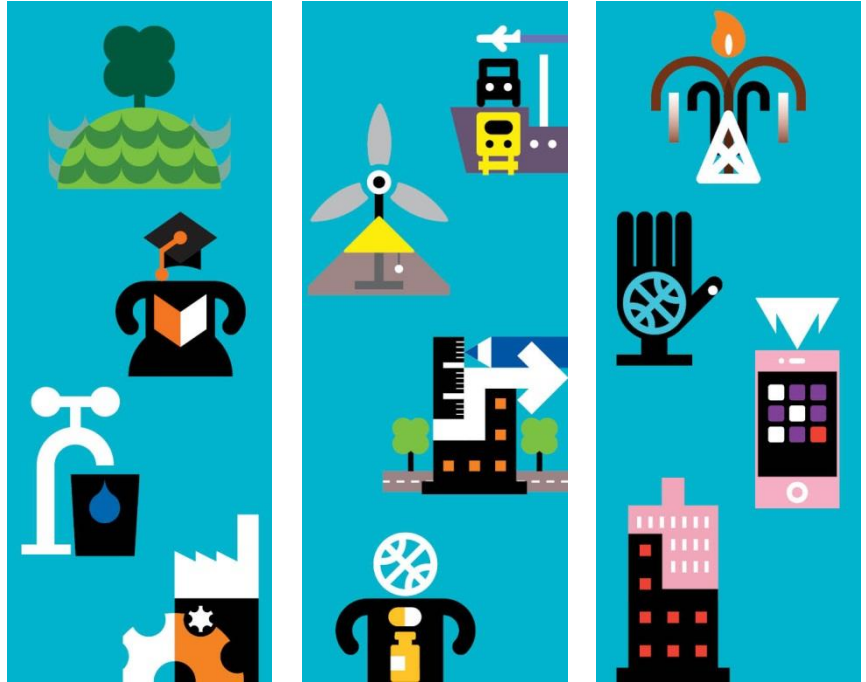




Proposed development at 100-114 Elm Grove, Hayling Island

Flood Risk Assessment

March 2015

Planning Issues Ltd

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Executive Summary

This Flood Risk Assessment has been prepared to support the award of credits Sur 1 and Sur 2 under Category 4: Surface Water Run-off, of the Code for Sustainable Homes (CfSH).

Planning Issues Ltd proposes a new residential development on the site of Pullinger's Interiors, 110-114 Elm Grove, Hayling Island, Hampshire, PO11 9EH. Mott MacDonald was commissioned to carry out a Flood Risk Assessment (FRA) for a proposed development of sheltered apartments for use as retirement accommodation.

The site covers a total area of approximately 0.33 hectares and is located within Flood Zone 1, defined as "land assessed as having a less than 1 in 1000 annual probability of river and sea flooding (<0.1%)". Approximately 87% of the existing development is surfaced with impermeable material. The proposed development includes a reduction in the impermeable area compared with the current situation, to approximately 64% of the site area.

Our review of the Hampshire County Council Preliminary Flood Risk Assessment (PFRA), the South Hampshire Strategic Flood Risk Assessment (SFRA), and the EA interactive Flood Maps does not indicate that there is any significant flood risk from rivers and the sea, reservoirs, surface water, fluvial flooding or groundwater.

Surface water run-off from the development may be managed by means of carefully designed ground levels and a surface water management system designed, constructed and maintained in accordance with the principles and strategy set out in this report. As such the risk from surface water flooding is within acceptable limits and the proposed development does not increase the risk of such flooding elsewhere. Attenuation storage may be required as part of the surface water management system.

Further investigation into the practicability of discharging of surface water via infiltration to the ground is recommended. If drainage via infiltration is found to not be reasonably practicable, Southern Water should be contacted to discuss potential options for discharging to the public sewer.

A surface water management system may be designed and constructed such that there will be no discharge from the developed site for rainfall depths up to 5mm, and the run-off from all hard-standing shall receive an appropriate level of treatment to minimise the risk of pollution. Therefore the award of two credits under Sur 1 of CfSH is merited.

There is a low or very low probability of flooding from all sources, and therefore should merit the award of two credits under Sur 2 of CfSH.

The level of flood risk to the proposed development is considered to be within acceptable limits as set out by the Planning Policy, and therefore from a flood risk standpoint there should be no reason for this development not to proceed.

1 Introduction

1.1 Scope

This Flood Risk Assessment (FRA) has been prepared by Mott MacDonald Ltd on behalf of Planning Issues Limited to support the award of credits under the Code for Sustainable Homes (CfSH) Issue SUR1 and SUR2 for the proposed development of retirement accommodation on the site of Pullingers Interiors, 110 - 114 Elm Grove, Hayling Island, Hampshire, PO11 9EH.

The Consultant has followed accepted procedure in providing the services but given the residual risk associated with any prediction and the variability which can be experienced in flood conditions, the Consultant takes no liability for and gives no warranty against actual flooding of any property (Client's or third party) or the consequences of flooding in relation to the performance of the service. This report has been prepared for the purposes of obtaining relevant credits under CfSH only.

1.2 Methodology

This FRA has been prepared in accordance with Code for Sustainable Homes Technical Guidance issued in November 2010 by the Department for Communities and Local Government.

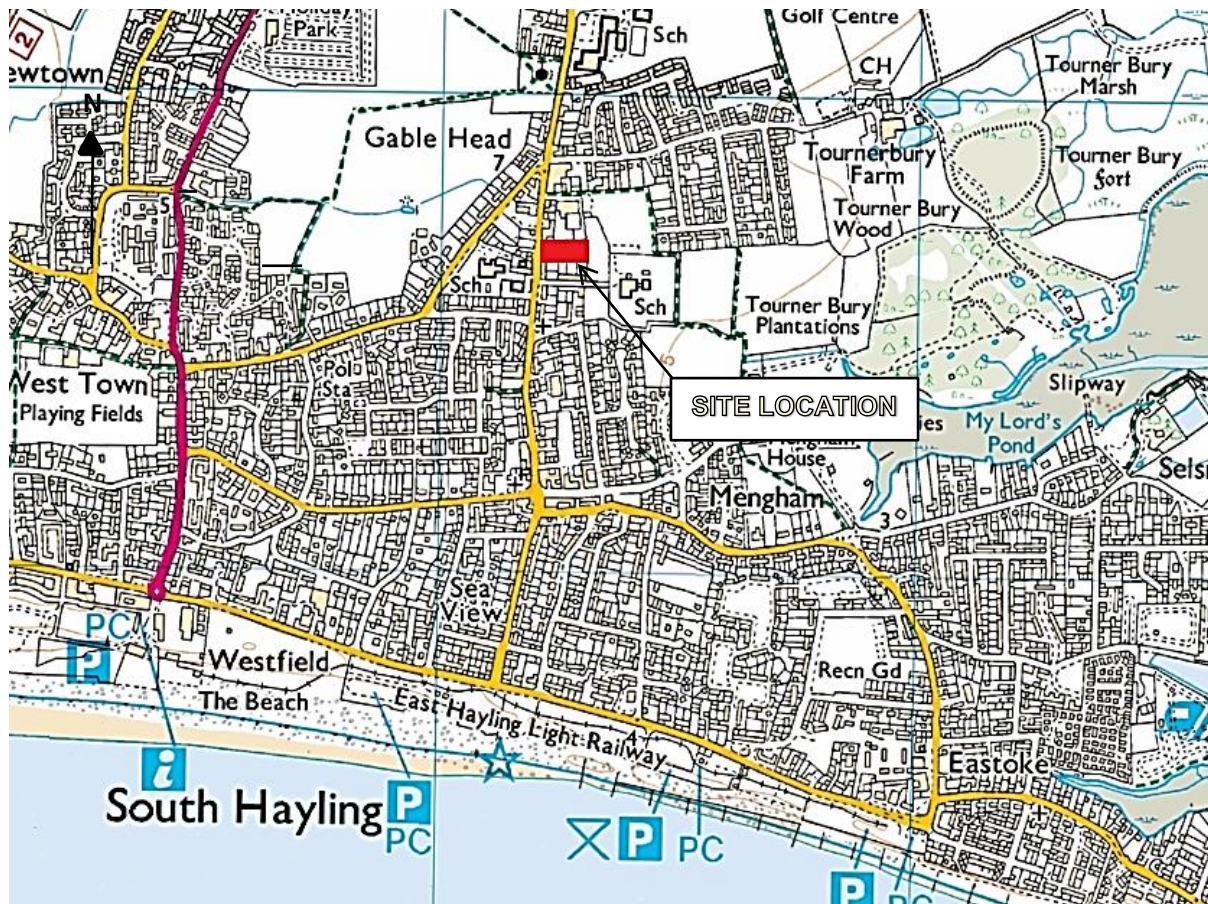
Mott MacDonald has reviewed the following sources of information in preparing this FRA:

- Partnership for Urban South Hampshire (PUSH) Strategic Flood Risk Assessment (SFRA) and associated online mapping tool <http://maps.hants.gov.uk/push/Map.aspx>;
- Preliminary Flood Risk Assessment (PFRA) for Hampshire County Council (HCC), dated June 2011;
- Topographic Survey for 110-114 Elm Grove, Hayling Island, produced by D&H Surveys, dated October 2014 and included in Appendix A.1;
- Site Layout Plan (no. 10073HI-RF01) prepared for Churchill Retirement Living, produced by Planning Issues Ltd, dated January 2015 and included in Appendix A.2;
- Ground Investigation Desk Study Appraisal by Crossfield Consulting dated October 2014; and
- Southern Water Sewer Records obtained from Planning Issues Ltd, dated September 2014.

1.3 Site setting

A site location plan is included in Figure 1.1 below (site shown in red). A site layout plan is included in Appendix A.2.

The site is located at the site of Pullingers Interiors, 110-114 Elm Grove in the town of Hayling Island, Hampshire, PO11 9EH. The site currently comprises a show room plus multiple storage containers located at the rear. It is in an established urban setting, adjacent to the site to the south is a Tesco Express store and approximately 25m to the south-west of the site entrance is the town's library. The site is bounded by Elm Grove to the west and allotments to the east. The site is approximately 1km north from the sea front at its closest point, at South Hayling.



Source: OS OpenData website, accessed February 2015.
Contains Ordnance Survey data © Crown copyright and database Right 2015

The Topographic Survey (Appendix A.1) indicates that the site is generally flat with the lowest levels of around 6.34 metres above Ordnance Datum (m AOD) located at the south-east corner of the site. The highest levels occur at the perimeter of the existing showroom in the north-west corner of the site at around 6.79m AOD. The site covers an area of approximately 0.33ha of which 0.29ha comprises impermeable surfacing (tarmac, paving and roofed areas).

1.4 Site geology and hydrogeology

Section 5.2 of the Ground Investigation Desk Study Appraisal indicates that 'Made Ground/reworked natural strata, variable clays and sands are likely to be present, associated with Brickearth and, underlying Raised Beach deposits' could be present and below this 'as shallow as 1.5m, London Clay Formation strata are indicated'. The report further confirms that the 1:50,000 scale solid and drift geology map of South Hayling (Sheet 316), produced by the British Geological Survey (BGS), shows that the site is underlain by London Clay Formation with superficial deposits of River Terrace/Brickearth (undifferentiated).

With regards to hydrogeology, it is stated in Section 4 of the Ground Investigation Desk Study Appraisal that: *“Hydrogeological information indicated that the underlying superficial deposits are classified as a “Secondary (A) Aquifer” which is defined by the Environment Agency as “permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers”.* Section 5.2 of the Ground Investigation Desk Study Appraisal also states that *‘groundwater is anticipated at shallow depths beneath the site and may be located about the London Clay Formation strata’.*

The ‘Groundwater’ interactive map available on the EA website, accessed February 2015, indicates that the site does not lie within Groundwater Source Protection Zone.

1.5 Existing drainage

The Southern Water Sewer Records confirm that there are both surface and foul water sewers running along Elm Grove to the west of the site (see Appendix B).

The information currently available does not indicate how the site is currently drained. It is considered likely that the surface water currently drains either directly or indirectly to the public sewer in Elm Grove due to the topography of the site and its location within an urbanised area. However, this should be confirmed by site investigation and with Southern Water before progressing the design of a surface water management system and in any case before any development commences.

1.6 Proposed development

The proposed development will involve the demolition of the existing show room buildings and the removal of the containers and construction of a two to three storey block of apartments together with associated car parking and managed soft landscaped amenity areas. Also included in the development is a retail property, with a residential flat above, and parking and pedestrian access areas. A provisional site plan is included in Appendix A.2.

Using the site plan contained in Appendix A.2 the impermeable areas proposed by the development has been estimated and are summarised in Table 1.1 overleaf. Calculations to support this table are provided in Appendix C.

The proposed development will therefore decrease the total impermeable surface area of the site from approximately 0.29ha (equivalent to 88% of total site area) to 0.21ha (65%), representing a reduction of impermeable surface area of 0.08ha (0.076ha) or approximately 23% in comparison to the current site layout.

Table 1.1 Summary of proposed areas of hard standing

Sub Area	Area (m ²)	Percentage area of site (%)
Main building	1264	38
Car parking and footpaths	729	22
Shop Unit	141	4
TOTAL	2134	65%

Source: Mott MacDonald February 2015.

2 Assessment of flood risk

2.1 Flooding history

The town of Hayling Island has a history of flooding from a variety of sources.

The PFRA details incidents of historic flooding on Hayling Island and provides an overview of catchment flood characteristics for this area stating it is “*typically prone to surface water flooding*.” This assertion is backed by a BBC news report which indicates surface water flooding of homes on Hayling Island in December 2012 (<http://www.bbc.co.uk/news/uk-england-hampshire-20794567>) and some roads within November 2010 (<http://www.bbc.co.uk/news/uk-england-hampshire-11718847>).

The SFRA contains information on incidents of recorded wave overtopping flooding at Hayling Island, which is discussed in more detail in Section 2.3 of this FRA. News reports suggest the most recent event of this nature occurred in January 2014 when the coastal area of South Hayling was flooding during a storm, particularly the roads up to Creek Road including Southwood Road. (<http://www.portsmouth.co.uk/news/local/storms-cause-flooding-and-damage-on-hayling-island-1-5790763>).

However these news reports do not suggest that the site or the close vicinity has flooded during these events.

With regards to sewers, Southern Water has confirmed that there have been incidents of sewer flooding in Elm Grove (see correspondence within Appendix B). Further details of this are provided in Section 2.7.

2.2 Fluvial flood risk

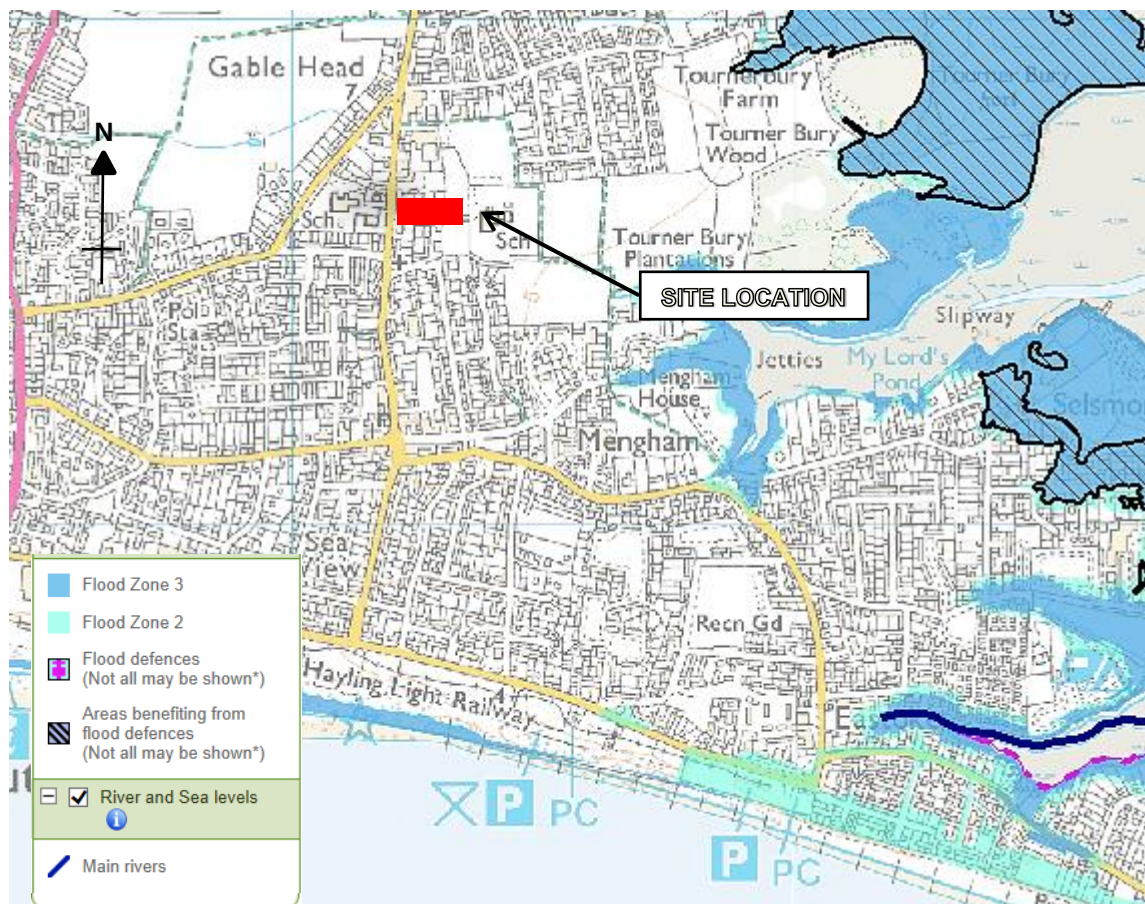
The ‘Flood Map for Planning (Rivers & Sea)’ available on the EA website, accessed February 2015, indicates that the site lies within Flood Zone 1 which is defined by the NPFF as having a “*low probability*” of flooding. The ‘Risk of Flooding from Rivers and Sea’ flood map which is also available on the EA website, accessed February 2015, shows the site as being within an area of “*very low*” flood risk, defined by the EA as an “*area that has a chance of flooding of less than 1 in 1000 (<0.1%)*” each year (Appendix A.4).

It is therefore considered that the site is at very low risk of flooding from fluvial sources.

2.3 Tidal flood risk

As stated above, the EA ‘Flood Map for Planning (Rivers & Sea)’ and The ‘Risk of Flooding from Rivers and Sea’ flood maps on the EA website, accessed February 2015, show that the site is an area of “*very low*” flood risk, defined by the EA as an “*area that has a chance of flooding of less than 1 in 1000 (<0.1%)*” each year (Appendix A.4). The Flood Zone maps do not account for the presence of flood defences but the Executive Summary of the South Hampshire SFRA asserts that Hayling Island is ‘*protected to a higher level with sea defences than other frontages in the sub-region*’.

Figure 2.1 Environment Agency 'Flood Map for Planning (Rivers and Sea)'



Source: Taken from Environment Agency website in February 2015. Contains Environment Agency information © Environment Agency and Database Right 2014

The EA map above depicts 'still water' flooding extents in relation to tidal sources. As mentioned in Section 2.1, the SFRA states that areas of Hayling Island have experienced flooding caused by wave overtopping. Most notably Section 4.2.1.6 of the SFRA recalls historic incidents of flooding caused by wave overtopping that have occurred outside of EA Flood Zones 2 and 3.

The coastal areas of Hayling Island are described within the SFRA as being exposed to '*low or medium wave energies*' and the SFRA recommends that development on sites adjacent to '*medium wave energy*' coastal frontages take into account this potential risk in site specific assessments. As Figure 2.1 shows, the Lord's Pond to the east of the site is the nearest section of coastline and is approximately 0.6km away. This section is assessed as having '*low wave energy*'. The nearest coastline assessed as having '*medium wave energy*' is located to the south of the site, at South Hayling, approximately 1.1km away.

Due to the site's distance from the coastline and elevation (excess of 6 m AOD), it is therefore considered to be at low risk of flooding from tidal sources. The SFRA affirms this as it does not provide any historical evidence of flooding to the site from wave overtopping.

2.4 Future tidal and fluvial flood risk

The impact of climate change over the course of a development's lifetime must be considered in line with the National Planning Framework (NPPF). For a residential development such as this one, a life expectancy of 100 years is generally accepted.

2.4.1 Future tidal flood risk

In order to allow planning authorities to adequately consider climate change with respect to tidal sources, the SFRA has analysed the potential effects this would have on flood extents. In line with current Defra guidance allowances for sea level rise, flood extent outlines for the years 2025, 2055, 2085 and 2115 were produced. The map for 2115 provides the most appropriate outline for this development proposal, considering its life expectancy of 100 years.

The maps produced as part of the SFRA indicate that when the effects of 100 years of climate change are taken into account, the site will remain in Flood Zone 1 for tidal sources.

2.4.2 Future fluvial flood risk

Section 4.2.1.5 of the SFRA concludes that there is an inconsistent set of modelled climate change data for fluvial flood zones. In order to obtain a consistent data set, the SFRA has therefore adopted an approach which assumes that the present day Flood Zone 2 (medium probability) becomes Flood Zone 3 (high probability) by 2025. The SFRA have also produced outlines for 2055, 2085 and 2115. This is a conservative assumption; however it allows consideration of whether or not an area that is currently not located within Flood Zone 2 or 3 will be likely to be within Flood Zone 2 or 3 in future.

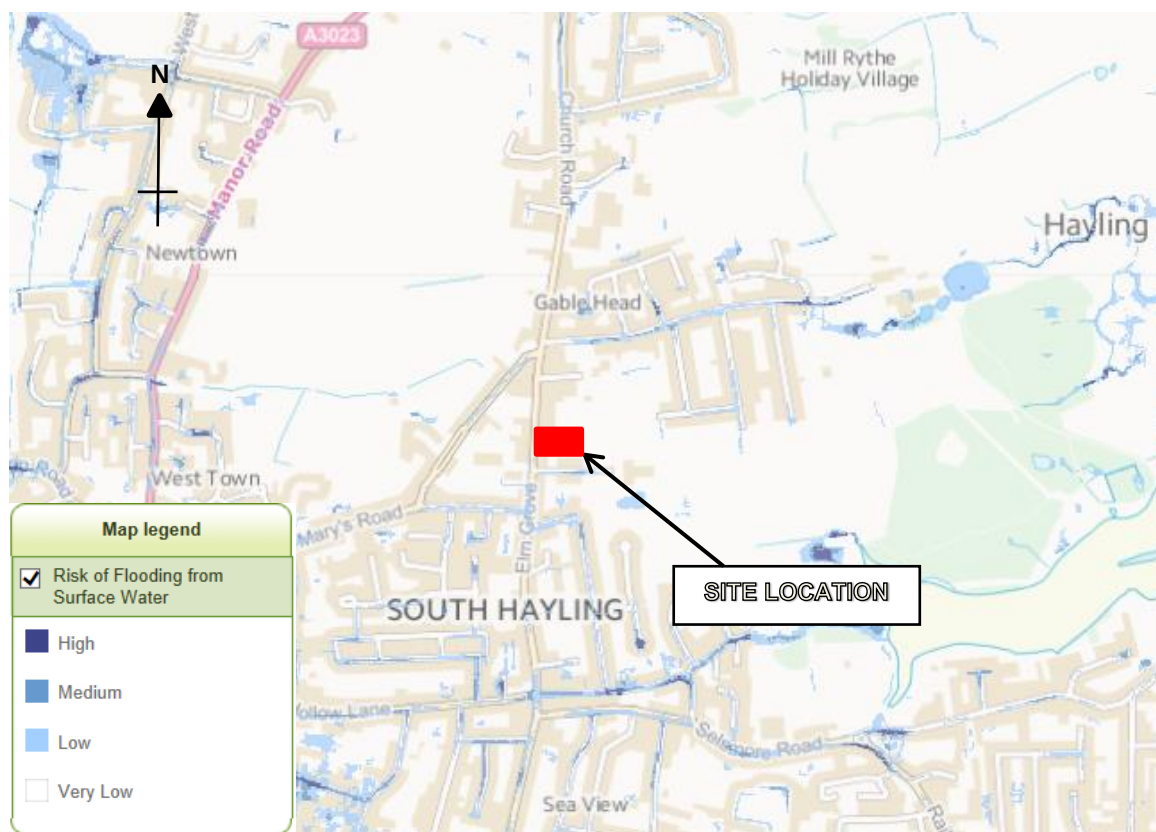
The maps produced as part of the SFRA indicate that when the effects of 100 years of climate change are taken into account, the site will remain in Flood Zone 1 for fluvial sources.

We therefore conclude that the site has a low risk of flooding from future tidal and fluvial sources.

2.5 Surface water flood risk

Surface water flooding happens when rainwater does not drain away through the normal drainage systems, or soak into the ground, but lies on or flows over the ground instead. The EA has produced a 'Risk of Flooding from Surface Water' map, presented below in Figure 2.2, which indicates that the site is at a 'very low' risk of flooding from surface water, defined as 'an area that has a chance of flooding of less than 1 in 1000 (0.1%)' each year.

Figure 2.2 Environment Agency 'Risk of Flooding from Surface Water' map



Source: Taken from Environment Agency website in February 2015. Contains Environment Agency information © Environment Agency and Database Right 2014

This figure also shows a narrow, confined strip of 'low' and 'medium' risk of surface water flooding to the south of the site along Palmerston Road and parts of Elm Grove. A 'low' risk of flooding from surface water is defined as 'an area that has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%) in any given year. A 'medium' risk of flooding from surface water is 'an area that has a chance of flooding between 1 in 100 (1%) and 1 in 30 (3.3%)' in any given year. It should be noted that the EA 'Risk of Flooding from Surface Water' map does not make any allowance for climate change.

Based on the information above it is considered that the site has a low risk of flooding from surface water.

2.6 Groundwater flood risk

As noted in Section 1.4 the interactive 'Groundwater' map available on the EA website, accessed in February 2015, shows that the site lies within a 'Minor Aquifer Low' groundwater vulnerability zone and is not within a Groundwater Source Protection Zone.

There are no borehole data for the site. However the Ground Investigation Desk Study Appraisal shows there are four British Geological Survey boreholes (nos. SZ79NW18, SZ79NW90, SZ79NW91 and SZ79NW92) near the site. From this data the study determined that *“Limited groundwater data is included in the records, however shallow groundwater is indicated in three of the four records, with standing levels at 5.2m AOD to 5.6m AOD (approximately 1.0m to 1.6m depth)”*. A groundwater level of 5.2 to 5.6m AOD at the site would equate to groundwater being approximately 1.1 to 0.8 metres below the surface.

The PFRA and SFRA do not note groundwater flooding as being an issue for this area.

Based on the information above it is considered that the site is at a low risk of flooding from groundwater.

2.7 Flood risk from sewers

The statutory sewerage undertaker for the area is Southern Water. Southern Water has confirmed that there are foul and surface water sewers running along Elm Grove, adjacent to the site (Appendix B).

The surface water sewer manhole nearest the site entrance is number 1651, which is at the head of a 375mm diameter sewer. It has a cover level of 6.56m AOD and an invert level of 4.46m AOD. The nearest manhole for the public foul water sewer, also located at the entrance of the site, is number 1602. It has a diameter of 300mm, a cover level of 6.58m AOD and an invert level of 3.56m AOD.

As previously stated in Section 2.1, initial correspondence from Southern Water stated that there had been several incidents of sewer flooding within the area. After further contact with Southern Water (also see Appendix B) they confirmed none of these affected the site. Elm Grove was affected by surface water sewer flooding in 2012, and in the six month period to March 2015 there was flooding in the area due to blockages in the surface water system which have since been cleared. Following a CCTV survey on 11 February 2015, Southern Water confirm they consider these latest issues as resolved.

Based on the information above it is considered that the risk of flooding from sewers is low.

2.8 Reservoir flood risk

The ‘Risk of Flooding from Reservoirs’ map available on the EA website, accessed in February 2015, indicates that the site is not at risk from reservoirs.

Neither the SFRA nor PFRA indicate that the site is at a significant risk of flooding from reservoirs.

It is therefore considered that the flood risk from reservoirs is very low.

3 Surface water management

3.1 Surface water disposal options

The total area of the site is 0.33ha, of which around 0.29ha (88%) is currently impermeable surfacing. The total proposed impermeable area is 0.21ha, approximately 64% of the total site area. Therefore the development will result in a net decrease in hard standing and therefore a net reduction in the rate and volume of surface water run-off, compared to the existing situation.

The options for surface water disposal as described in Building Regulations Approved Document H3 (3) are:

“Rainwater from a system ... shall discharge to one of the following, listed in order of priority –

(a) an adequate soakaway or some other adequate infiltration system; or, where that is not reasonable practicable,

(b) a watercourse; or, where that is not reasonable practicable,

(c) a sewer.”

3.1.1 Discharge to soakaway

In accordance with the above prioritisation of surface water disposal options, soakaways are the preferred disposal method for surface water.

As Section 1.4 outlines, British Geological Survey (BGS) maps show that the stratum underlying the site is likely to be firm London Clay of low permeability. Section 7 of the Ground Investigation Desk Study Appraisal Report concludes that *“Soakaway drainage is likely to be precluded by shallow groundwater and/or low permeability soils.”* Therefore it is unlikely that soakaway drainage is feasible for this development. We would recommend a ground investigation, including in-situ permeability tests (to the soakaway standard BRE365) is carried out to determine whether the use of soakaways will be a reasonably practicable solution.

In addition, Building Regulations Approved Document H3 paragraph 3.25 states that infiltration devices should not be built within 5 metres of a building or road. This requirement will restrict the areas of the development where soakaways could be accommodated. With reference to the proposed development layout (Appendix A.2), there is space to the south (soft landscape area) for the use of soakaways however it is unlikely that they could be employed in the north or west of the site.

The Ground Investigation Desk Study Appraisal highlights potential for contamination of groundwater due to the presence on neighbouring allotments of toxic and phytotoxic metals and chemicals associated with ash from bonfires, which could be spread to the site. It is also stated within Section 5.3 of the Ground Investigation Desk Study Appraisal that the site may have *“fuel-impacted soils if a fuel storage/refuelling facility was included in the property”*. In relation to contamination issues and the use of infiltration, the

Building Regulations Approved Document H3 section 3.25 states: *“infiltration devices should not be built where the presence of any contamination in the runoff could result in pollution of a groundwater source or resource.”* Therefore further investigation to rule out the potential for contamination in the run-off groundwater is recommended prior to infiltration devices being proposed.

3.1.2 Discharge to a watercourse

Subject to the results of the above investigations, if ground conditions preclude the use of soakaways at this site, then discharge to a watercourse is the next drainage disposal option. The nearest watercourse is The Lord's Pond located 0.6km away. The scale of the proposed development would not justify construction of a dedicated new sewer and it would be more practicable and sustainable to discharge surface water to an existing adjacent public sewer.

3.1.3 Discharge to a sewer

Based on the assumption that discharge of surface water from site via soakaway or to a local watercourse is not reasonably practicable, the preferred solution will be to discharge to the public surface water sewer. As Section 1.5 shows, the nearest surface water sewer is located on Elm Grove, which runs adjacent to the entrance of the site along the western boundary. It is considered likely that the surface water currently drains either directly or indirectly to the public sewer in Elm Grove due to the topography of the site and its location within an urbanised area. However, this should be confirmed by site investigation and with Southern Water before progressing the design of a surface water management system and in any case before any development commences.

In undertaking this assessment we have obtained information relating to sewer location, type and recorded flooding incidents but have not undertaken a formal Capacity Check with Southern Water.

Section 42 of the Flood and Water Management Act 2010 came into force in England in October 2012. This amends the Water Industry Act 1991 (Section 106) and qualifies the provisions and right to communicate with the public sewer via a lateral drain or private sewer.

If it can be demonstrated that in the current situation existing surface water run-off does drain into the Southern Water sewer then evidence of this precedence would support the disposal of surface water run-off from the new development to sewer. The reduction in rate and volume of surface water run-off compared to the existing situation would also support this proposal.

3.1.4 Summary of disposal options

The following action is recommended:

- In-situ permeability tests are undertaken to determine the feasibility of soakaway drainage on site;
- If the ground is found to be suitable for soakaway drainage, investigate the potential for infiltration of surface water to mobilise contamination to groundwater;

- If either of the above investigations demonstrates that the disposal of surface water via infiltration is not reasonably practicable, Southern Water should be contacted to assess the potential to discharge surface water run-off to the public sewer. As part of this process a capacity check may be required. Furthermore, investigation should be undertaken to ascertain whether an existing connection to the sewer exists and can be continued to be utilised for the new development or whether surface water run-off drains indirectly to a public sewer e.g. via road gullies.

For completeness we recommend this report should be submitted to Southern Water as part of any consultation.

3.2 Sustainable Drainage Systems (SuDS)

SuDS seek to mimic natural drainage systems and retain water on or near to the site, when and where rain falls. SuDS offer significant advantages over conventional drainage systems in reducing flood risk by reducing the quantity of surface water runoff from a site and the speed at which it reaches water courses, promoting groundwater recharge, and improving water quality and amenity.

In accordance with the planning policy and current best practice, sustainable drainage systems should be implemented wherever they will be effective in the new development proposal. SuDS have significant advantages over conventional drainage systems as they minimise the impacts from the development on the quantity and quality of the runoff, and maximise amenity and biodiversity opportunities for the site.

3.2.1 Quantity of water

The impermeable area of the proposed development is approximately 23% less than that for the existing (see proposed site layout in Appendix A.2). As a result of the decrease in overall impermeable area the CfSH mandatory “Peak Rate of Run-off” and “Volume of Run-off” criteria will not apply.

3.2.2 Quality of water

Section 1.4 of this report concludes that the site is not within a groundwater protection zone. There is a small car park proposed for the site which will not have a significant risk of pollution to the environment. However this risk should be mitigated through the use of appropriate SuDS train components where possible.

Water treatment will not be needed for approximately two thirds of the proposed impermeable surfacing due to the area being roofed. However run-off from access roads and parking areas will require two treatment train components as the development is in an area of ‘low’ receiving water sensitivity (Table 3.3 of The SuDS Manual). It is therefore considered that the small car parking areas that are proposed do not pose a significant risk of pollution to the environment as long as the risk that does exist can be mitigated by the use of appropriate SuDS treatment train components. Comparing the proposed layout (Appendix A.2) with Tables 5.4 and 5.7 from The SuDS Manual indicates that SuDS components such as permeable paving or a filter trench could provide an appropriate level of treatment to mitigate the risk in areas of low permeability. A SuDS design, informed by the result of any investigations outlined in Section 3.1.1.1,

should be carried out in accordance with The SuDS Manual to determine the number, size and type of SuDS components to be utilised by the development.

Following confirmation of infiltration potential it is recommended that a full SuDS selection assessment is carried out in accordance with The SuDS Manual in order to determine the number and type of SuDS components most appropriate for the whole site.

3.2.3 Adoption and maintenance

The National Standards for Sustainable Drainage are currently published in draft format only. When finalised, these will set out the requirement for the design, construction, operation, and maintenance of SuDS in England and Wales, including their future adoption. Schedule 3 of the Flood and Water Management Act 2010 (FWMA) (see Section 3.2) has not yet been implemented, and the Government has not confirmed the date when it will come into force.

DEFRA has recently proposed an alternative method to deliver effective sustainable drainage systems by changing the current planning regime. Developers will have a responsibility to maintain SuDS for the lifetime of the developments they serve. DEFRA is currently in consultation for this proposal and is expecting any changes to the planning policy to come into force in spring 2015.

4 Compliance with sustainability criteria

This FRA has been prepared with consideration given to the requirements of the Code for Sustainable Homes (CfSH) Technical Guidance (November 2010) in order to achieve the credits available under the Sur1 and Sur2 Issues, as detailed below.

4.1 Code for Sustainable Homes Sur1 – Management of surface water run-off

Hydraulic control criteria

The impermeable area of the proposed development is approximately 23% less than that for the existing (see proposed site layout in Appendix A.2). As a result of the decrease in overall impermeable area the CfSH mandatory “Peak Rate of Run-off” and “Volume of Run-off” criteria do not apply.

It is considered that this sufficiently demonstrates compliance with the mandatory elements of Sur 1.

Water quality control criteria

1. *“One credit can be awarded by ensuring there is no discharge from the developed site for rainfall depths up to 5mm”*

The above criterion may be satisfied by using “interception storage” (as defined in Box 3.2 of The SuDS Manual) for the treatment of pollution caused by the run-off from smaller events.

Approximately 10.7m³ of water would need to be retained by a SuDS feature in order to meet this criterion. Section 3.2.2 demonstrates that this may be achieved through the use of SuDS components such as permeable pavement or a filter trench. Therefore award of this credit is appropriate upon completion of SuDS design, carried out in accordance with The SuDS Manual, to determine the number, size and type of SuDS components.

2. *“One credit can be awarded by ensuring that:*
 - *The run-off from all hard surfaces shall receive an appropriate level of treatment in accordance with the SuDS Manual to minimise the risk of pollution.”*

Section 3.2.2 of this report identifies that the majority of the proposed impermeable surfacing will be roofed area that does not require treatment, and the small car parking areas are considered at a low risk of pollution. SuDS components should be designed in accordance with The SuDS Manual to determine the number, size and type and these SuDS components would provide an appropriate level of treatment to mitigate the risk. This would merit the award of the relevant credit.

4.2 Code for Sustainable Homes Issue Sur2 – Flood Risk

“Two credits are available for developments situated in Zone 1 – low annual probability of flooding (as defined in PPS25 Development and Flood Risk) and where the site-specific Flood Risk Assessment (FRA) indicates that there is low risk of flooding from all sources.”

It is noted that PPS25 has been superseded by the NPPF as of March 2012.

It is considered that Section 2 and Section 3 of this report demonstrate the above and hence should merit the award of two credits under Sur 2.

5 Conclusion

This Flood Risk Assessment has been carried out for the proposed development of retirement living accommodation on brownfield land at Pullinger's Interiors, 110-114 Elm Grove, Hayling Island, Hampshire, PO11 9EH. The assessment has been carried out in line with the Code for Sustainable Homes Technical Guidance issued in November 2010 to support the award of credits and demonstrate compliance with elements of Issue Sur1 and Sur2.

To summarise:

- The existing site is in Flood Zone 1 as defined in the NPPF;
- Southern Water reports that Elm Grove was affected by flooding in 2012. During the last six month period prior to March 2015 there was flooding in the area due to blockages in the surface water sewer. Following a CCTV survey 11th February 2015, Southern Water confirm that they consider these latest issues as resolved. We have found no record of historic flooding near the site from any other sources;
- Interactive maps available on the EA website, accessed February 2015 indicate that the site is not at a significant risk of flooding from rivers and sea or from reservoirs;
- The proposed approach and strategy for surface water management set out in Section 3 follows the hierarchy of disposal options listed in Building Regulations Approved Document H;
- Disposal of surface water to a watercourse is not reasonably practicable;
- It is likely that disposal of surface water to public sewer is required. This will require consultation with Southern Water;
- The development will result in a decrease of impermeable area and therefore a reduction in the rate and volume of run-off compared with the existing situation. It therefore complies with the mandatory elements of Sur 1;
- Section 3 of this report explains how, subject to the provision of an appropriate volume of interception storage, there will be no discharge from the developed site for rainfall depths up to 5mm, and that the run-off from all hard surfaces shall receive an appropriate level of treatment to minimise the risk of pollution. Therefore the award of two credits under Sur 1 of CfSH should be merited;
- Section 2 of this report demonstrates that there is a low or very low probability of flooding from all sources, and therefore that the development should merit the award of two credits under Sur 2 of CfSH;

5.1 Recommendations for further work

We recommend that the following work is undertaken to progress the development proposals.

- Further consultation with Southern Water and investigation should be undertaken to ascertain whether an existing connection to the sewer exists and can be continued to be utilised for the new development, or whether surface water run-off drains indirectly to a public sewer e.g. via road gullies.

- A ground investigation, including in-situ permeability tests (to the standard BRE365) should be undertaken to determine whether the use of soakaways is reasonably practicable.
- If the ground is found to be sufficiently permeable for soakaway drainage, investigate the potential for infiltration of surface water to mobilise contamination to groundwater.
- If soakaway drainage is demonstrated not to be reasonably practicable, Southern Water should be contacted to assess options for discharging surface water to the public sewer. A Capacity Check may be required, though if it can be demonstrated that in the current situation surface water does drain into the Southern Water sewer then evidence of this precedence would support a new application. The reduction in the rate and volume of surface water run-off compared to the existing situation would also support the case for a discharge to sewer.
- In accordance with the SuDS manual, a SuDS design, informed by permeability test results should be undertaken to determine the number, type and size of SuDS components to be utilised by the development.

Appendices

Appendix A. Site plans and data	20
Appendix B. Southern Water correspondence	22
Appendix C. Calculations	24

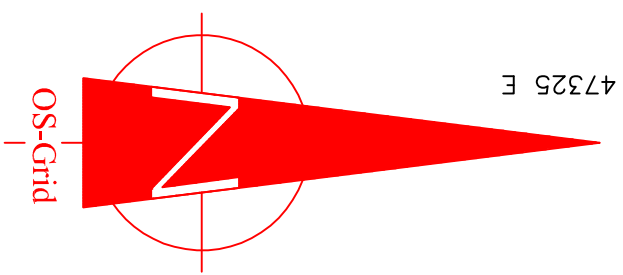
Appendix A. Site plans and data

A.1 Topographic survey

Drawing number 211538-SU-01 prepared by D&H Surveys, dated October 2014 [1 sheet]

A.2 Provisional site layout plan

Drawing number 10073HI-RF01 prepared by Planning Issues Ltd, dated January 2015 [1 sheet]



LINE TYPE MENU

Bank	— — — — —
Building	— — — — —
Kerb	— — — — —
Foliage	
Hedge	
Pipe	
Verge	
Trunk	
Telephone	
Electric	
Water line	
Tree	
Spread/trunk Dia/depth	50%
Mantle	
SWS	
FWS	
Grid Cross	

LEGEND

AV	Air Valve	RS	Roof sign
BL	Ballist	SC	Son Cock
BM	Bench Mark	Sr	Sour
BP	Boundary Point	SV	Son Valve
BT	British Telecom Cover	TL	Threshold level
CA	Cable	TP	Telephone Pole
CL	Cable Television Cover	WM	Water Meter
CL	Cover Level	WO	Wash Out
EV	Electric Power Pole	UTL	Unable To Lift
EP	Eave level	Fence Descriptions	
FH	First Floor	B/W	Barbed Wire
FH	Flare Point	CB	Cable
F	Fence Post	C/C	Covered from
G	Gully	CL	Chain Link
GP	Gate Post	C/P	Chain Link
GV	Gas Valve	CW	Chicken Wire
IC	Inspection Chamber	IR	Iron Railings
IO	Iron Level	PR	Post & Rail
KO	Knob Outlet	PW	Post & Wire
LC	Lamp Post	Back Fence	
LP	Lamp Post	Glass Roofed	
M	M	Buildings & Walls	
M	M	Double Gates	
MS	Marker	Single Gate	
MS	Milestone		
RG	Ridge Level		

D&H Surveys

Dr. Thomas Soderby, Great Smokytna, Chapman
Wilmington, N.S. 5511

Free phone surveys
Floor plans surveys
Volunteer surveys
Mail training surveys

Free telephone surveys
Free floor plans surveys
Free volunteer surveys
Free mail training surveys

S/S: Soderby, Ode
E-mail: ashm@hastings.ns.ca
Fax: (420) 721724

Volunteer surveys
Floor plans surveys
Mail training surveys

S/S: Soderby, Ode
E-mail: ashm@hastings.ns.ca
Fax: (420) 721724

Project Name
Elm Grove
Hayling Island

Drawing Title:
Topographic Survey

Client: Churchill Retirement Living
Agent:

Date: October 2014	Scale: 1:200 @ A1
-----------------------	----------------------

Drawn	Surveyor	Dwg No	Revision
P.J.S	S.C.B	211538-SU-01	

Site Datum	OSBM Reference
OSGM-02	

Disclaimer
D & H Surveys will Guarantee that this
Survey Data is Correct to the Indicated
Scale only.



Appendix B. Southern Water correspondence

NRSAWA
The Rosery
Odiham Road
Riseley
Berkshire
RG7 1SD

Your Ref Hayling Island
Our Ref 181348
Date 17 September 2014
Contact searches@southernwater.co.uk
Fax 01634 844514
DX:400450 Chatham 5

Attention: John Duncan

Dear Sirs

Provision of Public Sewer Main Record Extracts – VAT Receipt
104-112 Elm Grove, Hayling Island, Hampshire, PO11 9EH

Further to your recent enquiry regarding the provision of Southern Water apparatus record extracts for the above location.

Please be aware that there are areas within our region in which there are neither sewers nor water mains. Similarly, whilst the enclosed extract may indicate the approximate location of our apparatus in the area of interest, it should not be relied upon as showing that further infrastructure does not exist and may subsequently be found following site investigation. Therefore actual positions of the disclosed (and any undisclosed) infrastructure should be determined on site, because Southern Water does not accept any responsibility for inaccuracy or omission regarding the enclosed plan and accordingly it should not be considered to be a definitive document.

I confirm payment of the appropriate fee in the sum of £ **48.00**

The breakdown of costs is as follows: -

- Provision of record extracts £ 40.00
- VAT @ 20.0% £ 8.00

VAT Registration Number 813 0378 56

Should you require any additional information regarding this matter please contact this office at the address given at the foot of this letter.

Yours faithfully

Land Search Department

SEWER RECORDS PAGE 1 OF 2

99819



99531

O.S. REF.

SZ72999NW

Drawn by: mondalb

Scale: 1:1280

Date: 29/2014

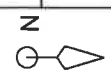
181348_104-112 Elm Grove, Hay

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site.

WARNING: BAC pipes are considered of Standard Adhesive Cement.

WARNING: Unknown (UBC) materials may include Standard Adhesive Cement.

Based upon Ordnance Survey Digital Data with the permission of controller of H.M.S.O. Crown Copyright Reserved



472465

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
05011X	6.33	4.16	300	CP	CIRC	05011X	6.33	4.16	300	CP	CIRC	05011X	6.33	4.16	300	CP	CIRC	05011X	6.33	4.16	300	CP	CIRC
05012X	6.27	4.29	225	CP	CIRC	05012X	6.27	4.29	225	CP	CIRC	05012X	6.27	4.29	225	CP	CIRC	05012X	6.27	4.29	225	CP	CIRC
05030X	6.35	5.34	150	CP	CIRC	05030X	6.35	5.34	150	CP	CIRC	05030X	6.35	5.34	150	CP	CIRC	05030X	6.35	5.34	150	CP	CIRC
05051X	6.39	5.45	150	CP	CIRC	05051X	6.39	5.45	150	CP	CIRC	05051X	6.39	5.45	150	CP	CIRC	05051X	6.39	5.45	150	CP	CIRC
05052X	6.37	5.67	150	CP	CIRC	05052X	6.37	5.67	150	CP	CIRC	05052X	6.37	5.67	150	CP	CIRC	05052X	6.37	5.67	150	CP	CIRC
05062X	6.48	4.8	225	CP	CIRC	05062X	6.48	4.8	225	CP	CIRC	05062X	6.48	4.8	225	CP	CIRC	05062X	6.48	4.8	225	CP	CIRC
05062X	6.75	5.75	225	VC	CIRC	05062X	6.75	5.75	225	VC	CIRC	05062X	6.75	5.75	225	VC	CIRC	05062X	6.75	5.75	225	VC	CIRC
06003X	6.693	5.922	150	VC	CIRC	06003X	6.693	5.922	150	VC	CIRC	06003X	6.693	5.922	150	VC	CIRC	06003X	6.693	5.922	150	VC	CIRC
06051X	6.851	5.727	225	CP	CIRC	06051X	6.851	5.727	225	CP	CIRC	06051X	6.851	5.727	225	CP	CIRC	06051X	6.851	5.727	225	CP	CIRC
06051X	6.85	6.06	225	VC	CIRC	06051X	6.85	6.06	225	VC	CIRC	06051X	6.85	6.06	225	VC	CIRC	06051X	6.85	6.06	225	VC	CIRC
06052X	6.589	6.18	150	VC	CIRC	06052X	6.589	6.18	150	VC	CIRC	06052X	6.589	6.18	150	VC	CIRC	06052X	6.589	6.18	150	VC	CIRC
07011X	6.87	4.86	225	VC	CIRC	07011X	6.87	4.86	225	VC	CIRC	07011X	6.87	4.86	225	VC	CIRC	07011X	6.87	4.86	225	VC	CIRC
08011X	6.7	3.72	300	CP	CIRC	08011X	6.7	3.72	300	CP	CIRC	08011X	6.7	3.72	300	CP	CIRC	08011X	6.7	3.72	300	CP	CIRC
15003X	6.42	3.52	300	CP	CIRC	15003X	6.42	3.52	300	CP	CIRC	15003X	6.42	3.52	300	CP	CIRC	15003X	6.42	3.52	300	CP	CIRC
1503X	6.28	3.86	300	CP	CIRC	1503X	6.28	3.86	300	CP	CIRC	1503X	6.28	3.86	300	CP	CIRC	1503X	6.28	3.86	300	CP	CIRC
1500DX			100	FF	CIRC	1500DX			100	FF	CIRC	1500DX			100	FF	CIRC	1500DX			100	FF	CIRC
1500X	6.34	5.25	225	CP	CIRC	1500X	6.34	5.25	225	CP	CIRC	1500X	6.34	5.25	225	CP	CIRC	1500X	6.34	5.25	225	CP	CIRC
15011X	6.24	4.83	225	CP	CIRC	15011X	6.24	4.83	225	CP	CIRC	15011X	6.24	4.83	225	CP	CIRC	15011X	6.24	4.83	225	CP	CIRC
15012X	6.17	3.92	750	CP	CIRC	15012X	6.17	3.92	750	CP	CIRC	15012X	6.17	3.92	750	CP	CIRC	15012X	6.17	3.92	750	CP	CIRC
16011X	6.29	3.39	300	CP	CIRC	16011X	6.29	3.39	300	CP	CIRC	16011X	6.29	3.39	300	CP	CIRC	16011X	6.29	3.39	300		

System	Architecture	Configuration	Performance	Reliability	Scalability	Security	Cost	Complexity	Flexibility	Interoperability	Integration	Deployment	Support	Documentation	Training	Upgrade	Migration	Backup	Recovery	Disaster	Compliance	Audit	Reporting	Monitoring	Alerting	Logging	Configuration	Management	Automation	Integration	Extensibility	Customization	Localization	Internationalization	Accessibility	Usability	Learnability	Efficiency	Effectiveness	Productivity	Quality	Value	Impact	Contribution	Legacy	Future	Evolution	Transformation	Innovation	Disruption	Change	Growth	Success	Failure	Risk	Opportunity	Challenge	Obstacle	Barrier	Constraint	Limitation	Weakness	Strength	Advantage	Benefit	Feature	Function	Capability	Ability	Power	Influence	Control	Authority	Power	Force	Impact	Effect	Result	Outcome	Consequence	Implication	Significance	Importance	Relevance	Usefulness	Value	Worth	Price	Cost	Expense	Investment	Expenditure	Outlay	Payment	Charge	Fee	Tax	Duty	Contribution	Revenue	Income	Earnings	Profit	Gain	Benefit	Advantage	Merit	Quality	Standard	Level	Grade	Rank	Order	Priority	Importance	Significance	Value	Worth	Price	Cost	Expense	Investment	Expenditure	Outlay	Payment	Charge	Fee	Tax	Duty	Contribution	Revenue	Income	Earnings	Profit	Gain	Benefit	Advantage	Merit	Quality	Standard	Level	Grade	Rank	Order	Priority	Importance	Significance	Value	Worth	Price	Cost	Expense	Investment	Expenditure	Outlay	Payment	Charge	Fee	Tax	Duty	Contribution	Revenue	Income	Earnings	Profit	Gain	Benefit	Advantage	Merit	Quality	Standard	Level	Grade	Rank	Order	Priority	Importance	Significance	Value	Worth	Price	Cost	Expense	Investment	Expenditure	Outlay	Payment	Charge	Fee	Tax	Duty	Contribution	Revenue	Income	Earnings	Profit	Gain	Benefit	Advantage	Merit	Quality	Standard	Level	Grade	Rank	Order	Priority	Importance	Significance	Value	Worth	Price	Cost	Expense	Investment	Expenditure	Outlay	Payment	Charge	Fee	Tax	Duty	Contribution	Revenue	Income	Earnings	Profit	Gain	Benefit	Advantage	Merit	Quality	Standard	Level	Grade	Rank	Order	Priority	Importance	Significance	Value	Worth	Price	Cost	Expense	Investment	Expenditure	Outlay	Payment	Charge	Fee	Tax	Duty	Contribution	Revenue	Income	Earnings	Profit	Gain	Benefit	Advantage	Merit	Quality	Standard	Level	Grade	Rank	Order	Priority	Importance	Significance	Value	Worth	Price	Cost	Expense	Investment	Expenditure	Outlay	Payment	Charge	Fee	Tax	Duty	Contribution	Revenue	Income	Earnings	Profit	Gain	Benefit	Advantage	Merit	Quality	Standard	Level	Grade	Rank	Order	Priority	Importance	Significance	Value	Worth	Price	Cost	Expense	Investment	Expenditure	Outlay	Payment	Charge	Fee	Tax	Duty	Contribution	Revenue	Income	Earnings	Profit	Gain	Benefit	Advantage	Merit	Quality	Standard	Level	Grade	Rank	Order	Priority	Importance	Significance	Value	Worth	Price	Cost	Expense	Investment	Expenditure	Outlay	Payment	Charge	Fee	Tax	Duty	Contribution	Revenue	Income	Earnings	Profit	Gain	Benefit	Advantage	Merit	Quality	Standard	Level	Grade	Rank	Order	Priority	Importance	Significance	Value	Worth	Price	Cost	Expense	Investment	Expenditure	Outlay	Payment	Charge	Fee	Tax	Duty	Contribution	Revenue	Income	Earnings	Profit	Gain	Benefit	Advantage	Merit	Quality	Standard	Level	Grade	Rank	Order	Priority	Importance	Significance	Value	Worth	Price	Cost	Expense	Investment	Expenditure	Outlay	Payment	Charge	Fee	Tax	Duty	Contribution	Revenue	Income	Earnings	Profit	Gain	Benefit	Advantage	Merit	Quality	Standard	Level	Grade	Rank	Order	Priority	Importance	Significance	Value	Worth	Price	Cost	Expense	Investment	Expenditure	Outlay	Payment	Charge	Fee	Tax	Duty	Contribution	Revenue	Income	Earnings	Profit	Gain	Benefit	Advantage	Merit	Quality	Standard	Level	Grade	Rank	Order	Priority	Importance	Significance	Value	Worth	Price	Cost	Expense	Investment	Expenditure	Outlay	Payment	Charge	Fee	Tax	Duty	Contribution	Revenue	Income	Earnings	Profit	Gain	Benefit	Advantage	Merit	Quality	Standard	Level	Grade	Rank	Order	Priority	Importance	Significance	Value	Worth	Price	Cost	Expense	Investment	Expenditure	Outlay	Payment	Charge	Fee	Tax	Duty	Contribution	Revenue	Income	Earnings	Profit	Gain	Benefit	Advantage	Merit	Quality	Standard	Level	Grade	Rank	Order	Priority	Importance	Significance	Value	Worth	Price	Cost	Expense	Investment	Expenditure	Outlay	Payment	Charge	Fee	Tax	Duty	Contribution	Revenue	Income	Earnings	Profit	Gain	Benefit	Advantage	Merit	Quality	Standard	Level	Grade	Rank	Order	Priority	Importance	Significance	Value	Worth	Price	Cost
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Model fit (R-squared)

Adjusted R-squared, Akaike's Information Criterion (AIC), Bayesian Information Criterion (BIC), Cross-validated R-squared, Deviance, F-test, Likelihood Ratio Test (LRT), Mean Squared Error (MSE), Root Mean Squared Error (RMSE), Total Sum of Squares (TSS)

Model fit (AIC)

Akaike's Information Criterion (AIC), Bayesian Information Criterion (BIC), Cross-validated R-squared, Deviance, F-test, Likelihood Ratio Test (LRT), Mean Squared Error (MSE), Root Mean Squared Error (RMSE), Total Sum of Squares (TSS)

Figure 2 displays box plots comparing the distribution of 1000 simulated data sets for two different model fit statistics: R-squared and AIC. The figure is divided into two main sections: 'Model fit (R-squared)' and 'Model fit (AIC)'. Each section contains box plots for various model fit statistics across 1000 simulated data sets. The 'Model fit (R-squared)' section includes box plots for Adjusted R-squared, Akaike's Information Criterion (AIC), Bayesian Information Criterion (BIC), Cross-validated R-squared, Deviance, F-test, Likelihood Ratio Test (LRT), Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and Total Sum of Squares (TSS). The 'Model fit (AIC)' section includes box plots for Akaike's Information Criterion (AIC), Bayesian Information Criterion (BIC), Cross-validated R-squared, Deviance, F-test, Likelihood Ratio Test (LRT), Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and Total Sum of Squares (TSS). The box plots show the distribution of these statistics for each of the 1000 simulated data sets, with the median and quartiles indicated by the box and whiskers. The 'Model fit (R-squared)' section shows a wider distribution of values compared to the 'Model fit (AIC)' section, which shows more consistent results across the simulated data sets.

Drawn by: mondalb	
Title: 181348_104-112 Elm Grove, Hay1	
Date: 17/09/2014	

Spinola - Richards, Olivia

From: Customeraccounts@southernwater.co.uk
<Customeraccounts@southernwater.co.uk>
Sent: 10 March 2015 13:32
To: Spinola - Richards, Olivia
Subject: Historic flooding in Elm Grove, Hayling Island PO11 9EH

Dear Sirs,

Thank you for your recent email regarding historic flooding in the Elm Grove, Hayling Island PO11 9EH area.

Southern Water have had several reported incidents here.

I hope this has been of assistance to you, but if you have any further queries please do not hesitate to contact our Technical Centre on 0845 278 0845.

Yours faithfully,

Penny Eley

Customer Advisor

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Record of telephone conversation



Project Title Planning Issues Ltd – Pullingers Interiors, 110-114 Elm Grove, Hayling Island

Project No 338772

File No. CE01

Between (for MMG)

Olivia Spinola-Richards

Date

12/03/15

Time

9am

And (name)

Ricky (Technical Services)

Organisation

Southern Water

**Phone
No.**

0845 278 0845

Subject

Sewer Flooding in the area

Summary

Follow up of recent email received from Southern Water on 10th March 2015 reporting that several incidents have occurred within the postcode area.

Specific locations of incidents

- No history on site
- Number 22 and 95 reported blockages February 2015
- Numbers 85 and 58 reported blockages October 2014
- Resolved 11th Feb 2015 (CCTV carried out)
- Confirmed flooding incidents were all due to blockages

SFRA 2011 shows incident of flooding on Chruch Road (not on Elm Grove)

- Out of date SFRA (2011)

Frequency of flooding

- 3 incidents along Elm Grove in 2012
- All recent incidents have no previous history of flooding

Improvements made or planned

- Resolved 11th Feb 2015 (CCTV carried out to find blockage and remove it)

Action

To	A	I	C	Sign	Date
Return to					

Appendix C. Calculations

Calculation cover sheet



No. of Sheets 2

Project Title Planning Issues Ltd **Project No.** 338772 **File No.** CE01

Section 110-114 Elm Grove, Hayling Island **Subject** Impermeable area and water quality criteria **Calc No.** 1

Project Manager Nick Price **Design Phase:** **A Concept or preliminary** ☒ **B Analysis and Detailed design** ☐ **C Design verification** ☐ **D Other (specify)** ☐

Designer Olivia Spinola-Richards

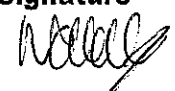
Computer Applications Used

Version/Date

N/A

Scopes of Checking for Manual and Computer Generated Calculations

Manual percentage checks and volume calculations

Sheets Checked *	Calculations by			Checked By		
	Name	Signature	Date	Name	Signature	Date
All	O Spinola-Richards		10/03/15	N Newton		11/03/15

*If an Excel spreadsheet or other computer file has been checked and has not been attached, enter the name, date and full file path or PIMS location of the file that was checked. (PIMS nickname or shortlink from Properties – General could also be useful.)

a) Basic Design Information or Source and Reference:

Site plan by Planning Issues Ltd 10073HI-RF01
CfSH

b) Identify documents/technical records where output will be used:

110-114 Elm Grove, Hayling Island FRA

Approved by
Project Manager

N.M. PRICE

Signature



Date 13/3/15.

Calculations for

CE - Hayling Island

Dvn/dept BNI/WTB

Calculated by OSR

Checked by MN

Job no/file no 338772 - CE

Date 10/3/15.

Sheet no

Date 11/3/15

1 of 2

Impermeable^{FRA} hardstanding

Existing Hard Standing

2895m² or 0.29 ha

Proposed Hardstanding

Buildings (main) = 1264 m².

Car parking + footpaths = 729 m²

Shop unit = 141 m².

TOTAL = 2134 m².

from draw
10073H1
-RF01
site plan
dwg

% of total site

$$\text{existing} = \frac{2895}{3301} \times 100 = 88\% \checkmark$$

$$\text{proposed} = \text{building} = \frac{1264}{3301} \times 100 = 38\% \checkmark$$

$$\text{car parking} \\ + \text{footpaths} = \frac{729}{3301} \times 100 = 22\% \checkmark$$

$$\text{shop unit} = \frac{141}{3301} \times 100 = 4\% \checkmark$$

$$\text{total proposed} = \frac{2134}{3301} \times 100 = 65\% \checkmark$$

∴ decrease of 23% ↓

Project Planning Issues
Ltd. CE- Pullingers
Hayling Island.
Calculations for
Water quality criteria



Dvn/dept BNI/WTB
Calculated by OSR.
Checked by MN

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Date 10/3/15 Sheet no
Date 11/3/15 2 of 2

Water quality criteria

5mm rainfall on hardstanding
= $2134 \text{ m}^2 \times 0.005 \text{ m} = 10.67 \text{ m}^3 \approx 10.7 \text{ m}^3$
would need to be retained to meet
water quality control criteria (1).

★ Add ref:
(FSH...
Code for
Sustainable
Home1
Technical
Guidance
(2010)
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