Drainage Strategy Report

Kilmarnock Farm

Charlwood Road, Charlwood RH11 0JY

for

PJ Brown Construction Limited

A18263C

April 2019

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1.0 Introduction

1.1.1 PJ Brown Construction Limited is planning a proposed development on the site at Kilmarnock Farm, Charlwood Road, Charlwood RH11 0JY.

1.1.2 Patrick Parsons Limited has been instructed by PJ Brown Construction Limited, to produce a Drainage Strategy report to support the Planning Application.

1.1.3 This report aims to demonstrate whether the development is at risk of any form of flooding. Also, 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:

- A number of data sources have been used in compiling this report. Whilst The Stilwell Partnership (TSP) 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 proposed site is located off Charlwood Road in Charlwood. A site location plan is enclosed at **Appendix A**.

2.1.2 The Local Authorities are Horsham District Council and West Sussex County Council.

3.0 Site Description

3.1 Existing Site

3.1.1 The existing site is Kilmarnock Farm. A Topographical Survey for the site has been commissioned for the site and can be found at **Appendix B**.

3.1.2 The site is relatively flat, with levels in the region of 66.0m AOD.

3.2 Existing Drainage System

3.2.1 Sewer records have been obtained from Thames Water and can be found at **Appendix C**. There are no public surface or foul water sewers on the site.

3.2.2 The closest public infrastructure is within the Outreach 3Way property to the east of the site. This connects to a public foul water sewer that runs parallel with the River Mole and crosses Charlwood Road.

3.2.3 There is an existing 750mm diameter public foul water sewer that crosses Charlwood Road to the south east of the site. The closest public manhole lies within the Stafford House grounds and is No. 1502 with cover level 63.60m AOD and invert level 57.55m AOD.

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 Weald Clay, described as follows:

"Weald Clay Formation - Clay-ironstone. Sedimentary Bedrock formed approximately 126 to 134 million years ago in the Cretaceous Period. Local environment previously dominated by swamps, estuaries and deltas. These sedimentary rocks are fluvial, palustrine and shallow-marine in origin. They are detrital, forming deposits reflecting the channels, floodplains and deltas of a river in a coastal setting (with periodic inundation from the sea)."

3.4 Geological Assessment

3.4.1 Boreholes in the local area indicate blue clay and shale only, indicating that infiltration is unlikely in the area.

3.4.2 A BRE Digest 365 soakage test could be undertaken to verify this, but it would fail and is not necessary.

3.4.3 Based on this information, a positive connection to a watercourse or sewer will be used for the development.

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)	Unproductive
Groundwater Vulnerability	None
Groundwater Source Protection Zone	None

3.6 Hydrology

3.6.1 The nearest strategic watercourse is the River Mole, located 400m to the south east of the site.

3.7 Existing Surface Water Runoff

3.7.1 The site has been previously developed, but an analysis of the Greenfield run-off rate is appropriate and will be made for the developable site area of 0.51 hectares.

3.7.2 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**.

3.7.3 The Qbar (rural) value for the site is 2.6 litres per second.

3.7.4 A technical assessment has been made for the site of the most appropriate flow rate suiting the site constraints as follows:

Flow Rate (Standard)	Flow Rate (l/s)	Method of control	Constraints
Qbar Rural	2.6	Hydro-Brake	1. Low flow rate indicates high level of silt removal required. 2. Hydrobrake chamber must be constructible.
-	2.0	Hydro-Brake	1. Low flow rate indicates high level of silt removal required. 2. Hydrobrake chamber must be constructible.
-	5.0	Orifice	Minimum flow rate of 5.0 l/s to prevent blockages (or 50mm diameter orifice)
Infiltration	0	None	Site must be suitable for infiltration

3.8 Greenfield Run-Off Assessment

3.8.1 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.

3.8.2 Infiltration has been discounted based on the geotechnical information provided within this report.

3.8.3 Greenfield run-off can be achieved without risk of blockages in the system and so a flow rate of 2.6 litres per second has been selected for the site if a positive discharge is required.

4.0 Proposed Development

4.1.1 The Proposed development is for a new soil recycling and concrete crushing facility. The proposed site layout can be found at **Appendix F**.

4.2 Environment Agency Policy for Development Use

4.2.1 The Environment Agency has published the document: Guidance on the classification and assessment of waste (1st Edition v1.1)- Technical Guidance WM3. This document assists developers in classifying the waste from their site during construction and post-construction.

4.2.2 Concrete is classed as non-hazardous waste with waste code 17-01-01. Concrete, bricks, tiles and ceramics in mixtures, containing no hazardous substances falls under code 17-01-07. Concrete crushing should generally be considered as an inert activity.

4.2.3 The exception to this is if the concrete already contains hazardous materials, in which case it is under code 17-01-06.

4.2.4 It is the responsibility of the end user to determine if any of the concrete to be crushed contains hazardous materials and undertake appropriate measures in line with the Environment Agency policy documents.

4.2.5 Similarly, the end user must be able to prove that the soil used in the development doesn't contain any hazardous substances, to classify soil as non-hazardous. The classification is as per the table below:

Waste type	Waste status	Waste code
Soil and stones containing hazardous substances	Hazardous	17-05-03*
Other soil and stones	Non-hazardous	17-05-04
Dredging spoil containing hazardous substances	Hazardous	17-05-05*
Other dredging spoil	Non-hazardous	17-05-06

4.2.6 It is anticipated that the works on site will involve only non-hazardous materials and therefore no special treatment systems would be required for removal of pollutants that may enter the drainage system. This should be confirmed by a specialist prior to occupation.

4.3 Infiltration Potential

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

4.3.2 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**

5.0 Drainage Proposal

5.1 SuDS Hierarchy

5.1.1 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	**Assumed not viable, to be confirmed by on site testing**
Discharge to Watercourse	**No watercourses in area**
Discharge to Surface Water Sewer	**No surface water sewers in the area**
Discharge to Other Sewer	**No foul water sewers in the area**

5.1.2 The 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	Site Constraints	No
Retention ponds	✓	✓	✓	X	X	Site Constraints	No
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	Poor Ground	No
Rainwater harvesting	X	✓	✓	✓	✓	N/A	No
Permeable paving	X	✓	✓	✓	✓	Site Use	No
Green roofs	✓	✓	✓	X	✓	N/A	No
Rain Garden (external)	✓	✓	✓	X	X	N/A	No
Rain Garden (planter)	✓	✓	✓	X	X	N/A	No

5.2 Surface Water Drainage

5.2.1 Surface water drainage at the site will follow the Sustainable Drainage Systems (SuDS) management train. The surface water will discharge into a new detention pond. A Drainage Plan can be found at **Appendix G**.

5.2.2 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.

5.2.3 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 30% on this development for design, with a 40% sensitivity check.

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%

5.2.4 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.

5.2.5 National SuDS standards and Sewers for Adoption recommend that the 1 in 30 year storm event is managed below ground with exceedance flows managed above ground.

5.2.6 The proposed drainage strategy for this site is to drain the hardstanding areas to a new swale or french drain. This will discharge into a new detention pond near the site access.

5.2.7 If existing ditches are found in the area, a new outfall can be made from the pond to an existing ditch. In this case, the flow should be restricted to greenfield rates. No ditches were found in the initial investigations.

5.2.8 The concrete storage and crushing areas should be appropriately bunded to minimise the silt and crushed particles washing across the hardstanding into the surface water system.

5.2.9 Due to the possibility of washed concrete fines in the swale, sand filters at regular intervals have been recommended. Also, a strict maintenance regime for the swale has been suggested to ensure it does not get clogged up.

5.2.10 The wheel wash area will be trimmed with a channel drain and then pass through an interceptor to ensure no hazardous particles enter the surface water system.

5.2.11 It is anticipated, based on the information in this report, that all other materials on site are inert and that the only potential for hazardous materials comes from the wheel wash.

5.2.12 MicroDrainage calculations have been undertaken, which can be found at **Appendix H**.

5.3 Urban Creep

5.3.1 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.

5.3.2 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

5.3.3 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.

5.3.4 The proposed development has limited potential for expansion and so no allowance for urban creep has been included in the design.

5.4 Water Quality

5.4.1 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.

5.4.2 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.

5.4.3 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).

5.4.4 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)	**YES**
High	Areas used for handling and storage of chemicals and fuels, handling of storage and waste	**NO**

5.4.5 The site does not lie within a source protection zone and therefore additional treatment stages are not required.

5.4.6 The extent of treatment depends on land use, level of pollution prevention in the catchment and the natural protection afforded by underlying soil layers. A high hazard site will require more treatment then low hazard.

5.4.7 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	**YES**
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**

5.4.8 Treatment has been provided through filtration devices, sand filters, interceptors and reed beds as appropriate to ensure water is treated.

5.5 Construction Phase Drainage

5.5.1 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).

5.5.2 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.

5.5.3 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.

5.5.4 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.

5.5.5 As infiltration is not viable on site, the temporary drainage for the development will be in the form of land drainage with discharge into the pond. It is recommended that the surface water connection and flow control devices are installed prior to any other drainage works on site.

5.5.6 Pollution will be controlled via the use of catchpit manholes and geotextiles.

5.5.7 Any potentially hazardous substances (i.e. form 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.

5.6 Foul Water Drainage

5.6.1 The foul water will discharge into a treatment system and then into a reed bed as part of the detention ponds.

6.0 Flooding Information

6.1.1 As set out in the National Planning Policy Framework (NPPF), inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere. For these purposes:

- "areas at risk of flooding" means land within Flood Zones 2 and 3; or land within Flood Zone 1 which has critical drainage problems, and which has been notified to the local planning authority by the Environment Agency;
- "flood risk" means risk from all sources of flooding - including from rivers and the sea, directly from rainfall on the ground surface and rising groundwater, overwhelmed sewers and drainage systems, and from reservoirs, canals and lakes and other artificial sources.

6.1.2 Flooding information for Planning from the Environment Agency (EA) has shown that the site lies within Flood Zone 1, as found in the map at **Appendix J**.

"Flood Zone 1 - shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area is defined as Land having less than a 1 in 1000 annual probability of river or sea flooding"

6.1.3 As the site is within Flood Zone 1, no further data was requested from the Environment Agency.

6.1.4 As part of the data capture, data and mapping from the Horsham Strategic Flood Risk Assessment (SFRA) was sought. This will be included and references in the relevant sections below.

7.0 Flood Risk

7.1 Fluvial Flooding Risk

7.1.1 The Environment Agency flood information indicates no risk from fluvial flooding on site.

7.2 Historic Flood Data

7.2.1 The Environment Agency and Horsham flood information sources do not indicate any historic fluvial flood events on site.

7.3 Groundwater

7.3.1 Groundwater flooding is caused by the emergence of water originating from sub-surface permeable strata. A ground water flood event results from a rise in ground water level, sufficient for the water table to intersect the ground surface and inundate low lying land. Groundwater floods may emerge from either a single point or diffuse locations.

7.3.2 The underlying strata throughout the area and investigations into the SFRA geology data suggest that the risk of groundwater emergence should typically be relatively low. However, groundwater flooding risks are often highly localised, and dependent upon geological interfaces between permeable and impermeable subsoils. Therefore, sustainable construction techniques for surfacing will minimise any potential groundwater risk.

7.3.3 The Horsham SFRA does not indicate any risk from groundwater emergence on site.

7.3.4 The potential for a high or perched groundwater table has been considered within this drainage strategy to mitigate any potential risk.

7.4 Flooding from Sewers

7.4.1 Flooding from sewers can occur because of different reasons; if sewers are blocked during the heavy rainfalls, or if sewer cannot provide adequate capacity, then flooding can cause a large amount of damage.

7.4.2 The Horsham SFRA does not indicate the site has flooded from sewers historically.

7.5 Flooding from Reservoirs

7.5.1 Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, we ensure that reservoirs are inspected regularly and essential safety work is carried out.

7.5.2 However, in the unlikely event that a reservoir dam failed, a large volume of water would escape at once and flooding could happen with little or no warning. If the site is within a risk area, plans should be made for safe evacuation and escape. Occupants may need to evacuate immediately, know the safest route to safety, and be ready to follow the advice of emergency services.

7.5.3 The Environment Agency mapping indicates no risk from reservoir flooding.

7.6 Surface Water Flooding

7.6.1 Overland flow / surface water flooding typically arise because of intense rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems. It can run quickly off land and result in localised flooding.

7.6.2 The Environment Agency has produced illustrative mapping (Flood Map for Surface Water) relating to flooding risks from surface water. They are classified as Flood Hazard Maps for the purpose of the Flood Risk Regulations 2009. These maps are the next generation on from the previous "Area Susceptible to Surface Water Flooding" maps, which are contained within the SFRA.

7.6.3 The EA maps show high resolution image and indicative flow paths for pluvial events. The maps are based on coarse level data and indicate ridges, valleys and flat spots where water would collect. Typically, the flow paths follow valleys, rivers and watercourses.

7.6.4 The surface water maps and the associated information are intended for guidance only, and cannot provide details for individual properties. They do, however, provide high level information and indicate areas in which surface water flooding issues should be investigated further. The risk categories are classified as follows:

- Very low probability of flooding – This zone is assessed as having less than a 1 in 1000 annual probability of surface water flooding.
- Low probability of flooding – This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of surface water flooding.
- Medium probability of flooding - This zone comprises land assessed as having between a 1 in 30 and 1 in 100 annual probability of surface water flooding.
- High probability of flooding – This zone is assessed as having greater than a 1 in 30 annual probability of surface water flooding.

7.6.5 A review of the EA mapping, as found at **Appendix K**, indicates that there is some risk to the site from surface water flooding.

7.6.6 A review of the "medium" risk mapping, representing the 1 in 100 year storm event, indicates no risk of flooding on the site.

8.0 Maintenance

8.1.1 The maintenance regime for the proposed development will be split into two main categories, SuDS drainage and regular private drainage. Both of these elements will be the responsibility of the end user.

8.1.2 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 item 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.

8.2 Riparian Responsibility

8.2.1 If a resident 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.

8.2.2 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).

8.3 Allowing for Replacement

8.3.1 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 take into account any potential replacement works (such as replacing permeable paving).

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

Operation and maintenance requirements for Surface Water 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

Operation and maintenance requirements for Proprietary Treatment System		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial Actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

Operation and maintenance requirements for Filter Strips		
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 filter strip surface to identify evidence of erosion, poor vegetation growth, compaction, ponding, sedimentation and contamination (eg oils)	Monthly (at start, then half yearly)
	Check flow spreader and filter strip surface for even gradients	Monthly (at start, then half yearly)
	Inspect gravel flow spreader upstream of filter strip for clogging	Monthly (at start, then half yearly)
	Inspect silt accumulation rates and establish appropriate removal frequencies	Monthly (at start, then 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 reseeding	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 Filter Drains		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular Maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

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 reseeding	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 Detention Basins		
Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular Maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	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 banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
Occasional Maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial Actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

9.0 Summary and Conclusions

9.1.1 PJ Brown Construction Limited is planning a proposed development on the site at Kilmarnock Farm, Charlwood Road, Charlwood RH11 0JY.

9.1.2 The Stilwell Partnership has been instructed by PJ Brown Construction Limited, to produce a Flood Risk Assessment under National Planning Policy Framework (NPPF) to support the Planning Application.

9.1.3 The Environment Agency website has confirmed that the site is within Flood Zone 1 for planning.

9.1.4 The surface water will discharge into a new detention pond on site. If a suitable ditch outfall is found, the surface water can be released at greenfield rates.

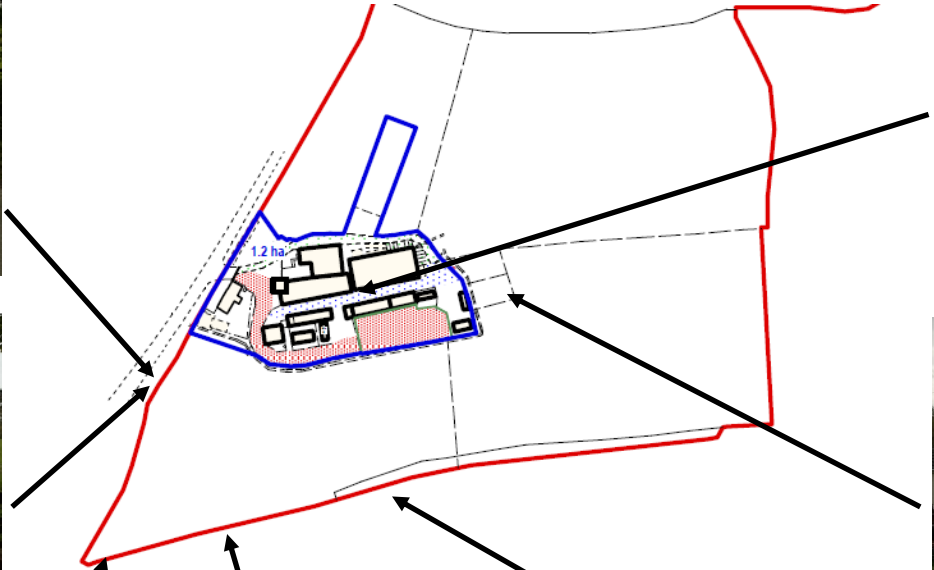
9.1.5 The foul water will be fully treated on site and enter the detention pond via a reed bed system.

9.1.6 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

Site Location Plan

Views of Existing Site



Appendix B

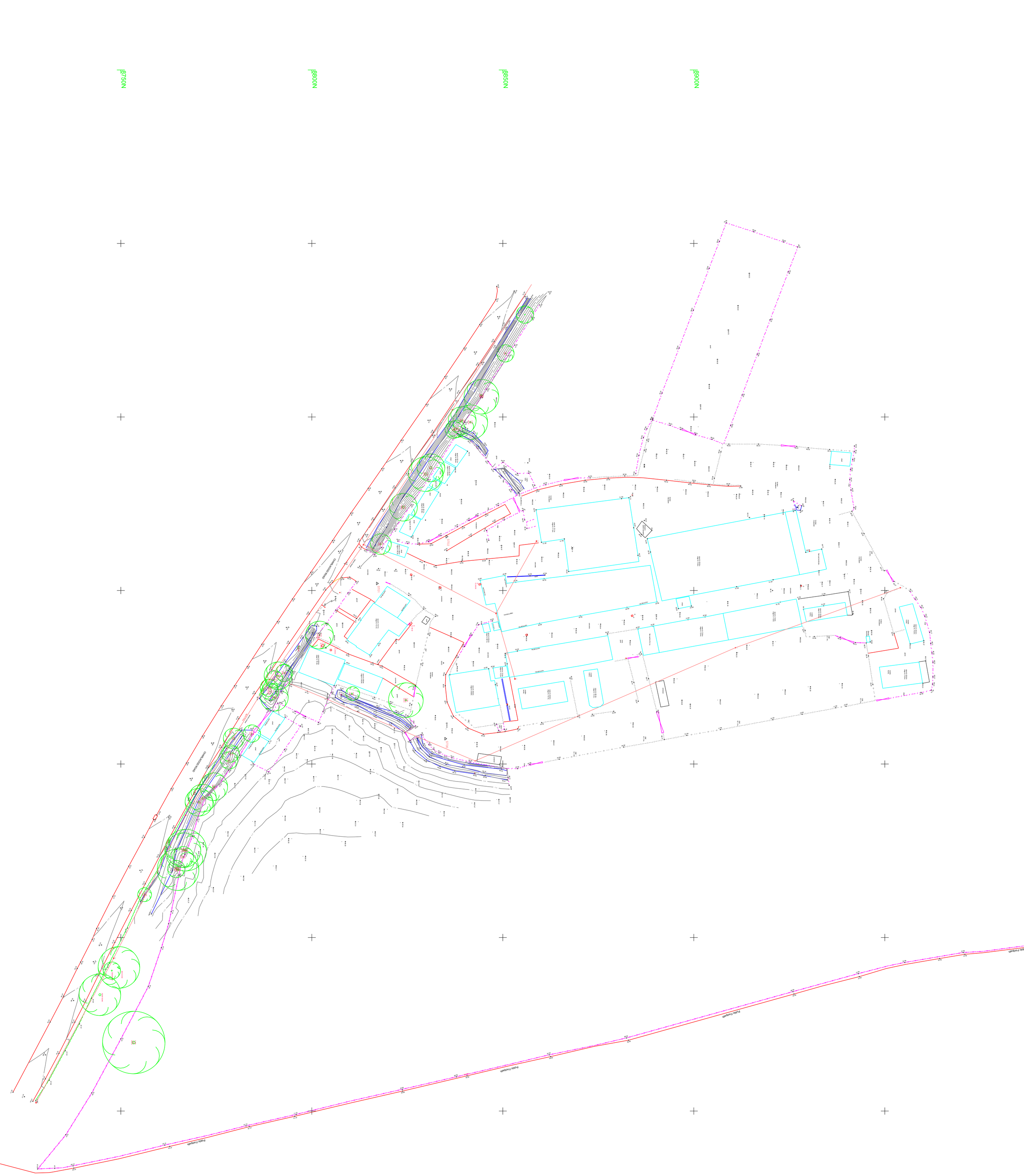
Topographical Survey

8750N

8800N

8850N

8900N



Client
P J Brown Construction (Ltd)

Project Title
Proposed Soil Recycling
&
Concrete Crushing Facility

Drawing Title

Scale

Date

Drawing No.

Kilmarnock Farm

Charlwood Road
Ifield, Crawley
West Sussex
RH11 0JY

Revisions

No.

Date

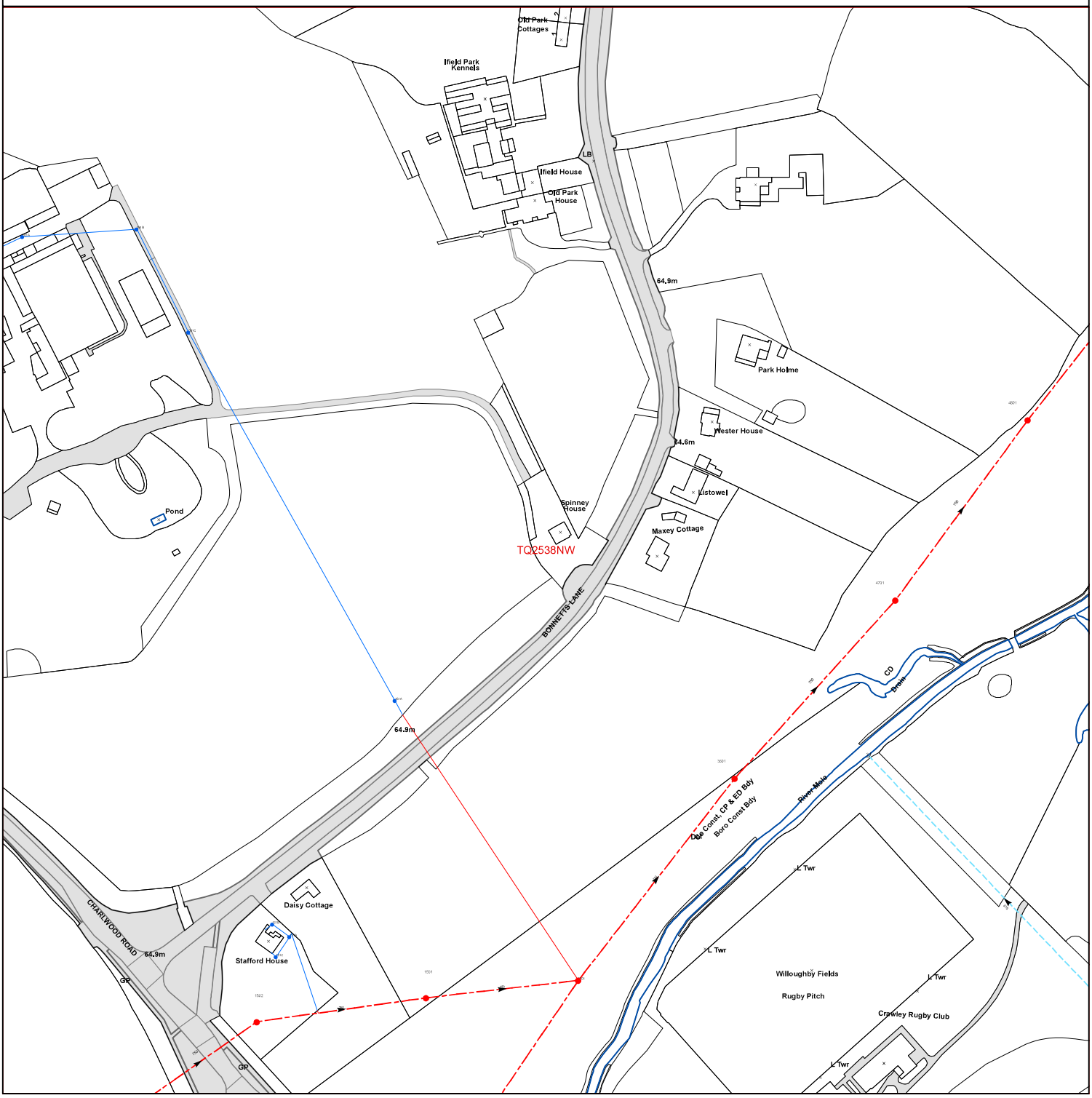
Notes

Appendix C

Thames Water Sewer Records

Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2018_3895459



0 10 20 40 60 80 Meters

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Width:	500m
Printed By:	SAsirvat
Print Date:	23/10/2018
Map Centre:	525250,138750
Grid Reference:	TQ2538NW

Comments:

ALS/ALS Standard/2018_3895459

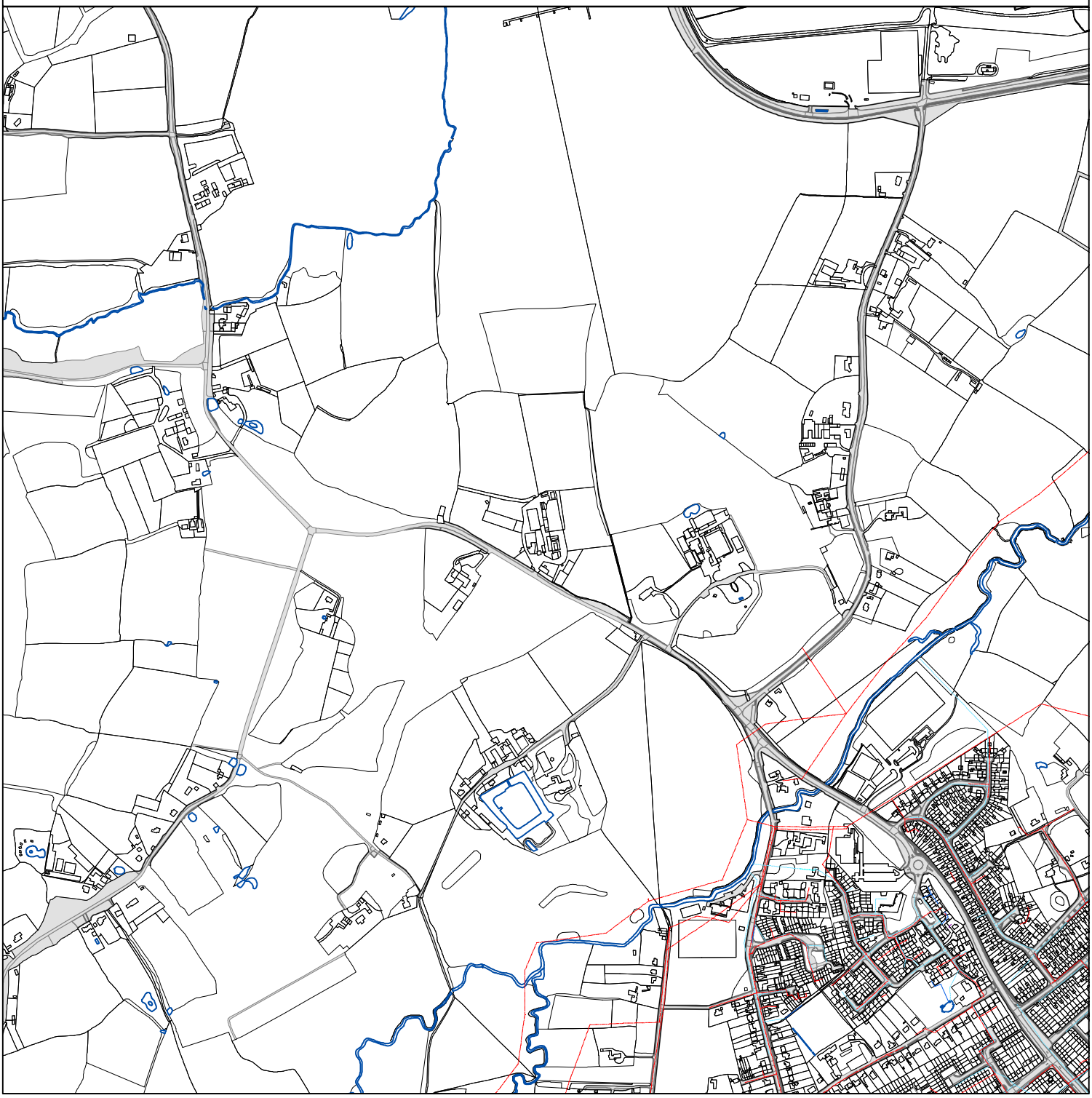
NB: Level quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates no Survey information is available.

REFERENCE	COVER LEVEL	INVERT LEVEL
2501	61.96	57.36
4701	61.7	56.99
1501	62.76	57.46
081A		
081B		
151C		
161A		

REFERENCE	COVER LEVEL	INVERT LEVEL
1502	63.6	57.55
3601	61.45	57.2
4801	61.58	56.76
081C		
151A		
151B		

Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2018_3895459



0 45 90 180 270 360
Meters

Scale:	1:7161
Width:	2000m
Printed By:	SAsirvat
Print Date:	23/10/2018
Map Centre:	524712,138853
Grid Reference:	TQ2438NE

Comments:

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

Control Valve

Drop Pipe

Ancillary

Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

Outfall

Undefined End

Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.

2) All measurements on the plans are metric.

3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

5) 'na' or '0' on a manhole level indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

Appendix D

Magic Map Groundwater Mapping

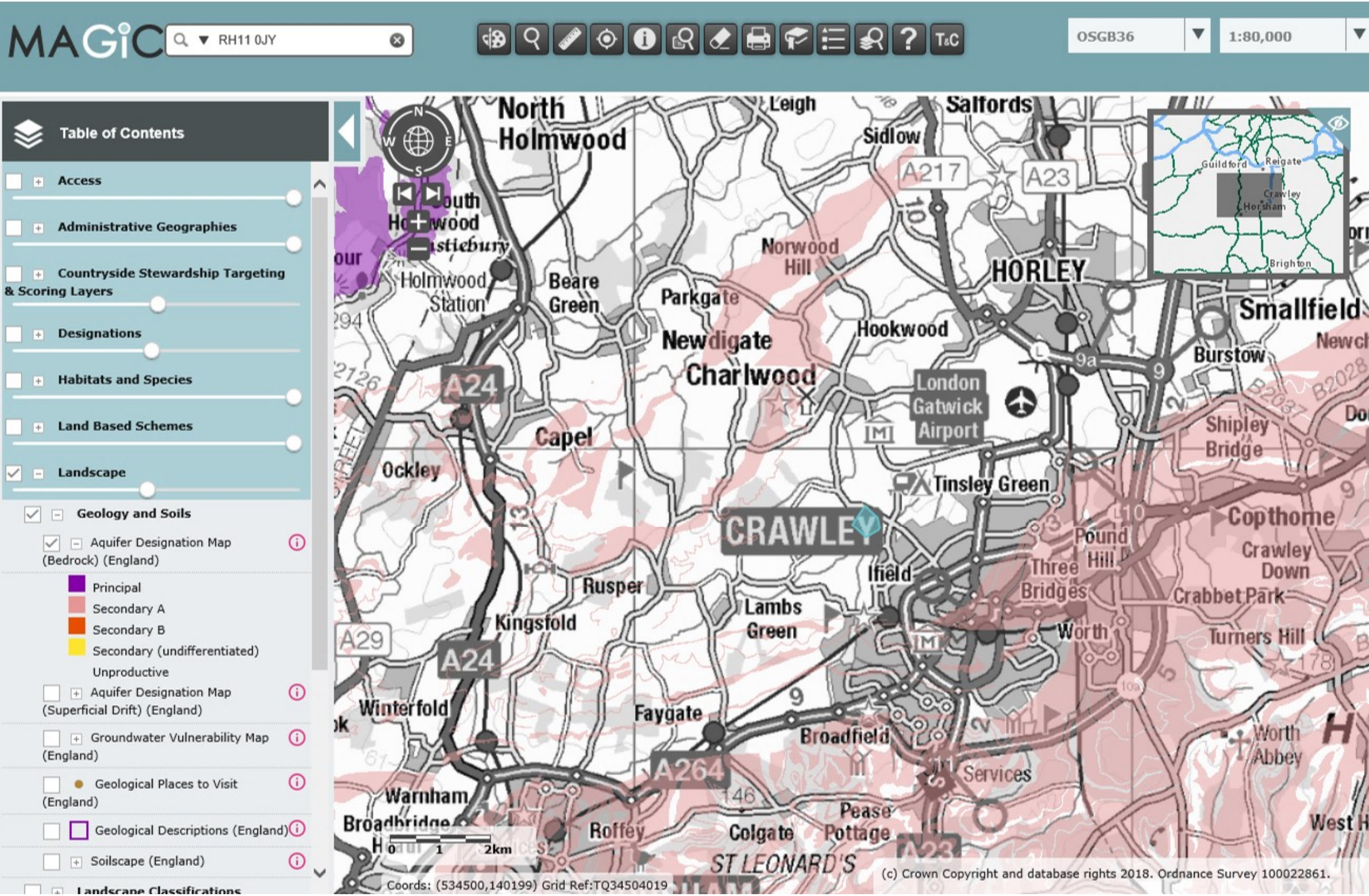

MAGIC
RH11 0JY
T&C
OSGB36
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Table of Contents
Access
Administrative Geographies
Countryside Stewardship Targeting & Scoring Layers
Designations
Habitats and Species
Land Based Schemes
Landscape
Geology and Soils
Aquifer Designation Map (Bedrock) (England)
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 (England)
Soilscape (England)
Landscape Classifications
North Holmwood
Leigh
Salfords
Sidlow
A217
A23
Norwood Hill
HORLEY
Holmwood Station
Beare Green
Parkgate
Newdigate
Charlwood
Hookwood
Smallfield
Burstow
A24
Capel
Ockley
London Gatwick Airport
Tinsley Green
CRAWLEY
Shipley Bridge
Copthorne
Pound Hill
Three Bridges
Crawley Down
Crabbet Park
Worth
Turners Hill
Ifield
Lambs Green
Rusper
Kingsfold
A29
Winterfold
Faygate
Broadfield
A264
Services
Worth Abbey
Warnham
Broadbridge Heath
Roffey
Colgate
Pease Pottage
ST LEONARD'S
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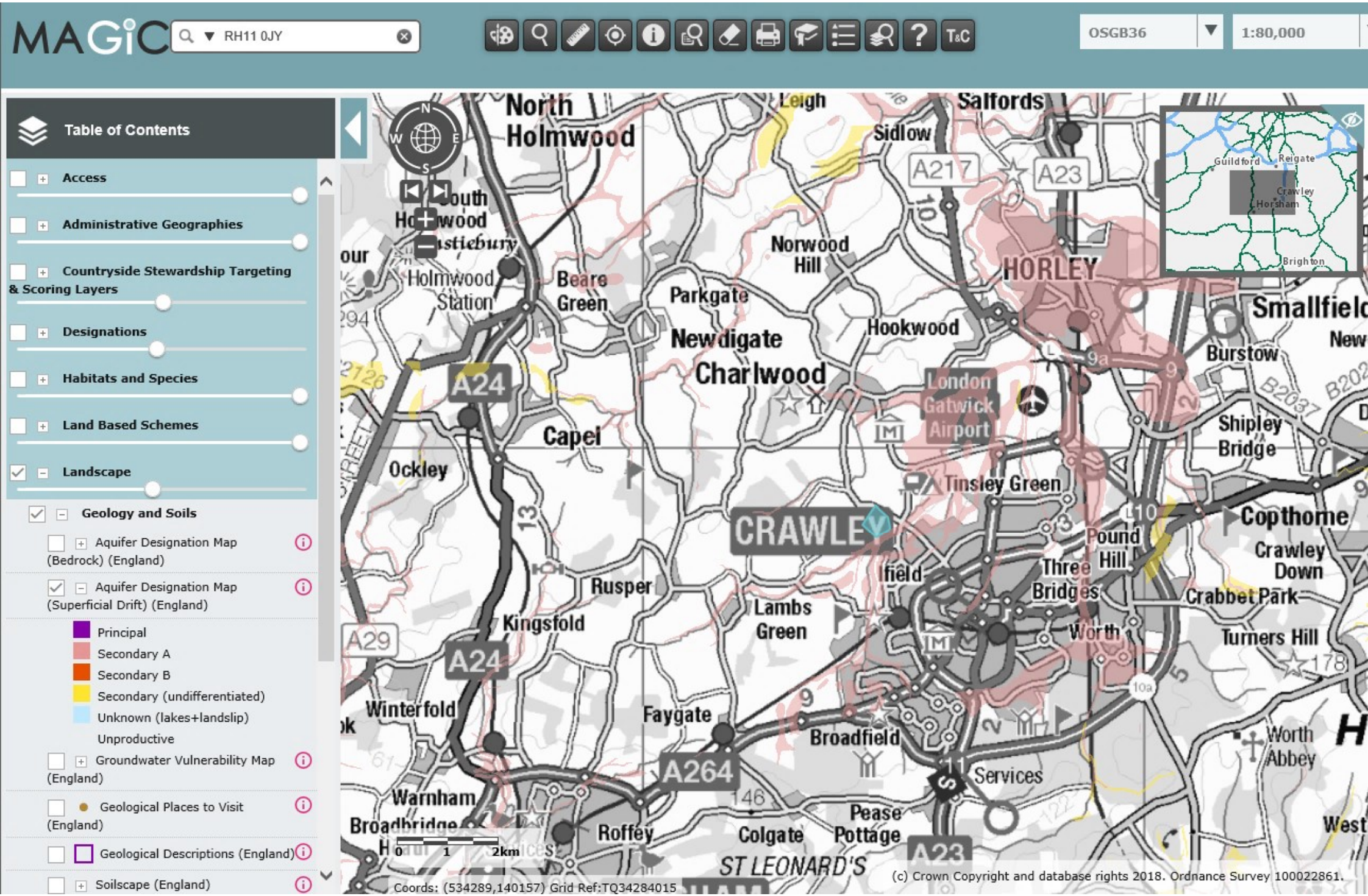
(c) Crown Copyright and database rights 2018. Ordnance Survey 100022861.


MAGIC
RH11 0JY
OSGB36
1:80,000
T&C
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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)
Soilscape (England)
North Holmwood
Holmwood Station
Beare Green
Parkgate
Newdigate
Charlwood
Norwood Hill
Hookwood
HORLEY
Salfords
Sidlow
A217
A23
A24
A29
A264
Capel
Ockley
Rusper
Kingsfold
Lambs Green
Winterfold
Faygate
Broadfield
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Crabbet Park
Turners Hill
Copthorne
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Burstow
Smallfield
Worth Abbey
Services
Guildford
Reigate
Crawley
Horsham
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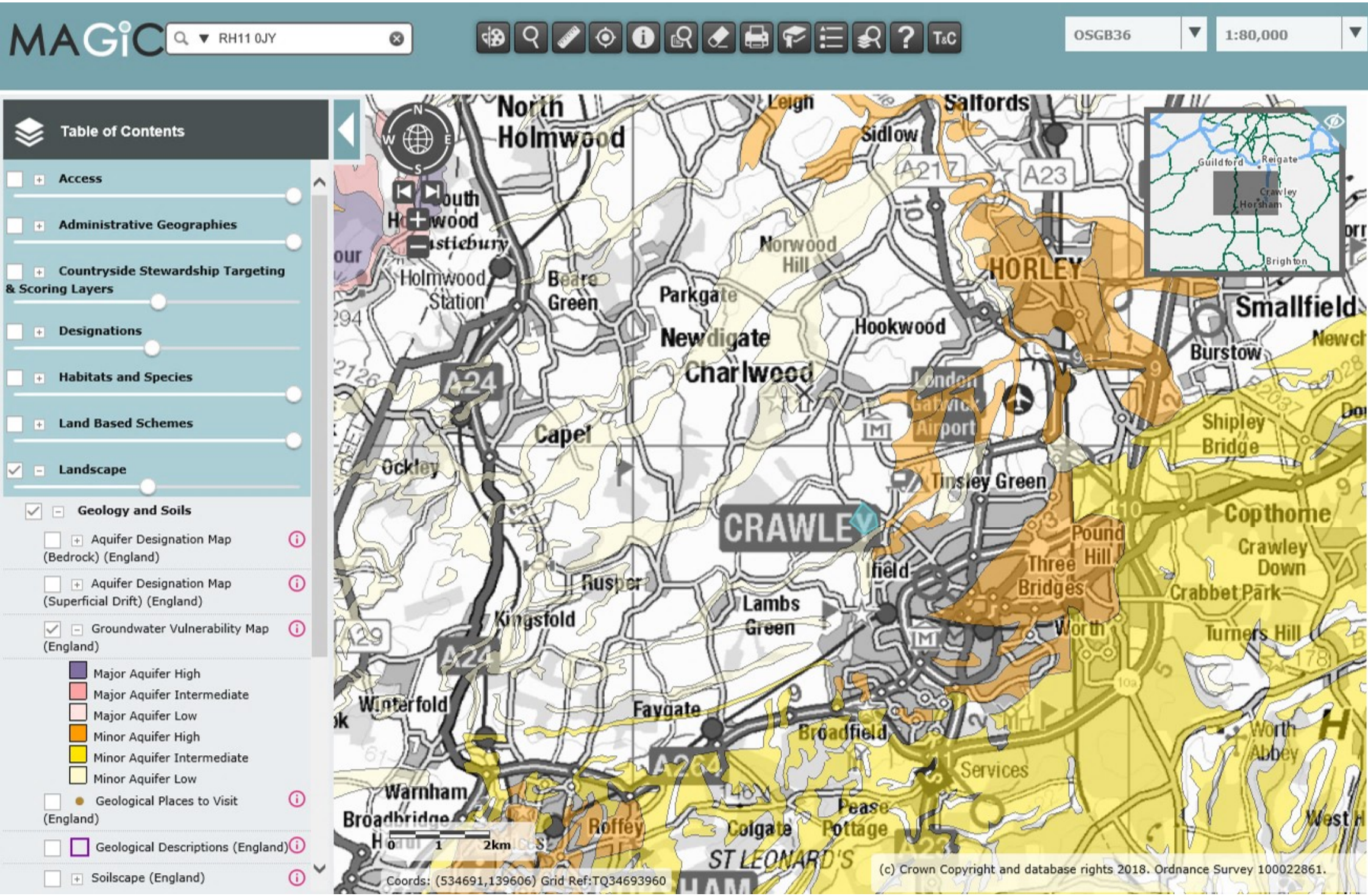
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RH11 0JY
T&C
OSGB36
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Aquifer Designation Map (Superficial Drift) (England)
Groundwater Vulnerability Map (England)
Major Aquifer High
Major Aquifer Intermediate
Major Aquifer Low
Minor Aquifer High
Minor Aquifer Intermediate
Minor Aquifer Low
Geological Places to Visit (England)
Geological Descriptions (England)
Soilscape (England)
North Holmwood
Holmwood Station
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Newdigate
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ST LEONARD'S
Salfords
Sidlow
A217
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A264
M23
Gatwick Airport
Guildford
Reigate
Crawley
Horsham
Brighton
0 1 2km
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Appendix E

Greenfield Run-off

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.450
Area (ha)	0.510	Urban	0.500
SAAR (mm)	800	Region Number	Region 6

Results l/s

QBAR Rural	2.6
QBAR Urban	5.1
Q1 year	4.4
Q1 year	4.4
Q30 years	9.7
Q100 years	11.8

Appendix F

Proposed Site Layout

8900N

8850N

8800N

8750N

ACOUSTIC BARRIER 4.5m high Class 3 fence to North boundary

ACCESS ROAD & TURNING BAYS concrete surface with 1: 40 falls to swale for surface water run off

SWALE 3 metres wide overall with perforated pipe and filter material below, draining to balancing pond

STOCK PILE concrete material, max. 4 metres high. Crusher operating area.

CRUSHER McCloskey International J40 12.7m x 2.5m x 3.2m high

STOCK PILE crushed material, max. 4 metres high. Screener operating area

SCREENER McCloskey International Kompaq 4m x 2.2m x 2.3m high

ACOUSTIC BARRIER 4.5m high Class 3 fence to West boundary

STOCK PILE unprocessed material, max. 4 metres high

STOCK BAYS for processed material timber built bays 10m x 6m x 3m high

WHEEL BATH drive through bath trimmed with channel drain 23.4m x 3.6m (including ramps)

RETENTION INTERCEPTOR to treat vehicle wash down waste water, to discharge to detention pond / reed beds

KLARGESTER BIODISC treatment plant for soil waste water to discharge to detention pond / reed beds

TICKET OFFICE steel shipping container conversion to office / tea room / WC 6.1m x 2.4m x 2.7m high

CAR PARKING 6 no. 6m x 2.4m bays for workforce parking

ENTRANCE GATE 3.5m high with min. superficial mass of 10kg/cub.metre

DETENTION POND / REED BEDS from klargester, piped discharge into existing ditch

ACOUSTIC BARRIER 4.5m high Class 3 fence to South boundary

BOUNDARY FENCE 1.8 metres high

BOUNDARY FENCE 1.8 metres high

DETENTION / BALANCING POND from swale to piped discharge into existing ditch

CONCRETE CULVERT under proposed new access road with brick headwalls and concrete aprons to pipes entry and discharge ditch

proposed 6m access road

CHARLWOOD ROAD

Public Footpath

N

SCALE BAR

0 25 50 75 100 m

Notes

Proposed Site Notes

Date | No. | Revisions

Kilmarnock Farm

Charlwood Road
Ifield, Crawley
West Sussex
RH11 0JY

Client

P J Brown Construction (Ltd)

Project Title

Proposed Soil Recycling
&
Concrete Crushing Facility

Drawing Title

Proposed Pj Brown Site Plan over Topo Survey

Scale

at A1 paper size **1 : 500**

Date

april 2019

Drawing No.

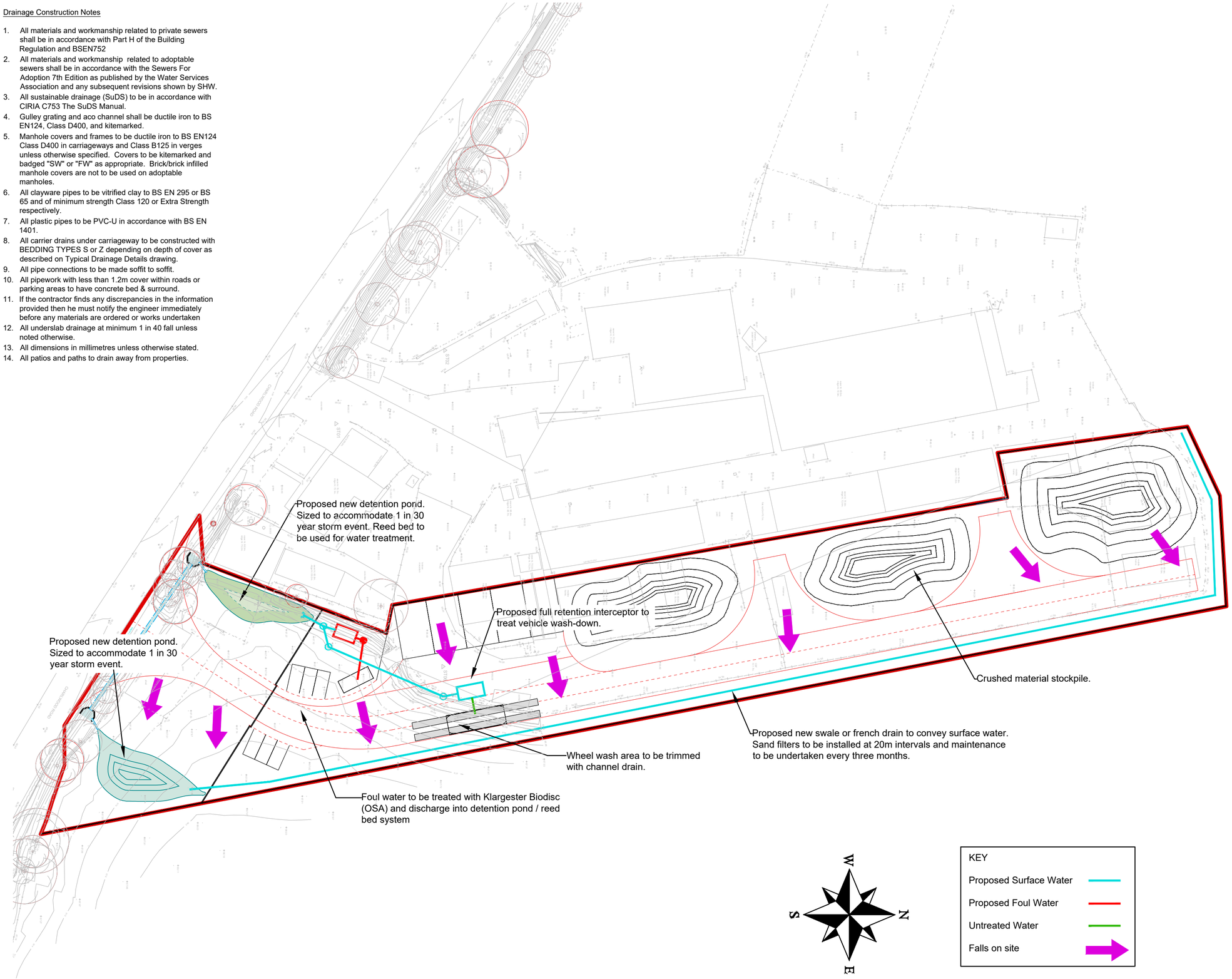
K 015 -P

Appendix G

Drainage Layout

Drainage Construction Notes

1. All materials and workmanship related to private sewers shall be in accordance with Part H of the Building Regulation and BSEN752
2. All materials and workmanship related to adoptable sewers shall be in accordance with the Sewers For Adoption 7th Edition as published by the Water Services Association and any subsequent revisions shown by SHW.
3. All sustainable drainage (SuDS) to be in accordance with CIRIA C753 The SuDS Manual.
4. Gulley grating and aco channel shall be ductile iron to BS EN124, Class D400, and kitemarked.
5. Manhole covers and frames to be ductile iron to BS EN124 Class D400 in carriageways and Class B125 in verges unless otherwise specified. Covers to be kitemarked and badged "SW" or "FW" as appropriate. Brick/brick infilled manhole covers are not to be used on adoptable manholes.
6. All clayware pipes to be vitrified clay to BS EN 295 or BS 65 and of minimum strength Class 120 or Extra Strength respectively.
7. All plastic pipes to be PVC-U in accordance with BS EN 1401.
8. All carrier drains under carriageway to be constructed with BEDDING TYPES S or Z depending on depth of cover as described on Typical Drainage Details drawing.
9. All pipe connections to be made soffit to soffit.
10. All pipework with less than 1.2m cover within roads or parking areas to have concrete bed & surround.
11. If the contractor finds any discrepancies in the information provided then he must notify the engineer immediately before any materials are ordered or works undertaken
12. All underslab drainage at minimum 1 in 40 fall unless noted otherwise.
13. All dimensions in millimetres unless otherwise stated.
14. All patios and paths to drain away from properties.



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1.2 DO NOT SCALE FROM THIS DRAWING.
1.3. LOCATIONS OF ALL EXISTING SERVICES ON-SITE TO BE CONFIRMED & PROVIDED TO THE ENGINEER PRIOR TO COMMENCEMENT OF WORKS.
1.4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT STILWELL LTD DRAWINGS & SPECIFICATIONS.

Rev.	Amendments	Date	Drg	Chk
P2	SITE PLAN UPDATED	10.04.19	AJ	DB
P1	INITIAL ISSUE	18.11.18	AJ	DB

Revisions

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W. www.patrickparsons.co.uk

Client
PJ Brown Construction

Project
Kilmarnock Farm

Drawing
Schematic Drainage Layout

Scales 1:500 At original size A2

Drawn AJ
Date Apr 2019
Checked DB

Status PRELIMINARY

Drawing No. A18263/0200 Rev. P2

Appendix H

MicroDrainage Calculations

Summary of Results for 30 year Return Period

Outflow is too low. Design is unsatisfactory.

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status
15 min Summer	8.406	0.406	42.8	O K
30 min Summer	8.520	0.520	55.7	O K
60 min Summer	8.638	0.638	69.3	O K
120 min Summer	8.759	0.759	83.8	O K
180 min Summer	8.831	0.831	92.6	O K
240 min Summer	8.882	0.882	99.0	O K
360 min Summer	8.958	0.958	108.5	O K
480 min Summer	9.015	1.015	115.7	O K
600 min Summer	9.060	1.060	121.6	O K
720 min Summer	9.098	1.098	126.6	O K
960 min Summer	9.160	1.160	134.8	O K
1440 min Summer	9.252	1.252	147.0	O K
2160 min Summer	9.348	1.348	160.3	O K
2880 min Summer	9.419	1.419	170.3	O K
4320 min Summer	9.524	1.524	185.2	O K
5760 min Summer	9.602	1.602	196.5	O K
7200 min Summer	9.664	1.664	205.7	O K
8640 min Summer	9.715	1.715	213.5	Flood Risk
10080 min Summer	9.760	1.760	220.2	Flood Risk
15 min Winter	8.451	0.451	47.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	76.035	0.0	27
30 min Summer	49.499	0.0	42
60 min Summer	30.811	0.0	72
120 min Summer	18.615	0.0	132
180 min Summer	13.715	0.0	192
240 min Summer	10.995	0.0	252
360 min Summer	8.034	0.0	372
480 min Summer	6.428	0.0	492
600 min Summer	5.404	0.0	612
720 min Summer	4.687	0.0	732
960 min Summer	3.743	0.0	972
1440 min Summer	2.723	0.0	1452
2160 min Summer	1.979	0.0	2172
2880 min Summer	1.577	0.0	2892
4320 min Summer	1.143	0.0	4332
5760 min Summer	0.910	0.0	5776
7200 min Summer	0.762	0.0	7216
8640 min Summer	0.659	0.0	8656
10080 min Summer	0.583	0.0	10096
15 min Winter	76.035	0.0	27

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status
30 min Winter	8.578	0.578	62.4	O K
60 min Winter	8.708	0.708	77.6	O K
120 min Winter	8.841	0.841	93.8	O K
180 min Winter	8.920	0.920	103.7	O K
240 min Winter	8.977	0.977	110.8	O K
360 min Winter	9.059	1.059	121.5	O K
480 min Winter	9.121	1.121	129.6	O K
600 min Winter	9.171	1.171	136.2	O K
720 min Winter	9.212	1.212	141.7	O K
960 min Winter	9.280	1.280	150.9	O K
1440 min Winter	9.380	1.380	164.7	O K
2160 min Winter	9.484	1.484	179.5	O K
2880 min Winter	9.562	1.562	190.7	O K
4320 min Winter	9.675	1.675	207.5	O K
5760 min Winter	9.759	1.759	220.1	Flood Risk
7200 min Winter	9.826	1.826	230.4	Flood Risk
8640 min Winter	9.882	1.882	239.1	Flood Risk
10080 min Winter	9.931	1.931	246.6	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	49.499	0.0	42
60 min Winter	30.811	0.0	72
120 min Winter	18.615	0.0	132
180 min Winter	13.715	0.0	192
240 min Winter	10.995	0.0	252
360 min Winter	8.034	0.0	372
480 min Winter	6.428	0.0	492
600 min Winter	5.404	0.0	612
720 min Winter	4.687	0.0	732
960 min Winter	3.743	0.0	972
1440 min Winter	2.723	0.0	1452
2160 min Winter	1.979	0.0	2172
2880 min Winter	1.577	0.0	2892
4320 min Winter	1.143	0.0	4332
5760 min Winter	0.910	0.0	5776
7200 min Winter	0.762	0.0	7216
8640 min Winter	0.659	0.0	8656
10080 min Winter	0.583	0.0	10096

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.300

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.100	4	8	0.100	8	12	0.100

Model Details

Storage is Online Cover Level (m) 10.000

Tank or Pond Structure

Invert Level (m) 8.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	100.0	2.000	160.0

Appendix J

Environment Agency Flood Map

Flood map for planning

Your reference	Location (easting/northing)	Created
A18263	**524705/138903**	**22 Oct 2018 3:01**

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Environment Agency

Flood map for planning

Your reference
A18263

Location (easting/northing)
524705/138903

Scale
1:2500

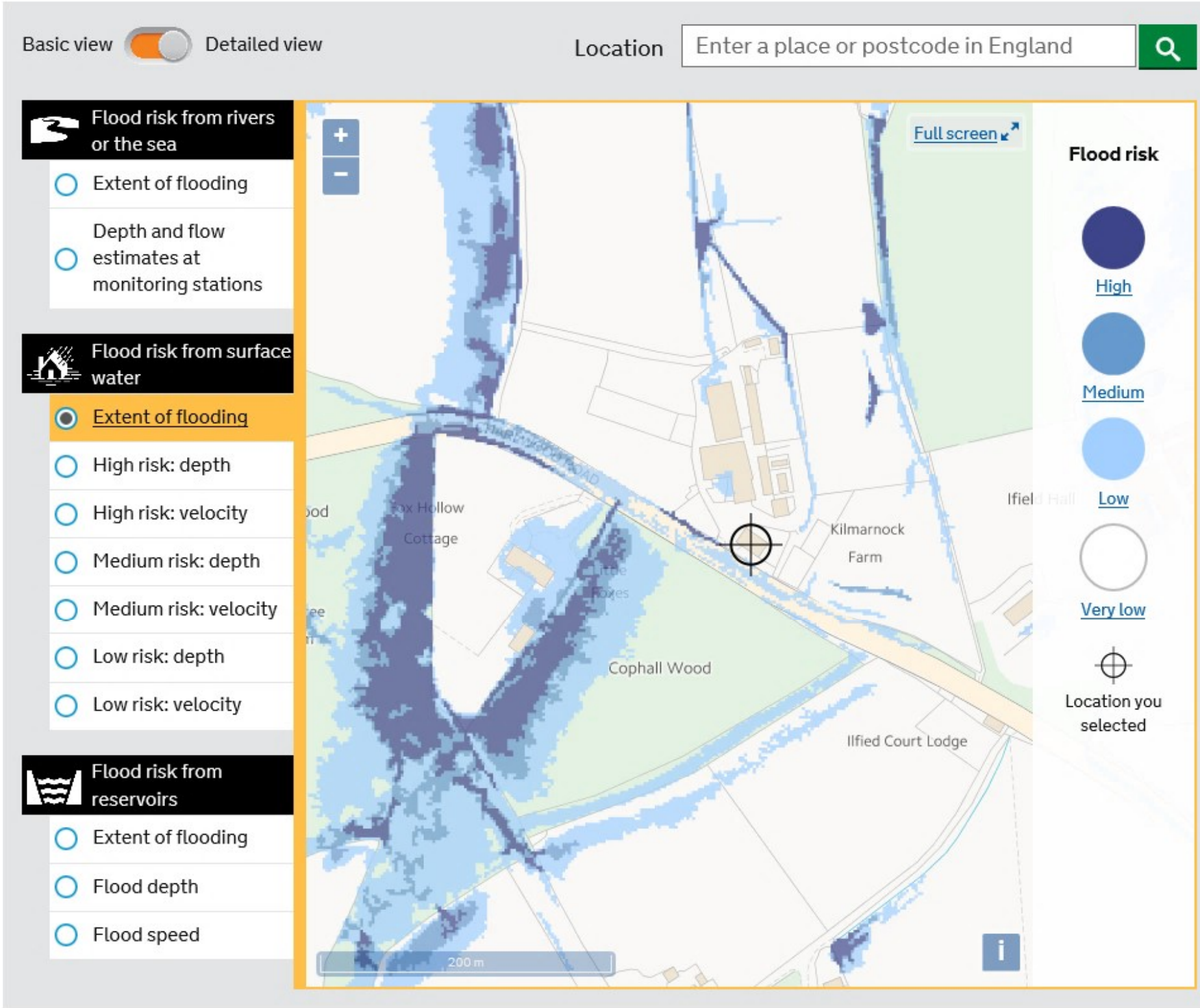
Created
22 Oct 2018 3:01

- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

0 20 40 60m

Appendix K

Environment Agency Surface Water Flood Map


Basic view
Detailed view
Location
Enter a place or postcode in England
Flood risk from rivers or the sea
Extent of flooding
Depth and flow estimates at monitoring stations
Flood risk from surface water
Extent of flooding
High risk: depth
High risk: velocity
Medium risk: depth
Medium risk: velocity
Low risk: depth
Low risk: velocity
Flood risk from reservoirs
Extent of flooding
Flood depth
Flood speed
Full screen
Flood risk
High
Medium
Low
Very low
Location you selected
Fox Hollow Cottage
Kilmarnock Farm
Cophall Wood
Ilfied Court Lodge
200 m

Basic view Detailed view

Location Enter a place or postcode in England

Flood risk from rivers or the sea

- Extent of flooding
- Depth and flow estimates at monitoring stations

Flood risk from surface water

- Extent of flooding
- High risk: depth
- High risk: velocity
- Medium risk: depth
- Medium risk: velocity
- Low risk: depth
- Low risk: velocity

Flood risk from reservoirs

- Extent of flooding
- Flood depth
- Flood speed

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