

Drainage Strategy

Land North of The Oysters
Furniss Way, Hayling Island, PO11 0FG

for

Hayling Island Builders Ltd

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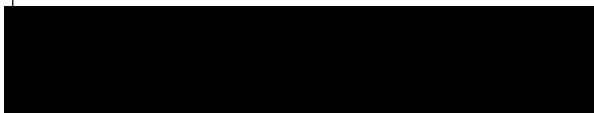
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Revision	Date of issue	Comments	Prepared By	Checked By
1.0	22.10.21	Initial Issue	AJ	DB

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Executive Summary

Description	
Patrick Parsons has been instructed by Hayling Island Builders Ltd, to produce a Drainage Strategy to support the Planning Application for the site at Land North of The Oysters, Furniss Way, Hayling Island, PO11 0FG.	
Site Parameters	
Total Area:	11,000m ² (1.1 Ha)
Greenfield:	YES
Brownfield:	NO
Mixed Green and Brownfield:	NO
Existing Runoff Location:	Ground.
Ground Conditions:	Clay
Method of Study:	Desk Investigation
Ground Infiltration Potential:	Low
Drainage Strategy / SuDS	
Infiltration Viable:	NO
Discharge Point (SW):	Watercourse
Flow Control:	3.7 l/s
Storage Provided:	1 in 100 Year + 40% Climate Change
Discharge Point (FW):	Sewer
SuDS Elements:	Porous Surfacing, Swales, Ponds
Water Quality Measures:	Catchpits, Geotextiles
Exceedance flows:	Managed within site
Conclusions	
Infiltration is unlikely to be viable on site and so attenuation is provided in open sustainable drainage features such as ponds and swales, with additional storage in porous surfacing systems.	

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1.0 Introduction

- 1.1.1 Hayling Island Builders Ltd is planning a proposed development on the site at Land North of The Oysters, Furniss Way, Hayling Island, PO11 0FG.
- 1.1.2 Patrick Parsons has been instructed by Hayling Island Builders Ltd, to produce a Drainage Strategy to support the Planning Application.
- 1.1.3 This report aims to demonstrate that a reduction in surface water run-off from the site can be achieved.
- 1.1.4 The general limitations of this assessment are that:
 - Several data sources have been used in compiling this report. Whilst Patrick Parsons believe them to be trustworthy; it is unable to guarantee the accuracy of the information that has been provided by others.
 - This report is based on information available at the time of preparation. There is potential for further information to become available, which may create a need to modify conclusions drawn in this report.

2.0 Location of Site

- 2.1.1 The site is located north of The Oysters in Hayling Island. A location plan is enclosed in **Appendix A**.
- 2.1.2 The Local Authorities are Havant Borough Council and Hampshire County Council.

3.0 Site Description

3.1 Existing Site

- 3.1.1 The existing site is the parcel of land to the north of The Oysters. A topographical survey has been commissioned for the site and can be found in **Appendix B**.

3.2 Existing Drainage System

- 3.2.1 Sewer records were obtained from Southern Water and can be found at **Appendix C**. There are public foul water and surface water sewers located within Furniss Way.
- 3.2.2 There is a public 150mm diameter foul water sewer within Furniss Way. The closest public manhole is No. 9801 with cover level 5.63m AOD and an invert level of 4.70m AOD.
- 3.2.3 There is a public 225mm diameter surface water sewer within Furniss Way. The closest public manhole is No. 9850 with cover level 5.82m AOD and an unknown invert level.

3.3 Existing Geology

- 3.3.1 The geology of the site has been ascertained by reference to the 1:50,000 British Geological Survey website. The data provided on the website indicates the bedrock and superficial drift geology for the site.
- 3.3.2 The strata of the site (bedrock geology) comprises London Clay formation, described as follows:

“London Clay Formation - Clay, Silt and Sand. Sedimentary Bedrock formed approximately 48 to 56 million years ago in the Palaeogene Period. Local environment previously dominated by deep seas. These sedimentary rocks are marine in origin. They are detrital and comprise coarse- to fine-grained slurries of debris from the continental shelf flowing into a deep-sea environment, forming distinctively graded beds.”

- 3.3.3 The strata of the site (superficial drift) comprises River Terrace Deposits, described as follows:

“River Terrace Deposits (undifferentiated) - Sand, Silt and Clay. Superficial Deposits formed up to 3 million years ago in the Quaternary Period. Local environment previously dominated by rivers (U). These sedimentary deposits are fluvial in origin. They are detrital, ranging from coarse- to fine-grained and form beds and lenses of deposits reflecting the channels, floodplains and levees of a river or estuary (if in a coastal setting).”

3.4 Geological Assessment

- 3.4.1 Boreholes in the local area indicate predominantly clay with seams of sand and gravel. They also indicate a groundwater strike at approximately 1.5m below ground level.

3.4.2 It has not been possible to undertake site investigations at the time of writing this report to determine the underlying geology. It is recommended that a full geotechnical investigation be completed prior to any detailed design of the scheme.

3.4.3 Based on the desk study information on the geology of the site, infiltration is not likely to be suitable for the development. The requirement for a positive surface water discharge has been considered in this report.

3.5 Hydrogeology Setting

3.5.1 The Environment Agency (EA) mapping service, as provided by Magic Map, indicates the aquifer designation for the bedrock and superficial drift geology and the groundwater vulnerability in the area. The mapping, as included at **Appendix D**, provide the following information for the site:

Geology Map	Site Description
Aquifer Designation (Bedrock)	Unproductive
Aquifer Designation (Superficial Drift)	Secondary A
Groundwater Vulnerability	Medium / Low
Groundwater Source Protection Zone	None

4.0 Site Run-Off

4.1 Existing Surface Water Runoff

- 4.1.1 The site has not been previously developed, so an analysis of the Greenfield run-off rate is appropriate and will be made for the developable site area of 1.10 hectares (excluding the existing pond area).
- 4.1.2 The Greenfield run-off rates have been calculated for the existing site. The existing site run-off rates have been calculated based on the Interim Code of Practice for Sustainable Drainage Systems, Chapter 6 using the Micro Drainage design software. The output from the software analysis can be found at **Appendix E**.
- 4.1.3 The Qbar (rural) value for the site is 3.7 litres per second.

4.2 Greenfield Run-Off Assessment

- 4.2.1 An assessment of the most appropriate flow restriction on site can be made with an engineering judgement made on the following parameters:
- Proposed depth of surface water system. Shallow systems will not be able to construct certain flow controls.
 - Risk of blockages, open drainage systems and conventional piped systems will have a significantly higher chance of blockage.
 - Potential for soakage or a hybrid solution with some infiltration and some positive discharge.
 - The existing use of the site (green/brown field) and the most appropriate reduction in surface water flows from the proposed development.
 - Potential development costs and the viability of achieving very low flow rates on sites.
 - Manufacturer limits, with Hydro-International stating they can achieve between 0.7 and 550 l/s on their product range.
- 4.2.2 Infiltration has not been selected, based on the geotechnical information provided within this report.
- 4.2.3 A flow control of 3.7 litres per second has been proposed, which is equivalent to the greenfield run-off rate.

5.0 Proposed Development

5.1.1 The proposal is for 32 No. residential units. A site layout can be found at **Appendix F**.

5.2 Infiltration Potential

5.2.1 The geotechnical information provided in this report indicates that standard infiltration methods will not be suitable on site.

5.2.2 The table below summarises the potential for infiltration.

Low infiltration potential: There is a low potential for infiltration SuDS in parts of the Site. Comments: It is likely that the underlying geology at the Site, or in areas of the site, is relatively impermeable which would limit the effectiveness of a proposed infiltration SuDS scheme. Recommendations: Infiltration SuDS should be focused in more suitable parts of the site. If a site investigation confirms that infiltration SuDS are not possible at the site, then attenuation SuDS with a controlled discharge into a nearby surface water feature or existing surface water drainage is recommended.	YES
Moderate infiltration potential: There is a moderate potential for infiltration SuDS in parts of the Site. Comments: It is likely that the permeability of the underlying material at the site would be suitable for infiltration drainage. However, there may be constraints on the use of infiltration SuDS because of any of the following: a high water-table, the limited thickness of the receiving formation, the potential for a significant range in permeability in the underlying geology and confirmation of the infiltration capacity is recommended. Recommendations: A site investigation is recommended to investigate groundwater levels and formation thickness and to confirm that infiltration rates at the site are sufficient to accommodate an infiltration SuDS feature. If a site investigation confirms that infiltration SuDS are possible at the Site then assorted options can be considered for infiltration SuDS and these include infiltration trenches, soakaways, swales, permeable pavements and infiltration basins without outlets.	NO
High infiltration potential: There is a high potential for infiltration SuDS in parts of the Site. Comments: It is likely that the underlying geology at the Site is highly permeable and an infiltration SuDS scheme should be possible at the Site. Groundwater levels are expected to be sufficiently deep at the site. Recommendations: A site investigation is recommended to confirm the high infiltration capacity and the depth of the winter water table. Assorted options can be considered for infiltration SuDS and these include infiltration trenches, soakaways, swales, permeable pavements and infiltration basins without outlets.	NO

6.0 Sustainable Drainage Assessment

6.1 SuDS Hierarchy

- 6.1.1 Options for the destination for the run-off generated on site have been assessed in line with the prioritisation set out in the Building Regulations Part H document and DEFRA's Draft National Standards for SuDS as follows:

Discharge to Ground	Not viable based on desk study
Discharge to Watercourse	Selected Option
Discharge to Surface Water Sewer	N/A
Discharge to Other Sewer	N/A

- 6.1.2 The indicative potential for different SuDS devices has been assessed and can be seen in the table below:

SuDS Feature	Environmental benefits	Water quality improvement	Suitability for low permeability soils ($k < 10^{-6}$)	Ground-water recharge	Suitable for small / confined sites?	Site specific restrictions	Appropriate for subject site?
Wetlands	✓	✓	✓	X	X	None	Yes
Retention ponds	✓	✓	✓	X	X	None	Yes
Detention basins	✓	✓	✓	X	X	None	Yes
Infiltration basins	✓	✓	X	✓	X	Poor Ground	No
Soakaways	X	✓	X	✓	✓	Poor Ground	No
Underground storage	X	X	✓	X	✓	None	Yes
Swales	✓	✓	✓	✓	X	None	Yes
Filter strips	✓	✓	✓	✓	X	None	Yes
Rainwater harvesting	X	✓	✓	✓	✓	None	Yes
Permeable paving	X	✓	✓	✓	✓	None	Yes
Green roofs	✓	✓	✓	X	✓	N/A	No
Rain Garden (external)	✓	✓	✓	X	X	Site Constraints	No
Rain Garden (planter)	✓	✓	✓	X	X	Site Constraints	No

6.2 Detailed SuDS Assessment

6.2.1 To maximize the potential use of SuDS at the site, a review has been undertaken in accordance with the SuDS Hierarchy (refer to SuDS: A Practical Guide prepared by the Environment Agency).

6.2.2 The following table indicates the potential setting for SuDS elements:

	Description	Setting	Required Area
Green Roof	A planted soil layer is constructed on the roof of a building to create a living surface. Water is stored in the soil layer and absorbed by vegetation.	Building	Building integrated
Rainwater Harvesting	Rainwater is collected from the roof of a building or from other paved surfaces and stored in an overground or underground tank for treatment and reuse locally. Water could be used for toilet flushing and irrigation.	Building	Water storage (underground or above ground)
Soakaway	A soakaway is designed to allow water to quickly soak into permeable layers of soil. Constructed like a dry well, an underground pit is dug filled with gravel or rubble. Water can be piped to a soakaway where it will be stored and allowed to gradually seep into the ground.	Open Space	Dependant on Run-off volumes and soils
Filter Strip	Filter strips are grassed or planted areas that runoff can run across to promote infiltration and cleansing.	Open Space	Maximum length 5 metres
Permeable Paving	Paving which allows water to soak through. Can be in the form of paving blocks with gaps between solid blocks or porous paving where water filters through the block itself. Water can be stored in the sub-base beneath or allowed to infiltrate into ground below.	Street / Open Space	Can typically drain double its area
Bioretention Area	A vegetated area with gravel and sand layers below designed to channel, filter and cleanse water vertically. Water can infiltrate into the ground below or drain to a perforated pipe and be conveyed elsewhere. Bioretention systems can be integrated with tree-pits or gardens.	Street / Open Space	Typically, surface area is 5-10% of drained area with storage below.
Swale	Swales are vegetated shallow depressions designed to convey and filter water. These can be 'wet' where water gathers above the surface, or 'dry' where water gathers in a gravel layer beneath. Can be lined or unlined to allow infiltration.	Street / Open Space	Account for width to allow safe maintenance typically 2-3 metres wide.
Hardscape Storage	Hardscape water features can be used to store run-off above ground within a constructed container. Storage features can be integrated into public realm areas with a more urban character.	Open Space	Could be above or below ground and sized to storage need.
Pond / Basin	Ponds can be used to store and treat water. 'Wet' ponds have a constant body of water and run-off is additional, while 'dry' ponds are empty during periods without rainfall. Ponds can be designed to allow infiltration into the ground or to store water for a period of time before discharge.	Open Space	Dependant on runoff volumes and soils.
Wetland	Wetlands are shallow vegetated water bodies with a varying water level. Specially selected plant species are used to filter water. Water flows horizontally and is gradually treated before being discharged. Wetlands can be integrated with a natural or hardscape environment.	Open Space	Typically, 5-15% of drainage area to provide good treatment.
Underground Storage	Water can be stored in tanks, gravel or plastic crates beneath the ground to provide attenuation.	Open Space	Dependant on runoff volumes and soils.

6.2.3 This review highlights the components referenced in the SuDS Hierarchy and provides recommendations on whether the components could be incorporated into the development.

Component	Recommendation / Opinion	
Green (living) roofs or Blue/Green roof systems	There is no scope for blue or green roofs on the development.	↓
Basins and Ponds	There is some potential for basins and ponds on the site, which have been selected as the primary attenuation device.	↓
Filter Strips and Swales	There is some scope for use of surface mounted SuDS on the scheme to convey water, subject to further design.	↓
Infiltration Devices	Infiltration devices are unlikely to be viable on site.	↓
Permeable Surfaces and Filter Drains	Porous surfaces should be viable on site in a tanked configuration.	↓
Tanked Systems	It is unlikely that these will be required.	↓

6.2.4 The proposed drainage system incorporates sustainable drainage features in accordance with the SuDS hierarchy, current legislation and best practice as much as practicable on site.

6.2.5 There may be opportunity for small scale bespoke SuDS elements (such as planters and filtration beds) to be included as part of the landscaping proposals. These should be considered fully before construction commences.

7.0 Drainage Proposal

7.1 Surface Water Drainage

- 7.1.1 Surface water drainage at the site will follow the Sustainable Drainage Systems (SuDS) management train. The surface water from the site will discharge into the existing watercourse at a restricted rate. A Drainage Plan can be found at **Appendix G**.
- 7.1.2 New climate change allowances have been in force since February 19th 2016. The new allowances take into consideration the design life of the development, flood zone, development type and geographical location.
- 7.1.3 Based on these parameters, the Central value for rainfall intensity should be used. Based on Table 2 (shown below), this is a range between 20% and 40% for the central and upper end values. Therefore, it is appropriate to use 40% on this development for design.

Table 2 peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline)

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

- 7.1.4 Any water up to a 1 in 100 year storm event including 40% climate change will be attenuated within the curtilage of the site in the proposed drainage system.
- 7.1.5 National SuDS standards, the Design and Construction Guidance 2020 and Sewers for Adoption recommend that the 1 in 30 year storm event is managed below ground with exceedance flows managed above ground.
- 7.1.6 MicroDrainage calculations have been undertaken, which can be found at **Appendix H**. Due to the method of surface water management, a full Simulation model was not appropriate for the site.
- 7.1.7 A source control model has been used with a complex structure for the pond and porous surfacing on the site. The system as drawn experiences no flooding in a 100 year event plus climate change and so is proof of concept for the scheme, to be developed further at the next design stage.

7.2 Existing Watercourse

- 7.2.1 It is intended to culvert the existing watercourse on the southern boundary of the site due to secure by design constraints on the proposed units.
- 7.2.2 If the Lead Local Flood Authority are opposed to the culverting of this watercourse, there are a few options that can be explored. These have been detailed in the drainage plan.

7.3 Designing for Exceedance Events

- 7.3.1 Current best practice guidance on flood risk requires an evaluation of how rainfall events beyond the design capacity of the proposed drainage system would be managed and what effects they are likely to have on flood risk at the site or surrounding areas.
- 7.3.2 Should a rainfall event exceeding the 1.0% AEP (1 in 100 year) event plus climate change event occur, the proposed storage and flow paths of surface water should be considered.
- 7.3.3 The surface water SuDS features included for the 1 in 100 year storm will be designed with sufficient resilience to manage and convey exceedance flows away from any properties to minimise risk.
- 7.3.4 Indicative exceedance pathways have been shown on the drainage layout, with further information to be defined once the detailed levels of the scheme have been developed.

7.4 Designing for System Failure

- 7.4.1 Current best practice on sustainable drainage design should consider failure of the surface water system and potential blockages from multiple sources. The potential risks to the surface water system have been indicated below:

Risk	Description	Comments / Recommendations
Blockage	Potential blockage of outfall from surface water system	Regular inspection and maintenance of the drainage system should be undertaken in line with the findings of this report
Failure	Potential blockage of outfall from flow control failure or build-up of debris	Regular inspection and maintenance of the drainage system should be undertaken in line with the findings of this report
Surcharge	Potential back-up of system due to surcharging or poorly maintained public surface water infrastructure or watercourse	Regular inspection and maintenance of the drainage system should be undertaken in line with the findings of this report
Blockage	Potential risk of flooding due to build-up of sediment within system	Catchpit manholes have been provided to remove solids and sediment. Regular inspection and maintenance of the drainage system should be undertaken in line with the findings of this report.
Failure	Potential risk of surface water flows from poor maintenance of surface mounted SuDS features (such as porous paving or swales)	Regular inspection and maintenance of the surface mounted SuDS should be undertaken in line with the findings of this report.
Surcharge	Potential risk of additional surface water flows or overland flows from extreme (exceedance storm) events in adjacent sites causing the surface water system to be overloaded.	Exceedance flow routes have been assessed and shown on the drainage layout.
Failure	Potential risk from failure of third-party specialist equipment such as pump stations or interceptors	Any pump stations or interceptors installed on site should be maintained in line with the specialist manufacturer's recommendations.

Blockage	Potential risk from poor maintenance of gullies	Regular inspection and maintenance of the underground drainage system should be undertaken in line with the findings of this report.
Blockage	Potential reduction in infiltration on site from compaction of soils during the construction phase	Ground consolidation should not have a major impact.
Failure	Poor planting and maintenance of green areas could reduce the hydraulic properties of SuDS devices (and amenity/biodiversity benefits)	Regular inspection and maintenance of the surface mounted SuDS should be undertaken in line with the findings of this report. The high groundwater table should be noted, and any observed risks reported.

7.5 Urban Creep

- 7.5.1 Urban Creep is the conversion of permeable surfaces to impermeable over time. e.g. impermeable surfacing of front gardens to provide additional parking spaces, extensions to existing buildings, creation of large patio areas. The consideration of urban creep (is best) assessed on a site by site basis but is limited to residential development only.
- 7.5.2 It is important that the appropriate allowance for urban creep is included in the design of the drainage system over the lifetime of the proposed development. The allowances set out below are applied to the impermeable area within the property curtilage:

Residential development density Dwellings per hectar	Change allowance % of impermeable area
≤ 25	10
30	8
35	6
45	4
≥ 50	2
Flats & apartments	0

- 7.5.3 Note where the inclusion of the appropriate allowance would increase the total impermeable area to greater than 100%, 100% should be used as the maximum.
- 7.5.4 The proposed development has scope for expansion. Based on this, 10% allowance for urban creep is required for the development.

7.6 Construction Phase Drainage

- 7.6.1 It is an offence to cause or knowingly permit the entry of poisonous, noxious or polluting material into the water environment. Prosecution may ensue if the pollution is serious enough to lower the ecological status of the water body in terms set by the Water Framework Directive (2000/60/EC).

- 7.6.2 The polluter does not have to be prosecuted first for remediation of damage to be required. If water pollution is serious enough to be classed as environmental damage the damage will require to be remediated such that the area is returned to the condition it would have been in if the damage had not occurred.
- 7.6.3 An offence may also be committed if environmental damage or the threat of environmental damage is not reported by the polluter or if no action is taken by the polluter to prevent further damage. Third parties (e.g. private water supply users, landowners, recreational users and the public) who may be affected by possible damage may also report 'risk' of environmental damage to the enforcing authority; in this instance an offence may be committed if action is not taken to prevent the potential environmental damage occurring.
- 7.6.4 The principles of Sustainable Drainage Systems (SuDS) shall be applied to all components of design and construction regarding surface water management. Any design or site works that may impact on the site drainage or water quality shall:
- Soakaway where soils allow
 - Consider and manage erosion
 - Retain any silts on site and prevent silts from discharging into watercourses or drains
 - Remove pollutants in surface water
 - Keep runoff rates at existing greenfield runoff
 - Prevent accidental spillages reaching watercourses.
- 7.6.5 As infiltration is not expected to be viable on site, the temporary drainage for the development will be in the form of land drainage with discharge into the existing sewer, with the appropriate levels of treatment.
- 7.6.6 Pollution will be controlled via the use of catchpit manholes and geotextiles.
- 7.6.7 Any potentially hazardous substances (i.e. from plant / deliveries) will be within a controlled compound with a separate drainage system that will contain a penstock valve / containment kit in the event of a spillage.

7.7 Foul Water Drainage

- 7.7.1 The foul water for the development will discharge into the existing public sewer. Foul water flows are anticipated to be 1.48 litres per second based on 4000 litres per dwelling per day in accordance with Sewers for Adoption 7th Edition and the Design and Construction Guidance 2020.

8.0 Water Quality

8.1 Water Quality Overview

- 8.1.1 A key requirement of any SuDS system is that it protects the receiving water body from the risk of pollution. This can be effectively managed by an appropriate “train” or sequence of SuDS components that are connected in series.
- 8.1.2 The frequent and short duration rainfall events are those that are most loaded with potential contaminants (silts, fines, heavy metals and various organic and inorganic contaminants). Therefore, the first 5-10 mm of rainfall (first flush) should be adequately treated with SuDS.
- 8.1.3 The minimum number of treatment stages will depend on the sensitivity of the receiving water body and the potential hazard associated with the proposed development SuDS Manual (CIRIA, 2015).
- 8.1.4 The proposed development is a combination of very low (roof water) to low hazard (runoff from small car parking areas), as indicated on the table below:

Hazard	Source of Hazard	Present
Very Low	Residential Roof drainage.	YES
Low	Residential amenity uses including low usage car parking spaces and roads, other roof drainage	YES
Medium	Commercial, industrial uses including car parking spaces and roads (excluding low usage road, trunk roads and motorways)	NO
High	Areas used for handling and storage of chemicals and fuels, handling of storage and waste	NO

- 8.1.5 The site does lie within a source protection zone and therefore additional treatment stages are required.
- 8.1.6 The treatment processes provided by different SuDS components will have varying capabilities for removal of different types of contaminants as per the table below:

Hazard	Requirements for discharge to surface water and groundwater	Present
Very Low	Removal of gross solids and sediments only.	YES
Low	Simple index approach	YES
Medium	Surface water: Simple index approach Ground water: Simple index approach and risk screening	NO
High	Guidance and risk assessment process in HA (2009). Discharge may require environmental permit or licence. Obtain pre-permitting advice from environmental regulator. Risk assessment likely to be required.	NO

8.2 Simple Index Approach

- 8.2.1 The index approach as defined by CIRIA C753 (the SuDS Manual) defines the index approach to water quality in three steps as defined in Box 26.2 below:

BOX 26.2 Steps of the simple index approach

Step 1 – Allocate suitable pollution hazard indices for the proposed land use

Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index

Step 3 – Where the discharge is to protected¹ surface waters or groundwater, consider the need for a more precautionary approach

Note:

¹ Designated as those protected for the supply of drinking water (Table 4.3).

8.3 Step 1- Allocate Potential Hazards

- 8.3.1 To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contaminant type):

Total SuDS mitigation index $\geq$ pollution hazard index

(for each contaminant type) (for each contaminant type)

- 8.3.2 Where the only destination of the runoff is to a surface water – that is there is no infiltration from the SuDS to groundwater – the surface water indices should be used.
- 8.3.3 In England and Wales, where the principal destination of the runoff is to a surface water, but small amounts of infiltration may occur from unlined components (Interception), then the groundwater indices should be used for the discharge to groundwater, and the surface water indices should be used for the main surface water discharge (as suggested in Table 26.3).
- 8.3.4 Where the principal destination of the runoff is to groundwater, but discharges to surface waters may occur once the infiltration capacity is exceeded, the groundwater indices should be used, as suggested in Table 26.4. The risk to surface waters will be low, as dilution will be high for large events, so treatment is not required.
- 8.3.5 The pollution indices for this site have been selected using the guidance in CIRIA C753 and are as per Table 26.2 below:

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

Notes

- 1 Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).
- 2 These should only be used if considered appropriate as part of a detailed risk assessment – required for all these land use types (Table 4.3). When dealing with high hazard sites, the environmental regulator should first be consulted for pre-permitting advice. This will help determine the most appropriate approach to the development of a design solution.

Where a site land use falls outside the defined categories, the indices should be adapted (and agreed with the drainage approving body) or else the more detailed risk assessment method should be adopted.

Where nutrient or bacteria and pathogen removal is important for a particular receiving water, equivalent indices should be developed for these pollutants (if acceptable to the drainage approving body) or the risk assessment method adopted.

8.3.6 The identified hazard levels are as follows:

- Total Suspended Solids (TSS) 0.70
- Metals 0.60
- Hydrocarbons 0.45

8.3.7 Treatment has been provided in the form of catchpit manholes to remove sediment and contaminated particles and geotextiles within the porous paving as a filter medium.

8.3.8 Additional treatment is provided in the pond with appropriate planting and reeds.

8.4 Treatment with Discharge to Surface Water

8.5 As the site is discharging to a watercourse or sewer, Table 26.3 of the CIRIA C753 manual is used to evaluate the water quality mitigation measures offered by the proposed drainage system.

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters				
Type of SuDS component	Mitigation indices¹			
	TSS	Metals	Hydrocarbons	
Filter strip	0.4	0.4	0.5	
Filter drain	0.4 ²	0.4	0.4	
Swale	0.5	0.6	0.6	
Bioretention system	0.8	0.8	0.8	
Permeable pavement	0.7	0.6	0.7	
Detention basin	0.5	0.5	0.5	
Pond ⁴	0.7 ³	0.7	0.5	
Wetland	0.8 ³	0.8	0.8	
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.			

Notes

- 1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.
- 2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.
- 3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.
- 4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.
- 5 See **Chapter 14** for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: <http://tinyurl.com/qf7yuj7>
- 6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

8.5.1 The identified hazard remediation levels are as follows:

	Hazard	Treatment	Result
– Total Suspended Solids (TSS)	0.70	1.4	0
– Metals	0.60	1.3	0
– Hydrocarbons	0.45	1.2	0

9.0 Ownership Responsibility

9.1.1 The drainage has been separated by ownership as part of this strategy. The separation is as follows:

Drainage Element	Ownership	Adopted
Private Surface Water system *	Maintenance company appointed by Hayling Island Builders Ltd	Private
Private / Residential Foul Water System *	Maintenance company appointed by Hayling Island Builders Ltd	Private
Public / Road Surface Water system	Southern Water (offered under S104)	Public
Public / Road Foul Water system	Southern Water (offered under S104)	Public
Sustainable drainage features	Maintenance company appointed by Hayling Island Builders Ltd	Private
Riparian Foul Plot Drainage	Property Owner	Private
Riparian Surface Water Plot Drainage	Private Owner	Private

***Note*:** Predominately two units or more

9.2 Adoptable Drainage

9.2.1 Sewers for Adoption (7th and 6th Edition) are guidance documents used by the water companies to approve and review drainage designs that are offered to them (or vested) for adoption. This is usually via a S104 or similar agreement.

9.2.2 As of 1st April 2020, the Design and Construction Guidance documentation will replace both the previous versions and will be mandatory as part of the Code for Adoption agreements.

9.2.3 Appendix C of the Design and Construction Guidance (DCG) is in effect the replacement for Sewers for Adoption (SfA) 6th and 7th edition.

9.3 Adoptable Systems

9.3.1 The table below indicates the type of drainage element that is currently allowed to be offered for adoption under DCG 2020, with the previous allowances shown for reference.

	SfA6 / 7	DCG	LA	PRIVATE
Rainwater Harvesting	X	X	X	✓
Green Roofs	X	X	X	✓
Infiltration Systems	X	✓	✓	✓
Proprietary Treatment Systems	✓	✓	✓	✓
Filter Strips	X	X	✓	✓
Filter Drains	X	✓	✓	✓
Swales	X	✓	✓	✓
Bioretention Systems	X	✓	X	✓
Trees	X	X	✓	✓
Pervious Pavements	X	X	✓	✓
Attenuation Storage Tanks	✓	✓	✓	✓
Detention Basins	X	✓	✓	✓
Ponds and Wetlands	X	✓	✓	✓

9.3.2 The drainage elements on this system that are intended to be offered for adoption have been shown on the drainage plan as appropriate.

10.0 Drainage Maintenance

10.1.1 Regular inspection and maintenance is particularly important to ensure the effective long-term operation of surface water drainage, sewers and sustainable drainage systems (SuDS).

10.1.2 When designing, we have considered the required maintenance over the design life of the project, ensuring sufficient and permanent access to all areas of the system.

10.1.3 Maintenance operations can be divided into the following categories:

- Regular (or routine frequent) - this covers items that are carried out typically with a frequency from monthly to annually. It includes items such as inspection and monitoring, litter removal, grass cutting or other vegetation management, sweeping permeable pavements.
- Infrequent (or routine infrequent) - this covers items that are required typically with a frequency from annually up to 25 years (or possibly greater). It includes items such as wetland vegetation management, silt removal from swales, ponds or wetlands, scarifying and spiking infiltration basins and gravel replacement to filter drains.
- Remedial (or reactive) - this covers maintenance that is not usually required, but may be necessary as a result of vandalism, accidental damage, rainfall that exceeds the design capacity or similar events. Examples include repair of erosion in a swale or repair of permeable surfaces blocked for example by mixing concrete on them.

10.2 Riparian Responsibility

10.2.1 If an occupier owns land adjoining, above or with a portion of the drainage system running through it, they have certain rights and responsibilities. In legal terms they are a 'riparian owner'. If they rent the land, they should agree with the owner who will manage these rights and responsibilities.

10.2.2 It is recommended that the owner's appointed Management Company handle the maintenance of all underground drainage and all SuDS devices, with the following exceptions:

- Inspecting and cleaning out any surface mounted hard drainage systems (such as channel drains);
- Inspecting and cleaning out (or reporting) SuDS systems on a small scale (such as garden ditches and swales).

10.3 Allowing for Replacement

10.3.1 The design life of some SuDS elements and drainage elements of the proposed system is shorter than the predicted design life of the development. Therefore, the design and maintenance regime consider any potential replacement works (such as replacing permeable paving).

10.3.2 Regular inspection of the underground drainage system should be as per the tables below.

Operation and maintenance requirements for Surface Water and Foul Systems		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect for sediment and debris in catchpit manholes and gullies. Clean out as required	Twice Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris from catchpits, gullies, attenuation devices and inside of concrete manhole rings	As required, based on inspections
Remedial Actions	Reconstruct and/or replace components, if performance deteriorates or failure/blockage occurs	As required
	Replacement of clogged components (flow restriction)	As required
Monitoring	Inspect silt traps/gullies/catchpits and note rate of sediment accumulation	Monthly in the first year and then annually
	Check flow control chamber and attenuation devices	Annually

11.0 Suds Maintenance

- 11.1.1 Like all drainage systems, SuDS components should be inspected and maintained. This ensures efficient operation and prevents failure. Usually SuDS components are on or near the surface and most can be managed using landscape maintenance techniques.
- 11.1.2 For below-ground SuDS such as permeable paving and modular geocellular storage the manufacturer or designer should provide maintenance advice. This should include routine and long-term actions that can be incorporated into a maintenance plan.
- 11.1.3 The design process considers the maintenance of the components (access, waste management etc.) including any corrective maintenance to repair defects or improve performance.
- 11.1.4 In the absence of legislation funding for the adopter to maintain their SuDS may need to be resolved at the start of the development process to ensure that either the local authority, a maintenance company, local residents or the water company have sufficient resources to maintain the system in the long-term.
- 11.1.5 Further information on maintenance can be found in The SUDS Manual (CIRIA publication C697), which has been used as a guide for this report.
- 11.1.6 The SuDS scheme is unlikely to be handed over for maintenance until all parties are confident that the scheme is constructed and performs as designed. An interim maintenance plan can be incorporated on larger or phased schemes.
- 11.1.7 Maintenance of SuDS drainage should be in accordance with the guidance presented in CIRIA Factsheet “Maintenance of SuDS” May 2017. A detailed maintenance plan for the scheme will be generated by the appointed owner/maintainer of the site or a selected maintenance company and this section is for guidance only.

11.1.8 Regular inspection of the sustainable drainage system should be as per the tables below.

Operation and maintenance requirements for Swales		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional Maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial Actions	Repair erosion or other damage by re-turfing or reseedling	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Operation and maintenance requirements for Pervious Pavements		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Operation and maintenance requirements for Ponds and Wetlands		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc. for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices eg penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1 m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1 m above water level	Annually
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay.	Every 1–5 years, or as required
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays.	Every 5 years, or as required
Occasional Maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 25–50 years
Remedial Actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair / rehabilitate inlets, outlets and overflows.	As required

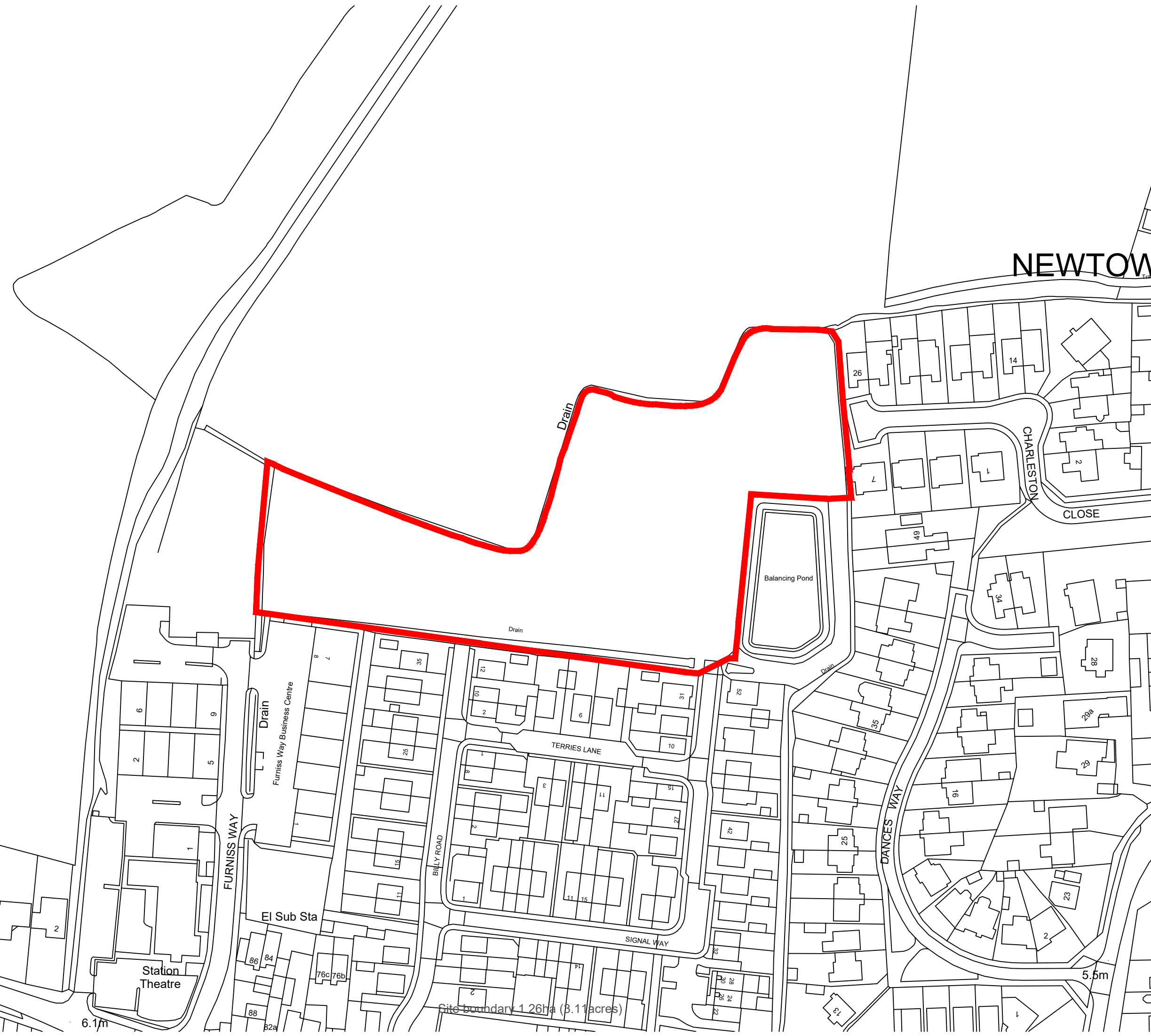
12.0 Summary and Conclusions

- 12.1.1 Hayling Island Builders Ltd is planning a proposed development on the site at Land North of The Oysters, Furniss Way, Hayling Island, PO11 0FG.
- 12.1.2 Patrick Parsons has been instructed by Hayling Island Builders Ltd, to produce a Drainage Strategy to support the Planning Application.
- 12.1.3 The surface water system will discharge into the existing watercourse at a restricted rate.
- 12.1.4 The foul water will discharge into the existing public sewer.
- 12.1.5 The report has demonstrated that the proposed drainage measures ensure that no property will be at risk of flooding if the development proceeds and that suitable means of surface water and foul drainage can be achieved for the proposed development.

Appendix A

Location Plan

Site boundary 1.26ha (3.11acres)



Project
Land North of the Oysters

Drawing Title
Site Location Plan

Date	Scale	Drawn by	Check by
08/03/2021	1:1,250 at A3	ML	SR
Project No	Drawing No	Revision	
1239	001	-	

Appendix B

Topographical Survey

ALL LEVELS ARE ORTHOMETRIC HEIGHTS RELATED TO OSGM15
GPS DATUM, COMPUTED USING LEICA SMARTNET RTK NETWORK

[illegible]

	Single Gate	-----	Telecom Overhead
	Double Gate	-----	Power Overhead
	Banking	-----	Foot Water
	Step Up	-----	Surface Water
	Diameter shown in mm	-----	Combined Water
	Survey Station	-----	Unsewered Services
		-----	Change of Surface
		-----	Drop Kerb
		-----	Fence
		-----	Wall
		-----	Kerb
		-----	Building Foot
		-----	Overhead Feature
		-----	Trench Scar
		-----	Tree Canopy
		-----	Burner Foliage/Overgrowth
		-----	Tree Crown

AL	Alder	HL	Hemlock	RH	Rhododendron
BE	Beech	HO	Holly	RO	Rowan
CE	Cedar	HZ	Hazel	SA	Sapling
CH	Cherry	LA	Larch	SB	Silver Birch
CO	Coniferous	LB	Laburnum	SCN	Shrub
CY	Cypress	LM	Lime	SHR	Shrub
DE	Deciduous	LO	Locust	ST	Stamp
ED	Elder	LU	Laurel	SY	Sycamore
EU	Eucalyptus	MA	Maple	WB	Whitebeam
FR	Fruit	MG	Magnolia	WG	Willow
HA	Hawthorn	NS	Norway Spruce	WI	Willow
HB	Hornbeam	PI	Pine	WN	Walnut
HC	Horse Chestnut	PO	Poplar		
		PL	Plane		

NOTES:

1. The tree species have been identified to the best of the surveyors knowledge. They have not been verified by an arborist and are not guaranteed. If they are important they should be verified.
2. Tree heights are estimated.
3. A CAD layer exists with the full tree canopies intact which is turned off.
4. Trees with bole diameters below the specified minimum size may not have been surveyed.
5. Multiple sizes are indicative.

SURVEY STATIONS			
Name	Easting	Northing	Height
1STN	471156.962	99901.025	5.685
2STN	471094.116	99889.086	5.168
3STN	471018.424	99885.366	5.350
L1STN	471185.949	99911.852	5.495
L2STN	471179.164	99973.795	5.231
L3STN	471185.835	99851.545	5.582

CLIENT

Hayling Island Builders Limited

SITE
Parcel 1
Land North of 'The Oysters' Development
Station Road PO11 0EL

DRAWING TITLE
Topographical Survey

PROJECT NUMBER	DRAWING NUMBER	DATE
SP21219	SD21219-01	Mar 2021

SURVEYED BY
C1

DRAWN BY
C1

CHECKED BY
C1

SCALE 1:200 SHEET SIZE A1 SHEET 2 OF 4



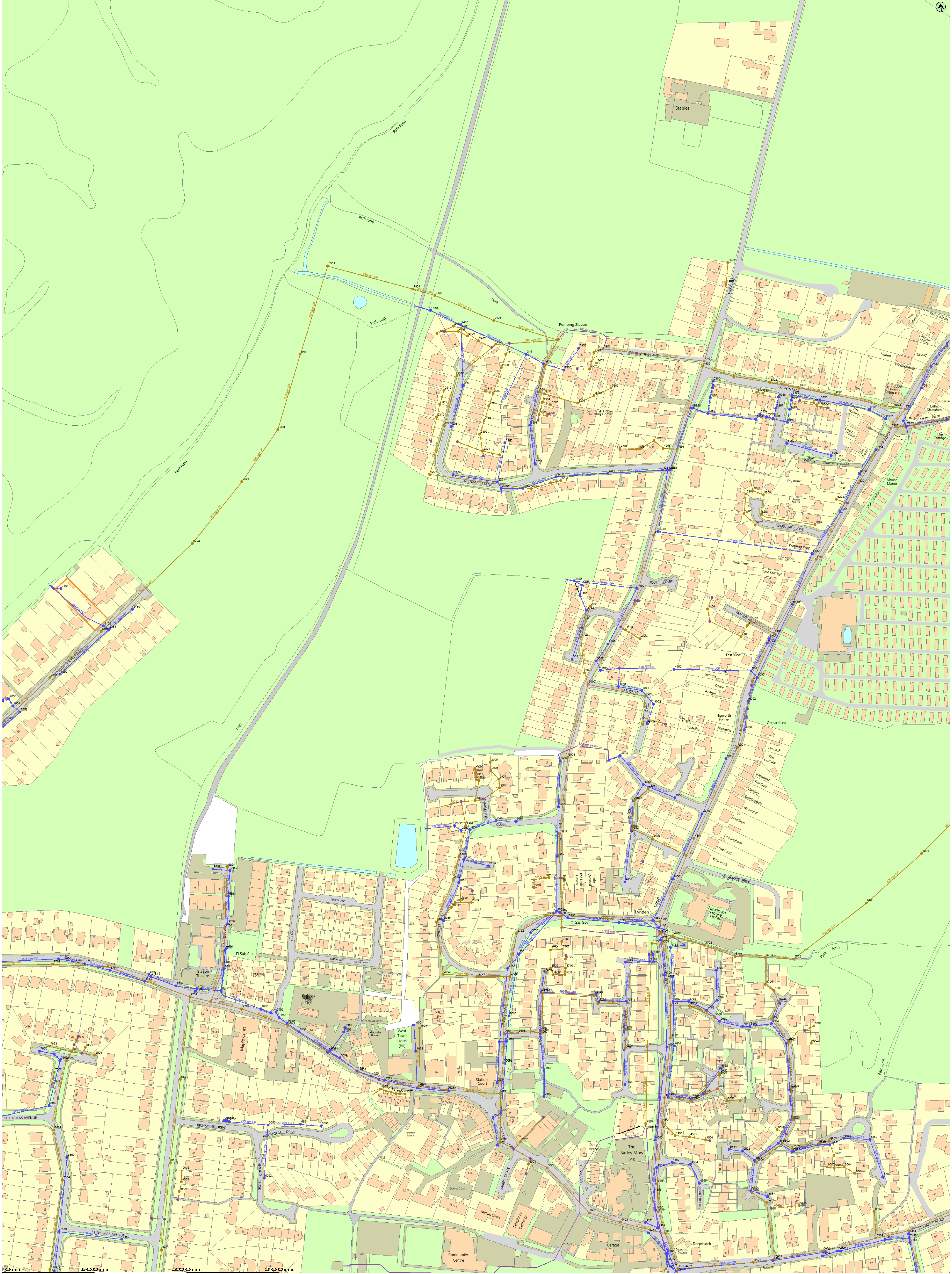
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Geospatial Consultant Surveyors

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Appendix C

Southern Water Sewer Records



Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0301	F	5.08	0.00	
0401	F	4.28	0.00	
0501	F	2.10	0.58	
0601	F	5.84	3.48	
1201	F	4.36	0.36	
1401	F	1.98	0.30	
1601	F	6.08	4.30	
1802	F	5.98	3.24	
1803	F	5.71	3.13	
1604	F	5.56	3.02	
1605	F	0.00	0.00	
1607	F	0.00	0.00	
1608	F	0.00	0.00	
1609	F	0.00	0.00	
1610	F	0.00	0.00	
1611	F	0.00	0.00	
2301	F	2.71	-0.14	
2302	F	3.70	0.12	
2303	F	0.00	0.00	
2304	F	0.00	0.00	
2305	F	0.00	0.00	
2306	F	0.00	0.00	
2307	F	0.00	0.00	
2308	F	0.00	0.00	
2309	F	0.00	0.00	
2310	F	0.00	0.00	
2311	F	0.00	0.00	
2312	F	0.00	0.00	
2313	F	0.00	0.00	
2401	F	3.66	0.00	
2402	F	0.00	0.00	
2403	F	1.89	0.13	
2404	F	0.00	0.00	
2406	F	0.00	0.00	
2407	F	0.00	0.00	
2408	F	0.00	0.00	
2409	F	0.00	0.00	
2411	F	0.00	0.00	
2412	F	0.00	0.00	
2501	F	6.33	4.50	
2502	F	0.00	0.00	
2601	F	5.78	2.58	
2602	F	5.68	2.72	
2603	F	5.73	2.99	
2604	F	5.87	2.81	
2605	F	5.80	2.81	
2606	F	5.73	2.63	
2701	F	5.43	3.72	
2702	F	5.31	2.34	
2703	F	5.68	3.48	
2704	F	5.68	3.30	
2705	F	5.58	2.44	
2801	F	5.85	3.95	
2802	F	5.69	3.84	
2803	F	0.00	0.00	
2804	F	0.00	0.00	
2805	F	0.00	0.00	
2806	F	0.00	0.00	
2901	F	5.58	4.10	
2902	F	0.00	0.00	
2903	F	0.00	0.00	
2904	F	0.00	0.00	
2905	F	0.00	0.00	
2906	F	0.00	0.00	
2907	F	0.00	0.00	
2908	F	0.00	0.00	
2909	F	0.00	0.00	
2910	F	0.00	0.00	
2911	F	0.00	0.00	
2912	F	0.00	0.00	
3001	F	0.00	0.00	
3002	F	5.10	0.83	
3101	F	4.99	3.75	
3102	F	4.83	3.43	
3201	F	0.00	0.00	
3202	F	0.00	0.00	
3203	F	0.00	0.00	
3301	F	2.61	1.53	
3302	F	2.78	1.77	
3303	F	0.00	0.00	
3304	F	0.00	0.00	
3305	F	0.00	0.00	
3306	F	0.00	0.00	
3307	F	0.00	0.00	
3308	F	0.00	0.00	
3309	F	0.00	0.00	
3310	F	0.00	0.00	
3311	F	0.00	0.00	
3401	F	7.10	5.44	
3401	F	2.89	0.00	
3402	F	3.53	2.21	
3403	F	0.00	0.00	
3404	F	0.00	0.00	
3501	F	6.96	4.90	
3503	F	0.00	0.00	
3601	F	6.17	3.00	
3701	F	5.99	4.07	
3702	F	5.75	3.81	
3703	F	5.94	4.00	
3704	F	5.90	3.28	
3705	F	0.00	0.00	
3706	F	0.00	0.00	
3707	F	0.00	0.00	
3708	F	0.00	0.00	
3709	F	0.00	0.00	
3710	F	0.00	0.00	
3711	F	0.00	0.00	
3712	F	0.00	0.00	
3801	F	5.17	0.48	
3802	F	5.30	0.00	
3803	F	5.30	2.20	
3809	F	0.00	0.00	
3810	F	0.00	0.00	
3811	F	0.00	0.00	
3812	F	0.00	0.00	
3901	F	4.93	0.63	
4001	F	5.36	3.16	
4002	F	5.44	3.48	
4101	F	4.92	1.09	
4103	F	0.00	0.00	
4104	F	0.00	0.00	
4106	F	0.00	0.00	
4201	F	4.86	1.31	
4301	F	4.78	1.54	
4302	F	0.00	0.00	
4303	F	0.00	0.00	
4304	F	0.00	0.00	
4305	F	0.00	0.00	
4306	F	0.00	0.00	
4401	F	6.65	4.32	
4401	F	4.57	1.77	
4402	F	6.73	4.23	
4402	F	4.59	1.72	
4403	F	7.05	4.84	
4404	F	6.67	4.43	
4405	F	6.62	5.12	
4501	F	6.50	4.69	
4502	F	6.66	0.00	
4503	F	6.76	4.53	
4504	F	0.00	0.00	
4505	F	0.00	0.00	
4506	F	0.00	0.00	
4601	F	6.48	4.83	
4602	F	6.14	4.34	
4603	F	6.43	0.00	
4604	F	6.64	0.00	
4605	F	6.46	4.80	
4606	F	6.33	4.60	
4702	F	5.97	4.32	
4703	F	6.27	4.31	
4704	F	0.00	0.00	
4705	F	5.71	4.41	
4706	F	6.14	4.51	
4707	F	5.99	4.10	
4708	F	6.10	4.25	
4709	F	6.24	4.75	
4710	F	6.12	4.74	
4711	F	6.16	4.28	
4801	F	5.80	2.64	
4802	F	5.75	2.57	
4803	F	5.63	2.91	
4804	F	5.79	2.49	
4900	F	0.00	0.00	
4901	F	5.23	3.22	
4902	F	5.28	3.41	
5001	F	5.48	3.08	
5101	F	5.45	3.25	
5102	F	5.46	4.32	
5103	F	0.00	0.00	
5104	F	0.00	0.00	
5201	F	0.00	0.00	
5202	F	0.00	0.00	
5203	F	0.00	0.00	
5205	F	0.00	0.00	
5206	F	0.00	0.00	
5207	F	0.00	0.00	
5301	F	4.81	3.31	
5302	F	5.01	3.48	
5303	F	5.15	3.57	
5304	F	0.00	0.00	
5305	F	0.00	0.00	
5401	F	6.33	4.56	
5401	F	4.68	0.00	
5402	F	6.34	4.52	
5403	F	6.94	5.36	
5404	F	0.00	0.00	
5405	F	0.00	0.00	
5501	F	7.16	5.53	
5501	F	0.00	0.00	
5502	F	7.29	5.67	
5503	F	7.32	5.81	
5504	F	7.29	5.92	
5505	F	7.01	5.65	
5506	F	0.00	0.00	
5601	F	6.35	5.02	
5602	F	6.76	5.18	
5603	F	6.92	5.43	
5604	F	0.00	0.00	
5605	F	0.00	0.00	
5606	F	0.00	0.00	
5607	F	0.00	0.00	
5608	F	6.42	5.03	
5610	F	6.40	5.48	
5701	F	6.27	4.31	
5702	F	6.61	4.13	
5703	F	6.48	4.24	
5704	F	6.61	4.81	
5705	F	6.74	4.92	
5706	F	6.47	4.95	
5901	F	5.80	2.90	
6101	F	5.56	3.48	
6201	F	5.49	3.75	
6203	F	0.00	0.00	
6204	F	0.00	0.00	
6301	F	5.37	3.72	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
6302	F	5.54	3.91	
6303	F	0.00	0.00	
6304	F	0.00	0.00	
6305	F	0.00	0.00	
6306	F	0.00	0.00	
6401	F	6.16	4.36	
6402	F	6.37	4.56	
6403	F	6.16	4.15	
6501	F	7.16	6.16	
6502	F	7.20	6.30	
6503	F	0.00	0.00	
6504	F	0.00	0.00	
6505	F	0.00	0.00	
6506	F	7.20	0.00	
6507	F	0.00	0.00	
6601	F	0.00	0.00	
6602	F	0.00	0.00	
6801	F	6.45	3.91	
7001	F	5.28	2.37	
7002	F	5.54	2.62	
7301	F	5.74	3.96	
7302	F	5.86	4.36	
7305	F	5.57	4.13	
7401	F	6.10	4.83	
7402	F	6.33	4.01	
7503	F	7.39	5.86	
7504	F	6.91	5.34	
7601	F	7.48	6.66	
7602	F	7.39	6.88	
7603	F	7.39	6.56	
7702	F	6.04	3.95	
7801	F	6.51	3.87	
8101	F	5.10	2.17	
8601	F	7.24	6.53	
8602	F	7.53	6.38	
8603	F	7.39	6.28	
8604	F	0.00	0.00	
8605	F	0.00	0.00	
8701	F	6.04	4.96	
9201	F	5.49	0.00	
9202	F	5.69	0.00	
9401	F	7.28	5.23	
9501	F	7.00	4.81	
9503	F	0.00	0.00	
9504	F	0.00	0.00	
9505	F	0.00	0.00	
9601	F	6.54	4.35	
9701	F	6.13	3.79	
9702	F	5.96	3.62	
9703	F	6.17	4.27	
9704	F	6.19	4.00	
9705	F	6.12	3.73	
9801	F	5.63	4.70	
9802	F	5.94	4.50	
0550	S	4.57	3.02	
0551	S	0.00	0.00	
0552	S	0.00	0.00	
0553	S	5.73	4.50	
0650	S	5.85	4.78	
0651	S	5.83	4.76	
0652	S	5.77	4.72	
0653	S	5.82	4.78	
0654	S	5.93	4.69	
0655	S	5.81	5.08	
0750	S	5.98	5.27	
0751	S	5.95	5.19	
0752	S	5.87	5.12	
1450	S	2.57	0.90	
1650	S	4.60	0.00	
1651	S	6.02	4.82	
1652	S	6.02	4.80	
1654	S	5.98	4.67	
1655	S	5.94	4.60	
1656	S	5.79	4.58	
1657	S	5.60	4.40	
1658	S	0.00	0.00	
2250	S	3.77	2.93	
2251	S	3.54	1.94	
2252	S	3.53	1.98	
2253	S	3.70	2.14	
2350	S	2.79	1.46	
2351	S	3.68	2.65	
2352	S	0.00	0.00	
2450	S	2.37	0.98	
2550	S	6.03	5.13	
2551	S	6.07	5.39	
2552	S	6.35	5.49	
2550	S	5.55	0.00	
2651	S	0.00	0.00	
2652	S	5.79	0.00	
2653	S	5.56	0.00	
2654	S	5.72	0.00	
2655	S	5.75	4.80	
2656	S	5.46	4.53	
2752	S	5.62	4.53	
2850	S	5.75	4.34	
2851	S	5.74	4.45	
2852	S	5.79	4.59	
2853	S	5.60	4.22	
2954	S	5.73	4.78	
2855	S	5.38	4.74	
2950	S	5.62	4.62	
2951	S	5.55	4.70	
2952	S	5.54	4.18	
3050	S	5.19	3.87	
3051	S	5.04	4.05	
3052	S	5.19	3.84	
3150	S	9.85	8.74	
3152	S	4.95	0.00	
3153	S	5.09	3.82	
3155	S	9.92	8.81	
3156	S	10.00	8.89	
3250	S	3.69	2.37	
3251	S	4.21	2.71	
3252	S	3.50	2.60	
3350	S	0.00	0.00	
3351	S	2.92	2.24	
3450	S	0.00	0.00	
3451	S	2.86	1.15	
3452	S	2.91	1.71	
3650	S	7.02	5.15	
3651	S	6.76	4.92	
3652	S	6.17	4.68	
3653	S	6.16	4.65	
3750	S	5.29	4.48	
3751	S	5.76	4.37	
3752	S	5.87	4.12	
3753	S	5.91	3.76	
3850	S	5.16	4.10	
3851	S	5.36	4.19	
3852	S	5.30	4.21	
3853	S	5.11	4.26	
3951	S	4.92	3.98	
3952	S	5.11	3.83	
4050	S	5.54	4.44	
4051	S	5.43	4.04	
4052	S	5.49	0.00	
4053	S	5.25	4.58	
4054	S	5.48	4.86	
4150	S	4.80	3.54	
4250	S	4.92	3.29	
4251	S	4.67	3.11	
4252	S	4.66	0.00	
4254	S	4.91	3.01	
4350	S	4.65	3.26	
4351	S	4.79	3.19	
4352	S	5.02	3.28	
4354	S	5.06	3.56	
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4451	S	6.88	5.92	
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4453	S	6.68	5.16	
4454	S	6.73	6.60	
4455	S	6.72	4.46	
4456	S	6.77	5.29	
4457	S	6.70	5.09	
4458	S	6.76	4.64	
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4553	S	6.92	5.63	
4554	S	7.04	6.23	
4555	S	7.16	6.38	
4556	S	6.88	0.00	
4651	S	6.39	3.98	
4652	S	6.13	4.96	
4653	S	6.38	4.17	
4654	S	6.64	4.28	
4655	S	6.73	4.39	
4656	S	6.88	5.22	
4657	S	6.48	4.51	
4658	S	6.35	4.25	
4750	S	5.57	4.31	
4751	S	5.77	4.47	
4752	S	5.72	4.57	
4753	S	5.96	0.00	
4755	S	6.06	3.38	
4756	S	5.91	4.66	
4757	S	6.17	3.44	
4758	S	6.31	3.49	
4759	S	6.40	3.51	
4760	S	6.15	3.59	
4761	S	6.09	3.50	
4763	S	6.05	3.24	
4764	S	5.97	3.23	
4765	S	5.91	3.22	
4850	S	5.82	4.64	
4851	S	5.47	4.34	
4852	S	0.00	0.00	
4853	S	5.67	4.53	
4950	S	5.79	4.92	
4951	S	0.00	0.00	
4952	S	5.29	3.71	
4953	S	0.00	4.12	
4954	S	0.00	0.00	
5050	S	5.33	4.55	
5051	S	5.48	4.48	
5052	S	5.58	4.97	
5053	S	5.84	5.05	
5150	S	5.40	4.47	
5151	S	5.47	4.89	
5152	S	5.43	4.79	
5350	S	4.72	3.66	
5351	S	4.90	3.59	
5353	S	5.30	3.75	
5354	S	5.20	0.00	
5355	S	5.27	0.00	
5356	S	5.28	0.00	
5357	S	5.25	3.74	
5358	S	5.26	3.84	
5359	S	5.38	3.67	
5360	S	5.38	3.58	
5361	S	5.37	3.91	
5362	S	5.23	3.97	
5363	S	5.31	3.47	

Appendix D

Magic Map Geology Information

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- ☐ Access
- ☐ Administrative Geographies
- ☐ Countryside Stewardship Targeting & Scoring Layers
- ☐ Designations
- ☐ Habitats and Species
- ☐ Land Based Schemes
- ☒ Landscape

☒ Geology and Soils☒ Aquifer Designation Map (Bedrock) (England)

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unproductive

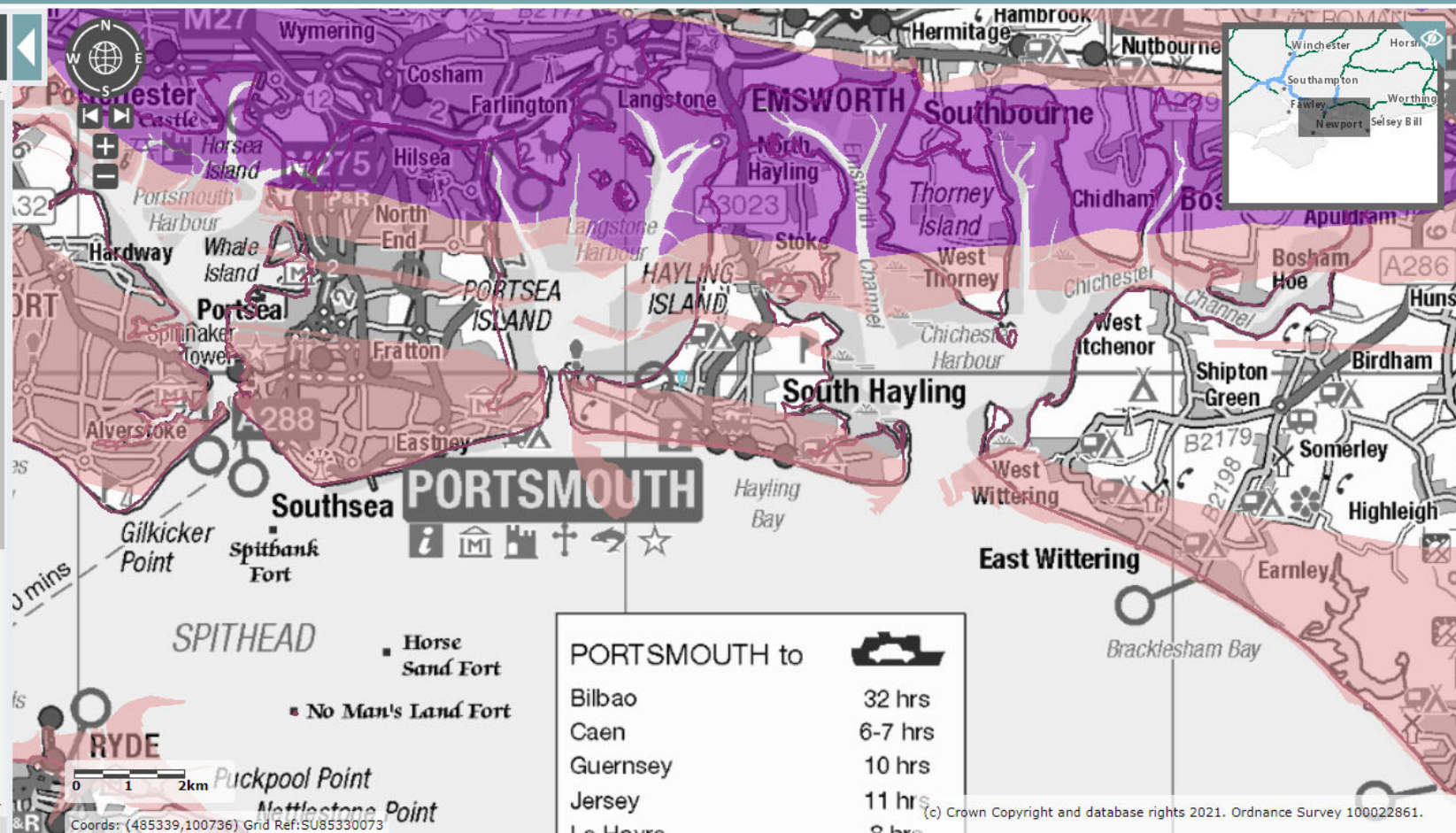
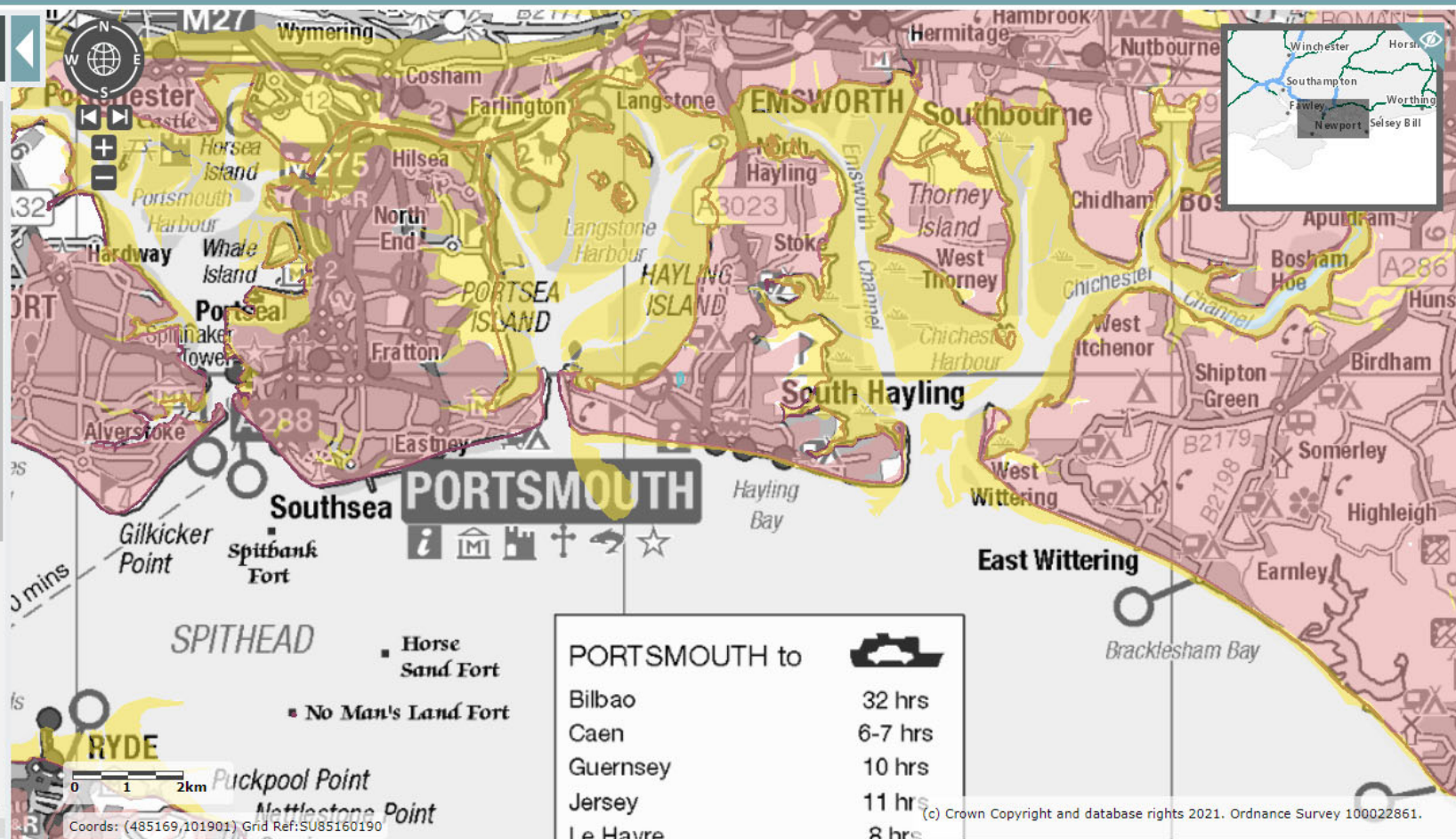
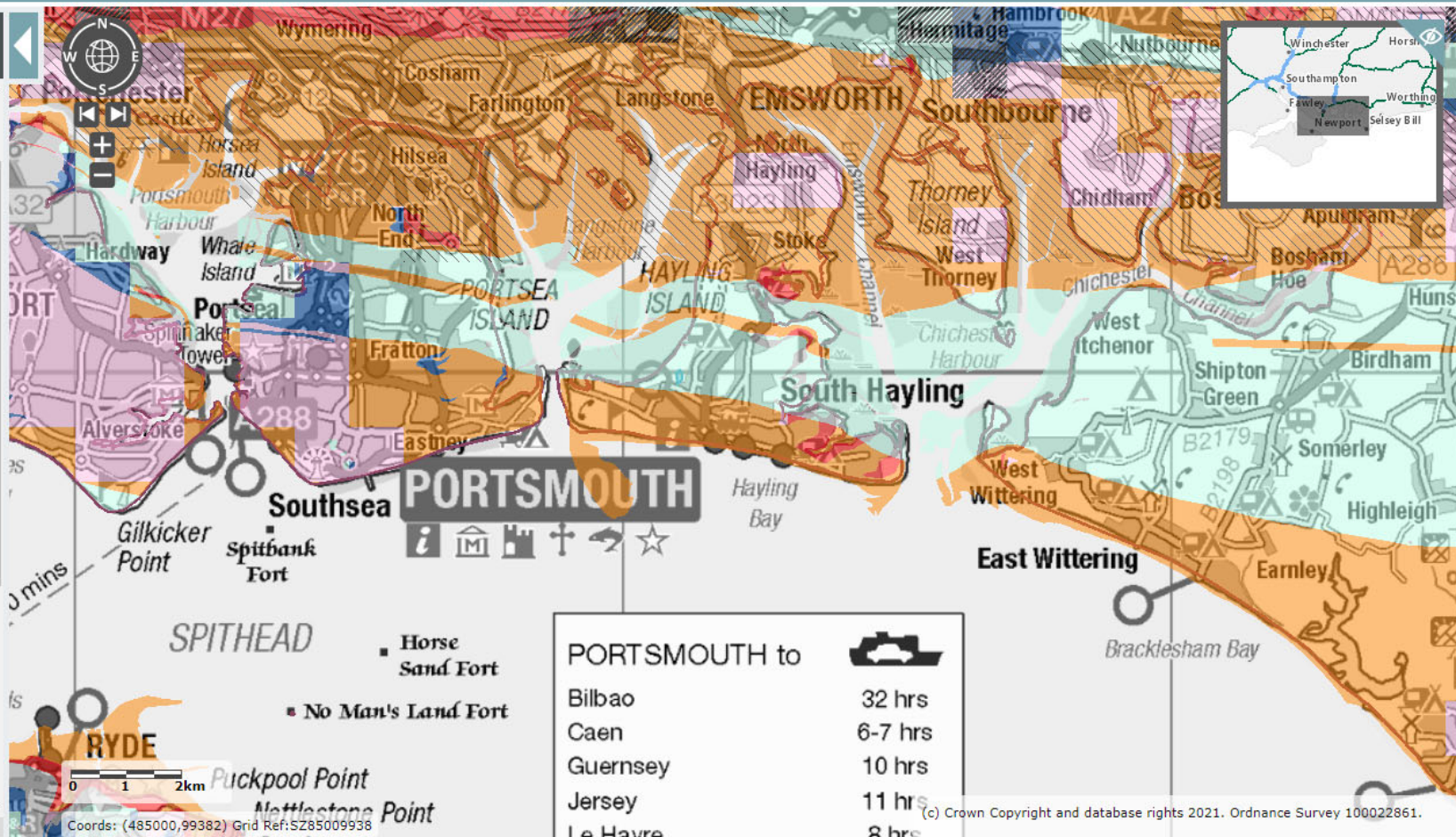
☐ Aquifer Designation Map (Superficial Drift) (England)☐ Groundwater Vulnerability Map (England)☐ Geological Places to Visit (England)☐ Geological Descriptions

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- ☐ Access
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- ☐ Land Based Schemes
- ☒ Landscape
- ☒ Geology and Soils
 - ☐ Aquifer Designation Map (Bedrock) (England)
 - ☒ Aquifer Designation Map (Superficial Drift) (England)
 - ☐ Principal
 - ☐ Secondary A
 - ☐ Secondary B
 - ☐ Secondary (undifferentiated)
 - ☐ Unknown (lakes+landslip)
 - ☐ Unproductive
 - ☐ Groundwater Vulnerability Map (England)
 - ☐ Geological Places to Visit (England)



☐ ☒ Geological Descriptions
(England)



Appendix E

Greenfield Run-Off

Patrick Parsons Limited		Page 1
Waterloo House Thornton Street Newcastle Upon Tyne, NE1 4AP	The Oysters	
Date 31/03/2021 09:04 File	Designed by A Johnson Checked by D Brooke	
Innovyze Source Control 2020.1		

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.400
Area (ha)	1.100	Urban	0.000
SAAR (mm)	700	Region Number	Region 7

Results 1/s

QBAR Rural	3.7
QBAR Urban	3.7
Q1 year	3.2
Q1 year	3.2
Q30 years	8.5
Q100 years	11.9

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Appendix F

Site Plan

05 Site Layout

The Land to the North of the Oysters provides an opportunity to create a new, high-quality neighbourhood of up to 32 homes.

Proposed mix

- 2 bed - 27%
- 3 bed - 50%
- 4 bed - 23%

Density: 35 dwellings per hectare

Parking Standards

Car parking will be set out in accordance with the highway authorities standards.

- 1 Proposed vehicular access
- 2 Proposed pedestrian access
- 3 Sustainable drainage system infiltration pond
- 4 Existing tree planting
- 5 Proposed vegetation



Appendix G

Drainage Layouts



GENERAL NOTES

1.1. THIS DRAWING IS COPYRIGHT AND SHOULD NOT BE REPRODUCED IN WHOLE OR PART WITHOUT THE WRITTEN CONSENT OF PPCE GROUP LTD.

1.2. DO NOT SCALE FROM THIS DRAWING.

1.3. ALL DIMENSIONS TO BE CHECKED ON SITE AND CO-ORDINATE WITH RELEVANT ARCHITECTS DRAWINGS. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.

1.4. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE.

1.5. ALL LEVELS IN METRES.

1.6. SIZES HEREON SHALL NOT BE MODIFIED WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.

1.7. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS DRAWINGS & SPECIFICATIONS.

Drainage Construction Notes

1. All materials and workmanship related to private sewers shall be in accordance with Part H of the Building Regulations and BS EN752 and best practice

2. All materials and workmanship related to adoptable sewers shall be in accordance with the Design and Construction Guidance 2020 as published by the Water Services Association and any subsequent revisions shown by the water authority

3. All sustainable drainage systems to be designed and maintained in accordance with CIRIA C753 The SuDS Manual and best practice guidance.

P2

SITE LAYOUT UPDATED

HS

18.10.21

DB

18.10.21

DB

18.10.21

P1

INITIAL ISSUE

HS

01.10.21

DB

01.10.21

DB

01.10.21

REV.

REVISION NOTE/COMMENT

DRW BY

DATE

CHK BY

DATE

APP BY

DATE

Revisions

PATRICK PARSONS

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Client

Hayling Island Builders

Project

Land North of The Oysters

Drawing

Drainage Strategy Plan
Foul Water

Scales

1:500

At original size

A1

Drawn

AJ

Date

July 2021

Checked

DB

Status

PRELIMINARY

Drawing No.

A21078/0200

Rev.

P2