# Options Appraisal – River Lavant, Goodwood Estate

## FLOW0059 – RIVER LAVANT RESTORATION FEASIBILITY

Produced for

Western Sussex Rivers Trust

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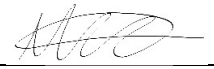
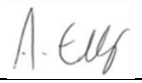
| Author | Maddie Crabb |  | 22/09/2025 |
| Reviewer | Adam Ellis |  | 24/10/2025 |

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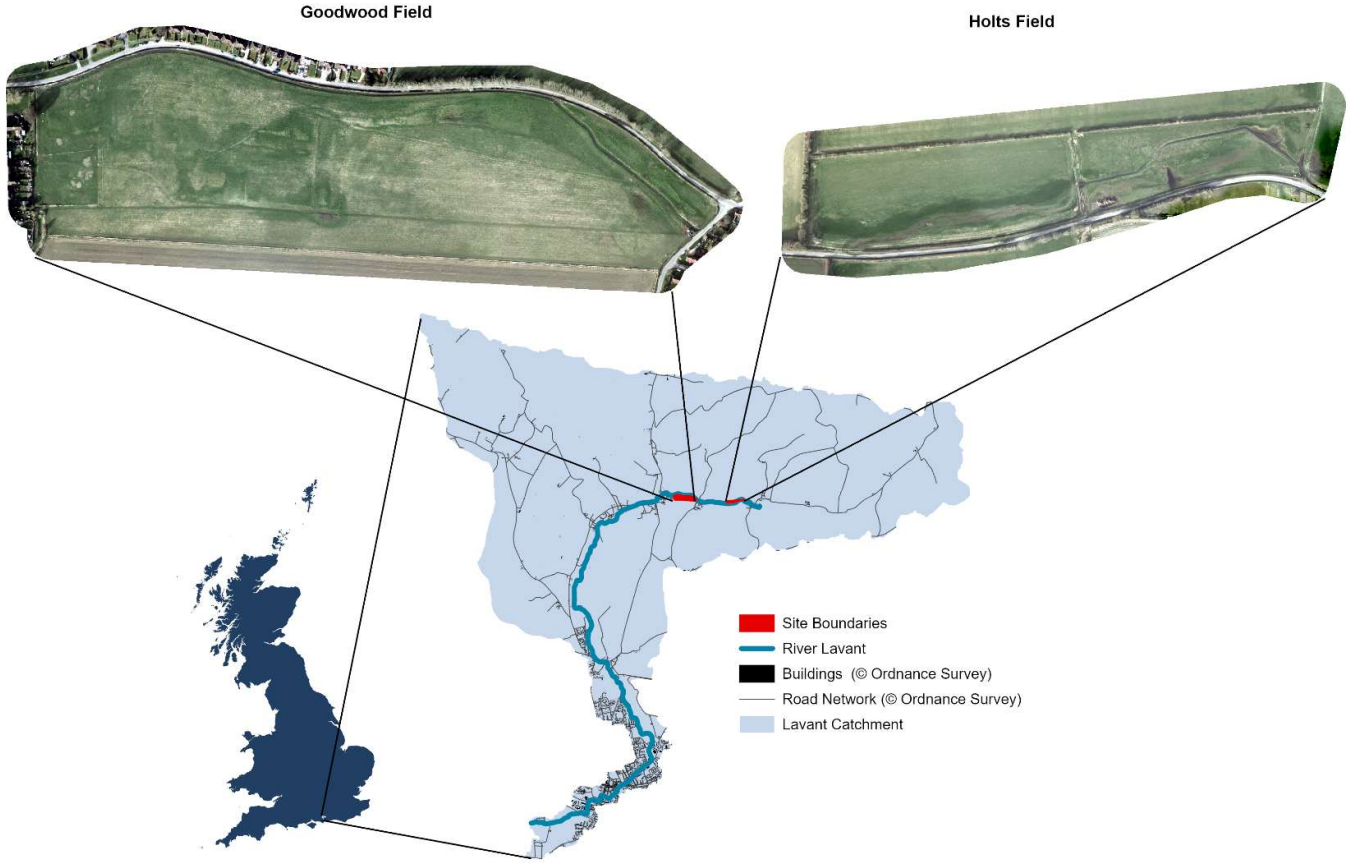
# 1. Project Details

The Western Sussex Rivers Trust commissioned FLOW CIC to undertake a feasibility study of two land parcels in the upper catchment of the River Lavant, West Sussex. The Goodwood Estate owns the land, that have ambitious aims for biodiversity for the River Lavant that runs through its estate. The scheme is looking to restore natural function and form to the River Lavant to enhance biodiversity and chalk stream resilience. The locations of each field are shown below.



# 2. Site Walkover

FLOW CIC conducted a site walkover on the 4th September 2025 with the client and the Goodwood Estate. Additional drone surveys were undertaken on the 19th September 2025.

## 2.1. Goodwood Field

<table>
<tr><th colspan="6">Site Description</th></tr>
<tr><td colspan="2" rowspan="3">The site comprises an 11.8 hectare field currently used for livestock grazing. Large areas of the field are covered with substantial flint deposits, making the land likely unfavourable for arable farming. The River Lavant flows from east to west along the northern boundary of the field. For approximately 200 metres, the river passes through the field parcel itself, maintaining a relatively good connection to the floodplain, with minor bunding along the left bank.<br><br>Beyond this section, the river runs adjacent to the road, bounded by a hedgerow on the right bank and a fence along the top of the left bank. The channel appears to be over-deepened, likely as part of road drainage works. During flood events, surface water has been observed flowing both along the road and within the river channel.<br><br>Across Goodwood Field, a visible sewer line runs approximately through the centre of the site from east to west, following the valley bottom. Villages bound the field at either end of the reach.</td><td>U/S NGR</td><td>SU 88721 13037</td><td>D/S NGR</td><td>SU 88021 13185</td></tr>
<tr><td>Reach Length (m)</td><td>761</td><td>Gradient (m/m)</td><td>0.0064</td></tr>
<tr><td>Avg. Width (m)</td><td>5.6</td><td>Avg. Depth (m)</td><td>0.77</td></tr>
<tr><th colspan="6">Morphological Description</th></tr>
<tr><td colspan="2">Planform Type</td><td colspan="4">Single-threaded low sinuosity river planform</td></tr>
<tr><td colspan="2">Flow Type & Flow Diversity</td><td colspan="4">Surveyed during no-flow (dry) conditions. The River Lavant is a Winterbourne (ephemeral) chalk stream</td></tr>
<tr><td rowspan="2">Bed Characteristics</td><td>Materials</td><td colspan="4">A mixture of large and small flint gravels and cobbles. Large areas are vegetated with terrestrial grass species.</td></tr>
<tr><td>Features</td><td colspan="4">No in-channel bed features were observed.</td></tr>
<tr><td rowspan="2">Bank Face Characteristics</td><td>Materials</td><td colspan="4">Bank material looked to be cohesive and earthy. The majority of all banks were vegetated with terrestrial grasses.</td></tr>
<tr><td>Features</td><td colspan="4">The bank face profile varied between gentle and composite dependant on the access of livestock to the river bank. The bank face lacked any features.</td></tr>
<tr><td colspan="2">Bank Top Characteristics</td><td colspan="4">The bank top lacked any notable riparian features. In particular, there is a complete absence of riparian trees on the site.</td></tr>
<tr><td colspan="2">River Condition Assessment</td><td colspan="4">Classified as ‘fairly poor’ with bed siltation and filamentous algae cover having the largest impact on negative indicator scores. See study for further details[1].</td></tr>
<tr><th colspan="6">Riparian Zone Pressures</th></tr>
<tr><td colspan="2">Landcover/use</td><td colspan="4">Land cover is grassland utilised for livestock grazing. A public right-of-way additionally runs along the southern boundary of the field.</td></tr>
<tr><td colspan="2">Infrastructure & Engineering</td><td colspan="4">The upstream extent of the site is bound by a double arch brick road bridge with an additional concrete pipe running through the structure on the right bank side. At the time of the survey, the bridge was blocked off with corrugated iron to stop livestock from roaming</td></tr>
</table>

[1] River Lavant Condition Assessment and Walkover Survey Report, Dr. Rowenna Baker & Sandra Manning-Jones (2024) https://awscp.org.uk/files/river-lavant-rca-and-walkover-survey-spring-2024-compressed.pdf

| | |
|---|---|
| | upstream. Through the centre of the site runs a gravity-fed sewer pipe across the valley bottom, with prominent above-ground manhole covers visible throughout the field. A large livestock drinking trough is found in the north-west corner of the field. In addition a Portsmouth Water mains runs along the road and the river. |

Upstream extent of the Lavant, displaying the road bridge.

Upstream reach of River Lavant through the Goodwood Field

The section of the River Lavant that runs adjacent to the road bound by a hedge on the right bank and fence on the left bank.

View of the floodplain and abundance of flint cobbles at the surface.

Drone imagery taken on the 19.09.2025 of the Goodwood Field

## 2.2. Holts Field

<table>
<tr><td colspan="5">Site Description</td></tr>
<tr><td colspan="2" rowspan="3">The site comprises two fields with a total area of 4.83 hectares. The eastern field is used for livestock grazing, while the western field is used for arable crops. In the eastern field, a dirt track and ford run from south to north along the eastern boundary, providing access to other fields outside the project scope. Within this field, the river has a distinctive planform along the floodplain edge, featuring several right-angle turns. The river is clearly artificial in form.<br><br>In the western field, the river runs along the road and hedge line on the left bank and is notably over-deep.<br><br>Across the site, overhead SSEN lines run from east to west. Additionally, a sewer line crosses the valley bottom in the same direction.</td><td>U/S NGR</td><td>SU 90073 13015</td><td>D/S NGR</td><td>SU 89549 12943</td></tr>
<tr><td>Reach Length (m)</td><td>572</td><td>Gradient (m/m)</td><td>0.0069</td></tr>
<tr><td>Avg. Width (m)</td><td>6.0</td><td>Avg. Depth (m)</td><td>0.78</td></tr>
<tr><td colspan="5">Morphological Description</td></tr>
<tr><td>Planform Type</td><td colspan="4">Single-threaded low sinuosity river planform</td></tr>
<tr><td>Flow Type & Flow Diversity</td><td colspan="4">Surveyed during no flow (dry) conditions. The River Lavant is a Winterbourne (ephemeral) chalk stream</td></tr>
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<tr><td colspan="5">Riparian Zone Pressures</td></tr>
<tr><td>Landcover/use</td><td colspan="4">Landcover is grassland utilised for livestock grazing and arable.</td></tr>
<tr><td>Infrastructure & Engineering</td><td colspan="4">The upstream extent of the site is currently set out as an informal ford area. There is no hard infrastructure in place at this ford, it is just a shallow earth crossing area for agricultural vehicles. Throughout the field are several utilities. Of particular importance are the overhead SSEN power lines and the Southern water sewer, both running from east to west in the central region of the site.</td></tr>
</table>

| | | | |
|---|---|---|---|
| | | | |
| Upstream extent of the river reach. Informal ford crossing | Central reach of the eastern field. | Central reach of the eastern field. | Indicative of the reach running along the road. The left bank is dominated by a hedge row and the channel is overgrown. |

Drone imagery taken on the 19.09.2025 of the Holt's Field

# 3. Desk-Based Assessment

## 3.1. Physical Setting & Catchment Description

**Catchment Description**

The River Lavant is an ephemeral chalk stream located in West Sussex, forming part of the hydrological system of the South Downs. The catchment exhibits a distinct transition from a steep, permeable chalk upland in the headwaters to a low-lying clay-dominated geology downstream. This geology strongly influences the river's flow regime, with seasonal emergence and drying typical of chalk stream headwaters.

The upper catchment, above Westhampnett, is predominantly agricultural land interspersed with areas of woodland. The permeable chalk substrate supports rapid infiltration, groundwater recharge, and baseflow generation during wetter periods. The Lavant rises near East Dean and flows southward, with its flow heavily dependent on groundwater levels within the chalk aquifer. In contrast, the lower catchment, extending toward Graylingwell and Chichester, is markedly flatter and underlain by clay bedrock deposits. This area has undergone substantial urban development, altering surface runoff characteristics.

Overall, the River Lavant catchment represents a complex hydrological system where interactions between chalk groundwater dynamics, surface hydrology, land use, and urban development play a defining role. Restoration efforts within the catchment should therefore consider the seasonal nature of flow, the importance of groundwater–surface water connectivity, and the pressures from agricultural and urban land uses.

**Environment Agency and Water Framework Directive (WFD) Information**

The scheme covers two reaches of the River Lavant, which lie within the Lavant (Sussex) Water Body. Under the Water Framework Directive (WFD), this water body has been classified as having poor ecological status.

The following elements are classified as poor:

- Fish
- Macrophytes and phytobenthos (combined)
- Macrophytes (sub-element)

The following elements are classified as moderate:

- Invertebrates
- Phosphate

Continuous sewage discharges have been identified as a key factor in the failure to achieve good ecological status in most of the above elements. Sewage pollution is known to be a significant issue within the catchment, with Southern Water reported to have discharged into the River Lavant at Singleton 146 times (3206 hrs) in 2024.[2]

The river also fails its chemical status, consistent with all surface water bodies in England. The failure is due to the presence of mercury and its compounds, as well as polybrominated diphenyl ethers (PBDEs).

| | |
|---|---|
| **WFD Ecological Status** | Poor |
| **WFD Chemical Status** | Fail |
| **Watercourse Type** | Main River |
| **Principal Salmon River** | No |
| **Priority Chalk River** | Yes |

**Landcover**

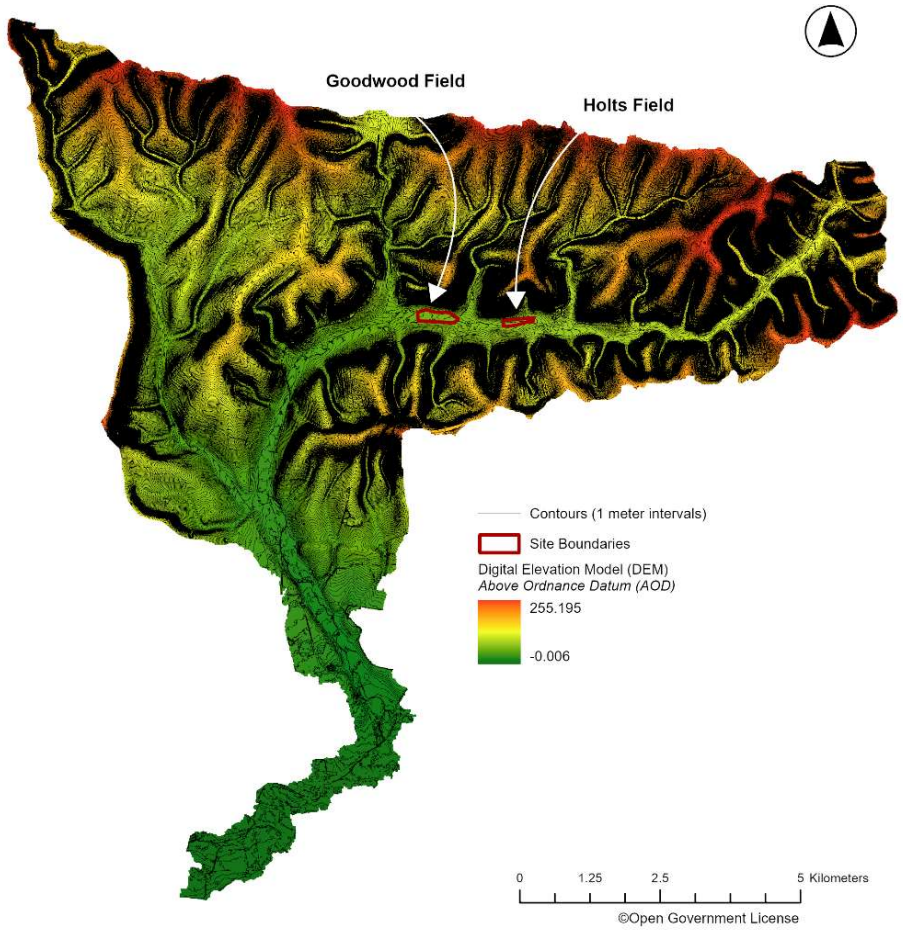
Both Goodwood Field and Holts Field predominantly consist of improved grassland, with arable land as a subdominant cover type. Surrounding both fields are small suburban and rural villages. The broader landscape generally comprises a similar mosaic of landcover types, with the addition of calcareous grasslands and broadleaved, mixed and yew woodlands.

The scheme's focus area, and the River Lavant valley in general, lack significant tree cover. Trees play an important role in intercepting rainfall and temporarily storing water within their branches and leaves before it either evaporates or reaches the ground. Below ground, tree roots create cavities in the soil, providing pathways for water to infiltrate and increasing the soil's storage capacity. Enhancing tree and vegetation cover and reducing impermeable surfaces, such as concrete, are important measures for improving water management and building climate resilience within the catchment. Trees and vegetation play a vital role in flood management.

[2] Environment Agency https://environment.data.gov.uk/dataset/21e15f12-0df8-4bfc-b763-45226c16a8ac

**Topography**

Catchment DEM with one-meter contours overlain



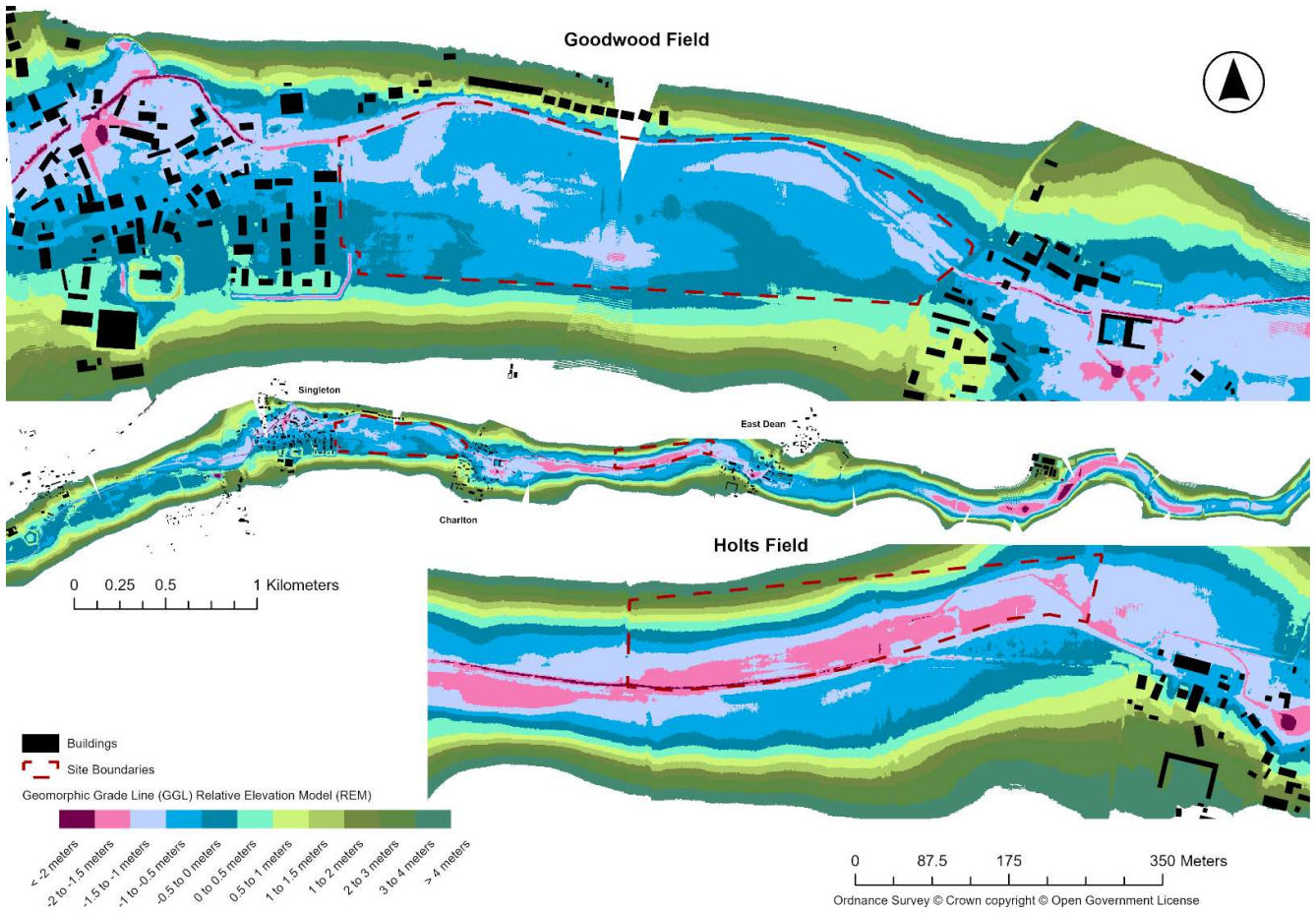

The River Lavant catchment is characterised by steep chalk valley slopes in its upper reaches, gradually transitioning into a broad, low-lying floodplain as the river flows southward toward Chichester. In the lower catchment, the landscape becomes notably flat, and in some areas, ground levels dip below sea level, influencing both drainage and flood risk characteristics. The highest elevation within the catchment reaches approximately 255 metres above Ordnance Datum (AOD).

The elevation across the catchment, combined with the permeable chalk geology, gives rise to a distinct topographical and hydrological pattern. In the headwaters, narrow and steep-sided valleys have developed through prolonged erosion of the chalk substrate. These valleys act as natural flow pathways, efficiently conveying surface water and groundwater discharge into the main River Lavant channel. During periods of high rainfall, these upper valleys can rapidly deliver runoff to the river, especially as the road network has been built along several valley floors. Transforming naturally permeable areas to impermeable hard surfaces.

Further downstream, as the gradient decreases, the valley widens into a gently undulating floodplain. This flatter topography supports improved agricultural land and suburban development. Still, it also results in slower drainage and a greater propensity for surface water and fluvial flooding, particularly where historic floodplains have been modified or disconnected from the river.

Overall, the River Lavant's topography strongly influences its hydrological behaviour, sediment transport, and ecological potential. Understanding these relationships is essential for informing effective river restoration and flood management strategies within the catchment.

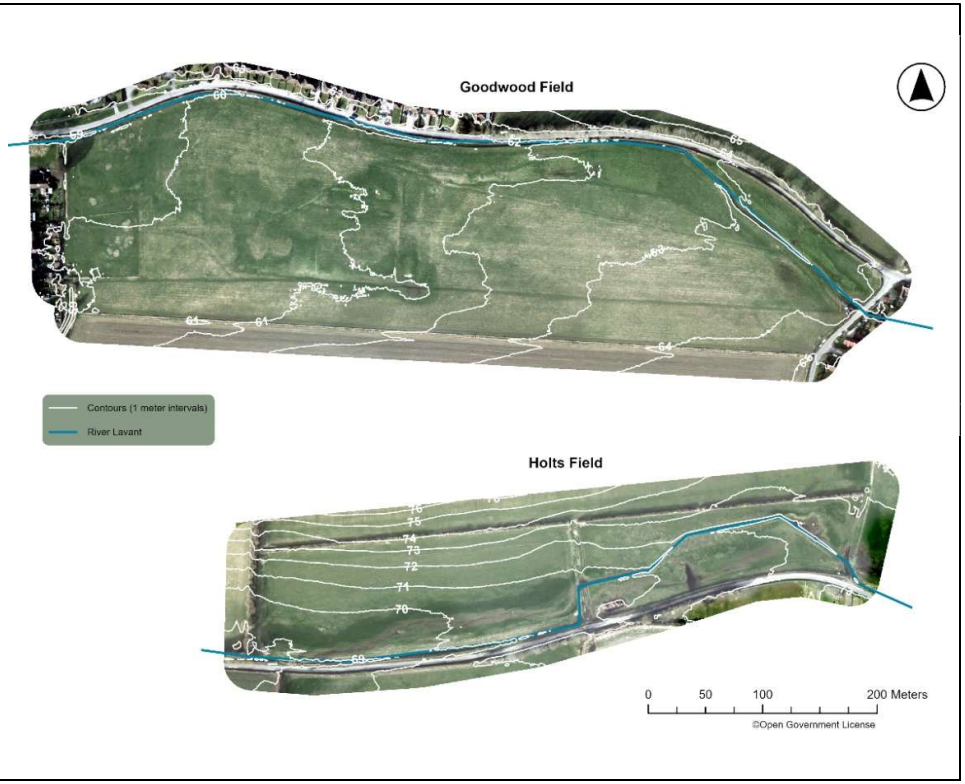
Geomorphic Grade Line Relative Elevation Model




A geomorphic grade line (GGL) relative elevation model (REM) was run for the catchment using DEFRA's 1-meter resolution LIDAR. This model is used to analyse the river valley by fitting a trend to the river gradient and then comparing the surrounding topography with the expected valley slope. The output raster has been classified based on the predicted valley floor level. Negative values indicate potential over deep areas, whereas positive values indicate features such as embankments or higher terrain. Natural riverine floodplain values for the sites would be expected to fall within the range of positive one and negative one (blue).

**Goodwood Field**
The field shows a wide expanse of floodplain with some lowered areas. These lowered areas correspond with flow pathway mapping. The river runs along the northern boundary and would be considered overdeep and likely artificially pushed to the edge of the floodplain.

**Holts Field**
The field shows as potentially an overdeep area of the valley. Looking at the wider Upper Lavant catchment, there is a clear pattern of areas being displayed as over deep interspersed with connected areas of floodplain in a regular occurrence and pattern. This is likely a natural landscape-scale pattern of sediment transport and deposition. However, the channel along the road is shown as significantly deeper (>2m), suggesting historic realignment.

| | |
|---|---|
| **Goodwood Field** |  |
| The lowest part of the field corresponds to the River Lavant at its downstream extent, lying at approximately 58 metres above Ordnance Datum (AOD). The highest areas of the field are located in the south-east corner, at around 65 metres AOD. Overall, the field is predominantly flat, with a gentle slope falling westwards in line with the valley gradient.<br><br>A topographic survey of the River Lavant channel was undertaken by Storm Geomatics. Analysis of the long section derived from this survey indicates a channel gradient of approximately 0.0064 m/m (0.64%, or 1:155).<br><br>The River Lavant's current alignment lies along the northern edge of the floodplain, adjacent to the road. It is likely that the river was historically realigned to this position to facilitate road drainage, field drainage, and to maximise agricultural land within the valley floor. | |
| **Holts Field** | |
| The lowest part of the field corresponds to the River Lavant at its downstream extent, lying at approximately 68 metres above Ordnance Datum (AOD). The highest areas of the field are located to the north, where the field transitions to a steep valley slope, at around 74 metres AOD.<br><br>Storm Geomatics undertook a topographic survey of the River Lavant channel. Analysis of the long section derived from this survey indicates a channel gradient of approximately 0.0069 m/m (0.69%, or 1:143).<br><br>The River Lavant's current alignment runs partially along the valley bottom in its lower reaches, along the road. The upper proportion of the field shows some deviation from the valley centre, where there is some apparent historic realignment due to the unnatural near right-angle bends in the river. The purpose of this is unknown. | |

**Geology**

The upper catchment (above Westhampnett) comprises a series of Chalk bedrock formations, including the Lewes Nodular Chalk, Seaford Chalk, Newhaven Chalk, Culver Chalk, Holywell Nodular Chalk Formation, New Pit Chalk Formation, and Portsdown Chalk Formation. These units together form part of the Cretaceous Chalk Group, which is regionally important for groundwater storage and baseflow contribution.

In contrast, the lower catchment is underlain by the Lambeth Group and the London Clay Formation. These strata act as aquicludes, meaning they have very low permeability and do not readily store or transmit groundwater. This represents a significant hydrogeological contrast with the upper chalk catchment, which is classified as a Principal Aquifer under the Environment Agency's Aquifer Designation Dataset.

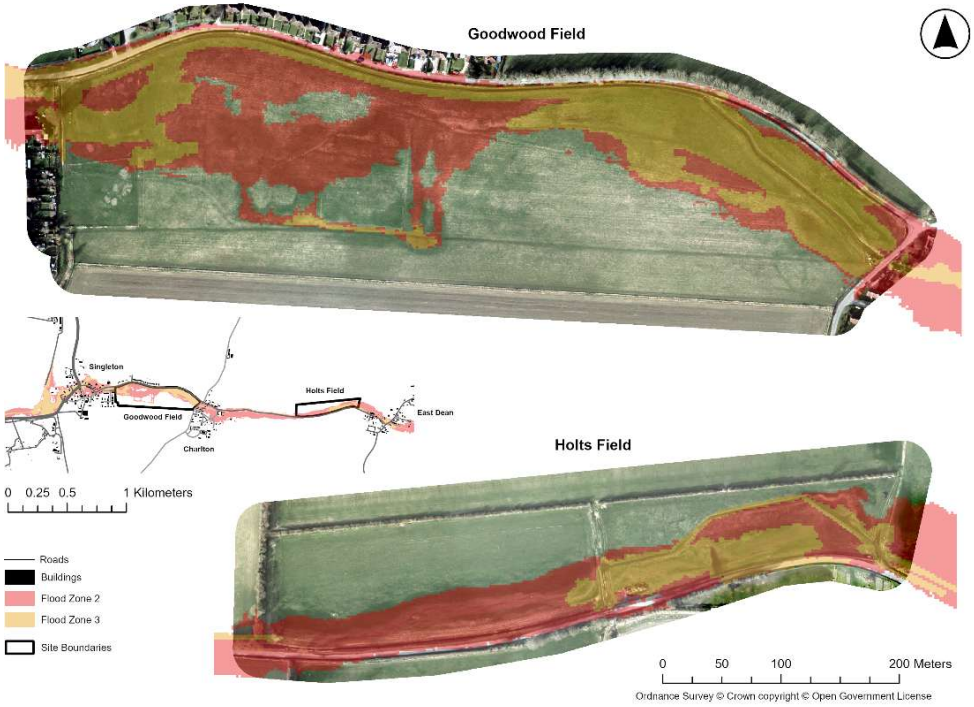
The superficial geology of the River Lavant catchment indicates that the valley floor is primarily composed of Alluvium, a mixture of clay, silt, sand and gravel, representing relatively recent fluvial deposits. Along the edges of the floodplain, these alluvial deposits transition to Head deposits, consisting mainly of reworked gravels derived from earlier fluvial and slope processes. As the river approaches Chichester, the valley floor broadens and the deposits transition into alluvial fan sediments, reflecting historical sediment accumulation where the river gradient decreases.

*Geology source information: British Geological Society* https://www.bgs.ac.uk/datasets/bgs-geology-50k-digmapgb/

## 3.2. Flood Risk

### Flood Risk

EA flood risk from rivers and the sea




#### River and Sea Flooding

Both the Goodwood and Holts Fields contain areas with a high likelihood of annual flooding from the river. These areas are shown in orange and generally correspond to either the existing course of the River Lavant or its floodplain. The red areas indicate zones with a moderate likelihood of annual flooding. The Environment Agency (EA) flood zones align closely with observed flooding patterns in the region. See the image below showing Goodwood Field during flood flows.

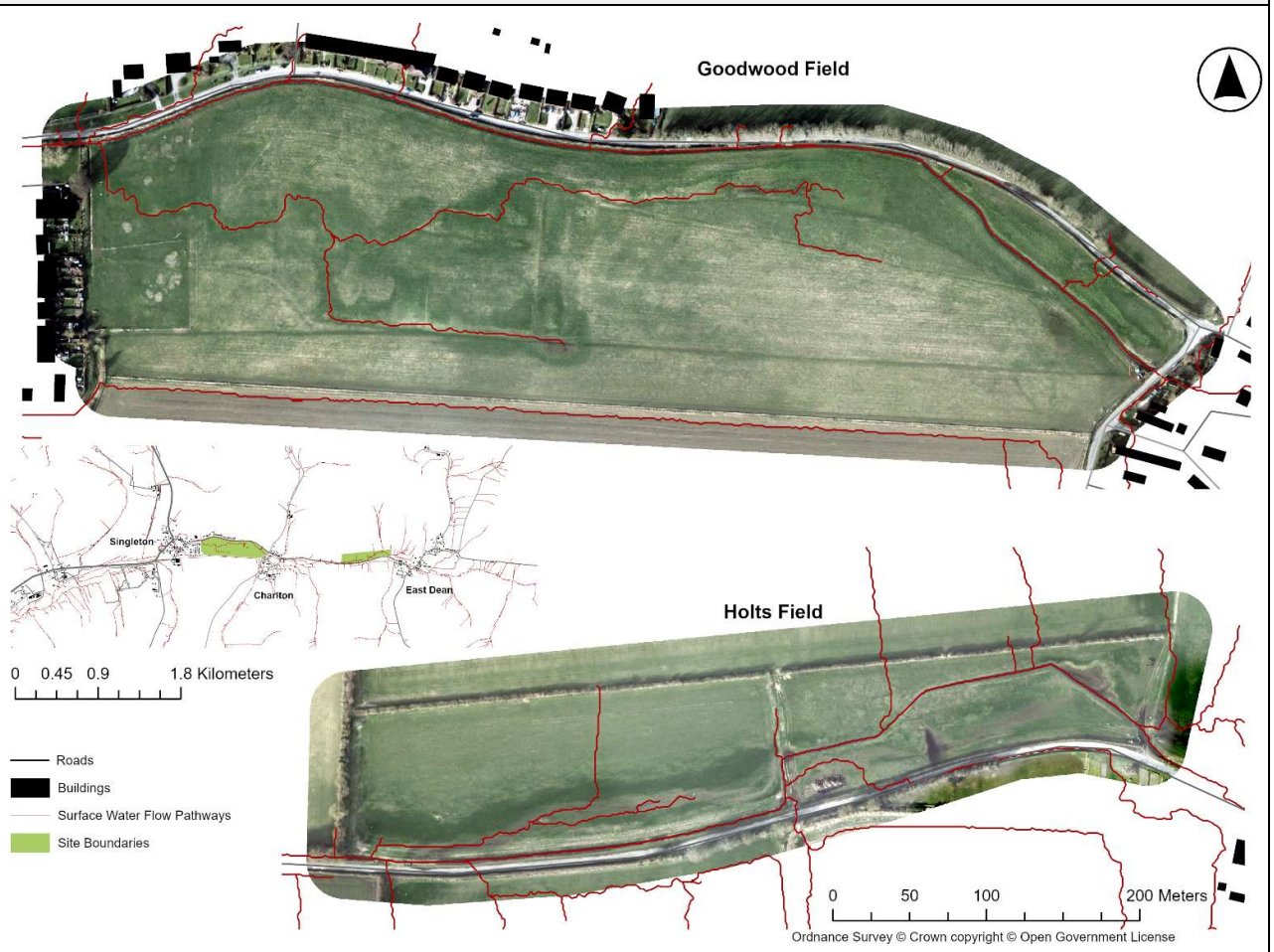
#### Receptors

There are several potential flood risk receptors in the area. The residential communities of Charlton and Singleton lie predominantly within the floodplain and are subject to a high to medium likelihood of annual river flooding. These areas, particularly along Charlton Road, are known to experience flooding. The flooding is believed to be caused in part by groundwater, surface water, and sewerage issues. Improvement works are currently underway to upgrade the sewerage infrastructure, which is thought to be the main source of flooding in the area.

*Goodwood Field in flood flows. Image taken facing southwards across the valley.*

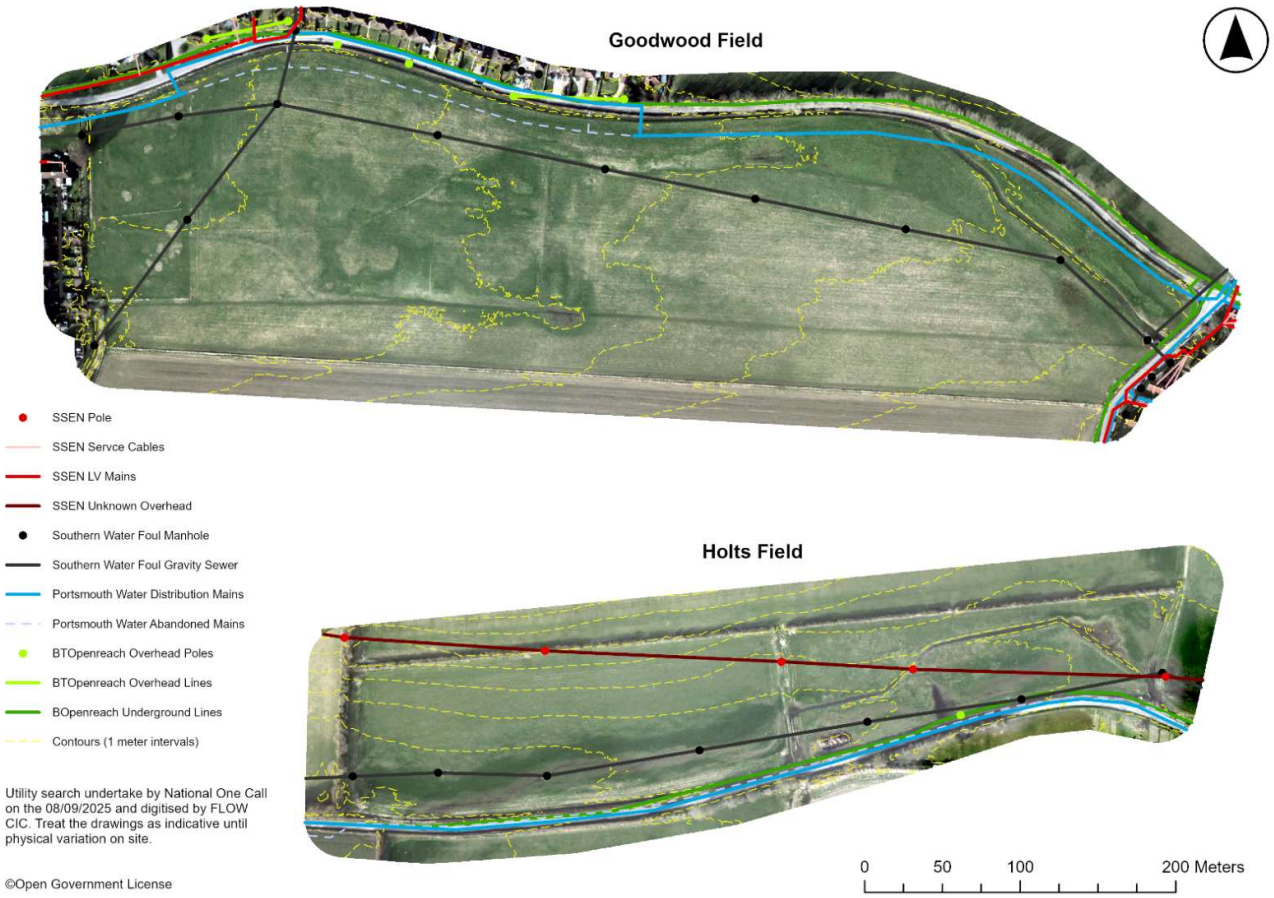
*Charlton Road in Singleton during surface water flooding. Road runs adjacent to the River Lavant.*

*Goodwood Field in flood flows. Image taken facing southeast across the valley.*

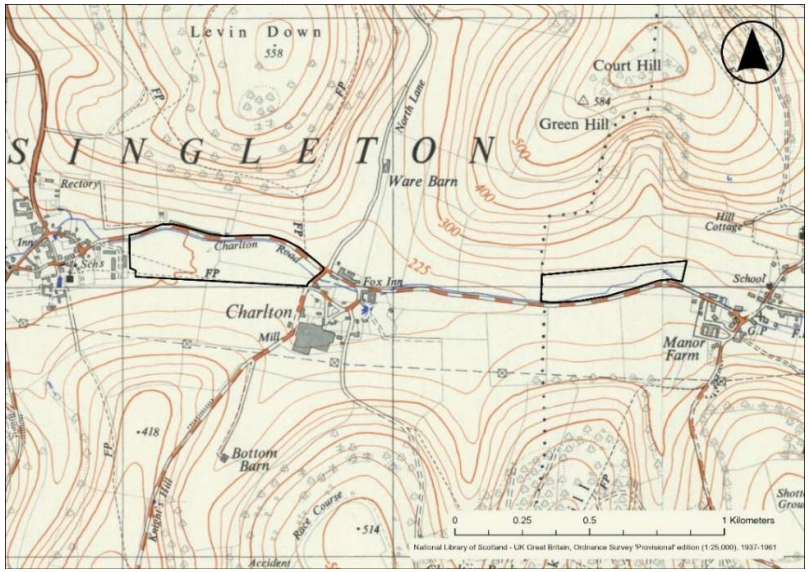
| Surface Water Flooding | Flow pathways calculated using 1 m LIDAR |
|---|---|
| Surface water flooding does occur locally within the catchment. In particular, the road networks, which predominantly lie along the valley bottom, act as conduits for surface water during rainfall events. Due to their impermeable surfaces, these roads reduce interception and infiltration. Charlton Road, in particular, receives notable surface water flows. This may be one of the reasons why the River Lavant runs adjacent to the road network, reflecting its historic role in road drainage. Although this configuration can be beneficial for surface water conveyance, it has a negative impact on water quality due to contaminants from the road entering the watercourse and degrading water quality.<br><br>In the Goodwood Field, the predominant flow pathways highlight the current location of the River Lavant to the north, as well as areas that are seasonally inundated during flood events.<br><br>A similar pattern is evident in Holts Field. The mapped flow pathways indicate where the field becomes seasonally wet, which was also observed during our site walkover. Arable crops appeared to struggle in areas that are likely to remain damp for extended periods. These wetter areas also correspond with the location of the sewer network.<br><br>At both sites, there is significant land area that could potentially be utilised for surface water storage. |  |

## 3.3. Infrastructure, Access, and Heritage

| Utility Assets | |
|---|---|
| Distribution of utilities across Goodwood and Holt Fields (National One Call Data Request, 08/09/2025) | There is a complex network of utilities throughout both reaches. The most significant to the project is the **Southern Water foul gravity sewer**, which runs east to west across both sites, following the valley bottom where the River Lavant would naturally lie. It should be noted that the asset mapping received from Southern Water deviates significantly, by up to 20 metres in some locations, from the position of manholes identified during site walkovers, drone surveys and aerial imagery. Consequently, the sewer network has been plotted based on these field and remote observations. Physical verification **of the sewer's exact location will be essential in later design stages.**<br><br>In Goodwood Field, a **Portsmouth Water distribution main** runs parallel to a significant section of the River Lavant. A similar arrangement exists in Holts Field, although it is understood that in this area the distribution main runs beneath the adjacent road.<br><br>**SSEN overhead power lines** cross the River Lavant within Holts Field. The voltage is currently unknown, as only the SSEN poles were identified in the utility search data.<br><br>Across both sites, multiple utilities run above and below ground along Charlton Road**,** which lies adjacent to the River Lavant. These are not expected to have a significant effect on future river restoration works. |



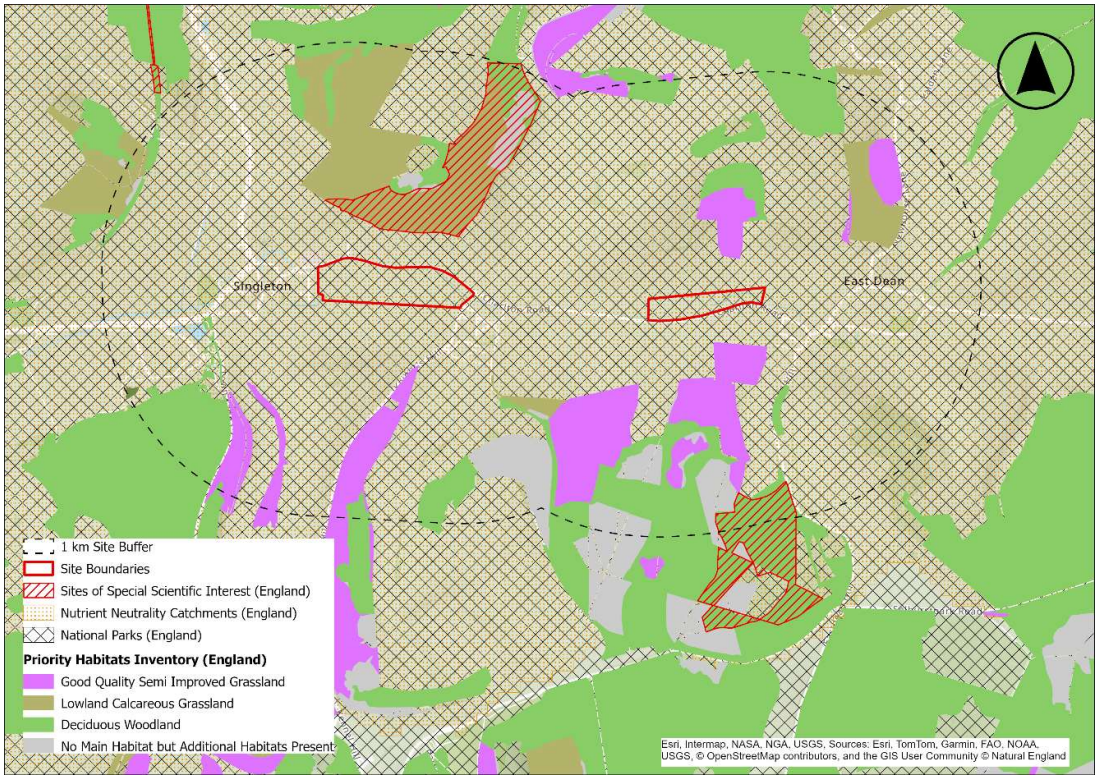
| Access Infrastructure | |
|---|---|
| Public Rights of Way | A singular public footpath runs along the southern edge of the Goodwood Field. It does not cross the river. There are aspirations from the estate to have improved permissive access to the Goodwood Field. No Public footpaths run through the Holts Field. |
| Permissive Paths | No known permissive paths on either site. |
| National Cycle Way | No national cycle ways on either site. |
| Roads, Paths, Tracks | Charlton Road runs along the northern boundary of the Goodwood Field and along the southern edge of the Holts Field. An informal earth track and river crossing run along the eastern boundary of the Holts Field. This access in the Holts Field is desired to be kept for agricultural management. |
| Railway | No railways on the site or in the nearby vicinity |
| Airfield | No airfields on the site or in the nearby vicinity |
| **Heritage** | |
| Conservation Areas | The sites do not lie within a conservation area; however are adjacent to two conservation areas that cover the residential areas of Singleton and Charlton |
| Tree Protection Orders (TPO) | There are no TPOs in either site. |
| National Listings | There are no listings on either site. The Goodwood Estate archaeologists have stated that there is little chance of archaeological findings in either field, based on their records and knowledge of the estate land and the sites[3] |
| **Historic Mapping** | |
| UK Great Britain, Ordnance Survey 'Provisional' edition (1:25,000), 1937-1961 | Historic mapping is available dating back as far as 200 years. From the available maps, the river appears to have maintained the same planform throughout Goodwood Field. Holt's Field shows a similar planform to what exists today; however, more of the River Lavant previously ran centrally through the western field, rather than along the road where it lies at present. This change appears to have occurred around the 1960s.<br><br>Historic mapping was obtained from the National Library of Scotland database. |




[3] Correspondence with Goodwood Estate

## 3.4. Environmental Designations

| Environmental Designations | |
|---|---|
| **Designation** | **Within 1 km** |
| Area of Outstanding Natural Beauty | No |
| Local Nature Reserve | No |
| National Nature Reserve | No |
| National Park | Yes |
| Ramsar Site | No |
| Site of Scientific Special Interest | Yes |
| Special Area of Conservation | No |
| Special Protection Area | No |
| Nutrient Neutrality Catchments | Yes |
| Priority Habitats | Yes |




**Further designation information**

Both fields lie within the South Downs National Park and the Solent Nutrient Neutrality Catchment. The sites are not designated as Sites of Special Scientific Interest (SSSIs); however, there are two SSSIs within a 1 km radius: Levin Down SSSI and East Dean Park Wood SSSI.

Similarly, the sites do not contain any mapped priority habitats, although there are significant areas of priority habitat within a 1 km radius. These include lowland calcareous grassland, deciduous woodland, and good-quality semi-improved grassland.

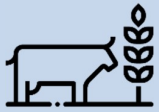
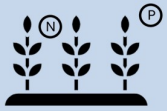
*All data acquired from Natural England's Magic Map https://magic.defra.gov.uk/MagicMap.html*

## 3.5. Constraints and Opportunities

Several constraints and opportunities have been identified through the desk study and site visit that will be considered throughout the assessment of options. They include:

| Opportunities | | Constraints | |
|---|---|---|---|
| | **Improved Morphology** – At present, the River Lavant is uniform and often pushed towards the boundary of its floodplain. Across both sites, there is potential to realign channels to create a more natural, sinuous form and restore geomorphic processes. | | **Topography –** Both fields offer significant space for restoration, but Holts Field lies at the edge of the valley, with the northern area rising towards the hillside. The most workable areas are along the roadside and the existing sewer line. Goodwood Field is generally flatter, following the natural valley gradient and offering greater scope for interventions. |
| | **Slowing the Flow** – The Lavant was historically modified for drainage and conveyance. There is an opportunity to reintroduce features that slow flow and promote natural flood management (NFM), thereby reducing peak flows, improving soil infiltration, and enhancing water quality. | | **Flow Regime** – The Lavant is a winterbourne, flowing seasonally and largely dependent on groundwater. Restoration design must accommodate prolonged dry periods, maintaining ecological connectivity for species adapted to intermittent flow. Groundwater abstraction in the catchment also influences baseflow and must be considered. |
| | **Floodplain Reconnection** – In 1994, embankments and dredging works were carried out by the Goodwood Estate and local villages[4]. There is now an opportunity to reconnect the river with its floodplain, allowing seasonal rewetting to restore natural processes and support diverse floodplain habitats. Currently, floodplain connectivity occurs only during high flows. | | **Water Quality –** The catchment currently fails for phosphates under the WFD and continues to experience ongoing sewage discharge issues. Roadside reaches likely receive runoff containing fine sediment, nutrients, and metals, which can smother gravels and degrade habitats important for winterbourne invertebrates. |
| | **Flood Water Storage -** Both fields have large, low-lying areas that could be used to temporarily store surface water during high-flow events, reducing flood risk downstream. | | **Flood Risk** – The nearby settlements of Singleton, Charlton, and East Dean have experienced flooding from multiple sources (groundwater and surface water). Restoration must be designed to avoid increasing local flood risk and ensure suitable conveyance and storage. |
| | **Climate Resilience** – The River Lavant, as a chalk winterbourne, is sensitive to climate change. There are strong opportunities to improve resilience through nature-based solutions such as tree planting and floodplain reconnection, which enhance water storage and shade. There is also potential for carbon sequestration within floodplain wetlands. | | **Climate Change** – Projected increases in extreme weather events may cause longer dry periods and more intense rainfall. These shifts could alter the flow regime and recharge patterns in the aquifer. Designs must anticipate greater flow variability and more frequent flash flooding. |

[4] Correspondence with Goodwood Estate and local newspaper clippings from 1994

| | |
|---|---|
| **Tree Planting** – Both sites currently lack riparian trees. Planting would help regulate temperature, stabilise soils, and improve biodiversity along the riparian corridor. Trees would also enhance infiltration and provide future sources of large woody material. | **Southern Water Foul Sewer** – A gravity-fed foul sewer runs along the valley bottom across both sites, occupying the natural channel alignment. Restoration must ensure protection and access for this asset through coordination with Southern Water. |
| **Community Value & Public Access** – The Goodwood Estate has expressed interest in improving public access and creating permissive footpaths to showcase the restored River Lavant (in the Goodwood Field) and promote public engagement. | **Public Access** – A public footpath currently runs along the southern boundary of Goodwood Field. This must be maintained and protected during and after restoration works. |
| **Stakeholder Consultation** – The Western Sussex Rivers Trust is advancing the project in partnership with the Goodwood Estate, who share an ambition to restore natural processes and deliver multiple benefits. This strong relationship supports effective design development. | **Agricultural Access** – Holts Field includes a farm access track and an informal ford crossing on the eastern boundary. These are essential for agricultural use and must be retained or suitably redesigned within the restoration. |
| **Biodiversity Net Gain -** Restoration of the River Lavant presents a strong opportunity to deliver Biodiversity Net Gain. Realigning the channel, rewetting floodplain areas, and introducing riparian woodland and wet grassland can substantially increase habitat diversity and ecological function. BNG metrics can be used to quantify gains and support potential offsetting or investment opportunities for the Goodwood Estate across both terrestrial and aquatic environments. The sale of off-site BNG units could provide a funding route for both sites. |  **Agricultural Land Use** – Goodwood Field is currently used for livestock grazing (cattle) and is topped during the summer. A single drinking trough is already present in the field; however, livestock currently have unrestricted access to the river. Holts Field is divided into two uses: the eastern half is used for livestock grazing, while the western half is managed as arable land. Both fields are within Countryside Stewardship (Mid-Tier) agreements. Any changes to channel alignment or floodplain reconnection could affect arable productivity and will require agreement with the landowner regarding future land management arrangements. |
|   **Nutrient Neutrality -** The River Lavant catchment currently fails to meet phosphorus targets, creating an opportunity to contribute to nutrient neutrality objectives through targeted natural interventions. Measures such as reconnecting floodplains and planting riparian buffers can enhance nutrient uptake and retention, thereby reducing downstream loading. Integration of these features could help offset nutrient discharges associated with nearby development or wastewater inputs, aligning with South Downs and Chichester Harbour mitigation frameworks. | **Geology –** Due to the permeable chalk geology, sustaining surface water or permanent wetlands may be challenging, and restoration must align with the catchment's natural seasonal hydrology. |

# 4. Options Appraisal

## 4.1. Project Objectives

The project objectives have been set out and determined by the landowner, Goodwood Estate.

| | |
|---|---|
| **Restoring Natural Processes** | Re-establishing natural flow patterns, river channel dynamics, sediment depositories, creating shade, and building natural harbours such as leaving woody debris in channel. |
| **Improving Water Quality** | Reduce pollution, improve oxygen levels, and enhance the overall health of the river ecosystem. |
| **Restoring and Enhancing Biodiversity** | Creating suitable habitats and improving water quality - support recovery of native plants/animals. |
| **Functional Floodplain Creation** | Improve water storage, reduce downstream flooding, and create valuable wetland habitats. |
| **Reduce Flood Risk** | Slow water flow and increase water storage. |
| **Improved Water Supply** | Improving resilient and reliable water supply for the surrounding area, enhancing and strengthening the aquifer. |
| **Community Improvements** | The landscape enhancement will provide an area for education, engagement, and environmental awareness. |

## 4.2. Assessment Approach

Proposed options will be ranked using a 0–3 weighting system:

- **0** – Insignificant impact/gain
- **1** – Minor impact/gain
- **2** – Moderate impact/gain
- **3** – Major impact/gain

Cost estimates will be assessed using a banded approach based on experience from similar-sized projects. These estimates cover only the construction phase of the project and exclude pre-construction activities and consenting. Contractors have not verified the costs and should therefore be treated as indicative only. Cost bands are as follows:

- **Low:** £50k – £100k
- **Medium:** £100k – £200k
- **High:** Greater than £200k

## 4.3. Goodwood Field Opportunity Description

### *4.3.1. Do nothing*

This option maintains the status quo and provides a benchmark against the other suggested options. The do-nothing approach would have no environmental benefits and offer no additional ecosystem services to the site.

### *4.3.2. In-channel enhancement*

This option would focus on improving the river within its existing course, without moving the channel. The aim would be to enhance the condition and function of the River Lavant while keeping the current alignment.

A key element would be raising the riverbed using imported gravel. The channel is currently too deep, meaning it rarely connects with its floodplain. By lifting the bed level, flows would be spread more evenly, improving natural processes and encouraging floodplain connection.

However, this would need to be carefully designed to ensure it does not increase flood risk to Charlton Road or Singleton village, as the river currently sits close to the edge of the floodplain.

In the upstream section, where the river runs further from the road, woody material (such as tree trunks and limbs) could be added within the channel to create flow diversity and encourage localised overbank flow. These features would also provide valuable habitat for aquatic life and contribute to a more natural appearance.

As with all options, tree planting is strongly recommended to:

- Improve climate resilience and provide shade,
- Strengthen soil structure and stability,
- Offer future sources of woody material, and
- Increase biodiversity value along the river corridor.

To protect infrastructure, trees should be planted at least 10 metres away from the Portsmouth Water mains, as roots could damage the pipeline.

| Benefits |
| --- |
| • **Improved habitat diversity:** Gravel and woody material would create varied flow conditions, benefiting invertebrates and aquatic plants.<br>• **Enhanced natural processes:** Bed raising would promote floodplain connection, supporting river health.<br>• **Lower implementation risk:** Working within the existing river corridor reduces the need for major earthworks or land changes.<br>• **Climate and habitat resilience:** Tree planting improves shading, water quality, and long-term ecosystem stability. |
| **Constraints & Disadvantages** |
| • **Limited floodplain reconnection:** As the river remains in its current position, opportunities for full floodplain restoration are restricted.<br>• **Flood risk sensitivity:** Bed raising must be designed carefully to avoid increasing flood risk to nearby roads and properties. Hydraulic modelling would be recommended.<br>• **Maintenance needs:** Woody features may require occasional inspection and management to ensure they remain stable and effective, especially due to the river's location next to the road.<br>• **Tree planting constraints:** Set-back distances from water mains must be respected, limiting where trees can be planted. |

### *4.3.3. Channel realignment*

At present, the River Lavant runs along the edge of its floodplain and partly acts as road drainage for this stretch. Although the Goodwood Field area has a large floodplain that becomes inundated during high flows, the river currently has a poor connection to its floodplain due to its depth and position.

This option would realign the River Lavant to the south of its current course, following a more natural, meandering route (there are several possible options). The new channel would be shallower and narrower, allowing water to spill naturally into the floodplain more often and helping keep the area wetter for longer throughout the year.

Adding woody material (such as logs and branches) to the channel and floodplain would help create more varied flow patterns during high water and provide important habitat for invertebrates year-round.

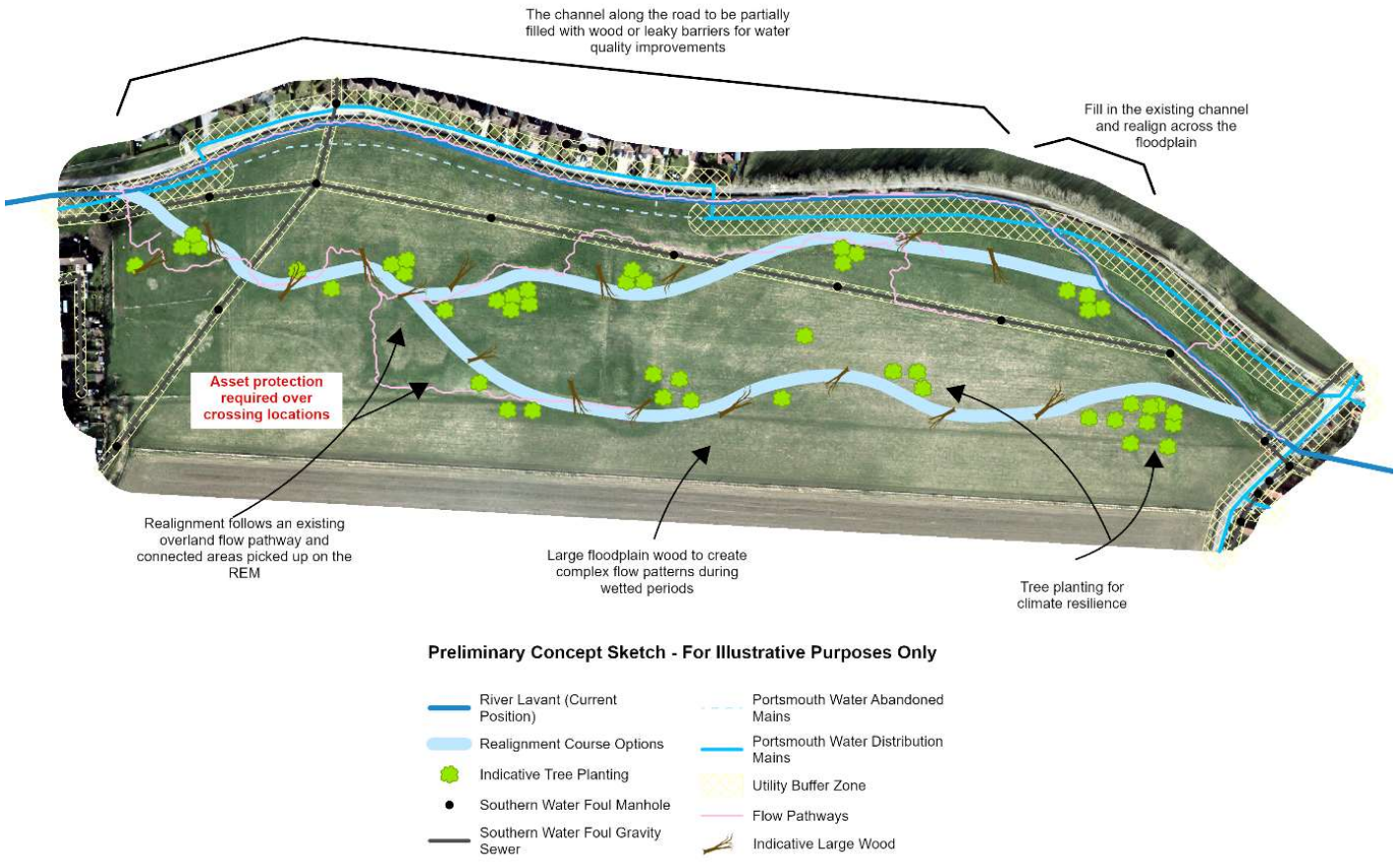
Tree planting is also recommended across all options to:

- Improve climate resilience and provide shade to keep the river cool;
- Strengthen soils and reduce erosion;
- Create future sources of woody material; and
- Boost biodiversity along the river corridor.

Trees should be planted at least ten metres from the Portsmouth Water mains to avoid potential damage from roots.

The existing roadside channel would remain in place to continue functioning as road drainage, but could be partially filled with wood or leaky woody dams. These would help filter runoff, improve water quality, and maintain the channel's drainage role.

Preliminary concept sketch depicting two potential re-alignment routes for the River Lavant.




| Benefits | Constraints & Disadvantages |
|---|---|
| • **Floodplain reconnection:** The river would be able to spill onto its floodplain more naturally, reducing erosion and improving lateral function.<br>• **Improved habitats:** A meandering channel, woody material, and tree planting would support a wider range of plants, insects, and wildlife. | • **Existing utilities:** The proposed realignment would need to cross the Southern Water foul sewer in at least two places. Early discussions with Southern Water will be essential to agree on protection measures. The sewer sits around 1.35–1.75 m below ground level, and at least 300 mm clearance will be required above the pipe. |

| | |
|---|---|
| • **More natural river processes:** The river could move and change shape naturally over time, restoring balance between erosion and sediment deposition.<br>• **Climate and water resilience:** Shadier and wetter habitats would help the river cope better with droughts and temperature extremes.<br>• **Landscape and amenity value:** A more natural-looking river corridor would improve the local landscape and offer opportunities for community engagement.<br>• **Water quality improvements:** Retaining the existing roadside channel with leaky wood structures helps trap sediment and filter surface water. | • **Construction challenges:** Working close to buried services and within a floodplain could increase costs and require careful management during works.<br>• **Temporary disturbance:** Construction activity may temporarily affect local habitats and access in the area.<br>• **Stakeholder input:** Landowner and utility coordination will be essential to finalise the design and agree on long-term maintenance responsibilities. |

### *4.3.4. Pseudo stage zero*

This option combines elements of the channel realignment and stage zero approaches to create a more natural, process-led restoration while maintaining control around sensitive assets and infrastructure.

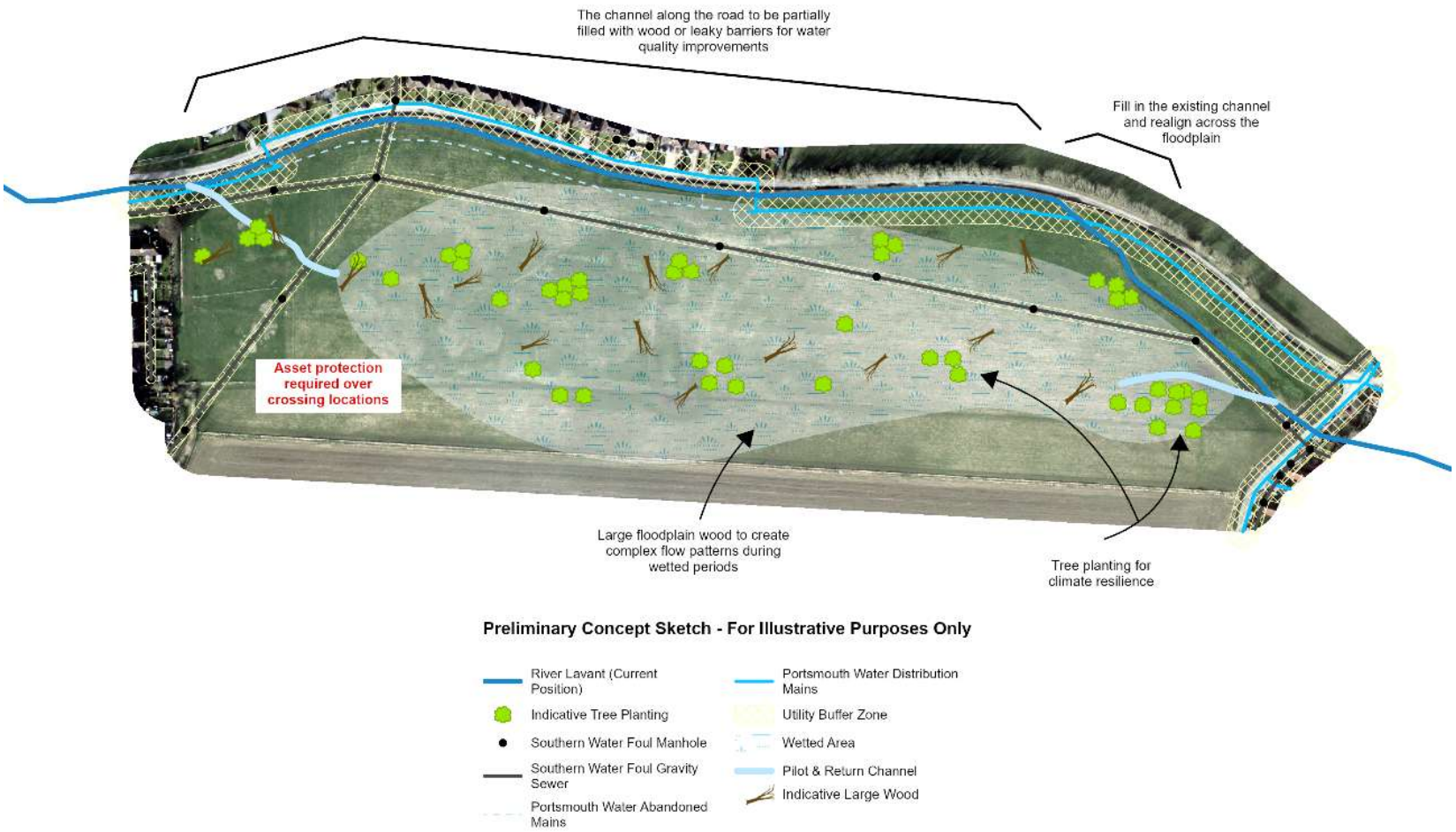
The proposal would realign the River Lavant to the south of its current position, placing it more centrally within the Goodwood Field floodplain. This realignment would occur at both the upstream and downstream ends of the reach, allowing the river to follow a shallower, narrower course that improves floodplain connection and supports a more natural flow regime.

Realignment would also cross the Southern Water foul gravity sewers, which could act as defined control points for asset protection. The works would need to ensure suitable clearance and stability over the buried services, developed in consultation with Southern Water. Between these realigned sections, a controlled “stage zero-inspired” area could be created, where the river would be encouraged to reform multiple shallow flow paths across the floodplain. This would allow natural processes to shape the landscape, but within a defined area that reduces the flood risk and uncertainty associated with a full stage zero implementation.

In this central “pseudo stage zero” area, large woody material would be added throughout the floodplain, and riparian tree planting would be established to create a complex, textured surface. This would encourage water to slow down and spread out, reducing erosion, promoting sediment deposition, and creating a range of wetland and channel habitats.

In the realigned sections, in-channel woody material would be placed strategically to slow flow velocities and enhance habitat diversity. The existing roadside channel would remain in place to continue functioning as road drainage, but could be partially filled with wood or “leaky” woody dams. These would help filter runoff, improve water quality, and maintain the channel’s drainage role.

Preliminary concept sketch depicting a pseudo stage zero options




| Benefits | Constraints & Disadvantages |
|---|---|
| • **Balanced restoration approach**: Combines the natural process benefits of stage zero with the practical control of channel realignment, offering a good compromise between ambition and feasibility. | • **Design complexity:** Combining different restoration approaches will require careful hydraulic and geomorphic design to ensure stability and effective flow pathways. |

| | |
|---|---|
| • **Improved floodplain connectivity:** Shallow, meandering channels and floodplain wood promote natural overbank flow and wetland habitat creation.<br>• **Enhanced biodiversity:** A mix of in-channel and floodplain habitats supports a wide range of aquatic and terrestrial species.<br>• **Asset protection:** Controlled alignment over existing sewers allows restoration without compromising buried infrastructure.<br>• **Water quality improvements:** Retaining the existing roadside channel with leaky wood structures helps trap sediment and filter surface water.<br>• **Increased resilience:** The system would better manage both floods and droughts through more distributed flow and improved water retention. | • **Construction challenges:** Working over and around the Southern Water foul sewers will require close collaboration and potentially protective measures to safeguard assets.<br>• **Land use implications**: Converting the area into a seasonally wet, multi-channel system may affect existing land uses, such as grazing or access for asset maintenance.<br>• **Maintenance requirements:** While mostly self-sustaining, the use of woody material and leaky dams may require occasional checks and adjustments after high-flow events.<br>• **Moderate feasibility constraints:** Although more practical than a full Stage Zero, this approach still carries some risk of increased localised flooding or sediment build-up if not carefully managed. |

### *4.3.5. Stage zero*

This option would involve infilling the existing river channel and allowing the River Lavant to re-establish a natural course across its floodplain. Traditional river restoration often focuses on re-meandering straightened channels, assuming the river should form a single, sinuous path. In contrast, a stage zero approach seeks to restore full floodplain connectivity and the river's natural hydrological and geomorphic processes. Instead of forcing the river into a defined course, the landscape is reset to allow multiple shallow flow pathways to form naturally.

Under this approach, the existing incised channel would be filled in. Large woody material would be distributed across the floodplain, and extensive riparian tree planting would be introduced. These elements would create a complex surface that encourages water to spread out and flow more slowly across the floodplain, reducing erosion and promoting natural sediment deposition. Over time, this would lead to the creation of a dynamic, multi-channel network with high habitat diversity and enhanced resilience to flooding and drought.

While a stage zero approach represents the most ambitious and ecologically beneficial form of restoration, it is not considered feasible for this reach of the River Lavant due to existing incision upstream and potential flood risk to Charlton. By infilling the channel, this would act as an impounding structure, backing up water through Charlton due to the channel's overdeep nature. For stage zero to work, bed raising upstream of the project area would be required, which would be inappropriate through the village of Charleton. Additionally, there would be no control over the new river planform, which may negatively impact the site's utility assets and pose a significant risk. However, the underlying principles, such as improving floodplain connectivity and using woody material to slow flows, should inform more moderate restoration options.

| Benefits |
|---|
| • **Restored natural processes:** The river would once again shape its own course, improving long-term hydrological and geomorphic balance.<br>• **Habitat creation:** A mosaic of wetland, shallow channels, and vegetated areas would provide diverse habitats for invertebrates, amphibians, and birds.<br>• **Flood energy reduction:** Water would spread across a wider area, dissipating erosive forces and reducing downstream flood peaks.<br>• **Improved water quality:** Increased residence time and filtration through vegetation would help trap fine sediment and nutrients.<br>• **High climate resilience:** A re-wetted, connected floodplain would store more water in wet periods and release it slowly in dry conditions. |

- **Long-term sustainability:** Once established, the system would require minimal maintenance, as it would function largely through natural processes.

**Constraints & Disadvantages**

- **Invertebrate habitat loss:** Infilling the channel would remove the unique winterbourne habitat that several specialised invertebrate species use.
- **Upstream constraints:** The river channel upstream, particularly through Charlton village and extending into Holts Field, is deeply incised. Implementing a Stage Zero approach here would cause water to back up, increasing flood risk to properties and infrastructure, making this option impractical for this site.
- **Construction challenges:** Working over and around the Southern Water foul sewers will require close collaboration and potentially protective measures to safeguard assets.
- **Need for geomorphic control:** The restored area would need to tie back into the existing River Lavant both upstream and downstream. The downstream end could potentially reconnect through a restored channel and gently lowered floodplain area, but the upstream connection would require significant geomorphic control to prevent impoundment and flooding.
- **Earthworks:** Filling in the existing channel and re-grading the floodplain would involve excavation, material movement, and cost.
- **Land use implications**: Converting the area into a seasonally wet, multi-channel system may affect existing land uses, such as grazing or access.
- **Asset protection:** Stage Zero wouldn't allow for the determination of the river location and may pose erosion or damage risk to utility assets on site.
- **Feasibility limitations:** Given the current topography and channel incision, Stage Zero is unlikely to be appropriate or achievable at this location without unacceptable increases in flood risk.

## 4.4. Goodwood Field Options Assessment

| Option | Description | Objectives | | | | | | | Estimated Cost | Score |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Restoring Natural Process | Improving Water Quality | Restoring & Enhancing Biodiversity | Functional Floodplain Creation | Reduce Flood Risk | Improved Water Supply | Community Improvements | | |
| Do nothing | No works undertaken | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Cost | 0 |
| In-channel enhancements | Bed raising and in-channel woody feature installation. River to maintain the existing planform. | 1 | 0 | 1 | 2 | 0 | 0 | 0 | Low/medium | 4 |
| Channel realignment | Realignment of the river planform south into the centre of the floodplain. Existing channel to be utilised for road runoff drainage. | 2 | 2 | 2 | 2 | 3 | 0 | 2 | Medium | 13 |
| Pseudo stage zero | Partial realignment of the existing channel south towards the centre of the floodplain at either end of the reach. A stage zero approach is to be taken in the centre of the reach. Existing channel to be utilised for road runoff drainage. | 2 | 2 | 3 | 3 | 3 | 0 | 2 | Medium | 15 |
| Stage zero | Full stage zero of the site. Filling in the entire existing channel. | 3 | 2 | 2 | 3 | 3 | 0 | 2 | Medium | 15 |

## 4.5. Holt's Field Opportunities

### *4.5.1. Do nothing*

This option maintains the status quo and provides a benchmark against the other suggested options. The do-nothing approach would have no environmental benefits and offer no additional ecosystem services to the site.

### *4.5.2. In-channel enhancement*

This option would focus on improving the river within its existing course, without moving the channel. The aim would be to enhance the condition and function of the River Lavant while keeping the current alignment.

A key element would be raising the riverbed using imported gravel. The channel is currently too deep, where it lies along the road, so it rarely connects to its floodplain. By lifting the bed level, flows would be spread more evenly, improving natural processes and encouraging occasional floodplain connection.

However, this would need to be carefully designed to ensure it does not increase flood risk to Charlton Road, as the river currently sits close to the road's edge.

In the upstream section, where the river runs further from the road, woody material (such as tree trunks and branches) could be added within the channel to create flow diversity and encourage localised overbank flow. These features would also provide valuable habitat for aquatic life and contribute to a more natural appearance.

As with all options, tree planting is strongly recommended to:

- Improve climate resilience and provide shade,
- Strengthen soil structure and stability,
- Offer future sources of woody material, and
- Increase biodiversity value along the river corridor.

To protect infrastructure, trees should be planted at least ten metres away from the Portsmouth Water mains, as roots could damage the pipeline.

| Benefits |
| --- |
| • **Improved habitat diversity:** Gravel and woody material would create varied flow conditions, benefiting invertebrates and aquatic plants.<br>• **Enhanced natural processes:** Bed raising would promote floodplain connection, supporting river health.<br>• **Lower implementation risk:** Working within the existing river corridor reduces the need for major earthworks or land changes.<br>• **Climate and habitat resilience:** Tree planting improves shading, water quality, and long-term ecosystem stability. |
| **Constraints & Disadvantages** |
| • **Limited floodplain reconnection:** As the river remains in its current position, opportunities for complete floodplain restoration are restricted.<br>• **Flood risk sensitivity:** Bed raising must be designed carefully to avoid increasing flood risk to nearby roads and properties.<br>• **Maintenance needs:** Woody features may require occasional inspection and management to ensure they remain stable and effective, especially due to the river's location next to the road.<br>• **Tree planting constraints:** Set-back distances from water mains must be respected, limiting where trees can be planted. |

### *4.5.3. Channel realignment*

At present, the River Lavant shows two distinct channel forms within the Holts Field area.

At the downstream end, the river runs alongside the road and, in places, acts as road drainage. This section is significantly over-deepened, which means it is largely disconnected from its floodplain and unable to spill naturally onto the surrounding land during higher flows. Further upstream, the channel is pushed to the northern edge of the floodplain, taking several sharp, right-angled bends that indicate past modification. Despite this, the floodplain connection is better in this upper reach.

This option proposes realigning the river through the centre of the floodplain, away from the road, following a more natural, passively meandering course. The aim is to restore a stronger connection between the river and its floodplain, allowing water to spread out during higher flows and helping to keep the area wetter for longer throughout the year. This would also enhance groundwater recharge and wetland function.

However, realignment in the downstream section would affect the current arable land use, as parts of the field would become wetter and less suitable for regular cultivation.

The introduction of woody material both within the channel and across the floodplain would create more varied flow patterns during high water. These features would help slow flows, encourage sediment deposition, and provide year-round habitat for invertebrates and other wildlife.

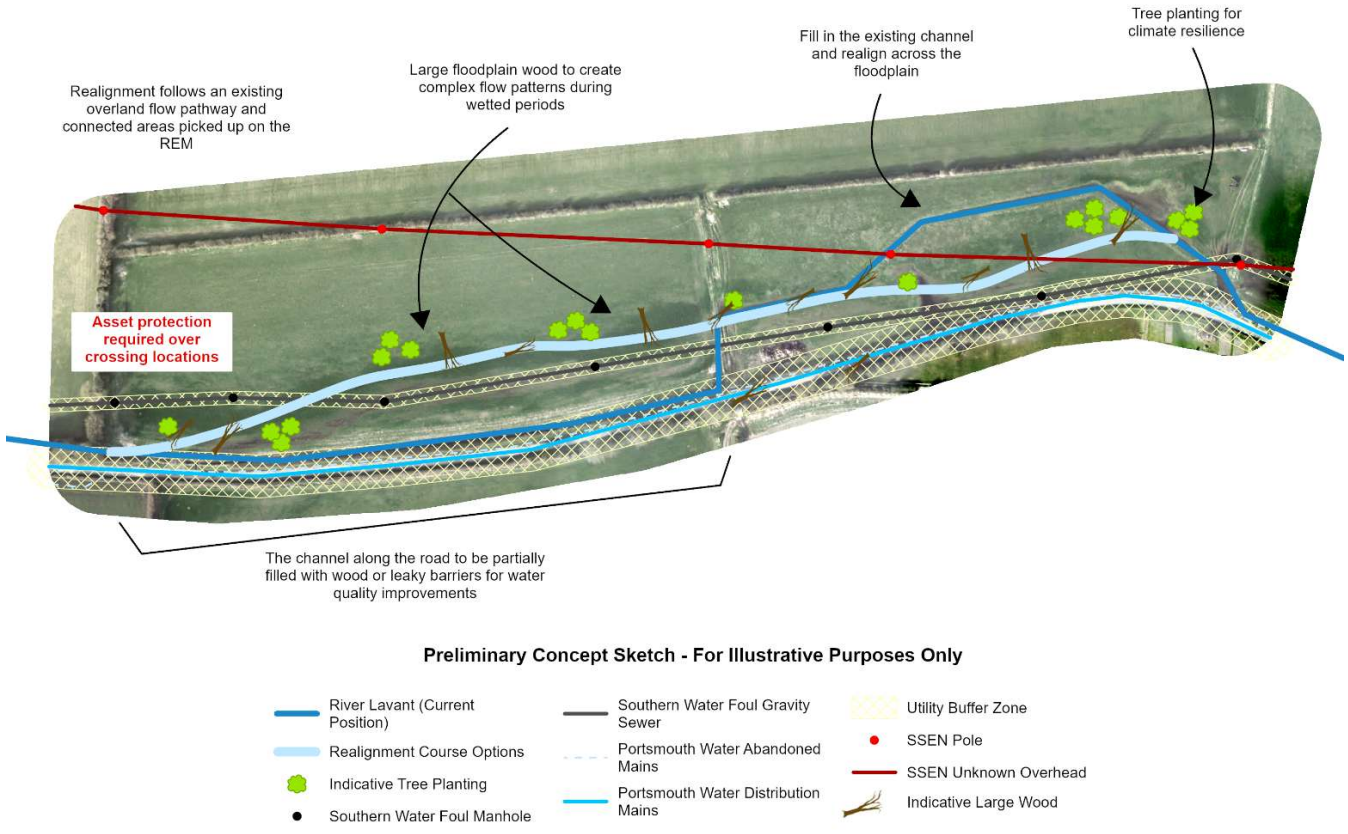
As with all options, tree planting is recommended to:

- Improve climate resilience and provide cooling shade;
- Strengthen soil structure and reduce erosion;
- Create future sources of woody material; and
- Increase biodiversity value along the river corridor.

To protect infrastructure, trees should be planted at least ten metres away from the Portsmouth Water mains to avoid potential damage from roots.

The existing roadside channel would remain in place to continue serving its drainage function, but it could be partially filled with woody material or leaky dams. These would help filter runoff, improve water quality, and reduce maintenance needs, while still ensuring effective drainage.

Preliminary concept sketch depicting a realigned channel



| Benefits | Constraints & Disadvantages |
|---|---|
| • **Improved floodplain connection:** A central, passively meandering channel would enable more frequent overbank flows, enhancing wetland function and groundwater recharge.<br>• **Enhanced habitat diversity:** In-channel and floodplain wood features would create a mosaic of habitats for aquatic and terrestrial species.<br>• **Climate resilience:** A wetter, shaded floodplain would help buffer against drought and high-temperature impacts.<br>• **Water quality benefits:** Retaining and adapting the roadside channel would filter road runoff and reduce sediment and nutrient input to the main river. | • **Loss of arable land:** Realignment through the centre of the field would reduce the area available for cultivation and may require land-use change or compensation.<br>• **Flood risk management:** Careful design is needed to ensure the wetter floodplain does not increase local flood risk to infrastructure or neighbouring land.<br>• **Ongoing maintenance:** Woody features and leaky dams may require periodic inspection, especially following major flood events.<br>• **Construction challenges:** Working over and around the Southern Water foul sewers will require close collaboration and potentially protective measures to safeguard assets. Setback planting distances must be maintained to protect the Portsmouth Water mains and SSEN power lines. |

### *4.5.4. Stage zero*

This option would involve infilling the existing river channel and allowing the River Lavant to re-establish a natural course across its floodplain.

Traditional river restoration often focuses on re-meandering straightened channels, assuming the river should form a single, sinuous path. In contrast, a stage zero approach seeks to restore full floodplain connectivity and the river's natural hydrological and geomorphic processes. Instead of forcing the river into a defined course, the landscape is reset to allow multiple shallow flow pathways to form naturally.

Under this approach, the existing channel would be filled in. Large woody material would be distributed across the floodplain, and riparian tree planting would be introduced. These elements would create a complex surface that encourages water to spread out and flow more slowly across the floodplain, reducing erosion and promoting natural sediment deposition. Over time, this would lead to the creation of a dynamic, rewetted floodplain with high habitat diversity and enhanced resilience to flooding and drought.

To create a stage zero project at this site, hydraulic modelling would be required due to flooding in the village of East Dean. Stage zero should increase floodplain water storage; however, this will impact land use in Holt's Field. The access track across the field at points may become compromised and be boggier than the existing trackway. Additional tree planting would have to be selective due to overhead cables and underground sewer and water mains. A geomorphic control feature would be needed at the downstream end of the site. This feature would allow the Stage Zero reach to transition back into the modified, over-deepened channel of the River Lavant, which runs alongside the road. Due to the unpredictable nature of stage zero and several utility assets on site, this project may pose too much risk to surrounding asset protection, despite the low erosional forces of the Winterbourne.

While a stage zero restoration would deliver substantial ecological and hydrological benefits, including enhanced biodiversity and natural flood management, it carries significant feasibility and infrastructure risks at this site. The presence of existing utilities, flood risk concerns in East Dean, and the potential loss of land function make this option challenging to deliver safely.

| Benefits |
| --- |
| • **Full floodplain reconnection:** The river would be free to move naturally across its floodplain, restoring wetland function and improving groundwater recharge.<br>• **High ecological value:** A re-wetted system would support a wide range of plants, invertebrates, amphibians, birds, and other wildlife.<br>• **Natural flow moderation:** By spreading flow energy across the floodplain, erosive forces are reduced and downstream flood peaks are likely to decrease.<br>• **Water quality improvements:** Slower flows and increased contact with vegetation would help trap sediments and nutrients.<br>• **Climate resilience:** The rewetted floodplain would store water in wetter months and release it slowly in drier periods, improving drought resistance. |
| **Constraints & Disadvantages** |
| • **Flood risk and modelling requirements:** The village of East Dean already experiences flooding, so detailed hydraulic modelling would be required to assess potential impacts. While Stage Zero typically increases floodplain storage, it could also raise local water levels in certain areas.<br>• **Land use change:** Implementing Stage Zero would significantly alter existing land use, which could become wetter and less suitable for arable agriculture or vehicle access.<br>• **Access impacts:** The trackway across the field may become boggier and less reliable due to increased soil saturation.<br>• **Utility constraints:** Overhead power cables, underground sewers, and water mains limit where trees and woody material can be placed. Careful planning would be needed to avoid damaging or undermining these assets. This may also impact access to the site for maintenance/inspection of assets.<br>• **Geomorphic control requirements**: At the downstream extent, a control structure would be required to reconnect the restored area with the existing modified, over-deepened channel of the River Lavant alongside the road.<br>• **Asset protection risks:** Despite the Lavant being a winterbourne (with low erosive power for much of the year), the uncontrolled nature of Stage Zero may still present too high a risk to surrounding infrastructure and buried assets at this location. |

## 4.6. Holt's Field Options Assessment

| Option | Description | Objectives | | | | | | | Estimated Cost | Score |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Restoring Natural Process | Improving Water Quality | Restoring & Enhancing Biodiversity | Functional Floodplain Creation | Reduce Flood Risk | Improved Water Supply | Community Improvements | | |
| Do nothing | No works undertaken | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Cost | 0 |
| In-channel enhancements | Bed raising and in-channel woody feature installation. River to maintain the existing plan form. | 1 | 1 | 1 | 1 | 2 | 0 | 0 | Low/Medium | 6 |
| Channel realignment | Realignment of the river planform into the centre of the floodplain. Existing channel to be utilised for road runoff drainage. | 2 | 1 | 2 | 2 | 1 | 0 | 0 | Medium | 8 |
| Stage zero | Full stage zero of the site. Filling in the entire existing channel. | 3 | 1 | 3 | 3 | 2 | 0 | 0 | Medium | 12 |

# 5. Options Summary

All options are high-level summaries of potential restoration opportunities for the sites, intended to illustrate overall feasibility. Each option could be complemented by additional river restoration features, such as riparian tree planting and floodplain scrapes, as the design process progresses. These supplementary features have not been specified at this stage of the scheme.

## 5.1. Goodwood Field

The **Do Nothing** option provides a baseline but would not address the current ecological and hydromorphological issues affecting the reach. It would fail to deliver any improvement to habitat diversity, floodplain connectivity, or climate resilience. The river would remain in poor condition.

The **In-Channel Enhancement** option represents a low-risk, easily deliverable approach that improves local habitat quality and encourages limited floodplain interaction through bed raising and the installation of woody material. However, because the river would remain in its current constrained position, this option would yield only modest gains in ecological function. It would not address the underlying disconnection between the channel and its floodplain. Hydraulic modelling would be required to model the effects of bed raising on local flooding. This option could disproportionately affect local flooding due to the River's proximity to Charlton Road.

The **Channel Realignment** option offers more substantial benefits, creating a new, naturally meandering course that reconnects the river to its floodplain, enhances water quality, and supports a more resilient ecosystem. Although feasible within the site, this approach would require careful coordination with Southern Water to protect the existing foul sewer and Portsmouth Water to protect the water mains, which may increase construction complexity and cost.

The **Pseudo Stage Zero** approach presents a strong balance between ambition and practicality. It allows for a process-based, reconnected floodplain system while maintaining control over infrastructure and managing flood risk. By encouraging multiple shallow flow paths and integrating woody material across both the channel and the floodplain, this option would deliver significant biodiversity, hydrological, and water-quality benefits, contributing directly to biodiversity and water-quality objectives.

The **Full Stage Zero** option, while representing the highest potential ecological value, is not considered feasible for this reach due to the current degree of upstream incision, flood risk implications for Charlton, and the presence of critical utility infrastructure. Its implementation would require significant modification of upstream reaches, making it unsuitable for the present site conditions.

## 5.2. Holts Field

The **Do Nothing** option serves as a baseline but would not address the current morphological and ecological degradation of the reach. It would not contribute to floodplain reconnection, biodiversity enhancement, or improved ecosystem services.

The **In-Channel Enhancement** option provides a low-intervention, low-risk opportunity to improve habitat quality within the existing channel alignment. By raising the bed and introducing woody material, this approach would improve flow diversity and limited floodplain connection while avoiding major earthworks. However, it would not resolve the fundamental disconnection between the river and its floodplain, and the long-term ecological gains would therefore be moderate. Hydraulic modelling would be required to model the effects of bed raising on local flooding. This option could disproportionately affect local flooding due to the River's existing proximity to Charlton Road.

The **Channel Realignment** option presents a stronger, process-based solution that restores the Lavant to a more natural, central alignment within the floodplain. This would enhance hydrological function, improve floodplain connectivity, and increase biodiversity by creating varied habitats and woody features. However, this approach requires the loss or modification of a portion of arable land and careful management of buried utilities, increasing design and construction complexity.

The **Stage Zero** option represents the most ecologically ambitious alternative, offering full floodplain reconnection and the creation of a dynamic, self-sustaining wetland system. While the long-term habitat and hydrological benefits would be significant, the feasibility of this approach at Holt's Field is limited by several key constraints. These include overhead and buried utilities, as well as potential impacts on existing land use and access. These aspects would need to be explored during the project's concept design phase.

# 6. Implementation Pathway and Key Considerations

## 6.1. Considerations

Optioneering provides an evaluative framework for determining the most appropriate route forward in the design process of a river restoration scheme. As a result of this process, several key considerations have been identified that will be pivotal to the progression of the project.

### *6.1.1. Service Assets*

Both land parcels contain significant infrastructure assets owned by Southern Water, Portsmouth Water, and SSEN. In particular, the water utility assets will play a critical role in shaping the scheme and will require close liaison with the asset owners. It is recommended that early engagement be undertaken to establish the necessary level of asset protection and the extent of manageable risk permitted. This factor is likely to be a defining constraint on the scheme and may significantly limit the scope of river restoration achievable within both land parcels.

### *6.1.2. Hydraulic Modelling*

It is recommended that any option taken forward, other than the 'do nothing' approach, be hydraulically modelled, given the known flood risk issues within the catchment. The majority of proposed options seek to reconnect the floodplain and dissipate energy across it; however, maintaining positive relationships with local residents and landowners will require clear evidence of flood risk benefits. Hydraulic modelling outputs will also form a critical component of the Flood Risk Activity Permit (FRAP) application needed from the Environment Agency before construction.

### *6.1.3. Road Drainage*

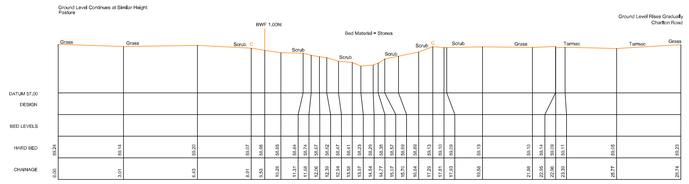
It would be recommended that for several of the options liaison with the local authority be undertaken due to potential changes to road drainage as a consequence of restoration efforts and the potential for maintenance responsibilities associated with wood and leaky dam installation.

## 6.2. Route Mapping

The next phase of the project will involve progressing to concept design. This stage will require the collection of additional site data and the development of a concept design for each land parcel. The table below provides a high-level summary of the typical phases and activities associated with river restoration and habitat enhancement schemes, although not all activities are required for each project.

| Phase | Project Planning & Setting | Concept Design | Detailed Design | Construction | Maintenance |
|---|---|---|---|---|---|
| Stage description | A defined set of aims and objectives agreed with the client, setting out the vision and success criteria for the scheme. | The initial phase of the design process, developing concept ideas based on the project brief, baseline evidence, and site investigations. | The final stage of the design process, translating the preferred concept into a construction-ready plan and securing all relevant permissions and consents. | The physical delivery of the works on site, including site preparation, earthworks, installation of restoration features, and associated activities. | The post-construction phase for maintaining, monitoring, and, where necessary, adapting the restored river and floodplain. |
| Potential Activities / Requirements | • Define client requirements and success criteria<br>• Identify funding sources and delivery partners<br>• Baseline data review and gap analysis<br>• Feasibility / optioneering study<br>• Initial stakeholder mapping and engagement plan | • Topographic and bathymetric surveys<br>• Hydraulic modelling<br>• Ground investigations<br>• Contaminated land and heritage surveys<br>• Ecological baseline surveys (PEA, fish, invertebrates, River Condition Assessment, UK Hab Assessment)<br>• Development of conceptual designs<br>• Outline cost estimates and delivery strategy<br>• Health and safety/CDM risk assessment<br>• Stakeholder workshops and feedback | • Detailed Designs<br>• Construction method statements and phasing plans<br>• Bill of quantities<br>• Flood Risk Activity Permit (FRAP)<br>• Ordinary Watercourse Consent<br>• Planning permission (if required)<br>• Statutory Biodiversity Metric for BNG (if required)<br>• Habitat management and monitoring plan (if required for BNG)<br>• Water abstraction/transfer and impoundment licences (if required)<br>• Environmental Impact Assessment (if required)<br>• Stakeholder engagement and landowner agreements | • Pre-construction surveys (ecological, utilities, archaeology)<br>• Construction Environmental Management Plan (CEMP)<br>• Site mobilisation and environmental inductions<br>• Implementation of works (earthworks, habitat creation, planting, structures)<br>• Environmental Clerk of Works (ECoW) oversight<br>• Health and safety management<br>• Progress reporting and quality assurance | • Maintenance and inspection plan implementation<br>• Post-construction ecological and geomorphological monitoring<br>• Adaptive management interventions (as required) |

# Appendix – Topographic Survey

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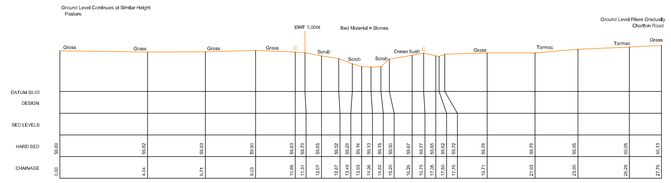


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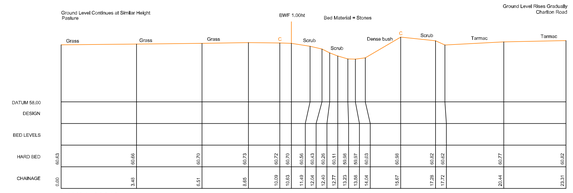


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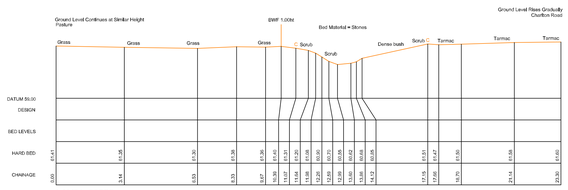


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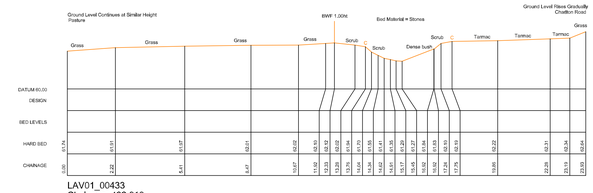


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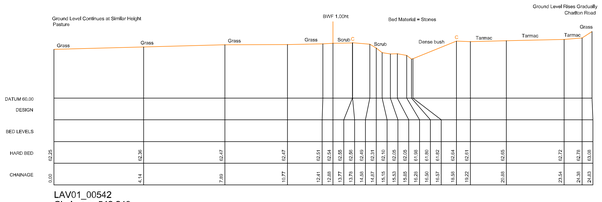


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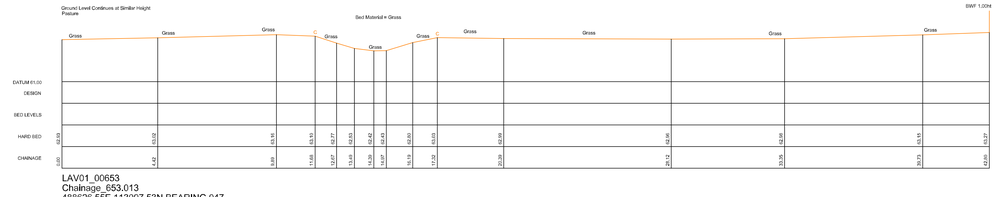


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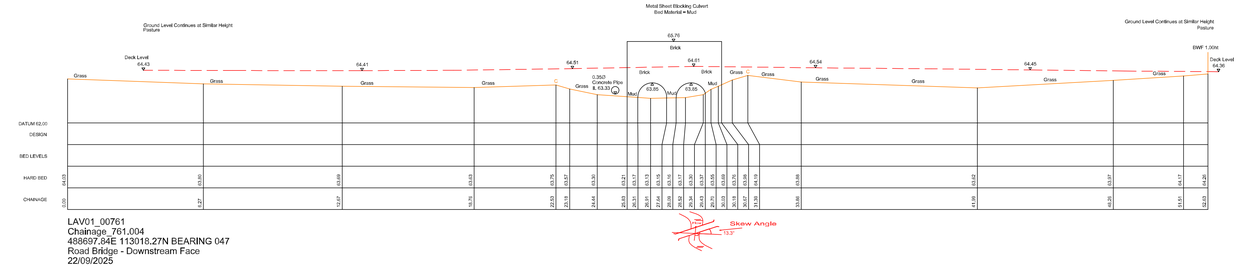


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Road Bridge - Downstream Face
22/09/2025

CROSS SECTION KEY:

WATER LEVEL

BED LEVEL

SILT LEVEL

NOTES:

ALL CROSS SECTIONS VIEWED IN A DOWNSTREAM DIRECTION UNLESS OTHERWISE STATED.
ALL LEVELS ARE METRIC HERE. TRONWORTH DATUM UNLESS OTHERWISE STATED.
ALL DIMENSIONS IN CHAINAGE ARE IN METRES UNLESS OTHERWISE STATED.

SURVEY LEGEND

| | | | | | |
|---|---|---|---|---|---|
| AB | AIR BRICK | FH | FIRE HYDRANT | PHP | POST & WIRE FENCE |
| AV | AIR VALVE | FHM | FIRE HYDRANT MARKER | PE | PIPER SUB. |
| BH | BOREHOLE | FP | FLOOD POST | PS | PUMPING STATION |
| BS | BOLLARD SELECTION | FT | FENCE POST | RG | ROAD GRID |
| BSC | BOREHOLE | FWL | FLOOD WATER MANHOLE | SC | SOIL CONTROL |
| BW | BOUNDARY | G | GATE | SMP | SUBMERSION PIPE |
| BL | BOLLARD | GL | GUY LINE | SP | SOIL PIPE |
| BL | BOLLARD | GP | GUTTER POST | SU | STONE UNIT |
| BS | SUB STOP | GR | GAS MARKER | TK | TEMPORARY |
| BT | BUS TIMETABLE | GV | GAS VALVE | TM | TELEPHONE MARKER |
| BR | BRICK WALL | HW | HEDGE WALL | TMP | SUB SELECTION MARKER |
| BWP | BARBED WIRE FENCE | IL | INSPECTION CHAMBER | WP | SHEET METAL RAILING |
| CB | COMBINED BLOCK WALL | IR | IRON RAILING | WP | WOOD POST |
| CF | COMBUSTED BOW POLES | IW | IRON / METAL FENCE | WT | STEEL PALLISADE FENCE |
| CL | COVER LEVEL | INP | INTERVISION PENCE | WW | WOOD WALL |
| CP | CONCRETE POLES | KB | KERB BLOCK | XS | CROSS SECTION |
| CONC | CONCRETE | KBL | KERB BATT SLILT | GP | G.B. VENT PIPE |
| CP | CONCRETE POST | LS | LIFT SIGN | TSN | TEMPORARY SENCH MARK |
| CR | CONCRETE POST & PLANK FENCE | LTS | LIFT SIGN | TT | TELEPHONE MANHOLE (POST |
| CT | CYCLE RACK | LV | LAMP POST | TC | TELECOM CABINET |
| CTA | CABLE T.V. MARHOLE | ME | MOORING BOLLARD | TMH | TELECOM MANHOLE |
| DP | DRAIN POST | MP | MOORING POST STAKING | TP | TELEPHONE POLE |
| DS | DISCUP KERB | MH | MANHOLE | TL | TRAFFIC LIGHT |
| DL | DATA LEVEL | MHT | MUNDIT | TLB | TRAFFIC LIGHT BOX |
| DP | DRAIN POST | MP | MARKER POST | TP | TRAFFIC POST |
| DPC | DUMP TROOP COARSE | MSF | METAL SLEEPER FENCE | TS | TIMBER SLEEPER STUMP |
| DR | DRAIN | NE | NAIL STOPS | TT | TREE STUMP |
| DW | DRAIN WELL MH | NG | NATURAL GROUND | UC | UNDERGROUND CABLE MARKS |
| Ex | EXISTING AGENCY | NSA | NATIONAL WASTE AUTHORITY | VP | VENT PIPE |
| EB | ELECTRICITY BOX | OHC | OVERHEAD CABLE | WE | WASTE BIN |
| EC | ELECTRICITY CABLE | OL | OVER LEVEL | WM | WATER MANHOLE / WATCH JNC |
| ECT | ELECTRICITY CABLE TEE | OS | OPEN STEEL RAILINGS | WA | WATER METER |
| EMP | ELECTRICITY MARKER P. | P | PIPE | WMP | WRAU MOUNT POST |
| ES | ELECTRIC SUB STN | PB | PILLAR BOX | WP | WOOD POST |
| ES | ELECTRIC SUB | PH | PARKING METER | WPH | WOOD POST & THE FENCE |
| FM | FOUL MANHOLE / TRANSITION JNC | PM | POST MARKER | WT | WOOD TRELLIS |
| FN | FLOWER BED | PST | POST & THE FENCE | YG | YARD GULLY |
| FR | FOOTBRIDGE | PTA | PARKING TICKET MACHINE | | (GB+44 prefix apply to E's &n/nw data only) |

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STORM GEOMATICS
Tel: 01608 664910
mail@storm-geomatics.com
www.storm-geomatics.com


CLIENT: ForLoveOfWater

PROJECT: Goodwood Feasibility Study

SITE: River Lavant - LAV01
Charlton Rd, Charlton, Chichester PO18 0HU
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Sheet 1 of 1

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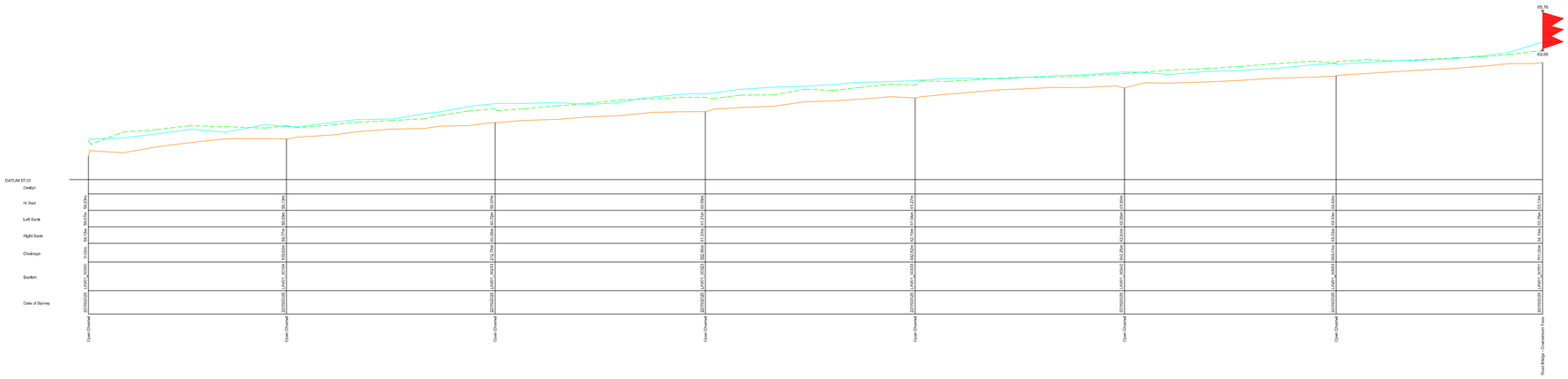


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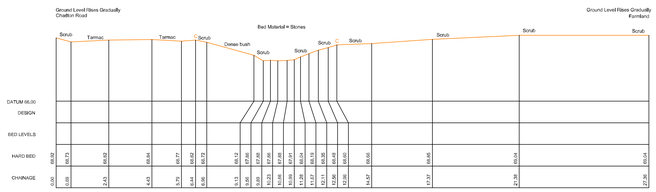


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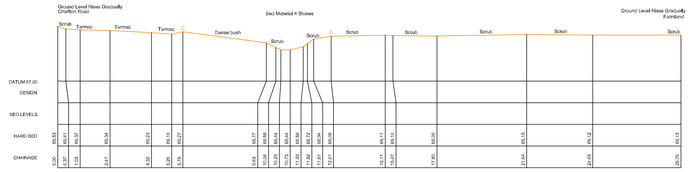


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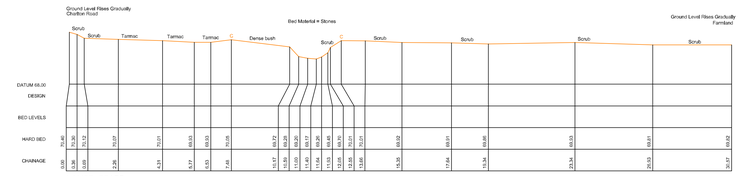


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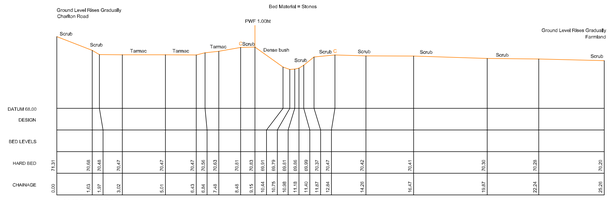


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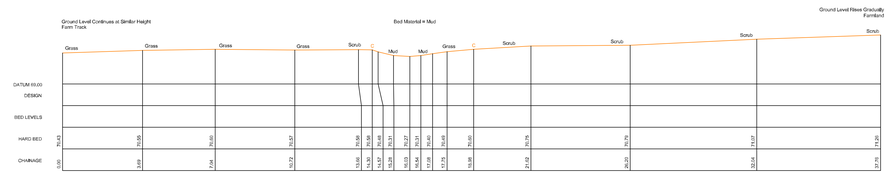


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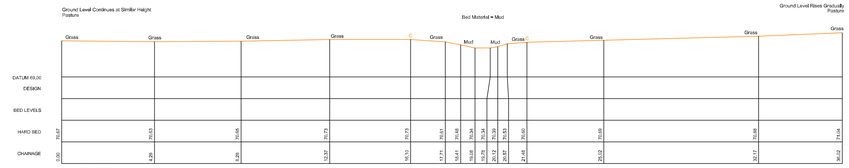


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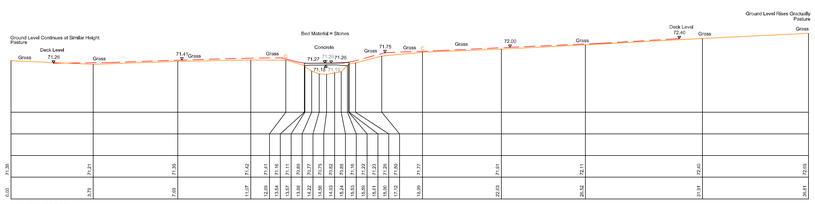


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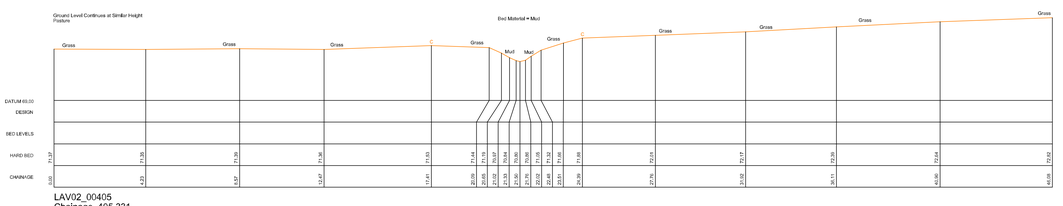


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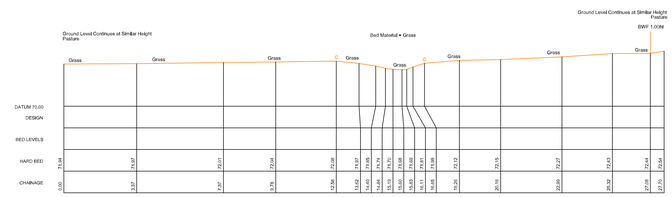


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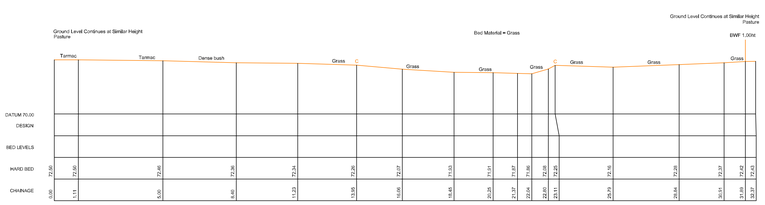


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23/09/2025

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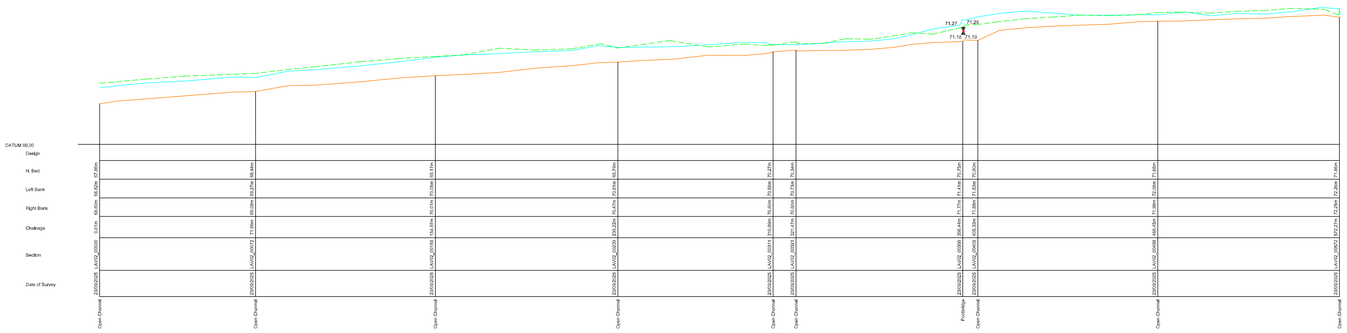
BED LEVEL
SILT LEVEL

NOTES:
ALL CROSS SECTIONS VIEWED IN A DOWNSTREAM DIRECTION UNLESS OTHERWISE STATED.
ALL LEVELS ARE METRIC MORE TRUNCATE DATUM UNLESS OTHERWISE STATED.
ALL DIMENSIONS IN CHAINAGE ARE IN METRES UNLESS OTHERWISE STATED.

SURVEY LEGEND

| | | | |
|---|---|---|---|
| AB | AIR BRICK | FH | FIRE HYDRANT |
| AV | AIR VALVE | FWH | FIRE HYDRANT MARKER |
| BH | BOREHOLE | FP | FLAG POLE POST |
| BL | BOLLARD / BILLICON | FT | FENCE POST |
| BM | BENCHMARK | FMH | FOUL WATER MANHOLE |
| BRK | BRICKWORK | G | GATE |
| BS | BUS STOP | GV | GATE VALVE (GTV) |
| BL | BILLICON | GU | GUTTER LEVEL |
| BS | BUS STOP | GH | GAS HANDER |
| BW | BRICK WALL | GM | GAS MARKER |
| BWP | BRICK WALL | HW | HEDGE WALL |
| BWF | BARBED WIRE FENCE | IL | INSPECTION CHAMBER |
| CH | CHAINAGE OF SURVEY | IC | INVERT LEVEL |
| CP | CONCRETE BOLLARD POSTS | KR | KERB RAISED TRACE |
| CL | COVER LEVEL | MF | MITCHAFORK FENCE |
| CLF | CHAIN LINK FENCE POSTS | MH | MANHOLE |
| CONC | CONCRETE | MSL | MEAN WATER SALLEY |
| CP | CONCRETE POST | LS | LIFT SHAFT |
| CPF | CONCRETE POST AND FENCE | LT | LIGHTING TOWER |
| CV | CYCLE RACK | LV | LAMP POST |
| CTA | CABLE T.V. MANHOLE | ME | MOORING BOLLARD |
| DH | DRAINAGE HOLE | MT | MOORING POST STAKING |
| DI | DRAINAGE | NR | MANHOLE |
| DL | DATA LEVEL | NWT | MANHOLE |
| DP | DOWN PIPE | OHL | OVERHEAD CABLE |
| DPC | DAMP PROOF COURSE | WEF | METAL GUIDING FENCE |
| DR | DOOR | WE | WELL STONE |
| DW | DRAINAGE MH | WT | WATER TANK |
| EA | ENVIRONMENT AGENCY | WA | NATIONAL WATER AUTHORITY |
| EG | ELECTRICITY BOX | CHC | CHECKED CABLE |
| ELT | ELECTRICITY CABLE TRUNKING | CW | CHECKED WIRES |
| ELT | ELECTRICITY CABLE TIP | CW | OPEN STEEL HUMANS |
| EMF | ELECTRICITY MARKER POST | | |
| ES | ELECTRICITY SUB STATION | FB | FILLER BOX |
| EL | ELEVATION LEVEL | FL | FUNERAL METER |
| FA | FLOOD ALLEVIATION TANK/BOX - JAC | FM | FUNERAL MARKER |
| FA | FLOWER BED | FST | POST & TUBE FENCE |
| FB | FOOTBRIDGE | FTA | FUNERAL TRUST MACHINE |
| FHF | POST & WIRE FENCE | | |
| FE | HEDGE LEVEL | | |
| FG | FENCE GATE | | |
| FL | FLOOD LEVEL | | |
| FM | FLOOD MARKER | | |
| FMP | SUBMERSIBLE PUMP | | |
| FP | FLAG POLE | | |
| GV | GAS VALVE | | |
| GV | GUIDE VANE | | |
| GW | GUIDE WALL | | |
| HB | HEDGE BANK | | |
| HF | HEDGE FENCE | | |
| HR | HEDGE RAISED | | |
| HT | HEDGE TRIMMED | | |
| IL | INVERT LEVEL | | |
| KR | KERB RAISED | | |
| LB | LIGHT BEACON | | |
| LP | LAMP POST | | |
| LT | LIGHTING TOWER | | |
| MB | MOORING BOLLARD | | |
| MP | MOORING POST STAKING | | |
| NR | MANHOLE | | |
| NWT | MANHOLE | | |
| OHL | OVERHEAD CABLE | | |
| WEF | METAL GUIDING FENCE | | |
| WE | WELL STONE | | |
| WT | WATER TANK | | |
| WA | NATIONAL WATER AUTHORITY | | |
| CHC | CHECKED CABLE | | |
| CW | CHECKED WIRES | | |
| OW | OPEN STEEL HUMANS | | |
| FB | FILLER BOX | | |
| FL | FUNERAL METER | | |
| FM | FUNERAL MARKER | | |
| FST | POST & TUBE FENCE | | |
| FTA | FUNERAL TRUST MACHINE | | |
| FWF | POST & WIRE FENCE | | |
| H




Scale: 1:1000H 1:100V

LONG SECTION KEY:

- WATER LEVEL
- BED LEVEL
- SILT LEVEL
- STRUCTURES
- RIGHT BANK
- LEFT BANK

LOOKING DOWNSTREAM. POINTS INDICATED BY 'C' ON CROSS SECTIONS AND ADDITIONAL POINTS BETWEEN SECTIONS

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NOTES:
ALL LEVELS ARE METRES MORE TRONANTE DATUM UNLESS OTHERWISE STATED.
ALL DIMENSIONS & CHAINAGES ARE METRES UNLESS OTHERWISE STATED.

SURVEY LEGEND

| | | | | | |
|---|---|---|---|---|---|
| AB | AIR BRICK | FH | FIRE HYDRANT | FWF | POST & WIRE FENCE |
| AV | AIR VALVE | FWH | FIRE HYDRANT MARKER | RB | RIGHT BANK |
| BH | BOREHOLE | FP | FLAG POLE | RE | RAILWAY ELEC |
| BS | BOLLARD, BILLICON | FT | FENCE POST | RS | ROAD SIGN |
| BSM | BOOMSHAFT | FWA | FOUL WATER MANHOLE | RTW | RETAINING WALL |
| BT | BT MANHOLE | G | GULLY | RWP | RAIN WATER PIPE |
| BL | BUS LEVEL | GL | GROUND LEVEL | S | STEP LEVEL |
| BW | BRIDGE WORK | GP | GATE POST | SCP | STUMP, TREE |
| CB | CATCH PIT | GV | GAS VALVE | SL | SOFFIT LEVEL |
| BH | BRICK HOUSE | GV | GAS VALVE | SL | SLIPPER LEVEL |
| BW | BRICK WALL | HW | HEAD WALL | SMH | SURVEY MONUMENT |
| CBF | CLOSE BOARDED FENCE | HV | HIGH VOLTAGE OVERHEAD | SP | SIGN POST |
| CBT | CLOSE BOARDED TRACK | IL | INVERT LEVEL | SV | SIGN POST |
| CV | CORRUGATED IRON HUT | HP | IRON HAND PUMP | STF | STEEL PALISADE FENCE |
| CL | CROSS LEVEL | JB | JUNCTION BOX | ST | STUMP |
| CJ | CHAIN LINK FENCE | JC | JUNCTION BOX | SV | SLUICE VALVE |
| CONC | CONCRETE | KS | KERB STONE SOLO | TC | TOP OF CHANNEL |
| CP | CONCRETE POST | LS | LOFT SHAFT | TSM | TEMPORARY BENCH MARK |
| CP | CHESTNUT PALING FENCE | LTP | LIGHTING POST | TCP TCP | TELEPHONE CALL BOX POST |
| CS | CONCRETE STEPS | LP | LAMP POST | TP | TELEGRAPH POLE |
| CTR | CABLE T.V. MANHOLE | ME | MOORING BOLLARD | TMK | TITLE/LAND MARKER T |
| DA | DRAIN ARM | MB | MOORING BOLLARD STAKING | TL | TOP OF BANK LEVEL |
| DA | DOCK PLATER | MH | MANHOLE | TL | TRAFFIC LIGHT |
| DL | DOCK LEVEL | MHT | MANHOLE | TLB | TRAFFIC LIGHT BOX |
| DP | DOWN PIPE | MP | METAL POST/RAIL | TLP | TRAFFIC LIGHT POST |
| DPT | DAMP PROOF COURSE | MSF | METAL SLEEPER FENCE | TW | TIMBER RAILWAY FORM |
| DW | DOOR | NC | NAILS TO TREE | TL | TREE STUMP |
| EB | ELECTRICITY BBK | NB | NOTICE BOARD, BOARDS | TW | TIMBER WALL, BOARDS |
| EL | ENVIRONMENT AGENCY | NEA | NOTICES, SIGNS, ILLEVANT? | UT | UNIT TRIP |
| EB | ELECTRICITY BOX | OHC | OVERHEAD CABLE | WB | WASTE BIN |
| EC | ELECTRICITY CABLE | OL | OVERHEAD LINE | WBT | WATER BOUNDARY MARK |
| ECP | ELECTRICITY CABLE PIT | OW | OPEN STEEL RAILINGS | WM | WATER METER |
| EMP | ELECTRICITY MARKER P | P | PILLAR | WMP | WIRE MESH FENCE |
| EP | ELECTRICITY POLE | PB | POST & BOX | WP | WATER POST |
| ES | ELECTRIC SIGN | PW | PANEL WALL | WPH | WOOD POST & RAIL FENCE |
| ETL | ELECTRICITY TRANSFORMER LINE | PO | POST | WV | WATER VALVE |
| FB | FLOWER BED | PT | PIPE TRAIL FENCE | YL | YARD LEVEL |
| FM | FOOTBRIDGE | PTM | PLANNING TRUST MACHINE | | Underlined text denotes EG survey data only |

| REV. | AMENDMENT | DRN | CHKD | DATE |
|---|---|---|---|---|
| | | | | |

CONTROL USED:

| ID | DESCRIPTION | Easting | Northing | Height |
|---|---|---|---|---|
| CMT ES-1 | PK Nail | 488751.616 | 113370.440 | 64.405 |


STORM GEOMATICS
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CLIENT: ForLoveOfWater

PROJECT: Goodwood Feasibility Study

SITE: River Lavant - LAV02
Charlton Rd, Charlton, Chichester PO18 0HU
Long Section & Location Plan
Sheet 1 of 1

| | | |
|---|---|---|
| SURVEYED BY: Storm Geomatics Ltd | | Project Ref: 25FLOW01260 |
| SURVEY DATE: Sept 2025 | | |
| SCALE: As Shown (A0 Sheet) | DRN: HS | CHKD: LW |
| DATUM: OS Newlyn (15) | DATE: 24/09/2025 | DATE: 26/09/2025 |
| GRID: OS Grid (15) | DRAWING NO. 0059 - 04 | REV. – |
| CAD FILENAME: 0059_DPP_LAV02_LS_LP.dwg | | |