the site and is of wider strategic importance for the city. This can not be delivered on alternative non waterfront sites.

Fruit and Vegetable Market / Holyrood Area

Type of use envisaged

Open space (e.g. civic squares)	-	<i>Water-compatible</i>
Restaurants	-	<i>Less Vulnerable</i>
Retail	-	<i>Less Vulnerable</i>
Offices	-	<i>Less Vulnerable</i>
Bars	-	<i>More Vulnerable</i>
Residential (to upper floors)	-	<i>More Vulnerable</i>

Planning Concept for this site

- 10.42 The site is located to the central southern part of the city centre in a key position between the High Street and retail core and Ocean Village / Oxford Street. A key component will be providing a layout that facilitates ease of movement along desired lines of movement such as between the High Street and Queens Park. This would be a Residential-led mixed use scheme with active uses along the High Street and Bernard Street frontages. The site is a key site in the city centre.

Can the concept be met elsewhere? (could the proposals be redirected to Zones 1 or 2)

- 10.43 Alternative sites were considered. The uses could be located elsewhere in the city centre, but the site is a regeneration opportunity which will provide important links.

College Street

Type of use envisaged

Restaurants	-	<i>Less Vulnerable</i>
Offices	-	<i>Less Vulnerable</i>
Bars	-	<i>More Vulnerable</i>
Residential (to upper floors)	-	<i>More Vulnerable</i>
Hotels	-	<i>More Vulnerable</i>

Planning Concept for this site

- 10.44 The site is split into two separate entities. The southern end is allocated for development as a mixed use site incorporating residential, cafes, restaurants and commercial uses; the northern end for redevelopment for residential, student accommodation or hotel uses. The site must respond to the setting of the adjacent conservation area and retain an element of public car parking; it should follow a block structure with public fronts and private backs. It must also provide pedestrian movements through the site; and improve soft and hard landscaping.

Can the concept be met elsewhere? (could the proposals be redirected to Zones 1 or 2)

- 10.45 Alternative sites were considered. The uses could be located elsewhere in the city centre, but the site remains an important component in this quarter.

Ocean Village

- 10.46 This site has planning permission.

Appendix 2: Site Based Measures

Central Station

The SFRA2

(Volume 3 pages 3-1 – 3-12).

Flood Risk:

Period	
2070 - 2115	The site will start to become affected by a flood risk.
By 2115	Parts of the site will be affected by a 'significant' flood hazard, and flood depths of 0.7 – 1.2 metres.

Management of Flood Risk:

Sequential Approach:	Residential and hotel uses should be located in the areas at least or no risk: to the north of the station, or on upper floors.
Option 1 Strategic Precautionary:	A strategic defence would be implemented so no significant additional measures would be required.
Option 2 Site Specific:	Residential development to the south of the station should be provided with a safe access, eg on to Central Station Bridge. Hotel development may have a shorter lifespan so not be affected by flood risk. Less vulnerable commercial development would require no significant additional measures.
Option 3 Managed Adaptive:	A strategic defence would be implemented by 2070 before the site would be affected by a flood risk. Therefore no significant additional measures would be required.

SCC Analysis of Safe Access

(Maps are in Appendix 3)

The Central Station Bridge extends from land with no flood hazard to the north of the station to raised land and associated raised approach roads to the south of the station. As a result, the analysis suggests these existing roads experience no or low flood risk, so are likely to be able to provide safe access from most parts of the Station Quarter. Nevertheless it should be noted that some of the 'low' flood hazard points will experience flood depths of up to 1 metre (but with low flood velocities). See Appendix X, Map 1, Routes A – D.

Conclusion

The SFRA2's 'managed adaptive' approach requires no significant additional measures. The Plan also requires 'safe access' where possible. The SCC analysis indicates that this is likely to be achievable. It is likely that the site can be developed incorporating all the measures set out in the SFRA2 and the Plan, creating a robust response to the flood risk.

MDQ

SFRA2

(Volume 3 pages 4-1 to 4-10).

Flood Risk:

Period	
2055 - 2070	A small part of the site in the south east starts to become affected by a generally 'low' flood hazard.
2070 - 2115	Nearly all of the site starts to become affected by a flood risk.
By 2115	The site is generally affected by a 'significant' flood hazard, with flood depths of generally 0.5 – 0.8 metres, with variations down to 0.1 and up to 1.2 metres. The central part of the site is lower lying and so it will take longer for flood waters to recede from this area.

Management of Flood Risk:

Sequential Approach:	Residential and hotel uses should be located in north or east of the site where possible, closer to higher land (eg south of the Station, west of Portland Terrace, Watermark WestQuay). The central area is the least preferred area, as flooding will last for longer. (Parts of the southern area experience only a 'low' hazard but are farthest from contiguous dry land).
Option 1 Strategic Precautionary:	A strategic defence would be implemented so no significant additional measures would be required.
Option 2 Site Specific:	The expected lifespan of commercial development ends before a flood risk would occur and so no significant additional measures would be required. There are 3 options for residential development: -Locate only on upper floors in the sequentially preferable areas.

	<p>Or</p> <p>-Raise West Quay Road to provide dry access (and de facto defence) (1 metre over 1.2 km); or to provide safe access (0.3 – 0.6) metres.</p> <p>Or</p> <p>Provide a 'local' defence on the southern boundary and tied in to a similar defence at Royal Pier.</p>
Option 3 Managed Adaptive:	A strategic coastal defence would be implemented by 2070 before the site was affected by a flood risk. Residential and hotel uses could be located on upper floors across the whole site. No significant additional measures would be required.

SCC Analysis of Safe Access

(Maps are in Appendix 3)

The further analysis indicates that there are a number of existing routes which experience no or 'low' flood hazard, or could achieve a 'low' flood hazard with limited route raising. Therefore it is likely that a large part of the MDZ would benefit from safe access. The potential routes to 'dry land' are as follows:

Heart of the City:				
From (site):	Via	To	Nature of Safe Access	Map
Marlands car park		Portland Terrace	Existing route only low flood hazard	Map 2, Route E
West Quay Retail Park or West Quay Site B	Harbour Parade and the Watermark West Quay	Portland Terrace	Existing route generally only a low flood hazard. Small section needs raising by about 13cm.	Map 2, Routes F and G
Western Gateway:				
City Industrial Estate site	West Quay Road and Southern Road	Station Quarter	Part of existing route only low flood hazard. Part would need raising by 5cm to 23cm	Map 3, Route H
Leisure World / West Quay Road Industrial Estate	West Quay Road, Harbour Parade and Watermark	Portland Terrace	Part of existing route only low flood hazard. Part would need	Map 3, Route I and Map 2 Route G

	WestQuay		raising by around 10cm to 50cm	
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In addition the MDQ will be based on a multi storey development concept which may create the opportunity to provide additional higher level safe access routes within an appropriate design concept for the development.

Conclusion

The SFRA2's 'managed adaptive approach requires either that residential uses are located on upper floors, and / or no significant additional measures. This approach is therefore achievable. The Plan also requires 'safe access' where possible. The SCC analysis indicates that this is likely to be achievable. It is likely that the site can be developed incorporating all of the measures set out in the SFRA2 and the Plan, creating a robust response to flood risk.

Royal Pier Waterfront

SFRA2

(Volume 3 pages 5-1 – 5-16).

Flood Risk:

Period	
Before 2055	The southern and western parts of the site become affected by a flood risk, generating flood depths of 0.4 – 1 metre by 2055.
2055 - 2070	Nearly all the site becomes affected by a flood risk. This includes more frequent moderate flooding (1 in 20 annual probability). By 2070 the southern and western parts experience a 'significant' flood hazard.
2070 - 2115	By 2115 the whole site experiences a 'significant' flood hazard, with flood depths of 0.4 – 1.2 metres.

Management of Flood Risk:

Sequential Approach:	Residential and hotel uses should be located in the north of the site where possible.
Option 1 Strategic Precautionary:	A strategic defence would be implemented. Residential development should be located on upper floors given the significant hazard from the residual risk.
Option 2 Site Specific:	There are 2 options for residential development: -Provision of a 'local' flood defence, linked in with a

	<p>similar defence for the MDZ and road raising at Town Quay.</p> <p>Or</p> <p>-Raise the site; by 1 metre, or by 0.5 metres with habitable rooms on upper floors. Safe access via Harbour Parade with limited footpath raising. Commercial development would have an expected lifespan of 60 years, by which time flood depths would be 0.5 – 1 metre. There are 2 options:</p> <p>-Provision of a 'local' flood defence (as above)</p> <p>Or</p> <p>-Floor levels raised above the flood level or to ensure only minimal flooding.</p>
Option 3 Managed Adaptive:	<p>A 'local' defence would provide protection until 2070, by which time this have extended into a strategic defence. This would avoid the need to raise Town Quay. Residential development should be located on upper floors given the significant hazard from the residual risk.</p>
Other:	<p>The effects of 'tide locking' on drainage should be assessed and may require additional storage.</p>

SCC Analysis of Safe Access

The further analysis indicates that there are two existing routes which experience no or 'low' flood hazard, or could achieve a 'low' flood hazard with limited route raising. Therefore it is likely that the site would benefit from safe access. The potential routes to 'dry land' are as follows:

Via Town Quay Road. The route to Bugle Street only experiences a low flood hazard. The route to High Street would only need limited raising of about 8cm. (See Map 3, Route K).

Via Western Esplanade. Parts of this route only experience low flood hazard. Other parts would need raising by about 10cm to 50cm. This may be achieved alongside general improvements to Town Quay Road or as part of the Watermark West Quay development, and will need to take account of the setting of the town walls. (See Map 3, Route J).

Conclusion

The 'managed adaptive' approach requires measures to address flood risk until a strategic defence is implemented in 2070. The developer's emerging concept creates a development platform which is raised above 2115 flood levels. This therefore meets the interim requirements to 2070 (as well as providing a key section of the longer term strategic defence). The Plan also requires 'safe access' where possible. The SCC analysis indicates that this is likely to be achievable. It is likely that the site can be developed incorporating

all the measures set out in the SFRA2 and the Plan, creating a robust response to flood risk.

Town Depot

SFRA2

(Volume 3 pages 7-1 to 7-15).

Flood Risk:

Period	
Now	About half the site is affected by flood risk, mainly in the north west, and a 'significant' flood hazard in the south east. The site is affected by more frequent moderate flooding, with flood depths of up to 0.5 metres (1 in 20 annual probability).
By 2055	Nearly all the site is affected by flood risk, generating a 'significant' hazard in most areas, and flood depths of 0.4 – 1 metre.
2070 - 2115	The whole site is affected by flood risk, generating a 'significant' hazard in nearly all areas, and flood depths of 1.5 – 1.8 metres by 2115.
2070 - 2115	By 2115 the whole site experiences a 'significant' flood hazard, with flood depths of up to 1.8 metres (and over 2 metres for the 1 in 1,000 probability event). The more frequent flood events also generate flood depths of 1.5 metres (1 in 20 annual probability).

Management of Flood Risk:

Sequential Approach:	Residential and hotel uses should be located on the western part of the site, which does not experience a 'significant' hazard until the longer term, and can connect to higher land via the Itchen Bridge.
Resistance / Resilience:	Given the high flood depths, development will need to be designed to remain structurally sound (including to manage residual risk). This may require the site to be raised.
Option 1 Strategic Precautionary:	A strategic defence would be implemented. Residential development should be located on upper floors given the significant hazard from the residual risk.
Option 2 Site Specific:	For residential development: Raising the site (or routes) by varying degrees (around 1.5 metres) to achieve either safe or dry

	<p>access across the site. This will achieve safe access to the Itchen Bridge, and hence away from the site.</p> <p>For commercial development: Raising the site by around 1 metre would ensure that development was only affected by 'low' hazard flooding over its lifetime (60 years). Raising floor levels by an additional 0.3 – 0.6 metres would ensure they remain dry.</p>
Option 3 Managed Adaptive:	<p>If the site were raised by 0.3 – 0.8 metres it would only be subject to 'low' flood hazard in 2070, by which time a strategic flood defence would be implemented. Habitable rooms should be located above flood levels.</p>
Other:	<p>The effects of 'tide locking' on drainage should be assessed and may require additional storage.</p>

SCC Analysis of Safe Access

If the site is raised above flood levels it will create a dry access route to the western end of the Itchen Bridge. This then provides continuous dry access across the Itchen Bridge to dry land on the far bank of the river. The Montagu Evans study has undertaken a viability appraisal of development at Town Depot. It included a range of significant costs, including the CIL (which could contribute towards flood defences) and in addition £1.9 million specifically for flood measures). It concluded that a development would still be likely to generate a sufficient financial return to secure its deliverability. The costs assumed are likely to be sufficient to raise the site. Therefore safe access is likely to be deliverable.

Conclusion

In order to create a development which is structurally sound and safe the whole site will need to be raised. This will also address the requirement to incorporate a strategic defence. The SCC analysis indicates that the site can be raised above existing flood levels. It is likely that the site can be developed incorporating all the measures set out in the SFRA2 and the Plan, creating a robust response to flood risk.

Fruit and Vegetable Market

SFRA2

(Volume 3 pages 6-1 to 6-9).

Flood Risk:

Period	
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Now - 2070	The site is not affected by flood risk.
2070 - 2115	Small parts of the eastern side of the site are affected by a flood risk, generating a 'low' or 'significant' flood hazard by 2115.

Management of Flood Risk:

Sequential Approach:	Residential and hotel uses on the south eastern part of the site should be located on upper floors.
Option 1 Strategic Precautionary:	A strategic defence would be implemented so no significant additional measures would be required.
Option 2 Site Specific:	For residential development: Locate residential uses on upper floors and raise parts of the site to create safe access to 'dry' parts of the site. For commercial development: No significant additional measures are required.
Option 3 Managed Adaptive:	A strategic defence would be implemented by 2070 before the site was affected by a flood risk. Habitable rooms should be located on upper floors.

SCC Analysis of Safe Access

Only a part of the site is affected by flood risk, the remainder of the site would be unaffected. It is assumed that limited land / route raising within this site can be delivered to achieve safe access.

Commentary

Development Concept

The Plan promotes residential led mixed use development which could also include offices and small scale retail uses.

Sequential Approach

The Plan requires that the most vulnerable uses are located in the areas of the development site with the lowest flood risk unless there is a clear justification otherwise. The SFRA2 identifies that this would mean locating any more vulnerable uses in the south east corner of the site on upper floors. This can be achieved. Therefore the Plan's sequential approach will be met.

Site Measures

The SFRA2's 'managed adaptive' approach requires no significant additional measures. The Plan also requires 'safe access' where possible. The SCC analysis indicates that this is likely to be achievable.

Conclusion

It is likely that the site can be developed incorporating all the measures set out in the SFRA2 and the Plan, creating a robust response to the flood risk.

Duke Street, Richmond Street and College Street

The SFRA2

(Volume 3 pages 10-1 to 10-8).

Flood Risk:

Period	
By 2055	The eastern edge of the site (predominately parts of the College Street site) are affected by a flood risk, generating a 'low' flood hazard.
By 2070	Significant parts of the site (predominately the College Street and Dukes Keep area) are affected by a flood risk. About half of the College Street site is affected by a 'significant' hazard, with flood depths of up to 0.6 – 0.8 metres. (No information is available for the Dukes Keep site).
By 2115	The whole site is affected by a flood risk; generating a 'significant' flood hazard. Flood depths on the College Street site range from 1 – 2 metres. (No information is available for the remainder of the site)

Management of Flood Risk:

The SFRA2 only assessed the College Street site.

Sequential Approach:	Residential and hotel uses should be located in the areas at least risk: the western parts of the site.
Option 1 Strategic Precautionary:	A strategic defence would be implemented. Residential development should be located on upper floors given the significant hazard from the residual risk.
Option 2 Site Specific:	For residential development: -Raise the site. Or -Locate residential uses on upper floors, create safe access through the site

	<p>And</p> <ul style="list-style-type: none"> -Create safe access to the site by a raised walkway connecting to Central Bridge (although this is a listed structure); or by raising the Threefield Lane / College Street intersection by up to 0.2 metres to achieve safe access through the Holyrood Estate. <p>For commercial development:</p> <ul style="list-style-type: none"> -Raise site (by up to 0.5 – 1 metres in the east).
Option 3 Managed Adaptive:	A strategic coastal defence would be implemented by 2070 before the site was affected by a 'significant' flood hazard. Habitable rooms should be located on upper floors.

SCC Analysis of Safe Access

The further analysis indicates that the existing Threefield Lane route only experiences a low level of flood hazard, so could create a safe access route with no road raising. (See Maps 4).

Conclusion

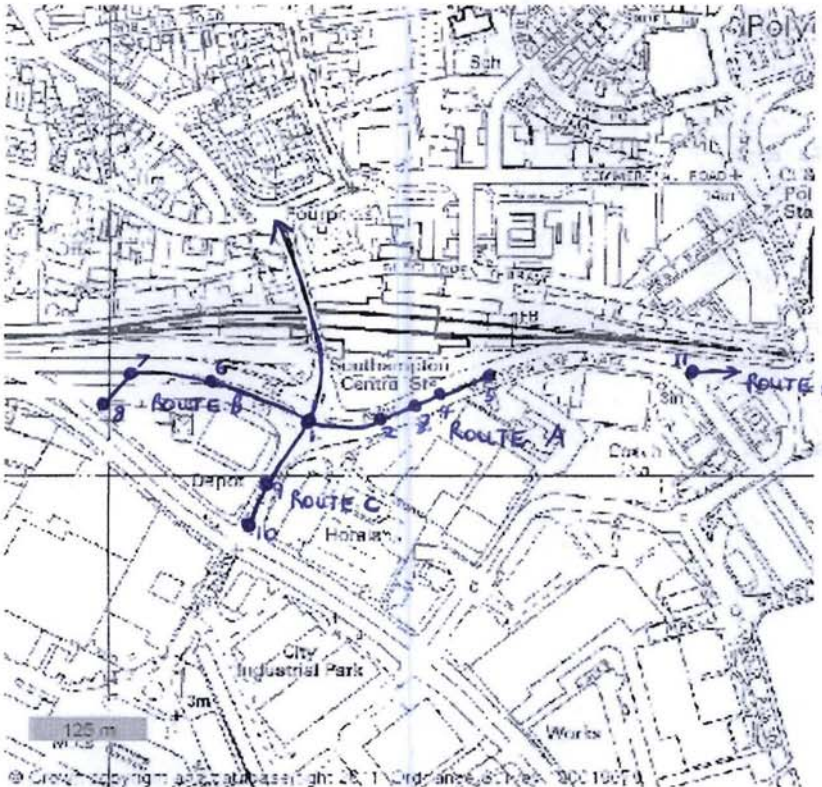
The SFRA2's 'managed adaptive' approach requires no significant additional measures. The Plan also requires 'safe access' where possible. The SCC analysis indicates that this is likely to be achievable. It is likely that the site can be developed incorporating all the measures set out in the SFRA2 and the Plan, creating a robust response to the flood risk.

Ocean Village



The development sites within Ocean Village (Admiral's Quay and the Promontory) have the benefit of planning permission, which has incorporated a consideration of flood risk issues.

Appendix 3: Safe Access Routes

Map 1: Station Quarter: Possible safe routes



See also SFRA2 Figure 10.4.4

Safe route: 
 Route raising to make safe: 

Based on 1 in 200 annual probability event in 2110:

Route A – Western Esplanade

	Flood Depth (m)	Flood Hazard	Safe route?	Route raising (m) to make safe	Notes
1	0	None	Yes		
2	0	None	Yes		
3	0	None	Yes		
4	0.68	Low	Yes		
5	1.04	Low	Yes		SFRA2: Significant hazard

Route B – Mountbatten Way

	Flood Depth (m)	Flood Hazard	Safe route?	Route raising (m) to make safe	Notes
1	0	None	Yes		
6	0	None	Yes		
7	0	None	Yes		
8	0.25	Low	Yes		

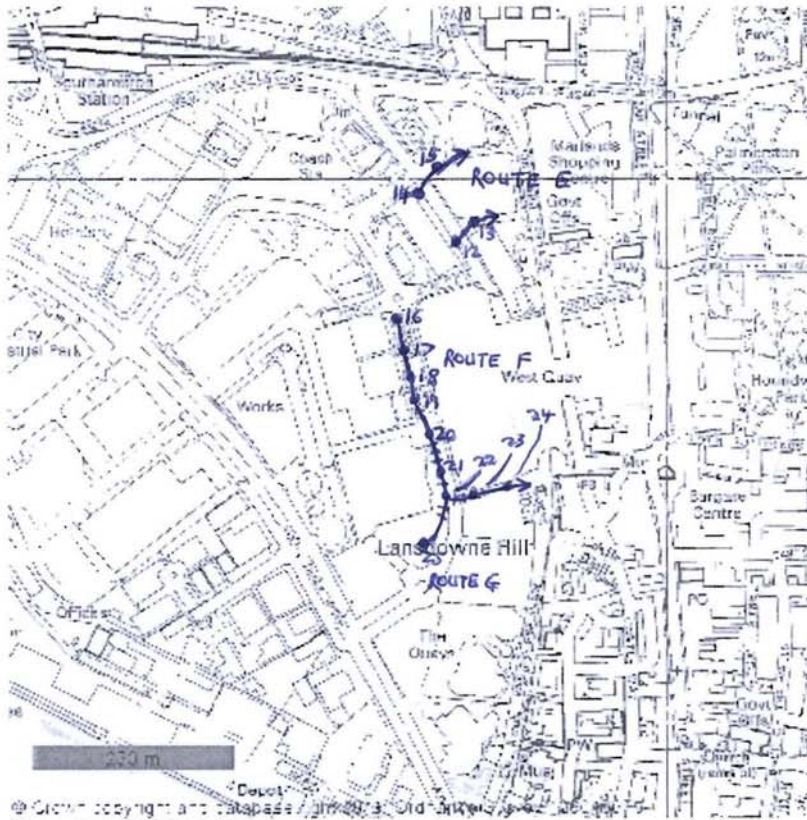
Route C – Southern Road

	Flood Depth (m)	Flood Hazard	Safe route?	Route raising (m) to make safe	Notes
1	0	None	Yes		
9	0.76	Low	Yes		SFRA2: Significant hazard
10	0.63	Low	Yes		



Route D – Civic Centre Road

	Flood Depth (m)	Flood Hazard	Safe route?	Route raising (m) to make safe	Notes
11	0	None	Yes		

Map 2: Heart of the City: Possible safe routes



See also SFRA2 Figure 10.4.4

Safe route: 
 Route raising to make safe: 

Based on 1 in 200 annual probability event in 2110:

Route E – From Marlands multi storey car park

	Flood Depth (m)	Flood Hazard	Safe route?	Route raising (m) to make safe	Notes
12	0.79	Low	Yes		
13	0	None	Yes		
14	0.74	Low	Yes		
15	0	None	Yes		

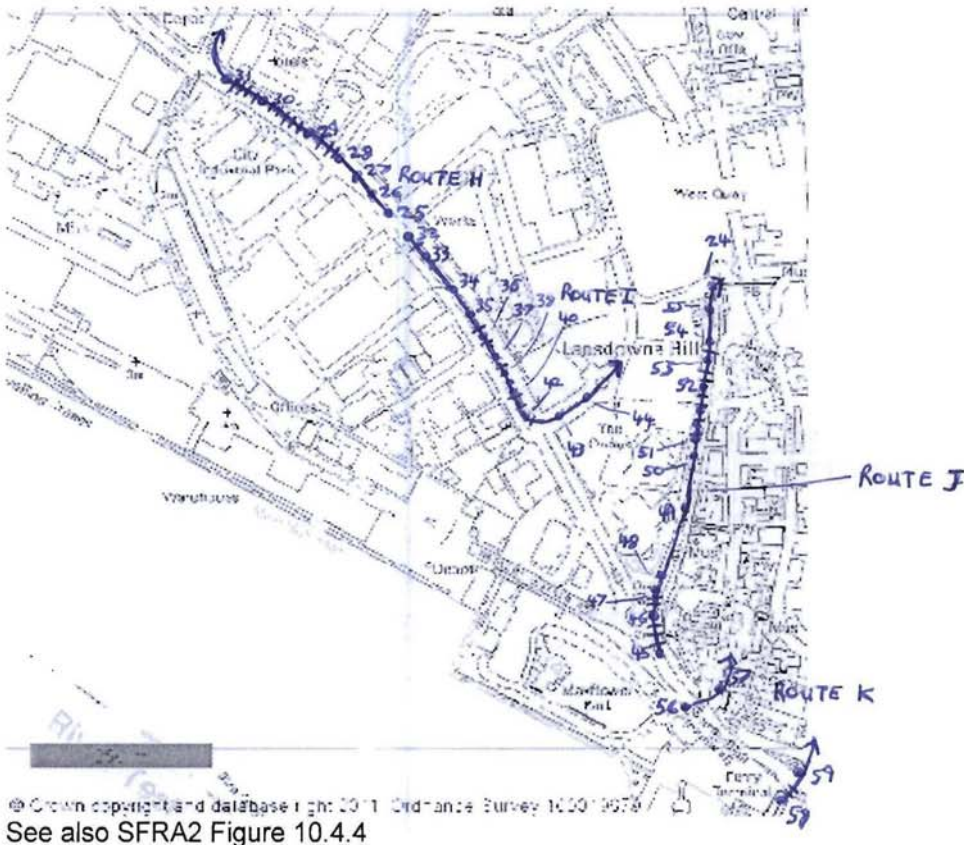
Route F – From West Quay Retail Park

	Flood Depth (m)	Flood Hazard	Safe route?	Route raising (m) to make safe	Notes
16	0.48	Low	Yes		
17	0.3	Low	Yes		
18	0.48	Low	Yes		
19	0.36	Low	Yes		
20	0.33	Low	Yes		
21	0.57	Moderate	No	0.13	
22	0.45	Moderate	No	0.01	
23	0	None	Yes		

Route G – From Watermark West Quay / West Quay Site B

	Flood Depth (m)	Flood Hazard	Safe route?	Route raising (m) to make safe	Notes
25	0.24	Low	Yes		
22	0.45	Moderate	No	0.01	
23	0	None	Yes		
24	0	None	Yes		

Map 3: Western Gateway / Royal Pier Waterfront: Possible safe routes



Safe route: ———

Route raising to make safe: - - - - -

Based on 1 in 200 annual probability event in 2110:

Route H – From City Industrial Estate

	Flood Depth (m)	Flood Hazard	Safe route?	Route raising (m) to make safe	Notes
25	0.43	Low	Yes		
26	0.22	Low	Yes		
27	0.11	Low	Yes		
28	0.53	Moderate	No	0.09	SFRA2: Significant
29	0.67	Moderate	No	0.23	
30	0.49	Moderate	No	0.05	
31	0.45	Moderate	No	0.01	

Route I – From Leisure World / West Quay Industrial Park

	Flood Depth (m)	Flood Hazard	Safe route?	Route raising (m) to make safe	Notes
32	0.68	Moderate	No	0.24	SFRA2: All Significant
33	0.23	Low	Yes		
34	0.08	Low	Yes		
35	0.39	Low	Yes		
36	0.56	Moderate	No	0.12	
37	0.4	Low	Yes		
38	0.81	Significant	No	0.37	
39	0.39	Low	Yes		
40	0.7	Moderate	No	0.26	
41	0.96	Significant	No	0.52	
42	0.88	Significant	No	0.44	
43	0.43	Low	Yes		
44	0.27	Low	Yes		

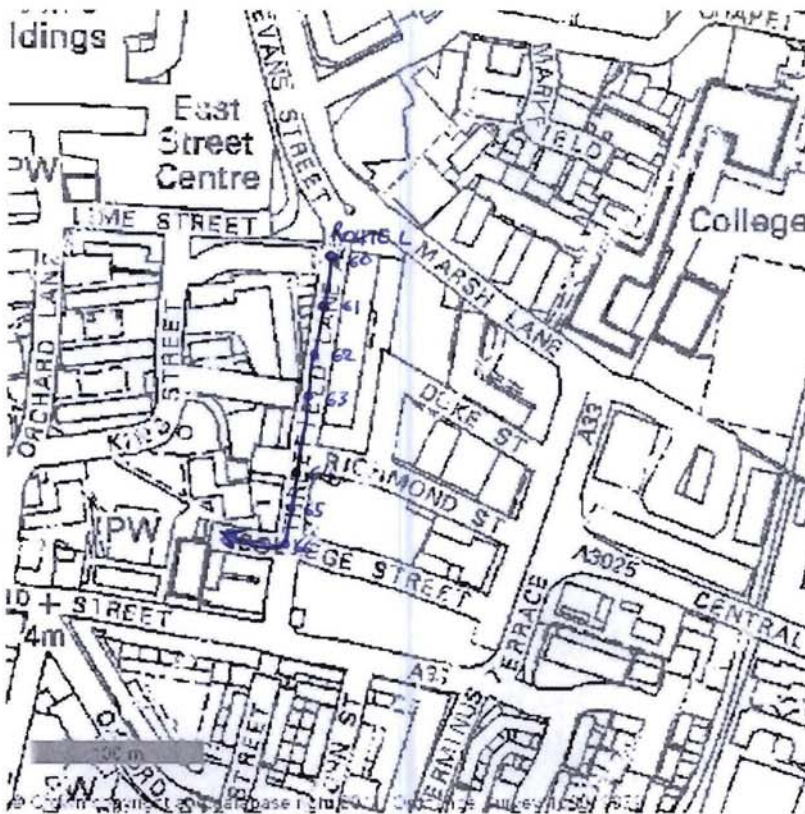
Route J – From Royal Pier Waterfront via Watermark West Quay

	Flood Depth (m)	Flood Hazard	Safe route?	Route raising (m) to make safe	Notes	
45	0.92	Significant	No	0.5	SFRA2: All Significant	
46	0.64	Moderate	No	0.22		
47	0.49	Moderate	No	0.07		
48	0.33	Low	Yes			
49	0	None	Yes			
50	0	None	Yes		Based on existing surface levels before Watermark West Quay	
51	0.62	Moderate	No	0.18		SFRA2: All Significant
52	0.81	Significant	No	0.37		
53	0.75	Significant	No	0.31		
54	0.65	Moderate	No	0.21		
55	0.16	Low	Yes			
24	0	None	Yes			



Route K – From Royal Pier Waterfront to Old Town

	Flood Depth (m)	Flood Hazard	Safe route?	Route raising (m) to make safe	Notes
56	0.11	Low	Yes		SFRA2: Significant
57	0.08	Low	Yes		
Or					
58	0.41	Moderate	No	0.08	SFRA2: Significant
59	0.09	Low	Yes		

Map 4: Duke Street / Richmond Street / College Street: Possible safe routes



See also SFRA2 Figure 10.4.7

Safe route: 
 Route raising to make safe: 

Based on 1 in 200 annual probability event in 2110:

Route L – Across Threefield Lane

	Flood Depth (m)	Flood Hazard	Safe route?	Route raising (m) to make safe	Notes
60	0.72	Low	Yes		
61	0.69	Low	Yes		
62	0.56	Low	Yes		
63	0.38	Low	Yes		
64	0.37	Low	Yes		
65	0.19	Low	Yes		
66	0.23	Low	Yes		

