

TECHNICAL NOTE

JBA Project Code	2017s6773
Contract	Brighton and Hove City Council Strategic Flood Risk Assessment
Client	Brighton and Hove City Council
Date	15 October 2020
Author	Ffion Wilson
Reviewer	Ben Gibson / Alastair Dale
Subject	UKCP18 updates and the impact on site allocation with the City Plan Part 2

1 Introduction

JBA Consulting prepared the Brighton and Hove Level 1 and 2 Strategic Flood Risk Assessment (SFRA) for the City Council in 2018, supporting the evidence base behind Brighton and Hove's City Plan Part 2. At that time, the climate change flood mapping was based on UK Climate Predictions 2009 (UKCP09) guidance, and UK Climate Predictions 2018 (UKCP18) was due to be published.

UKCP18 has since been published and the Environment Agency's guidance¹ has been updated in line with the latest predictions. JBA Consulting has been instructed by Brighton and Hove City Council to prepare this Technical Note which outlines the implications of UKCP18 on the allocation of sites within the City Plan Part 2 regarding tidal and surface water flooding.

This note has been prepared to present the changes in climate change allowances affecting Brighton & Hove, and understand whether the changes affect previous Plan decisions made with respect to site allocations in the City Plan Part 2.

It should be noted that as the Environment Agency Flood Zones are present day flood zones, the UKCP18 does not affect these.

Specific sites highlighted by Brighton and Hove City Council which could be affected by the updated guidance are:

Marina sites

- **Brighton Marina Inner Harbour** (located within DA2 Brighton Marina, Gas Works, and Black Rock Area in the adopted City Plan Part 1)
- **Land at Brighton Marina comprising Outer Harbour West Quay** (and adjoining land) Brighton (located within DA2 Brighton Marina, Gas Works and Black Rock Area in the adopted City Plan Part 1)

Kingsway sites

- **9-16 Aldrington Basin/ Land South of Kingsway Basin Road North** (located within DA8 Shoreham Harbour in the adopted City Plan Part 1)
- **Britannia House, 332 Kingsway** (allocated in the Shoreham Harbour Joint Area Action Plan as AB4 within Policy CA2 Aldrington Basin)
- **336 Kingsway, Hove** (allocated in the Shoreham Harbour Joint Area Action Plan as AB4 within Policy CA2 Aldrington Basin)

¹ Flood risk assessments: climate change allowances, last updated 22 July 2020, Available: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

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2 Data used in the 2018 SFRA and the Environment Agency's updated guidance

This section outlines the climate change data used within the 2018 SFRA and the updates recently made by the Environment Agency following the publication of UKCP18.

2.1 Tidal flood data

The tidal flood data supporting the SFRA for most of the coastline was based on a comparison of the tides level described by the JBA Extreme Sea Level Analysis (2004) and LIDAR data. The predicted cumulative sea level rise used in the 2018 SFRA was 1.21m (from 1990 to 2115) for the 0.5% Annual Exceedance Probability (AEP) flood event. Within the Shoreham Port / Aldrington Basin area, the Arun to Adur section of the East Sussex Coastal model (2012) was used to prepare flood level predictions for the same flood event.

The updated Environment Agency guidance is based on the UKCP18 and provides a range of allowances for each river basin district and epochs for sea level rise. Two allowances termed the "Higher central" and "Upper end" allowances are presented with different rates of net sea level rise for each. The two allowances are based on percentiles, which describe the proportion of possible scenarios that fall within specified allowance levels for respective predictions. The Higher central allowance is based on the 70th percentile (exceeded by 30% of the projections in the range) and the Upper end allowance is based on the 95th percentile (exceeded 5% of the projections in the range). For flood risk assessments and strategic flood risk assessments, the Environment Agency guidance states that assessment of both the higher central and upper end allowances should be completed to understand the range of the potential effect.

In addition to using updated data, the updated guidance assesses a slightly different time period and provides predicted cumulative sea level rise from 2000 to 2125.

For the south east river basin district, the predicted cumulative sea level rises are outlined in Table 2-1.

Table 2-1: Environment Agency's cumulative sea level rise

Allowance	Cumulative rise 2000 to 2125 (metres)
Higher central	1.20
Upper end	1.60

If the yearly allowances from the previous guidance were extrapolated for the time period within Table 2-1, the total uplift would have equated to 1.32m.

The guidance also considered allowances for offshore wind speed and extreme wave height values, which influence overtopping. Within the SFRA, for most of the coastline, wave overtopping was excluded which was considered appropriate when making land use planning decisions.

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2.2 Surface water

Outputs in the 2018 SFRA used the Environment Agency's Risk of Flooding from Surface Water (RoFSW) model, which was run with 30% and 40% uplifts in peak rainfall intensity to account for the potential impacts of climate change.

The Environment Agency's guidance for rainfall allowances has not been updated since the publication of UKCP18. The rainfall intensities are outlined in Table 2-2.

Table 2-2: Environment Agency's peak rainfall intensity guidance

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

The RoFSW model was run for the 2018 SFRA with a 30% uplift in peak rainfall intensity for climate so that developers would consider this as a minimum.

As the RoFSW model was also run with 40% uplift in peak rainfall intensity, the SFRA has taken into account the most recent Environment Agency guidance for the Upper end allowance which would be the worst-case scenario. Therefore, no further work has been undertaken to assess the impacts on the allocation of sites as part of this Technical Note.

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3 Method for assessing potential impacts of latest guidance

The updated tidal climate change guidance sea levels for the 0.5% AEP event (Flood Zone 3a) to the year 2120 were projected onto the ground level data described by LIDAR data to assess whether changes to the guidance in future flood risk could potentially affect planning decisions made relating to the allocation of sites. The results obtained from the LIDAR projections were then categorised into areas which were predicted to lie above or below the climate change sea level.

The Coastal Flood Boundary Dataset (2018) extreme sea level information for the coastline at Brighton and Hove (which has a base year of 2017) was adjusted to reflect the uplift to the year 2120 in accordance with the Higher central and Upper end sea level rise allowances for the period 2017-2120. Extreme sea levels for the 0.5% AEP event vary by 0.12m from the western (lower water levels) and eastern (higher water levels) extents of Brighton and Hove boundary. For the assessment described below, the highest predicted sea water levels were used as a precautionary approach. This conservative approach does not materially change the outcomes of the assessment as the relative level difference at the limits of the area under study are not substantial.

Predicted flood extents using the updated Environment Agency climate change guidance have been compared to the predicted flood extents used in the 2018 SFRA to identify differences and understand whether there are potential effects on previous zoning decisions.

4 Results

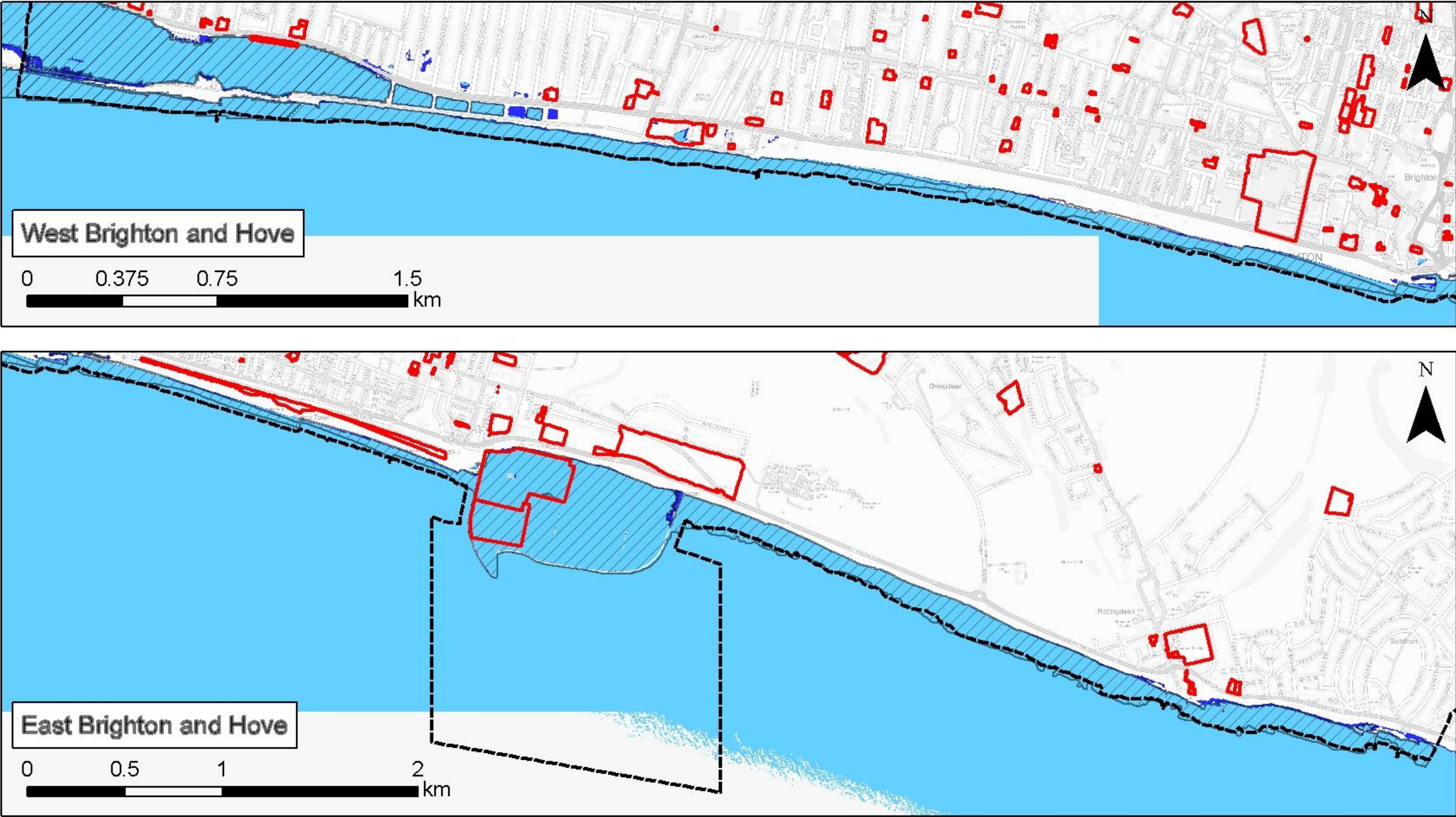
An overview map comparing the predicted tidal 0.5% AEP climate change events is presented in Figure 4-1. The map provides a comparison of the flood extent provided in the 2018 SFRA, along with predicted extents produced for the Higher central and Upper end sea level rise allowances using the latest Environment Agency guidance.

The mapping shows that throughout the city there are no substantive changes in the predicted tidal flood extents using the projected sea level method. As much of the city is protected by shingle beaches and/or cliffs, the flood extents do not significantly extend any further inland than those predicted within the 2018 SFRA. Minor differences in extents may also be expected due to the use of different LIDAR datasets (which might grid resolutions or collection dates that differ)

Figure 4-2 shows the comparison of the predicted flood extents for the Marina sites. There is very little change shown between the flood extent presented in the 2018 SFRA and the extents predicted using the Environment Agency's latest guidance. However, there may be a change in predicted flood depths (which would be expected to be related to the changes in peak water levels described in section 2.1). Planning considerations, for instance with respect to appropriate finished floor level and/or safe access and egress routes, should be investigated further with an SFRA addendum.

A comparison of the predicted flood extents for the Kingsway sites is shown in Figure 4-3. Similarly, to the Marina sites, there are very little changes in the predicted extent presented in the 2018 SFRA and the extents predicted using the Environment Agency's latest guidance. Again, there may be a change in predicted flood depths, and this should be investigated further with an SFRA addendum.

Figure 4-1: Comparison overview map

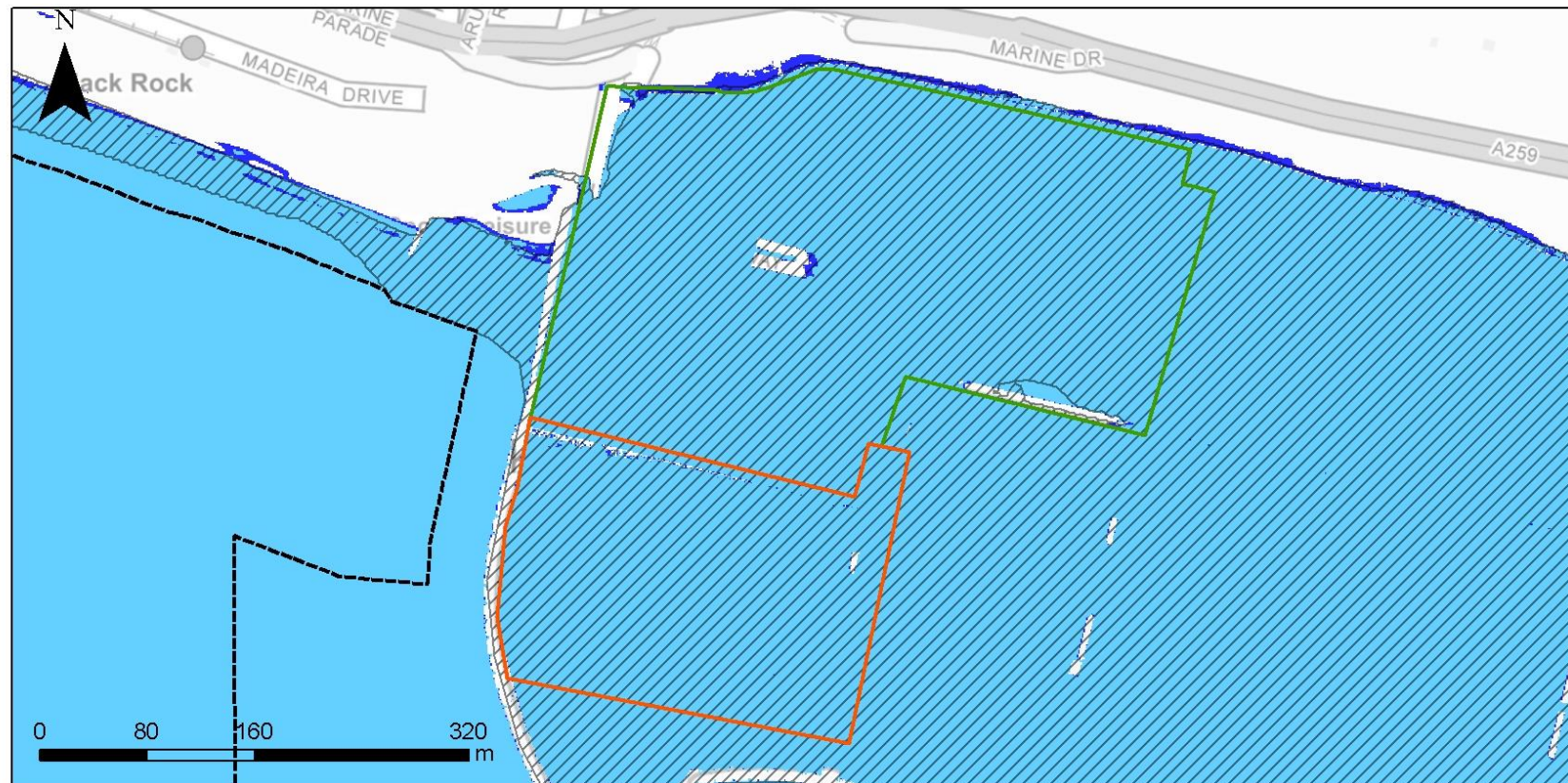


Legend

- Level 1 SFRA sites
- Brighton and Hove City Council boundary
- 0.5% AEP 2115 tidal event (used in the 2018 SFRA)
- 0.5% AEP 2120 tidal event - Higher Central (UKCP18)
- 0.5% AEP 2120 tidal event - Upper End (UKCP18)

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Figure 4-2: Comparison of extents at the Marina sites

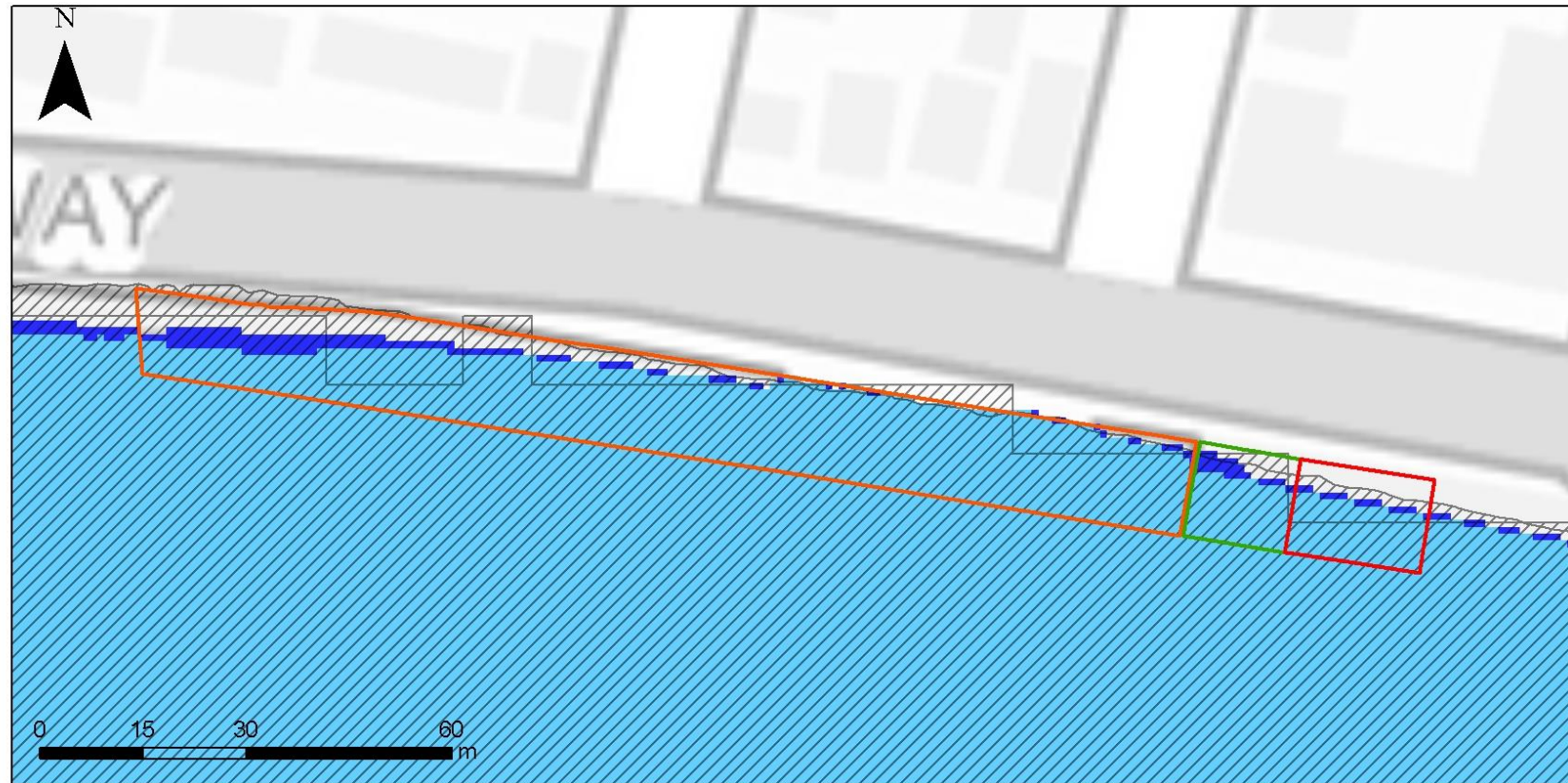


Legend

- | | | |
|---|---|--|
| Level 1 SFRA sites | 0.5% AEP 2115 tidal event (used in the 2018 SFRA) | Land at Brighton Marina comprising Outer Harbour West Quay |
| Brighton and Hove City Council boundary | 0.5% AEP 2120 tidal event - Higher Central (UKCP18) | Brighton Marina Inner Harbour |
| | 0.5% AEP 2120 tidal event - Upper End (UKCP18) | |

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Figure 4-3: Comparison of extents at the Kingsway sites



Legend

- | | | | |
|---|--|---|--|
| Level 1 SFRA sites | Brighton and Hove City Council boundary | 0.5% AEP 2115 tidal event (used in the 2018 SFRA) | Britannia House, 332 Kingsway |
| | 0.5% AEP 2120 tidal event - Higher Central (UKCP18) | | 336 Kingsway |
| | 0.5% AEP 2120 tidal event - Upper End (UKCP18) | | 9-16 Aldrington Basin/ Land South of Kingsway Basin Road North |

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5 Conclusion

5.1 Tidal flood extents

The results of the assessment described in this note show that there are no substantive changes in the predicted coastal/tidal flood extents for Flood Zone 3a when considered circa 100-years in the future, which take account of UKCP18 and the latest Environment Agency climate change guidance. This is due to most of the city being protected by shingle beaches and/or cliffs.

In light of the negligible changes to predicted extents, it is not considered that the new climate change allowances give rise to material effects that would influence decisions on the allocation of sites through the City Plan Part 2, including the Marina or Kingsway sites.

Note that the assessment has focused on Flood Zone 3a, and not Flood Zone 2, given the former is typically used to assess whether residential development is appropriate or not from a planning policy perspective. Future impacts of predicted climate change on the Flood Zone 2 event could be completed via a similar exercise if required.

It is recommended that an addendum to the SFRA is prepared to assess any changes in flood depths due to the updated guidance, to make prospective site developers aware that more recent climate change information is available which must be taken into account. The potential effects of changes to the predicted depths should be investigated further, along with updated potential mitigation options if required.

5.2 Surface water

As part of the 2018 SFRA, the RoFSW mapping was run with 30% and 40% uplifts in peak rainfall. Therefore, the Upper End allowance with the Environment Agency's guidance has been taken into account.

5.3 Allocation of sites

The five sites highlighted in Section 1 have already been allocated through the City Plan Part 1 and the Shoreham Harbour Joint Area Action Plan. The updates to the Environment Agency climate change guidance and UKCP18 and do not present a material change to the evidence used to inform the decision on these allocations.