Stantec

Flood Risk Assessment - Addendum

Hampton Park, Littlehampton
Phase 6a Reserve Matters Application

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1 Scope of Report

1.1.1 This Flood Risk Assessment (FRA) Addendum report has been prepared by Stantec for Persimmon Homes in relation to the delivery of the Phase 6a Reserve Matters Application (RMA) for the Hampton Park development site at Littlehampton.

1.1.2 Stantec has many years of experience in, amongst other areas, the assessment of flood risk, hydrology, flood defence and river engineering. The authors and reviewers of the document are all experienced engineers, and the reviewers are members of chartered institutions such as the Chartered Institution of Water and Environmental Management (CIWEM) or the Institution of Civil Engineers (ICE).

1.1.3 The Phase 6a RMA seeks to deliver 288no. residential units, in addition to children's play spaces, surface water drainage features and public access to Black Ditch.

1.1.4 Design principles for the development were established through the Littlehampton Outline Planning Application (OPA), approved by Arun District Council (ADC) in January 2013 under planning reference LU/47/11. This OPA was accompanied by a 2011 Flood Risk Assessment (FRA) produced by Peter Brett Associates (PBA, now Stantec).

1.1.5 The baseline flood risk data for the site was supplemented by subsequent documents to address preceding RMAs, with the associated design parameters updated as new flood data became available.

1.1.6 This report considers the Phase 6a RMA proposals and assesses these against the above, to demonstrate it meets the criteria established under the original OPA, with due consideration of the subsequent updates to information and associated agreements.

2 Consented Outline Scheme

2.1.1 The Littlehampton Outline Planning Application (OPA) was approved by Arun District Council (ADC) in January 2013 under planning reference LU/47/11.

2.1.2 This application was for a sustainable urban extension to Littlehampton based on a mixed-use development masterplan envisaging 1,260 dwellings, school, commercial, employment and retail uses, and wider landscape and transport improvements – see **Figure 2-1**.

2.1.3 This OPA was accompanied by a 2011 FRA produced by PBA, now Stantec, and the flood risk data for the site was supplemented by subsequent documents to address RMAs, with the design criteria updated as new flood data became available.

2.1.4 The main residential development platform is elevated outside the floodplain to minimise risk to the future occupants, with mitigation for floodplain capacity provided through ground lowering across the central wetland amenity area and over the playing fields/sports pitches area to the east.

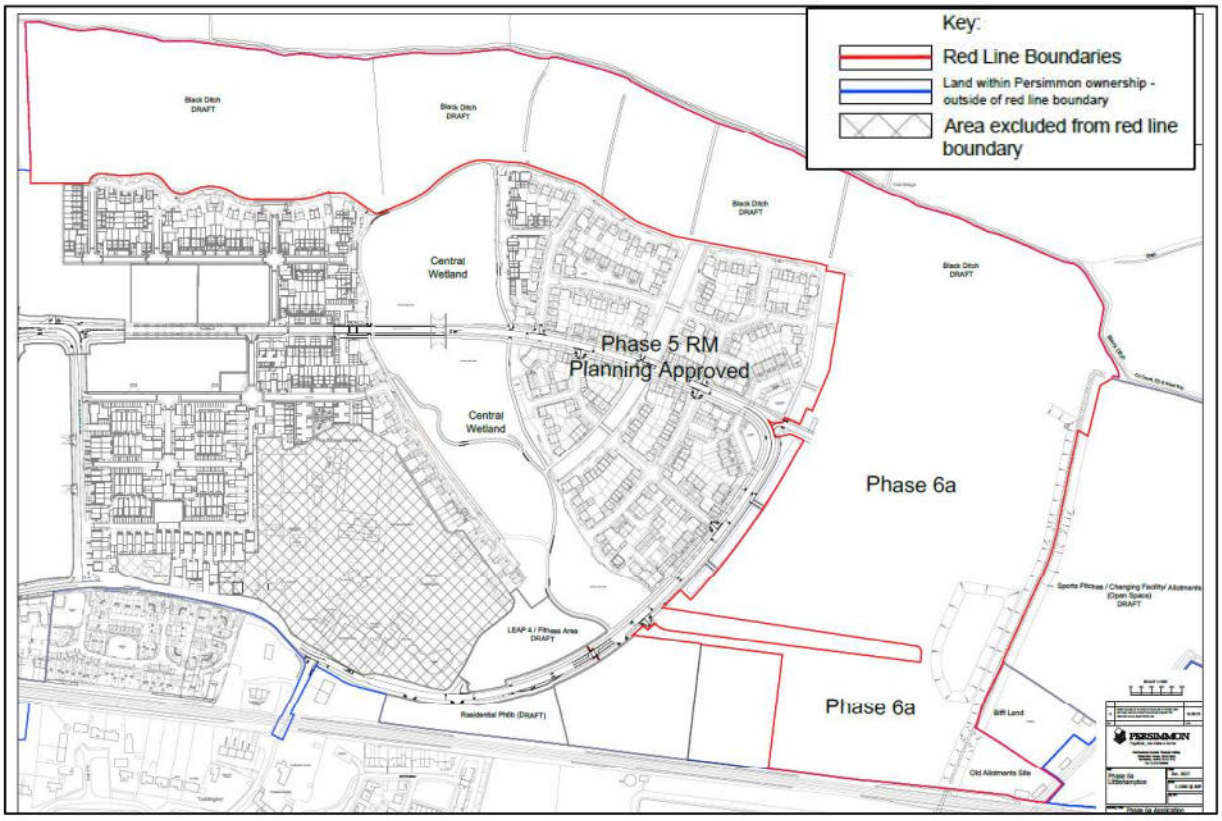
Figure 2-1: Outline Application - Illustrative Masterplan (December 2010)

2.1.5 The current state of development over the site is that western parcels have been approved via RMAs, along with the central wetland feature, and have been built out. Phase 5 is under construction, and the remaining elements on the eastern side of the site – i.e. residential parcel Phase 6a, local centre, Phase 6b, and the open space/sports pitches, facilities and allotments, are remaining to complete.

3 Proposed Reserve Matters Application

3.1.1 This report is to accompany the RMA for Phase 6a – see **Figure 3-1**.

Figure 3-1: Red Line Plan



3.1.2 It seeks to secure the following:

- 288 residential dwellings on Parcels E3, E4, E5, E6 and F2.
- Children's play spaces in the form of 4 LAPS
- SuDS features
- Public access to part of the Black Ditch Open Space

3.1.3 Phase 6a will complete the main residential element of the North Little Hampton Strategic Allocation, as well facilitating public access to some of the Black Ditch open space.

3.1.4 The proposed layout is provided in Persimmon Drawing 547_PL_100b in **Appendix B**.

3.1.5 Further details to demonstrate compliance with the OPA are provided in **Section 5**.

4 Flood Data – Lower Arun Modelling (2010)

4.1 Applicable Hydraulic Model Data

4.1.1 The Black Ditch is the primary source of flood risk to the site, lying to the north and flows west towards the River Arun.

4.1.2 The 2011 FRA and subsequent reference documents utilised data provided by the EA from their Lower Tidal River Arun Strategy (LTRAS) 2010 modelling, which includes both watercourses. The available defended fluvial flood levels and extents from the EA's 2010 LTRAS modelling.

4.1.3 The EA has confirmed that their 2010 Lower Tidal River Arun Strategy (LTRAS) model is still currently the most up-to-date modelling applicable for the area, although an updated flood risk study is currently being carried out (no immediate release date).

4.1.4 When considering reference flood events impacting an area, there are a number of ways that flood magnitudes can be expressed as follows, which all refer to the same severity of flood –

- 1 in 50 (2%) annual probability flood;
- 1 in 50-year flood;
- 50 year return period flood;
- 2% Annual Exceedance Probability (AEP) flood.

4.1.5 For clarity, the report references the event in the form of 'annual probability' ('AP'), to emphasise that there is an equal chance of such an event occurring each and every year.

4.2 Consented Position

4.2.1 The 2011 FRA for the OPA was based on the available flood modelling at the time that provides a (then 'reference') 1 in 100 AP +20% climate change allowance flood level of approximately 3.2m AOD over the Phase 6 development area.

4.2.2 By the time RMAs were submitted for the site in 2020 onwards, the reference applicable climate change scenario had changed to +45%. Since the 1 in 100 AP +45% scenario had not been modelled, it was agreed with the EA that the defended 1 in 1000 (0.1%) AP flood level of 2.38m AOD could be used as a conservative proxy for the applicable design event.

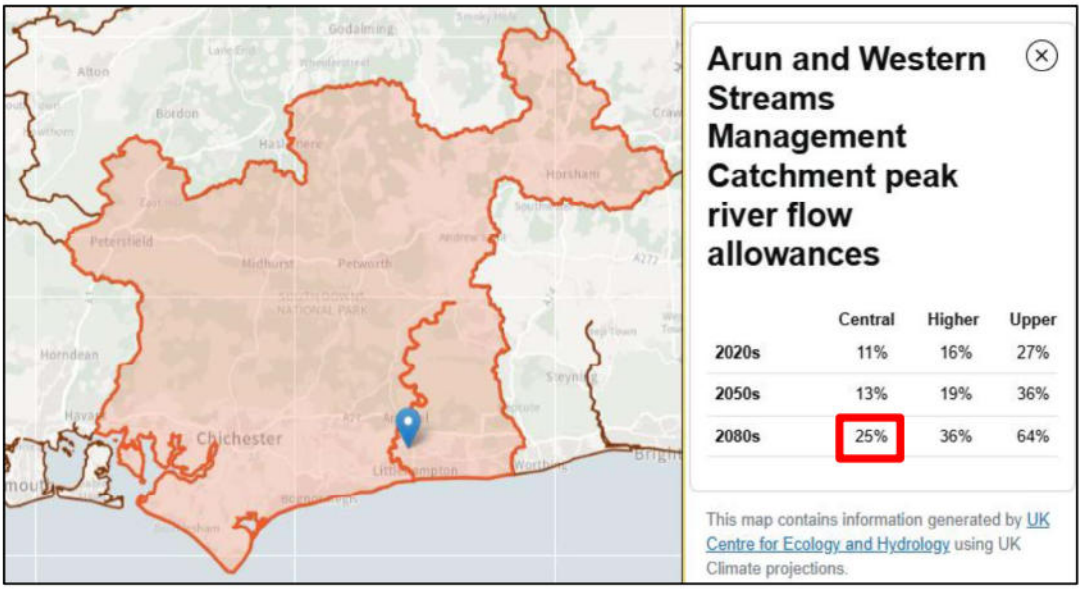
4.2.3 The above was confirmed as part of the RMA for the landscaped wetland corridor (known as the 'Central Wetland Area', which provides the majority of the floodplain capacity) in 2022 (copies of referenced information provided in **Appendix B**) as follows:

- **As part of the EA liaison, it was agreed that Finished Floor Levels (FFLs) across the development would be set a minimum of 500mm freeboard above the 1 in 1000 AP flood level of 2.38m AOD. Since plot levels were proposed at 4.0m AOD or higher, this freeboard was significantly exceeded – see Stantec Technical Note TN003A, September 2021.**
- **A submission was made to the EA in April 2022 (Technical Note TN004), that set out an updated floodplain storage analysis to this flood level, resulting in an overall gain of +8,193.6m^3 – see Stantec Drawing reference 39878_4001_008 rev D 'Flood Compensation'.**
- **This was accepted in the EA letter of approval dated 27th May 2022 (EA ref: HA/2022/123851/04-L01).**

4.3 Reference Flood Data

4.3.1 The latest relevant climate change allowance for this is area is now +25% (Central 2080s allowance for the 'Arun and Western Streams' management catchment – see **Figure 4-1**) and therefore the 1 in 1000 AP previously used is considered an even more conservative proxy for this new design 1 in 100 plus climate change scenario.

Figure 4-1: Climate Change Allowances – Arun and Western Streams



4.3.2 The available defended fluvial flood levels for the eastern area of the site where Phase 6 is located, are shown in **Table 4-1**.

4.3.3 The extreme 1 in 1000 (0.1%) AP event is notably a significant increase of over 500mm from the climate change scenario (and all other levels within a 380mm range).

Table 4-1: EA Modelled Flood Levels – Black Ditch

Modelled Flood Event (Annual Probability (AP))	Modelled Flood Level (m AOD)
1 in 5 (20%)	**1.45**
1 in 20 (5%)	**1.59**
1 in 75 (1.33%)	**1.72**
1 in 100 (1%)	**1.75**
1 in 100 plus 20% climate change	**1.83**
1 in 100 plus 25% climate change *(Extrapolated - applicable level from guidance)*	*1.85*
1 in 1000 (0.1%)	**2.38**

5 Compliance with OPA

The RMA demonstrates compliance with the original 2011 FRA accompanying the OPA as follows:

5.1 Building Floor Levels

5.1.1 The 2011 FRA specified that floor levels of new development would be set a minimum of 500mm above the 1 in 100 (1.0%) AP plus climate change flood level.

5.1.2 As part of the EA liaison on previous RMAs, it was also agreed that Finished Floor Levels (FFLs) across the development would be set a minimum of 500mm freeboard above the 1 in 1000 (0.1%) AP flood level of 2.38m AOD (as proxy for the reference 1 in 100 (1.0%) AP plus climate change flood level).

5.1.3 Since plot levels are proposed at 4.0m AOD or higher, this freeboard is significantly exceeded for the Phase 6a development.

5.1.4 As noted in **Section 4**, if the current planning guidance for climate change is considered (i.e. +25% peak river flow) then the estimated reference flood level would be significantly lower than the agreed design level, at 1.85m AOD, and the available freeboard would be over 2m.

5.2 Floodplain Storage Capacity

5.2.1 Any new development located in the vicinity of a watercourse should be constructed such that it does not detrimentally impact on flow routes or reduce the available floodplain storage over a site; either of which could potentially cause an increase in flood levels on-site or elsewhere. This is considered up to the benchmark of the 1 in 100 (1.0%) AP plus allowance for climate change fluvial flood level.

5.2.2 The 2011 FRA included a flood compensation scheme that demonstrated a gain in storage in accordance with EA requirements up to the then-applicable 1 in 100 (1.0%) AP plus allowance for climate change flood levels over the site.

5.2.3 A baseline flood storage analysis was undertaken to the latest EA flood data as part of subsequent RMAs for the site in 2022. The approved strategy for floodplain compensation is set out in the Stantec drawing reference 39878_4001_008 rev D 'Flood Compensation' (see **Appendix B**) and demonstrates an improvement in floodplain capacity over the wider site of +8,193.6m^3.

5.2.4 In relation to Phase 6a, the residential development is contained on the approved development platform area. The northern part of Phase 6a is retained as part of the Black Ditch Open Space, and it is noted that the alignment of the northern edge of the development platform has been adjusted to retain a greater area of the open space.

5.2.5 Further remodelling of the area to reduce flood risk to sports pitches over the eastern part of the site has been undertaken as part of the 'Open Spaces' RMA prepared in parallel with this document. The analysis undertaken as part of this work demonstrates that the revised ground modelling results in a revised overall site-wide floodplain storage balance of +9,180m^3; a significant betterment compared to existing, and an improvement over the baseline approved floodplain balance (+8,194m^3) of almost 1,000m^3.

5.2.6 Full details of the updated ground remodelling is detailed in the associated 'Open Spaces' RMA. The summary Stantec Drawing 332612482/4001/016 'Flood Storage Analysis and Proposed Ground Levels' is included in **Appendix C** for reference.

5.2.7 As such, the development meets – and exceeds - the baseline requirements and demonstrate a significant betterment in floodplain storage capacity as a result of the amended proposals.

5.3 Surface Water Management

5.3.1 The surface water management proposals are provided separately by Mayer Brown. The approach follows the agreed strategy of the OPA, with on site attenuation to control discharge to local watercourses, designed to the 1 in 100 year plus climate change scenario.

5.4 Safe Access

5.4.1 Although not specifically referenced in the 2011 FRA, continuous safe and dry access is provided to the Local Centre and Phase 6b, and the wider development, in accordance with current national and local planning guidance.

6 Conclusions

6.1.1 This Flood Risk Assessment (FRA) Addendum report has been prepared by Stantec for Persimmon Homes in relation to the delivery of the Phase 6a Reserve Matters Application (RMA) for the Hampton Park development site at Littlehampton.

6.1.2 Design principles for the development were established through the Littlehampton Outline Planning Application (OPA), approved by Arun District Council (ADC) in January 2013 under planning reference LU/47/11, the 2011 Flood Risk Assessment (FRA) produced by Peter Brett Associates (PBA, now Stantec), and with the associated design parameters updated as new flood data became available to address preceding RMAs.

6.1.3 The Phase 6a RMA seeks to deliver 288no. residential units, in addition to children's play spaces, surface water drainage features and public access to Black Ditch.

6.1.4 This report confirms that the RMA remains consistent with the OPA and the subsequent established design parameters as follows:

- Finished Floor Levels (FFLs) across the development are to be a minimum of 500mm freeboard above the extreme 1 in 1000 (0.1%) Annual Probability (AP) flood level of 2.38m AOD (as proxy for the reference 1 in 100 (1.0%) AP plus climate change flood level). As the development platform is a minimum of 4.0m AOD this freeboard will be significantly exceeded;

- The floodplain storage analysis has been reappraised to allow for refinements to the scheme delivered through the RMAs. This results in a revised overall site-wide floodplain storage balance of +9,180m^3; a significant betterment compared to existing, and an improvement over the baseline approved floodplain balance. The Phase 6a RMA contributes to this betterment through a realignment of the northern boundary to retain more low level open space alongside the Black Ditch.

- Surface water management is addressed separately by Mayer Brown. This approach follows the agreed strategy of the OPA, with on site attenuation to control discharge to local watercourses, designed to the 1 in 100 year plus climate change scenario.

- Continuous safe and dry access is provided to all units across the development.

6.1.5 In conclusion, the future users of the proposed development will be at a low risk of flooding, and the development will not increase flood risk elsewhere. It is demonstrated that the proposal complies with the principles established in the OPA FRA (and subsequent RMA submissions/agreements), and the National Planning Policy Framework (NPPF).

Appendix A Proposals

- Persimmon Red Line Boundary Drawing
- Persimmon Proposal Drawings 547_PL_100b rev C

Appendix B Consented Floodplain Storage Drawing and Correspondence

- Stantec Technical Note TN003A, September 2021
- Stantec Technical Note TN004, April 2022 (includes Stantec drawing reference 39878_4001_008 rev D 'Flood Compensation')
- EA letter of approval dated 27th May 2022 (EA ref: HA/2022/123851/04-L01)

Appendix C Floodplain Storage Analysis

- Stantec Drawing 332612482/4001/016 - Flood Storage Analysis and Proposed Ground Levels