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Part 1

Text Only



**PROPOSED RE-DEVELOPMENT
LAND NORTH OF MARKET PARADE, HAVANT, HAMPSHIRE**

**National Planning Policy Framework
Flood Risk Assessment Incorporating
Surface Water and Foul Water Drainage Strategies**

**Report No. 14-006-03A
September 2015**

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Surface Water and Foul Water Drainage Strategies**

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EXECUTIVE SUMMARY

- Odyssey Markides LLP has been commissioned by Hampshire & Regional Property Group to prepare a site-specific Flood Risk Assessment incorporating Surface Water Drainage Strategy (SWDS) and Foul Water Drainage Strategy (FWDS) to accompany the planning application for a re-development on a land north of Market Parade, Havant, Hampshire. A Site Location Plan is provided in **Appendix A**.
- The FRA has been prepared in accordance with the requirements set out in the National Planning Policy Framework (Communities and Local Government, March 2012) (NPPF) and supporting guidance and in line with the finding of the following information available at the time of the report:
 - Partnership for Urban South Hampshire Strategic Flood Risk Assessment (Atkins, Dec 2007) (PUSH SFRA);
 - Partnership for Urban South Hampshire: Integrated Water Management Strategy (Atkins, Dec 2008);
 - Partnership for Urban South Hampshire Online Flood mapping. (<http://maps.hants.gov.uk/push/Map.aspx>);
 - Havant Borough Council Draft Local Plan (Allocations) – Flood Risk Assessment, November 2012;
 - Havant Borough Council Strategic Flood Risk Assessment Supplement Section 6 Addendum (SD09/F/04), October 2013;
 - Topographical Survey undertaken by Solent Surveys, July 2013; Ref. 13355-S1;
 - Environment Agency Online Mapping (<http://www.environment-agency.gov.uk/homeandleisure/floods/default.aspx>);
 - Environment Agency Correspondence, June 2015;

- British Geological Survey Data;
 - Southern Water Services Ltd (SWSL) Foul and Surface Water Asset Plans, June 2015. Ref. 196951.
-
- The existing site is a brownfield site previously comprised a three storey terraced building for commercial and residential uses, which has now been demolished and replaced by a temporary car park. Access to the site is currently gained via Market Parade to the south of the site.
 - The re-development proposal consists of circa 130 new residential apartments with 6 commercial units on ground floor and associated infrastructure and 58 basement car parking spaces. Access to the site will be gained via a give way priority junction onto North Street to the east of the site.
 - The hard standing area will slightly increase over the existing. The SuDS in the form of flow controls, downstream defender and cellular storage units have been proposed as part of the SWDS for attenuation. The conveyed runoff will be discharged at a restricted rate equivalent to the existing 1 year brownfield flow rate of 28.3 l/s to the existing public surface water sewer in North Street. A pump will be required for conveying the surface water runoff from the rooftops and basement car park to the drainage system at ground level. The SWDS is discussed in more detail in **Section 9** of this report.
 - The FWDS will be designed in accordance with SWSL requirements and will discharge to the existing public foul sewers to the south and east of the site subject to a drainage survey and further review with SWSL during the detailed design stage. Connections would be made under a Water Industry Act (WIA) Section 106 Agreement with SWSL. The FWDS is discussed in detail in **Section 10** of this report.

1.0 INTRODUCTION

1.1. Odyssey Markides has been commissioned by Hampshire & Regional Property Group to prepare a site-specific Flood Risk Assessment (FRA), Surface Water and Foul Water Drainage Strategies to accompany the planning application for a proposed re-development a land north of Market Parade, Havant, Hampshire. The development proposals comprise of circa 130 new residential apartments with 6 commercial units on ground floor and associated infrastructure and 58 basement car parking spaces. A copy of the Site Location Plan is presented in **Appendix A**.

1.2. The circa 0.23ha site is a brownfield site which previously comprised of a three storey terraced building for commercial and residential uses. This has now been demolished and replaced by a temporary car park. The land parcel is bordered by Havant railway station to the north, 2-3 storey buildings providing ground floor retail frontage with office/residential use above to the east and the south, and the Market Parade pedestrianised shopping parade to the west.

1.3. Upon review of the Environment Agency's (EA) Flood Mapping, the site is located within Flood Zone 1 considered to be a low risk of flooding from fluvial and tidal sources.

1.4. The Partnership for Urban South Hampshire Strategic Flood Risk Assessment (Atkins, Dec 2007) (PUSH SFRA) 2115 flood mapping identifies that the site is potentially located within the fluvial Flood Zone 3 extent in the Year 2115. Therefore, the development site may be susceptible to future fluvial flooding. However, Havant Borough Council (HBC) SFRA Addendum SD09/F/04 confirms that the development site is allocated for regeneration under the Local Plan and an appropriate deliverable and safe development can be achieved on this site, and hence it is concluded that the sequential and exception tests have been met.

1.5. This FRA has been prepared in accordance with the requirements of National Planning Policy Framework (NPPF, 2012) with due regard to the PUSH SFRA (Atkins, Dec 2007), Havant Borough Council Flood Risk Assessment (Nov 2012) (HBC FRA) and SFRA Supplement Addendum (SD09/F/04) (Oct 2013), and EA data and correspondence.

2.0 RESIDENTIAL DEVELOPMENT PROPOSALS

2.1 The existing brownfield site is being put forward for re-development into a multi-storey building comprising circa 130 residential apartments dividing into 36 x one-bed and 94 x two-bed apartments and 6 commercial units (A1-A5 and B1a uses) with 1,166m² of total floor space, together with associated infrastructure and 58 basement car parking spaces. A copy of the proposed Masterplan is presented in **Appendix A**.

2.2 A new access to the basement car park will be provided via a ramp from North Street east of the site. Pedestrian access is provided from North Street, Market Parade and the pedestrianised shopping parade.

2.3 The existing public highway pedestrian footpath bordering around the site will be retained.

2.4 The overall proposed impermeable area of the new development is approximately 0.22ha, which is a negligible increase from the pre-development impermeable site area of 0.21ha.

2.5 The surface water runoff from the proposed development will be managed using a Sustainable Drainage System (SuDS) management train in the forms of flow controls, downstream defender and cellular storage units to attenuate and convey the surface water run-off from the buildings and access ramp/basement to the existing sewer network at a restricted rate equivalent to the existing 1 year brownfield flow rate of 28.3 l/s. A pump will be required for conveying the surface water runoff from the rooftops and basement car park to the proposed drainage network at ground level. The SWDS is discussed in detail in **Section 9.0**.

2.6 The FWDS for the new development will be designed in accordance with Sewers for Adoption 7th Edition and Part H of the Building Regulations and to SWSL requirements. The possible points of connection to existing public foul sewer networks are located to the south and east of the site subject to a drainage survey and further review with SWSL during the detailed design stage. Connection would be made under a

Water Industry Act (WIA) Section 106 Agreement with SWSL. The FWDS is discussed in detail in **Section 10**.

3.0 BASELINE CONDITIONS

Sources of Information

3.1 The baseline conditions have been established using the following sources of information:

- Partnership for Urban South Hampshire Strategic Flood Risk Assessment (Atkins, Dec 2007);
- Partnership for Urban South Hampshire: Integrated Water Management Strategy (Atkins, Dec 2008);
- Partnership for Urban South Hampshire Online Flood mapping. (<http://maps.hants.gov.uk/push/Map.aspx>);
- Havant Borough Council Draft Local Plan (Allocations) – Flood Risk Assessment, November 2012;
- Topographical Survey undertaken by Solent Surveys, July 2013; Ref. 13355-S1;
- Environment Agency Online Mapping (<http://www.environment-agency.gov.uk/homeandleisure/floods/default.aspx>);
- Environment Agency Correspondence, June 2015;
- British Geological Survey Data;
- Southern Water Services Ltd (SWSL) Foul and Surface Water Asset Plans, June 2015. Ref. 196951.

Site Description

3.2 The circa 0.23 hectares site is located in Market Parade, Havant, Hampshire, approximately 9.8km to the north east of Portsmouth city centre and approximately 480m to the north east of Havant Solent Retail Park. The site is bordered by Havant Railway

Station to the north, 2-3 storey buildings providing ground floor retail frontage with office/residential use above to the east and the south, and the Market Parade pedestrianised shopping parade to the west.

3.3 The site is a brownfield site previously used for C3 residential dwellings and B1 commercial/retail units. The site consisted of a three storey terraced building with car parking spaces provided in the centre of the site.

3.4 Vehicular access to the site was gained from Market Parade, to the south of the site, for car parking in the centre of the site.

Topography

3.5 The site topography generally has a gentle profile falling from north to south with the site sloping at a gradient of 1 in 112. The site highest level is approximately 9.24mAOD at the car parking area northwest of the site and the lowest level is approximately 8.93m AOD at the main entry south of the site. The topographical survey is presented as **Appendix B**.

Geology

3.6 BGS mapping indicates that the majority of the site is underlain by the London Clay formation which comprises of sand, silt and clay. The mapping also indicates a HEAD superficial deposit which is generally comprises of gravel and clay.

3.7 Historical borehole logs from the BGS database taken within the site indicates that the made ground is underlain by approximately 1.5m thick gravel with clay over London Clay which was proven at 3.5m thick whereby the borehole was completed. These findings should be verified via on site intrusive ground investigation.

3.8 Based on the limited depth of the granular soils over the London Clay formation across the site it is anticipated that infiltration drainage will be unsuitable for this site. However, site intrusive ground investigation and infiltration tests should be undertaken to

establish any site specific infiltration potential. Extracts from the BGS database are presented as **Appendix C**.

Hydrology

3.9 The EA's Flood Map and correspondence confirms that the site is located in Flood Zone 1, and is considered to be at low risk of flooding from fluvial and tidal sources. This Flood Map is presented as part of **Appendix D**.

3.10 The Lavant Stream runs through the City Centre of Havant with a section of the river being culverted between south of Havant Park and a junction of North Street/Market Parade/Prince George Street, and the nearest point of Lavant Stream in relation to the site is located at the junction to the south eastern corner of the site. The Lavant Stream is designated as a main river by the EA. The Lavant Stream flows in north to south direction before confluence with Langstone Channel 3.6km to the southwest of the site.

3.11 The PUSH SFRA 2115 flood mapping identifies that the site is potentially located within the future fluvial Flood Zone 3 extent in the Year 2115. However as the development site is identified as a regeneration opportunity under the Local Plan and appropriate deliverable and safe development can be achieved on this site, HBC concluded that the sequential and exception tests have been met by the site. An extract of the PUSH SFRA Flood Mapping of climate change in the Year 2115 is present as **Appendix E**, and an extract of HBC SFRA Addendum is present as **Appendix F**.

3.12 The flood hazard mapping provided within the SFRA provides a breakdown of Flood Zones 2 and 3 in terms of hazard of flooding within these zones without consideration of the effect of any existing flood defences. The current hazard rating for the site is low as indicated on the mapping. Extract of the PUSH SFRA Flood Hazard Map is present as **Appendix E**.

3.13 As the development site has met the requirements as set by the sequential and exception tests criteria for Flood Zone 3, the land within the future floodplain is, therefore, considered to be suitable for development, subject to meeting the requirements of the HBC SFRA Addendum.

Hydrogeology

3.14 The EA's online groundwater mapping indicates that the site is located over a Groundwater Protection Zone 1c designated within the subsurface below the made ground. The Groundwater Vulnerability Zone is designated as Minor Aquifer – High. The site is located over a designated aquifer superficial deposit (Secondary A). The extracts of EA's Flood Maps are presented as part of **Appendix D**.

3.15 The PUSH SFRA's flood hazard mapping indicates that there is no record of historical groundwater flooding in the vicinity of the site. However, the site is shown to lie over a bedrock deposit with moderate to low permeability, and the overland flow mapping indicates the site located in an area with a high to very high risk as a potential source of overland flow. It should be noted that this is due to it being an urban area with higher potential run off from urban uses. Extract of the PUSH SFRA Other Forms of Flooding Map is present as **Appendix E**.

Existing Drainage

3.16 The topographical survey shows drainage inspection chambers within the site. However the survey does not show which is foul or surface water or the route of the existing drainage. The existing points of connection to SWSL network are to be established prior to commencement of detailed design, so they may be utilised where possible.

3.17 SWSL mapping shows the existing 600mm diameter surface water arched-shape brick sewers located to the east of the site running along North Street in southerly direction, and it is assumed to be connected to the culverted Lavant Stream to the south east corner of the site based on the EA Main River and SWSL mapping. The nearest existing manhole for potential connection is located adjacent to the main entry of the proposed development with manhole ref. 8551 subject to existing drainage connection review.

3.18 SWSL mapping shows 2 No. of existing 225mm diameter foul water sewers located to the south and east of the site on Market Parade and North Street respectively,

which connect to the 300mm diameter foul water sewer running in southerly direction along North Street. SWSL mapping also shows an existing 225mm diameter foul water sewers located to the south west of the site on Market Parade running in southerly direction along Market Parade towards Elm Lane. The existing manholes referenced 7501, 7402 and 8501 located to the south and the east of the site is believed to have been the possible discharging points from the existing development, though this will need to be confirmed prior to detailed design.

3.19 Proposals for the discharge of the surface water and foul water are outlined in **Section 9.0** and **10.0** respectively. Extracts of the Southern Water records are present as **Appendix G**.

4.0 FLOOD RISK LEGISLATION AND POLICY

National Policy

National Planning Policy Framework 2012

4.1 The National Planning Policy Framework 2012 (NPPF) replaced all planning policy statements (including Planning Policy Statement 25: Development and Flood Risk) upon publication in March 2012.

4.2 The NPPF sets out Government's planning policies for England and how these policies should be applied. The technical guidance to the NPPF, the Planning Practice Guidance, March 2014 (PPG) was published to accompany the NPPF. The PPG is an online document and provides additional guidance and links to relevant current detail documents.

4.3 The NPPF states that *"inappropriate development in areas at risk of flooding should be avoided by directing development away from areas of highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere."*

4.4 Furthermore, the NPPF identifies that Local Plans should be supported by Strategic Flood Risk Assessment (SFRA) taking account of advice from the EA and other relevant flood risk management bodies.

4.5 When determining planning applications, Local Planning Authorities (LPAs) should ensure flood risk is not increased elsewhere and only consider appropriate development in areas at risk of flooding where, informed by a site-specific flood risk assessment (FRA) following the Sequential Test (and if required, the Exception test) it can be demonstrated that:

- Within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location;

- Development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and it gives priority to the use of sustainable drainage systems. (NPPF, 2012)

4.6 In accordance with the NPPF, a site specific FRA is required for:

- Proposals of 1 hectares or greater in Flood Zone 1,
- All proposals for development in Flood Zone 2 and 3,
- An area within Flood Zone 1 which has critical drainage problems,
- Development or change of use to a more vulnerable class may be subject to other sources of flooding.

4.7 All land in England and Wales is classified into three main Flood Zones which refer to the probability of river or sea flooding (ignoring the existence of defences). The PPG identifies and describes the EA Flood Zones as:

- Flood Zone 1: Low Probability defined as land assessed as having less than 1 in 1,000 annual probability of river or sea flooding (<0.1%)
- Flood Zone 2: Medium Probability defined as land assessed as having between 1 in 100 and 1 in 1,000 annual probability of river flooding (1% - 0.1%) or between 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% - 0.1%)
- Flood Zone 3a: High Probability defined as land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of sea flooding (>0.5%)
- Flood Zone 3b: The Functional Floodplain defined as land where water has to flow or be stored in times of flood (as identified by LPAs in their SFRAs)

4.8 Given the above, the site requires a site-specific Flood Risk Assessment on the basis that the site is considered to be within Flood Zone 3 extent in the Year 2115 as identified in the PUSH SFRA 2115 flood mapping.

Non-Statutory Technical Standards for Sustainable Drainage Systems 2015

4.9 The Non-Statutory Technical Standards for Sustainable Drainage System was published in March 2015.

4.10 The standards are to be used in order to manage surface run-off in accordance with Schedule 3 of the FWMA.

4.11 The standards state the run-off destination should be considered in the following order of preference:

- Discharge into the ground (infiltration);
- Discharge to a surface water body;
- Discharge to a surface water sewer;
- Discharge to a combined sewer.

4.12 Although yet to be formally adopted, the document provides guidance on run-off destination, peak flow rate, volume and control of water quality and function.

4.13 The LPAs may set local requirements for planning permission that have the effect of more stringent requirements than that of the standards.

Partnership for Urban South Hampshire: Integrated Water Management Strategy 2008

4.14 The Key aim of the Partnership for Urban South Hampshire (PUSH) is to promote growth in the South Hampshire sub-region while delivering sustainable communities.

4.15 The objectives of the Integrated Water Management Strategy (IWMS) are to:

- Guide and inform the level and location of development to be accommodated in South Hampshire.
- Identify a preferred high level strategy for water management for the period to 2026, including the general location and timing of infrastructure requirements, the agencies responsible and the means of funding the necessary work.
- Identify the further work necessary to implement the preferred strategy and to monitor its effectiveness over the plan period.

4.16 The aim of flood risk management for new development is to avoid flood risk hazard locations wherever possible to reduce the reliance on flood defence infrastructure (PUSH IWMS, 2008).

Partnership for Urban South Hampshire Strategic Flood Risk Assessment 2007

4.17 Atkins were commissioned by the Partnership for Urban South Hampshire (PUSH) to prepare a Strategic Flood Risk Assessment (SFRA) for South Hampshire. The PUSH SFRA was completed in December 2007 in consultation with the EA.

4.18 PUSH SFRA has collated and analysed flood risk information and provided mapping outputs. The proposed of the SFRA is to investigate all sources of potential surface water flooding (including tidal) to inform the LPAs in South Hampshire Region of the potential flood risk to sites being promoted for inclusion in the Local Development Framework (LDF). Extracts of PUSH SFRA Mapping is presented as **Appendix E**.

Havant Borough Council Draft Local Plan (Allocations) – Flood Risk Assessment 2012

4.19 The Havant Borough Council Draft Local Plan (Allocations) – Flood Risk Assessment was published in November 2012.

4.20 The purpose of Havant Borough Council's Flood Risk Assessment (HBC FRA) is to explain and justify the approach of the Council in the selection of development sites in the Draft Local Plan (Allocations) with regard to flood risk. This FRA will help demonstrate the soundness of the Allocations, and provide assurance that the proposed allocations can be delivered in accordance with the requirements of the NPPF.

4.21 The HBC FRA is a high level assessment of sites falling partly within Flood Zones 2 and 3. It is based on the information available at the time of the assessment and it is acknowledged that it needs to be expanded and justified to accompany the pre-submission Allocations Plan and meet the full requirements of the NPPF.

5.0 THE SEQUENTIAL TEST & THE EXCEPTION TEST

The Sequential Test

5.1 The EA flood zones are the starting point for the Sequential approach promoted by the NPPF, and are shown on the EA flood mapping. The NPPF's Planning Practice Guidance (PPG) identifies that the overall aim of the Sequential Test is to steer new developments to Flood Zone 1 (NPPF, 2012).

5.2 As stated by the NPPF, development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with lower probability of flooding. The SFRA will provide the basis for applying the test (NPPF, 2012).

5.3 Following application of the Sequential Test, if it is not possible for the development to be located in zones with lower probability of flooding (Flood Zone 1), proposed sites should take into account the flood risk vulnerability of land uses (Table 2, PPG) and consider reasonable site in Flood Zone 2, and apply the Exception Test if required (Table 3, PPG). Only where there are no reasonably available sites in Flood Zone 1 and Flood Zone 2 should the suitability of sites in Flood Zone 3 be considered, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required.

The Exception Test

5.4 For the Exception Test to be passed a development proposal:

- Must demonstrate that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA;
- The development should be on developable brownfield land or, if not, it must be demonstrated that there is no such alternative; and

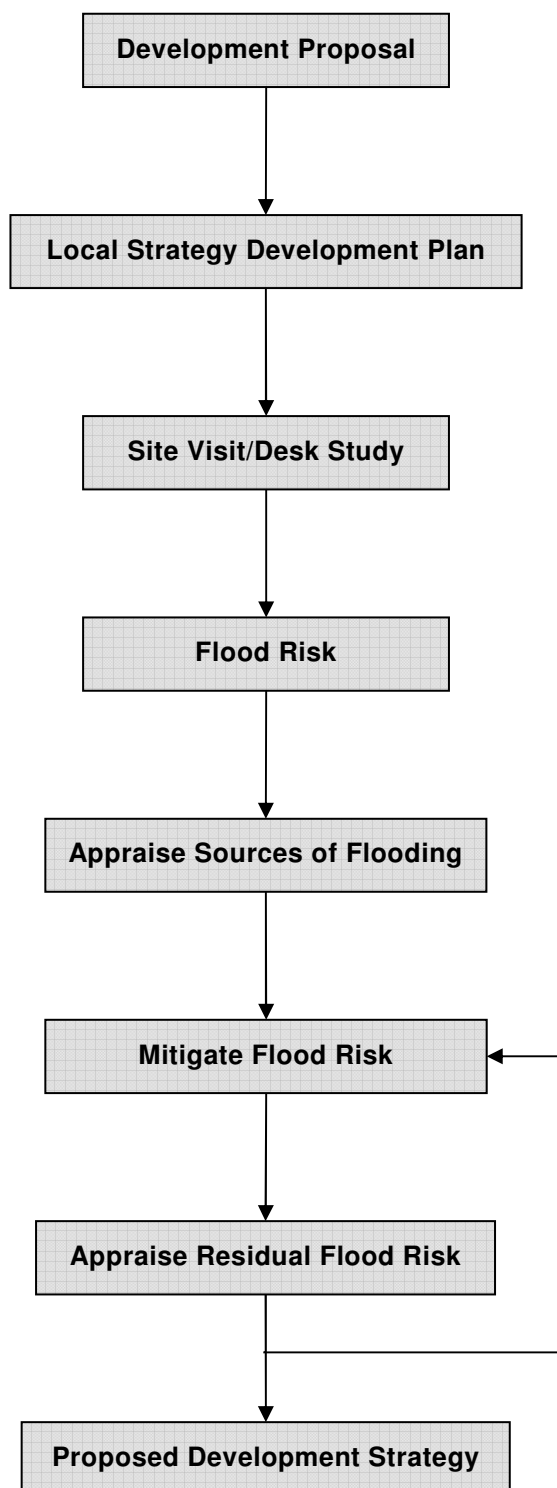
- A FRA must demonstrate that the development will be safe for its lifetime taking into account the vulnerability of its users, without increasing flood risk elsewhere, and where possible, reducing flood risk overall.

5.5 The EA's Flood Map and correspondence confirms that the site is located within Flood Zone 1. However the proposed development has been identified by the PUSH SFRA as potentially falling within the future fluvial Flood Zone 3 of Lavant Stream, and a Site Specific Flood Risk Assessment is required to support the planning application.

5.6 The PUSH SFRA considers this development to be within future fluvial Flood Zone 3 of high risk of flooding. Nevertheless, the proposed development has been recognised as a regeneration opportunity under the Local Plan, and appropriate deliverable and safe development can be achieved on this site. The HBC SFRA Supplement Addendum suggests that the Exception Test can be met by locating non-residential uses at ground level, living quarters at first floor level or above, and flood resilient construction. For these reasons, HBC concludes that the Sequential and Exception Tests criteria for Flood Zone 3 have been met, therefore, satisfying the NPPF.

5.7 An extract of the PUSH SFRA Flood Mapping of climate change in the Year 2115 is present as **Appendix E**, and an extract of HBC SFRA Addendum is present as **Appendix F**.

6.0 FLOOD RISK METHODOLOGY



The assessment methodology is based on the requirements of NPPF.

7.0 APPRAISE KEY SOURCES OF FLOOD RISK

7.1 In accordance with the NPPF requirement, all forms of flooding must be considered within a site specific FRA. The following is a review of the various types of flooding and an overview of their risk to the site, if any.

Flooding from the Sea (Tidal)

7.2 Tidal flood sources include the sea and estuaries, and tidal flooding is often caused by high tides with meteorological and storm events. Tidal flooding can be extremely rapid and its effects severe; deep fast-flowing water can create an extreme hazard.

7.3 The PUSH SFRA flood mapping shows the development site lies outside the tidal flood zones in the Year 2115, and therefore the proposed development is not susceptible to tidal flooding.

Flooding from Rivers (Fluvial)

7.4 Fluvial flooding is caused by high flows in rivers or streams exceeding the capacity of the river channel and spilling into the floodplain, or in some cases none designated flood plain which can occur after a period of heavy rainfall.

7.5 Environment Agency Flood Zones cover all watercourses with an upstream catchment area of 3km² or greater. The nearest watercourse is Lavant Stream located approximately 3.6km to the southwest of the site.

7.6 The EA's Flood Map and correspondence confirms that the site is located in Flood Zone 1, and is considered to be at low risk of flooding from fluvial source.

7.7 The main river Lavant Stream is located adjacent to the junction of North Street/Market Parade/Prince George Street at the south eastern corner of the development site. The Lavant Stream flows in north to south direct before confluence with Langstone Channel 3.6km to the southwest of the site. The PUSH SFRA flood mapping shows the development footprint is potentially located within the fluvial Flood

Zone 3 in the Year 2115, and therefore the site may be susceptible to future fluvial flooding.

7.8 As the development site has met the requirements as set by the sequential and exception tests criteria for Flood Zone 3, the land within the future floodplain is, therefore, considered to be suitable for development, subject to meeting the requirements of the HBC SFRA Addendum.

Groundwater Flooding

7.9 Groundwater flooding is caused by the emergence of water originating from sub-surface permeable strata. A groundwater flood event results from a rise in groundwater level sufficient for the water table to intersect the ground surface and inundate low lying land. Periods of prolonged rainfall may also be a cause of groundwater flooding with aquifers and soil becoming saturated.

7.10 The EA's online groundwater mapping indicates that the site is located over the Groundwater Source Protection Zone 1c designated within the subsurface below the made ground. The site is also identified to be located within the Aquifers Superficial Deposit Designation Zone and the Groundwater Vulnerability Zone designated as Minor Aquifer – High.

7.11 The PUSH SFRA Map indicates that the site is within the moderate to low bedrock permeability zones. Furthermore, the nearest borehole test report obtained from the British Geological Survey (BGS) website shows groundwater was encountered at approximately 3.2m below ground level (bgl) within the vicinity of the site. A site intrusive ground investigation should be undertaken to establish the groundwater levels within the site extents. The extracts from BGS database and PUSH SFRA mapping are presented in **Appendix C** and **Appendix E** respectively.

Reservoir Flooding

7.12 The EA's online reservoir flood mapping indicates that there are no reservoirs within the vicinity of the site that may affect the development. Therefore, the site is at low risk from reservoir flooding.

Surface Water Flooding/Overland Flows (Pluvial)

7.13 Surface water flooding is caused by rainfall levels exceeding the natural infiltration properties of the surrounding soils. It occurs where there is a lack of a formalised drainage system, as a result of poorly designed or maintained sewer systems or due to no natural method of drainage such as watercourses, ditches, or where soil infiltration rates are low. It often results in ponding of water at low points or backing up behind obstructions.

7.14 The EA's Flood Map and correspondence received advised that there is low risk of pluvial flooding occurring within the southern half of the site, medium risk of pluvial flooding occurring along Market Parade to the south, and high risk of pluvial flooding occurring along North Street to the east. The EA Surface Water Flood Map is presented in **Appendix C**.

7.15 The PUSH SFRA Map shows that the site has high to very high potential in generating overland flow due to the surface geology, and the site area susceptible to pluvial flooding is low. The PUSH SFRA Map is presented in **Appendix E**.

7.16 A SuDS system designed to accommodate the increase in surface water flows for a 1 in 100 year storm event plus 30% climate change will help mitigate any risk from overland flows within the proposed development.

7.17 Overland flood routes can be accommodated within the masterplan layout to direct any possible overland flows that occur from outside the development away from the proposed housing within the site.

Sewer Infrastructure Flooding

7.18 Flooding can occur due to the failure of existing foul or surface water drainage infrastructure. If flows within the drainage system exceed the designed capacity or foreign matter causes blockages, overflow to the surface can occur leading to flooding.

7.19 The PUSH SFRA mapping indicates no recorded incidents of sewer flooding observed by SWSL within the vicinity of the site. The PUSH SFRA Map is presented in **Appendix E**.

8.0 FLOOD RISK MITIGATION MEASURES

Mitigation against Flood Risk from the Proposed Development

8.1 To mitigate against the risk from localised overland flooding from the proposed development, a proposed SuDS management train will provide surface water runoff source control, treatment and attenuation in the forms of cellular attenuation tank, downstream defender and flow control unit.

8.2 SWSL's asset plan shows that there are existing 600mm diameter surface water arched-shape brick sewers running along North Street which is assumed to be connected to the culverted Lavant Stream to the south east corner of the site. Surface water run-off from the development site will be discharged to the adjacent existing surface water sewer, and will be managed using SuDS including cellular attenuation tank with flow controls.

8.3 The proposed on-site drainage system will be designed to cater for the 1 in 30 year storm and provide attenuation to store flood waters on-site during flood events up to and including the 1 in 100 year plus 30% climate change flood event.

8.4 By implementing a downstream defender, this will assist in reducing heavy metals, hydrocarbons and other pollutants from entering the existing sewer/watercourses.

Mitigation against Flood Risk to the Development

Fluvial and Pluvial Flooding

8.5 The PUSH SFRA flood mapping shows the development footprint is potentially located within the fluvial Flood Zone 3 in the Year 2115, and to be at low risk of pluvial flooding as confirmed by the EA's mapping and correspondence received. Therefore, the site may be considered to be susceptible to future fluvial flooding, but not susceptible to pluvial flooding. However, the development site has passed the Sequential and Exception Tests in accordance with HBC SFRA Addendum SD09/F/04, the land within the future floodplain is, therefore, considered to be suitable for development.

8.6 To mitigate surface water flow, a formalised surface water drainage system will be installed. The drainage system will be designed with attenuation at source and flow controls to restrict the rate of flow to the receiving watercourse. The surface water drainage system will be designed to accommodate storm water run-off from the 1 in 100 year event plus 30% climate change.

8.7 At the detailed design stage, mitigation against the potential risk of surface water flooding to the proposed development will be provided by the use of SuDS features and the manipulation of site levels to ensure that overland flows during extreme flood events will be diverted away from buildings.

Emergency Access/Egress

8.8 The development is potentially located within the future Flood Zone 3 in the Year 2115. Therefore a site specific flood emergency plan may be required, with Havant Borough Council and the emergency services to be consulted, as part of the detailed design proposals.

9.0 SURFACE WATER DRAINAGE STRATEGY

Stakeholder Responsibilities

9.1 The SWDS will ultimately approval from the EA, Havant Borough Council and Hampshire County Council.

9.2 To deal with the residual risk of blockage to all on-site drainage features, the developer, management company, LPA, LLFA and/or adopting Water Company will ensure maintenance of their respective drainage system in line with the manufacturers' recommendations by the production of a Maintenance Management Plan. The Developer would be responsible for employing a competent Management Company to undertake the recommended maintenance during the lifetime of the development for any systems remaining private. This will ensure that over the lifetime of the proposed development the drainage system will be properly maintained to ensure continued functionality.

9.3 Where a publically maintained road forms part of the drainage system, the road maintaining authority (Highways Authority) must exercise its functions in accordance with the approved drainage plan and their responsibilities under Highways Act (1980).

9.4 The water company, in this case SWSL, must have regard to relevant local and regional strategies and guidance in exercising any flood risk management functions.

Design Principles for Sustainable Drainage Systems

9.5 The current planning policy document NPPF, LPA requirements and EA guidance requires developments to employ SuDS techniques in the management of site run-off and surface water drainage. Careful design of SuDS features can ensure that the proposed surface water regime closely reflects the natural hydrology and hydrogeology of the site.

9.6 The key benefits of the proposed SuDS on-site are as follows:

- Improving water quality over a conventional piped system by removing pollutants;
- Maintaining the existing hydrology by attenuating the proposed surface water runoff within the site.

9.7 The Flood Water Management Act of 2010 (FWMA) has amended Section 106 of the Water Act to remove the automatic right to connect surface water sewers without prior consideration to SuDS.

Proposed Sustainable Drainage Strategy

9.8 SWSL's asset plan shows that there are existing 600mm diameter surface water arched-shape brick sewers running along North Street which is assumed to be connected to the culverted Lavant Stream to the south east corner of the site based on the EA Main River and SWSL mapping. Surface water run-off from the development site is proposed to be discharged to the adjacent existing surface water sewer subject to a drainage survey and further review with SWSL during the detailed design stage, and will be managed using SuDS including cellular attenuation tanks with flow controls. The existing connections may be utilised subject to confirmation of existing on site network.

9.9 The SWDS comprises of proposed lined cellular attenuation tank fitted with an orifice flow control unit provided at basement carpark to attenuate the surface water runoff from the development. The required storage volume is 46.5m³ measured at 0.5m deep calculated based on the 0.22ha of impermeable area within the site. Regular maintenance of proposed cellular attenuation tanks and flow control units will be undertaken by a Management Company. The storage estimate is presented as **Appendix H**.

9.10 A Downstream Defender from the supplier Hydro International will be implemented downstream of the proposed basement car parking drainage network. With the implementation of Downstream Defender, this will help reduce pollutants such as heavy metals and hydrocarbons from entering the existing watercourse. The Downstream Defender also will comply with EA requirement of water runoff from the development site to be treated before entering watercourse. Maintenance of the

Downstream Defender is carried out from the surface using a standard vacuum tanker without the need to enter the device, and a half yearly inspection with annual clean-out of the unit to ensure proper operation is recommended by the supplier. The technical details of the Downstream Defender provided by the supplier is presented in **Appendix I**.

9.11 The surface water run-off from the development site will be conveyed through a proposed pumping unit and rising main at a discharge rate of 28.3 l/s, equivalent to the existing 1 year brownfield rate, and into the proposed surface water sewers at ground level. The conveyed run-off will then be discharged into SWSL's surface water sewer manhole ref. 8551 as indicated in drawing no. 14-006-002, subject to existing drainage connection review.

9.12 The proposed cellular attenuation tanks have been designed to attenuate the 1 in 100 year + 30% climate change storm event to comply with the EA requirements and LLFAs standards. Regular maintenance of the proposed sustainable drainage features will be undertaken by a Management Company.

9.13 A copy of the SWSL's Existing Sewer Plan is presented as **Appendix G**, and the brownfield runoff calculation is presented as **Appendix H**. The SWDS drawing no. 14-006-002 and proposed surface water network calculation are presented as **Appendix J**.

10.0 FOUL WATER DRAINAGE STRATEGY

10.1 SWSL is the governing water authority for the area. SWSL mapping indicates that the closest public foul sewer is located on Market Parade to the south of the development, adjacent to the new residential access. A copy of the SWSL's Existing Sewer Plan is presented as **Appendix G**.

10.2 The FWDS proposes a new foul network within the proposed development designed to SWSL, Sewers for Adoption 7th Edition and Building Regulation Part H standards.

10.3 Section 98 of the WIA provides the legal mechanism through which the appropriate infrastructure can be requested (by the developer) and provided to drain a specific location off-site through third party land.

10.4 Calculating the foul discharge from the development under SFA at 4000 l/s/24 hr, the proposals of circa 130 dwelling units with 1,166m sq of ground floor commercial space site will generate an estimated peak foul discharge rate of 6.66 l/s. Whereas the previous development of 14 dwelling units with 516m sq of ground commercial space site generated an estimated peak foul discharge rate of 0.93 l/s. Therefore, the peak foul discharge rate from the proposed development generates an increase flow to the existing SWSL foul water sewers in the order of 5.73 l/s. The existing and proposed foul water discharge calculations are presented as **Appendix K**.

10.5 A SWSL Level 1 capacity assessment has been carried out and SWSL have advised that the existing foul sewerage network is currently inadequate to accommodate the additional foul flow rate of 5.73 l/s discharged from the proposed development at manhole reference No. 7402. SWSL have suggested that additional offsite sewers or improvements to existing sewers will be required to provide sufficient capacity to service the development. The nearest point where capacity is available for accommodating the additional discharge rate from the development is at Budds Farm WTW, which is located approximately 1.3km south west of the site. SWSL suggests that an alternative is to discharge foul flow rate no greater than the existing site's rate. A copy of the SWSL's correspondence is presented as **Appendix G**.

10.6 Given the above and the unknown extent of all the existing foul and surface water connections, it is recommended that the existing drainage regime and connections are reviewed at the detailed design stage in order to confirm existing flows connecting to the various systems. The proposed foul strategy would utilise foul network manholes referenced 7501, 7402 and 8501, but would be subject to a drainage survey and further review with SWSL during the detailed design stage.

10.7 Approval must be obtained from SWSL prior to making a future connection to the public sewer. The proposed connection point is shown in drawing no. 14-006-003 Foul Water Drainage Strategy, which is presented in **Appendix L**.

11.0 POLLUTION MEASURES

Contamination

11.1 The construction works must be undertaken in a manner to prevent pollution to any groundwater which may lie beneath the site and existing watercourses. Contractors are to make reference to current legislation and EA guidelines in respect of construction pollution prevention.

11.2 The contractor will be advised on the removal of any hotspots of contaminated ground established through an intrusive soil investigation or during excavation works.

11.3 All stocks of materials, oils and fuels are to be stored in a manor preventing spillage and seepage to ground. Wastewater will not be freely discharged to the ground or watercourses. All hydrocarbons and chemical spillages will be thoroughly cleaned by excavation of the polluted ground and disposed of to a licensed waste depot.

11.4 The EA produces Pollution Prevention Guides (PPGs) giving advice on the law and good environmental practice. The following guidance notes are considered relevant for this development:

- PPG1 – General Guide to the Prevention of Pollution (EA, July 2013)
- PPG2 – Above Ground Oil Storage Tanks (EA, April 2014)
- PPG3 – Use and Design of Oil Separators (EA, April 2006)
- PPG5 – Works In, Near or Liable to Affect Watercourses (EA, April 2014)
- PPG6 – Working at Construction and Demolition Sites (EA, April 2014)
- PPG8 – Safe Storage and Disposal of Used Oils (EA, 2004)
- PPG13 – Vehicle Washing and Cleaning (EA, July 2007)

12.0 CONCLUSIONS

12.1 This report has considered the flood risk and drainage to and from the development of 130 apartments with ground floor commercial space at a proposed redevelopment in Havant, Hampshire.

12.2 The EA's Flood Map and correspondence confirms that the site is located in Flood Zone 1, and is considered to be at low risk of flooding from fluvial and tidal sources.

12.3 Information provided by the PUSH SFRA 2115 flood mapping identifies that the site is potentially located within the future fluvial Flood Zone 3 extent in the Year 2115, considered to be at risk of flooding from the Lavant Stream.

12.4 Nevertheless, the proposed development has been recognised as a regeneration opportunity under the Local Plan, and appropriate deliverable and safe development can be achieved on this site. For these reasons, HBC concludes that the Sequential and Exception Tests criteria for Flood Zone 3 have been met, therefore, satisfying the NPPF.

12.5 The circa 0.23 hectares site is predominately brownfield site previously used for C3 residential dwellings and B1 commercial/retail units with car parking spaces provided in the centre of the site. The overall proposed impermeable area of the new development is approximately 0.22ha which is a slight increase from the pre-development impermeable site area.

12.6 SWSL's asset plan shows that there are existing 600mm diameter surface water arched-shape brick sewers running along North Street which is assumed to be connected to the culverted Lavant Stream to the south east corner of the site based on the EA Main River and SWSL mapping.

12.7 Surface water run-off from the development site will be discharged to the adjacent existing sewer subject to a drainage survey and further review with SWSL during the detailed design stage, and will be managed using SuDS including cellular attenuation tank with flow control.

12.8 The proposed drainage strategy comprises the proposed lined cellular attenuation tank of 46.5m³ fitted with orifice flow control unit to be provided at basement carpark to attenuate the overall surface water runoff from the development. The proposed cellular attenuation tanks have been designed to attenuate the 1 in 100 year + 30% climate change storm event to comply with the EA requirements.

12.9 Downstream defender will be implemented downstream stream of the proposed basement car parking drainage network to reduce pollutants from entering the existing watercourse.

12.10 The surface water run-off from the development site will be conveyed through a proposed pumping unit and rising main at a discharge rate of 28.3 l/s, equivalent to the existing 1 year brownfield rate, and into the proposed surface water sewers at ground level. The conveyed run-off will then be discharged into SWSL's surface water sewer manhole ref. 8551 as indicated in drawing no. 14-006-002, subject to existing drainage connection review.

12.11 The peak foul discharge rate from the proposed development generates an increase flow to the existing SWSL foul water sewers in the order of 5.73 l/s.

12.12 A SWSL Level 1 capacity assessment has been carried out and SWSL have advised that the existing foul sewerage network is currently inadequate to accommodate an additional foul flow rate of 5.73 l/s discharged from the proposed development at manhole reference No. 7402. SWSL have suggested that additional offsite sewers or improvements to existing sewers will be required to provide sufficient capacity to service the development. SWSL suggests that an alternative is to discharge foul flow rate no greater than the existing site's rate.

12.13 It is proposed to connect the foul network to the existing SWSL foul network manholes with references No. 7501, 7402 and 8501 located to the south and east of the site subject to further drainage investigation during the detailed design stage. Connection would be made under a Section 106 agreement, with the estimated peak foul discharge rate of 6.66 l/s. Final proposal will be subject to agreement with SWSL. The proposed foul water drainage strategy and connection are presented on drawing no. 14-006-003.

12.14 This Flood Risk Assessment has demonstrated that the proposed development is fully compliant with the requirements of NPPF. Issues relating to flood risk and drainage do not represent an obstruction to the development and therefore should not hinder an approval for planning permission of the proposed development.

APPENDIX A

Site Location Plan & Proposed Masterplan