

# Shadow Habitats and Regulations Assessment (SHRA)

8 Wood Lane, Norton-Juxta-  
Twycross

Reference: 2600183-ENV-S1-EM-TR-E-0002

Date: 27/07/2026

  
**Enviren**

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# 1. Introduction

- 1.1. This report has been prepared to support a planning application for the construction of 4 dwellings at land off Wood Lane, Norton-Juxta-Twycross and demonstrates through the acquisition of credits through a third party marketplace, the development will achieve Nutrient Neutrality.

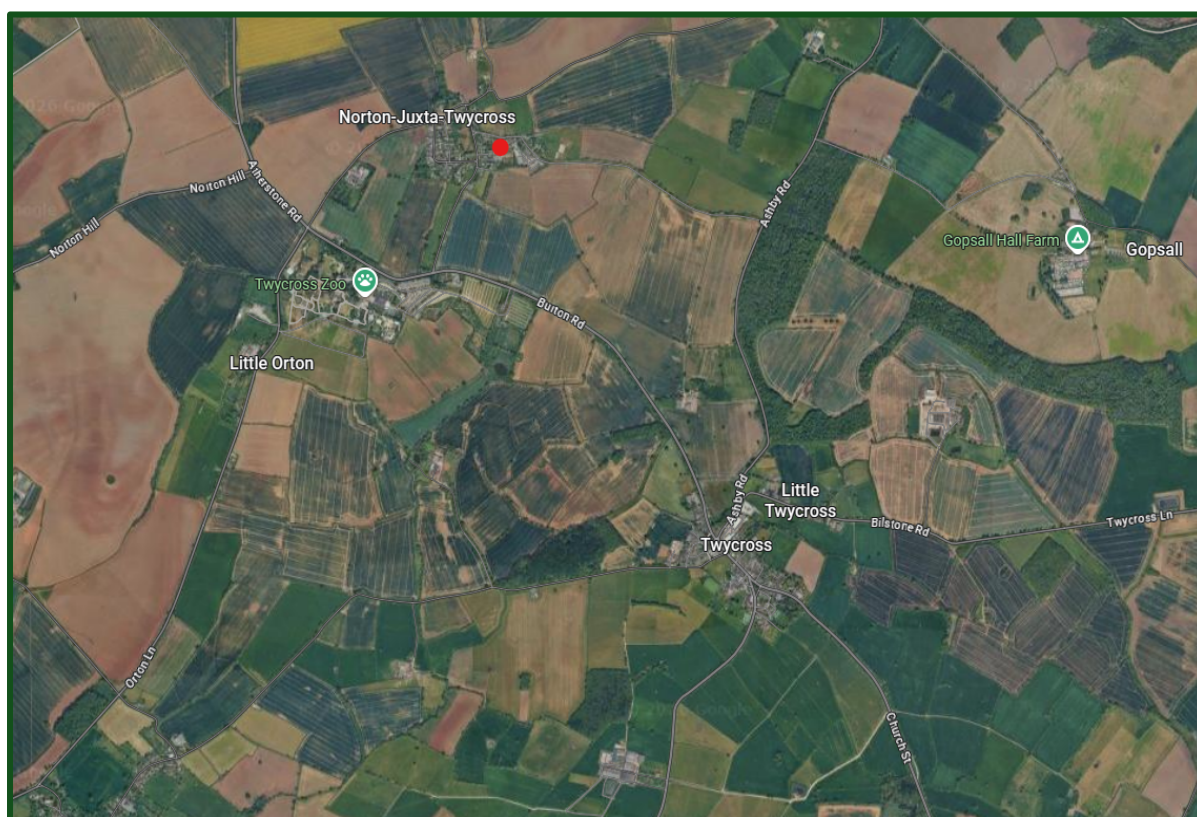
| Table 1.1 – Site Specific Information       |                                                    |
|---------------------------------------------|----------------------------------------------------|
| Category                                    | Site Specific Information                          |
| Site name                                   | Wood Lane, Norton-Juxta-Twycross                   |
| Site location                               | 8 Wood Ln, Norton-Juxta-Twycross, Atherstone       |
| Grid reference                              | SK 32529 06812                                     |
| Local Authority                             | <b>Hinckley &amp; Bosworth<br/>Borough Council</b> |
| Overall site area                           | 0.810 Hectares                                     |
| Nutrient(s) considered                      | Phosphorus                                         |
| Catchment (Surface Water)                   | River Mease                                        |
| Catchment (Foul Water)                      | River Mease                                        |
| Receiving Wastewater Treatment Works (WwTW) | Norton-Juxta-Twycross                              |
| Existing land use                           | Commercial/Industrial Urban<br>Greenspace          |
| Proposed land use                           | Residential Urban Land<br>Greenspace               |

## 2. Project Overview

| Table 2.1: Project or Plan Details. |                                                                                                                   |                                        |                                                                               |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------------------------------------------------------------------------|
| Application Reference Number        | TBC                                                                                                               | Date                                   | 27/07/2026                                                                    |
| Applicant details                   | Partnership Homes Ltd<br><a href="mailto:technical@enviren.co.uk">technical@enviren.co.uk</a><br>via 01275 560427 | Document prepared by/ and on behalf of | By Barney Townsend<br>(Enviren Ltd)<br>On behalf of:<br>Partnership Homes Ltd |
| Plan or Project Name*               | 8 Wood Lane, Norton-Juxta-Twycross                                                                                |                                        |                                                                               |
| Plan or Project Location            | 8 Wood Lane, Norton-Juxta-Twycross<br>Grid reference:<br>SK 32529 06812                                           | European Site(s) potentially affected. | River Mease SAC                                                               |
| Component SSSI(s):                  | River Mease SSSI                                                                                                  |                                        |                                                                               |

### Plan or Project site location

2.1. The exact location of the site can be found in **Figure 2.1**:



**Figure 2.1: Site Location**

## Environmental baseline

- 2.2. The development currently consists of a mixture of commercial/industrial land with associated structures and hardstanding, and greenspace. which has limited ecological potential. of local topographical information around the development parcel identifies that runoff from the site flows north towards the Main Street watercourse, which runs northeast and discharges into the River Mease. The River Mease travels northwest to discharge into the River Trent, which then flows northeast into the River Humber, ultimately discharging into the sea.
- 2.3. As presented in the Enviren Nutrient Neutrality Assessment and Mitigation Strategy (Report ref: 2600183-ENV-S1-EM-TR-E-0001)[see **Appendix 1**], the development will achieve nutrient neutrality through the acquisition of credits through a third party marketplace.

## Plan or Project description

- 2.4. The proposals are for the construction of 4 dwellings. The mitigation strategy shall consist of the acquisition of credits through a third party marketplace. The documents appropriate to this assessment are:
  - Enviren Ltd – Nutrient Neutrality Assessment and Mitigation Strategy (Report ref: 2600183-ENV-S1-EM-TR-E-0001) (see **Appendix 1**)

## Construction methodology and programme

- 2.5. The onsite laying of sewers shall be undertaken by a suitably qualified contractor. The pipes shall be either air tested or water tested to ensure that no leakages occur. The connection to the main foul sewer will be sealed and made good to prevent leakage.

## Operation

### Operational phosphorus outputs

#### Before mitigation

- 2.6. The existing land use is commercial/industrial land and greenspace and therefore by converting the land to residential urban land there will be an uplift in the quantity of phosphorus generated.
- 2.7. As calculated in the Enviren Ltd NNAMS the proposed development shall generate 1.44 kg/year of Total Phosphorus. This shall be immediately offset by the acquisition of credits through a third party market place. This is presented in **Table 2.2** and **Table 2.3** below:

| Table 2.2: Nutrient Arisings.                |                                                                |
|----------------------------------------------|----------------------------------------------------------------|
| Category                                     | Value                                                          |
| Foul water phosphorus arisings               | 0.76 kg/year                                                   |
| Area of proposed development                 | 0.810 hectares                                                 |
| Current site use                             | Greenspace – 0.450<br>Commercial/Industrial Urban Land – 0.360 |
| Existing land use phosphorus arisings        | -0.36kg/year                                                   |
| Proposed site use                            | Residential Urban Land - 0.660<br>Greenspace - 0.150           |
| Proposed land use phosphorus arisings        | 0.73 kg/year                                                   |
| Final Nutrient Budget (including 20% buffer) | 1.37 kg/year                                                   |

| Table 2.3: Final Nutrient Budget.                  |               |
|----------------------------------------------------|---------------|
| Proposed phosphorus load from development          | 1.37 kg/year  |
| Mitigation Provided Through Acquisition Of Credits | -1.37 kg/year |
| Resultant nutrient load                            | 0.00 kg/year  |

## 3.Information about the River Mease SAC Site

### Identifying sites

3.1. The development is hydrologically linked to the River Mease SAC.

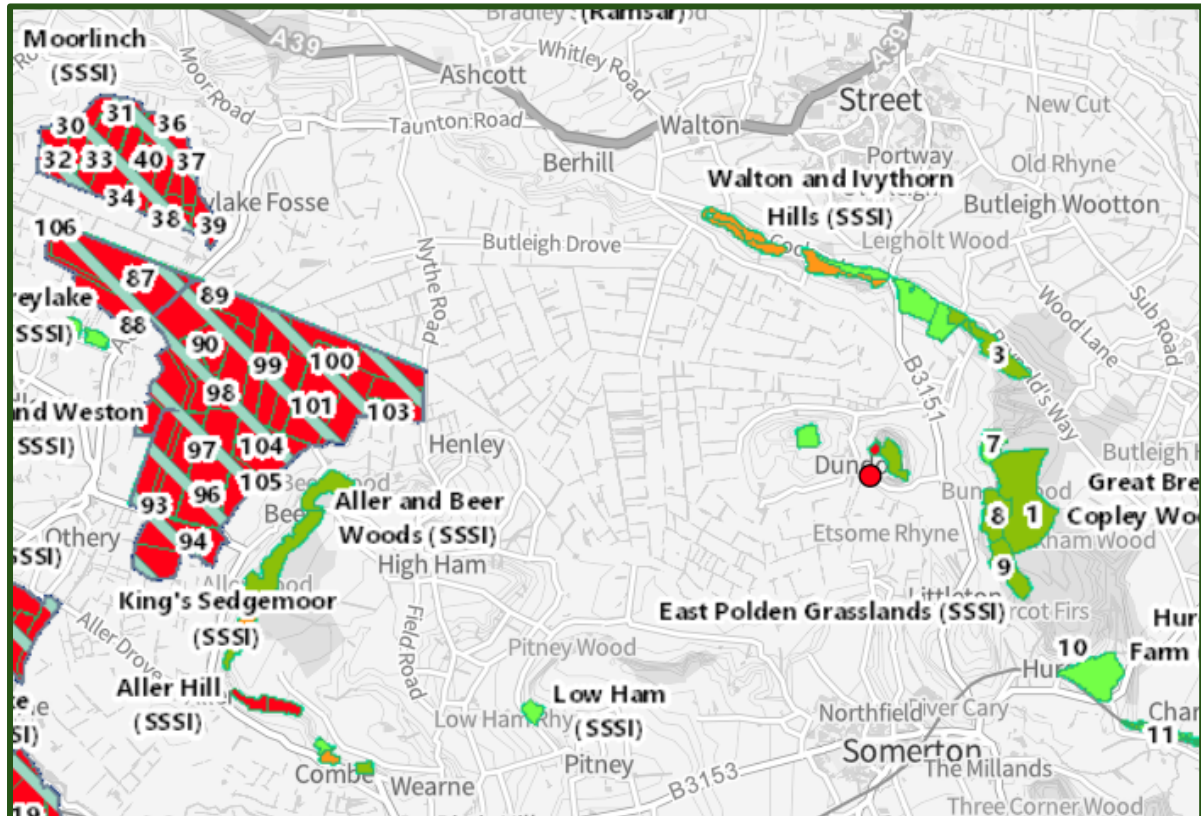


Figure 3.1: Protected Site Proximity.

### European Site conservation objectives and qualifying features

- 3.2. The conservation objectives for the protected site can be found here: **Conservation objectives.**
- 3.3. The Natural England citation can be found here: **Natural England Citation**

## 4. Stage 1 – Screening of the Plan or Project

### Likelihood of Significant Effects alone

- 4.1. Stage 1 of the HRA, the screening, is a test of Likely Significant Effect (LSE) to determine whether an Appropriate Assessment is required against all impact pathways identified. The screening is done considering the proposal in isolation and therefore not in-combination with any other plans or projects. It is also done in the absence of avoidance or other mitigation measures. Note that the assessment is made with awareness of the conservation objectives for the features of the European Site, however the actual assessment of the plan or project against the conservation objectives is not required until the Appropriate Assessment (Stage 2).

### Potential Impact Pathways

- 4.2. The impact pathways relevant to the application site are as follows:
- The proposed development would result in an increase in phosphate loading within the hydrological catchment of the SAC, through the production of wastewater/slurry during operation, potentially leading to degradation of habitat or changes in water quality.

### Likely Significant Effects

- 4.3. In terms of whether the project shall result in a Likely Significant Effect of the project, alone or in combination, it has been determined that:
- **There is an impact pathway and significant effects cannot be ruled out.**
- 4.4. This has been determined as the development shall result in an increase in wastewater, and as the project cannot fulfil the criteria established in the Natural England guidelines on small scale thresholds and nutrient neutrality principles for the River Mease SAC catchment. This conclusion has been arrived at with due consideration to:
- The vulnerability/sensitivity of the receiving environment/features of interest;
  - When the risk of effects are likely to occur (e.g. construction and/or operation);
  - The likely geographical extent of the effects; and
  - Likelihood of significant effects (e.g. those above negligible in magnitude) occurring based on previous experience with similar elements, where available.
- 4.5. The proposals shall result in an increase in phosphorus discharging to the surrounding water network; new development must accord with the provisions of the Interim Guidelines to determine whether there is a Like Significant Effect; therefore, as the development proposes new dwellings, the requirement for an Appropriate Assessment (AA) is triggered.

**Table 4.1 : Potential effects of the plan or project alone on the River Mease SAC Site and its qualifying features**

| Qualifying Feature*                                                                                                                                                                   | Relevant conservation objectives         | Potential impact pathway                                                                                                                                                                                                                                                                            | Likely Significant Effect alone                                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| 1                                                                                                                                                                                     | 2                                        | 3                                                                                                                                                                                                                                                                                                   | 4                                                                              |
| <b>European Site: River Mease SAC</b>                                                                                                                                                 |                                          |                                                                                                                                                                                                                                                                                                     |                                                                                |
| See here: <b>Natural England Citation</b>                                                                                                                                             | See here: <b>Conservation objectives</b> | ➤ The proposed development will result in an increase in phosphate loading within the hydrological catchment of the SAC, through the production of wastewater/slurry during operation, potentially leading to degradation of habitat or changes in water quality affecting the wildfowl assemblage. | <b>There is an impact pathway and significant effects cannot be ruled out.</b> |
| <b>Screening Decision of the Plan or Project Alone</b>                                                                                                                                |                                          |                                                                                                                                                                                                                                                                                                     |                                                                                |
| The risk of Likely Significant Effects on the River Mease SAC Site from the plan or project alone cannot be ruled out, and therefore an Appropriate Assessment (Stage 2) is required. |                                          |                                                                                                                                                                                                                                                                                                     |                                                                                |

## 5.Stage 2 – Appropriate Assessment

### Appropriate Assessment of the plan or project alone

#### Assessment of potentially adverse effects without additional mitigation measures

**Table 5.1 : Appropriate Assessment of the plan or project alone and in the absence of any mitigation measures.**

| Qualifying Feature                           | Impact pathway                              | Description of impacts and adverse effects                                                                                                                                                                                                                                                                                                                                                                       | Assessment of adverse effects in relation to conservation objectives                                                                                                                                                                                                                                                                                                                                 | Can adverse effect on River Mease SAC Site integrity be ruled out? Yes or No                                                                      |
|----------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>European Site: River Mease SAC</b>        |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                   |
| See here:<br><b>Natural England Citation</b> | See here:<br><b>Conservation objectives</b> | The wastewater produced by the project will discharge to the main sewer which would lead to the protected site. This would result in an increase in phosphorus <b>(+1.37 kg/yr)</b> that will be ultimately discharged into a watercourse hydrologically connected to the SAC Site. Due to the sensitivity of the SAC to any increase in phosphorus, this increase could cause further degradation or changes to | The increase in phosphorus could adversely affect all of the conservation objectives listed for the site; it will contribute to eutrophication of water bodies and changes to water chemistry within the site, thus making it unfavourable to aquatic invertebrates, affecting the structure and function of the habitats that support both them and vascular plants as per the qualifying criteria. | <b>In the absence of mitigation, the net gain of phosphorus of the development in isolation will have an adverse effect on the SAC integrity.</b> |

|                                                                                                                                                                                                |  |                                                                                                                                        |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------|--|--|
|                                                                                                                                                                                                |  | water quality to the waterbodies which support the aquatic invertebrate assemblage and vascular plants as per the qualifying criteria. |  |  |
| Total Phosphorus produced by the plan or project <u>in the absence</u> of mitigation (as calculated in the Nutrient Neutrality Assessment and Mitigation Strategy NNAMS) = <b>+1.37 kg/yr.</b> |  |                                                                                                                                        |  |  |

### Assessment of potentially adverse effects with additional mitigation measures

**Table 5.2 : Appropriate assessment of the plan or project alone with any mitigation measures, conditions or restrictions.**

| Qualifying Feature                                                                                                                                         | Description of adverse effects              | Can adverse effects be mitigated? Yes or No | Description of mitigation measures including how they would be applied                                    | Can adverse effect on site integrity be ruled out? Yes or No |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| <b>European Site: River Mease SAC</b>                                                                                                                      |                                             |                                             |                                                                                                           |                                                              |
| See here:<br><b>Natural England Citation</b>                                                                                                               | See here:<br><b>Conservation objectives</b> | Yes                                         | <b>Mitigation shall be secured through the acquisition of credits through a third party market place.</b> | <b>Yes</b>                                                   |
| Total Phosphorus produced by the plan or project <u>with</u> mitigation (as calculated in the NNAMS) = <b>-0.00 kg/year</b>                                |                                             |                                             |                                                                                                           |                                                              |
| <i>*Negative values show phosphorus removed from the catchment, '0' shows nutrient neutrality and positive values show that more mitigation is needed.</i> |                                             |                                             |                                                                                                           |                                                              |
| <b>Concluding Statement of Appropriate Assessment Alone</b>                                                                                                |                                             |                                             |                                                                                                           |                                                              |

When considered alongside proposed mitigation measures it has been determined that the proposal has no adverse effect on the integrity of the River Mease SAC Site'

#### Residual Effects

N/A

### Likelihood of Adverse Effects on Site Integrity in-combination other plans and projects

#### Likelihood of adverse effects in-combination due to nutrients

- 5.1. Nutrient neutrality has been demonstrated for the project alone with mitigation in place and therefore there will be no adverse effect on integrity of the SAC due to nutrients. Therefore, no in-combination assessment is required.

### Conclusions on site integrity

#### Concluding Statement on the River Mease SAC Site Integrity

'It is concluded that the project will not adversely affect the integrity of the River Mease SAC Site, either alone or in-combination with other plans or projects, subject to the mitigation identified being secured in perpetuity'.

# Appendix 1 – Enviren Nutrient Neutrality Assessment and Mitigation Strategy

*For convenience – press “Alt + Left Arrow” to return to the section of the report*



# Nutrient Neutrality Assessment and Mitigation Strategy (NNAMS)

8 Wood Lane, Norton-Juxta-  
Twycross

Reference: 2600183-ENV-S1-EM-TR-E-0001

Date: 27/07/2026

  
**Enviren**

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## Executive Summary

This report has been prepared for use as part of a planning application associated with the demolition of an existing warehouse and barn structure as well as the development of four residential dwellings in Norton-Juxta-Twycross (Grid reference: SK 32529 06812). The proposals are for four dwellings along with associated infrastructure.

This report demonstrates that the development will achieve Nutrient Neutrality through the installation of Sustainable Drainage Systems (SuDS) and the acquisition of credits from a third-party marketplace, the development will achieve nutrient neutrality.

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# 1. Introduction

- 1.1. This report has been compiled for the support of the development of four dwellings off Wood Lane, Norton-Juxta-Twycross (Grid reference: SK 32529 06812). The proposals are for four dwellings along with associated infrastructure. This report demonstrates that through the installation of SuDS and the acquisition of credits from a third-party marketplace, the development will achieve Nutrient Neutrality. The site is approximately 0.810 Hectares (8100 m<sup>2</sup>) when considering the areas outlined in the site plan.
- 1.2. The existing site currently consists of a mixture of commercial/industrial urban land and greenspace. The construction of the new dwellings would result in an increase in phosphorus discharging into the surrounding water network due to foul water and surface water discharge from the proposed dwellings; however, through suitable mitigation proposals the development will achieve nutrient neutrality (see **Appendix 1**).

| Table 1.1 – Site Specific Information |                                              |
|---------------------------------------|----------------------------------------------|
| Category                              | Site Specific Information                    |
| Site Name                             | Wood Lane, Norton-Juxta-Twycross             |
| Site Location                         | 8 Wood Ln, Norton-Juxta-Twycross, Atherstone |
| Local Authority                       | Hinckley & Bosworth Borough Council          |
| Overall Site Area                     | 0.810 Hectares                               |
| Nutrient(s) Considered                | Phosphorus                                   |
| Catchment (Surface Water)             | River Mease                                  |
| Catchment (Foul Water)                | River Mease                                  |

## 2. Local Context to Nutrient Neutrality

- 2.1. Following the ruling on the “Dutch N” (Case C-293/17 and C-294/17)<sup>1</sup> in November 2018 through the Court of Justice of the European Union (CJEU), as well as several other lower profile cases in Ireland, Natural England wrote a letter<sup>2</sup> to the Leicester Councils in March 2022 identifying unacceptable phosphate levels within River Mease SAC and requested greater scrutiny of planning applications going forward which would increase nutrient loads into the water system<sup>3</sup>, resulting in the Protected Area (SAC, SPA or Ramsar Site) reaching a point where the ability to return the site to favourable conditions would be compromised or necessarily limit the conservation objectives of the area.
- 2.2. Mitigation measures are to be put in place that would result in “Nutrient Neutrality”. As identified the site benefits from a pathway into the River Mease, this river is protected as an SAC (Special Area of Conservation) under the Habitat Regulations 2017 which is ratified in UK planning law under paragraph 181 of the NPPF<sup>4</sup>. The River Mease is also a protected SSSI (Site of Special Scientific Interest) which is protected under paragraph 180 of the NPPF. The River Mease is a Special Area of Conservation (SAC) due to the importance of the species and habitats it supports.

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<sup>1</sup> C-293/17 - Coöperatie Mobilisation for the Environment and Vereniging Leefmilieu ([Link-to-source](#))

<sup>2</sup> Natural England Letter to affected councils - Advice for development proposals with the potential to affect water quality resulting in adverse nutrient impacts on habitats sites. ([Link-to-source](#))

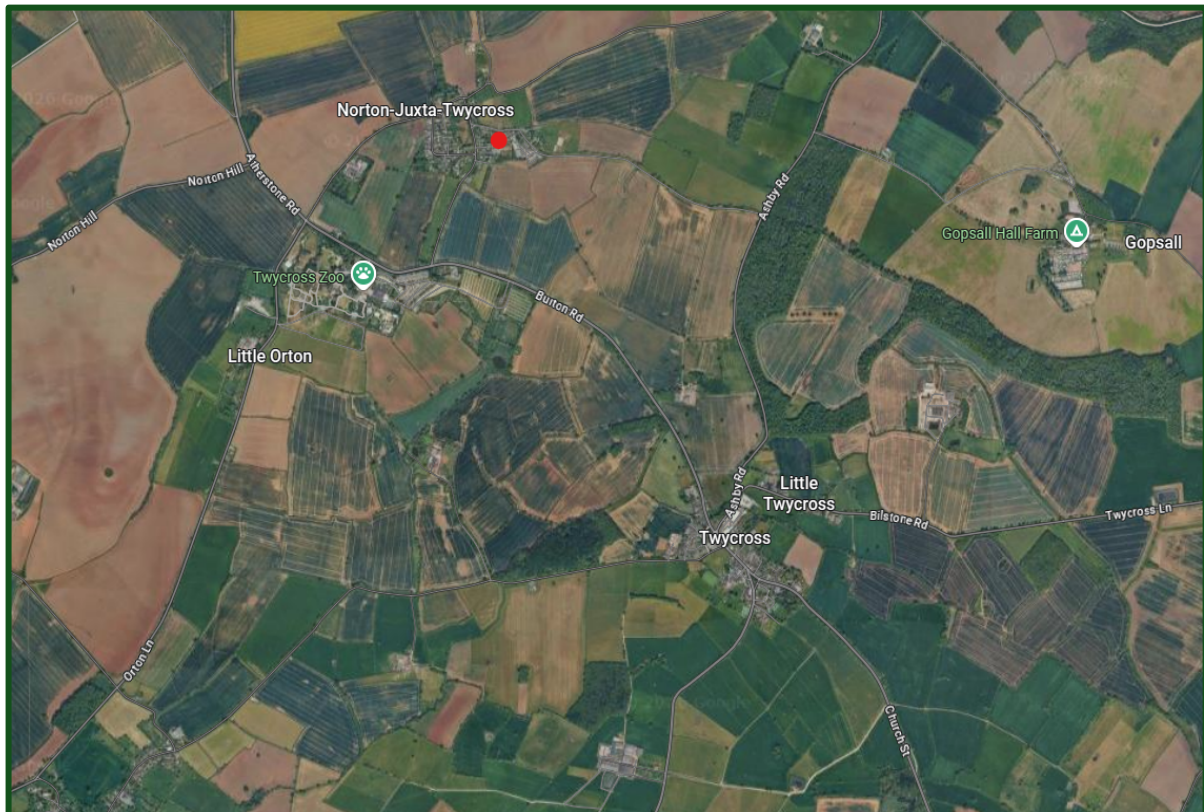
<sup>3</sup> Reg. 63 of the Habitats Regulations 2017.

<sup>4</sup> NPPF – UK Government National Planning Policy Framework ([Link-to-source](#))

## 3. Background Information

### Site Location

- 3.1. The site is located on the eastern side of Norton-Juxta-Twycross along Wood Lane and approximately 2.100 kilometres northeast of the neighbouring town of Twycross. The exact location can be found in **Figure 3.1**:



**Figure 3.1 – Site Location**

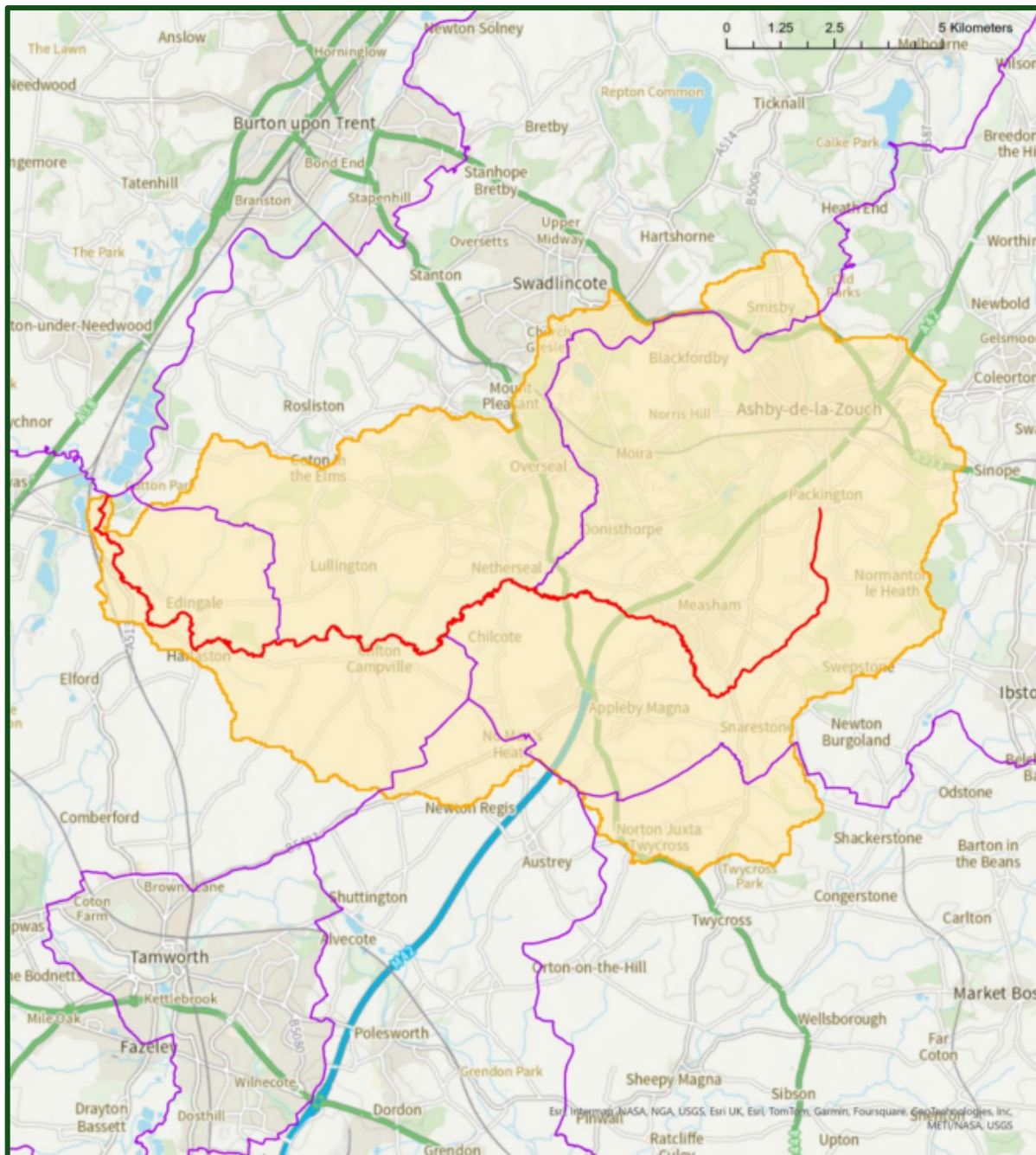
### Outline Site Hydrology

- 3.2. Interrogation of local topographical information around the development parcel identifies that runoff from the site flows north towards the Main Street watercourse, which runs northeast and discharges into the River Mease. The River Mease travels northwest to discharge into the River Trent, which then flows northeast into the River Humber, ultimately discharging into the sea.
- 3.3. Statutory Undertaker mapping (**Appendix 2**) also indicates that there are foul sewers around the site parcel to the north along Wood Lane, which run to the Norton Juxta WwTW which discharge to the River Mease.



**Figure 3.2 – SCALGO Topographic Data – Site Hydrology**

- 3.4. The development sits within the hydrological catchment of the River Mease SAC as indicated in **Figure 3.3**.



**Figure 3.3 – Hydrological Catchment Plan**

## Existing Site Description

- 3.5. The area to be developed currently constitutes a mixture of commercial/industrial land with associated structures and hardstanding, and greenspace. The site is approximately 0.810 hectares in size when considering the areas in the site plan (see **Appendix 3**). The site parcel is bordered to the east, west and north by dwellings and by grassland to the south.



Figure 3.4 – Aerial Reconnaissance Photography

## 4. Development Proposals

4.1. The development is to consist of 4 dwellings with associated infrastructure.

### Foul Water Drainage

4.2. The foul water drainage from the proposed dwellings will discharge to the main sewer network, north of the dwellings, where it will then be treated at Norton-Juxta-Twycross WwTW.

### Surface Water Drainage

4.3. The discharge of surface water from the site shall be to the adjacent watercourse. The proposed surface water shall be treated by a series of specifically designed Sustainable Drainage System (SuDS) components which shall maximise phosphorus removal and achieve nutrient neutrality.

4.4. Runoff from roofs shall be treated through a treatment train consisting of Bioretention zones and permeable paving. Runoff from drives and shared private roads shall be treated through a treatment train consisting of permeable paving. The performance of all SuDS components as contained in CIRIA C808 (Table 2.20) [issued August 2024] can be found in **Table 4.1**.

4.5. Maintenance requirements of the SuDS features can be found in **Appendix 4** with measures based on the associated schedules contained in CIRIA C753 and CIRIA 808. SuDS considerations outlined in CIRIA C808 are reviewed in **Appendix 5**. The design life for the SuDS measures are 100 years and will all remain in perpetuity.

**Table 4.1 – Phosphorus Removal Efficiency of Various SuDS Components (as per CIRIA C808)**

| SuDS Component                     | Swale | Detention basin | Retention basin | Pond | Floating wetland | Bioretention zone | Tree pit | Filter strip | Filter drain | Willow bed | Permeable pavement | Vortex grit separator | Oil water separator | Stormwater filter | Granular media | Rainwater capture |
|------------------------------------|-------|-----------------|-----------------|------|------------------|-------------------|----------|--------------|--------------|------------|--------------------|-----------------------|---------------------|-------------------|----------------|-------------------|
| Particulate Phosphorus Removal (%) | 28    | 28              | 28              | 39   | 39               | 44                | 44       | 22           | 22           | 55         | 39                 | 28                    | 28                  | 44                | 44             | 55                |

|                                  |    |    |    |    |     |    |    |    |    |     |    |    |    |     |     |     |
|----------------------------------|----|----|----|----|-----|----|----|----|----|-----|----|----|----|-----|-----|-----|
| Dissolved Phosphorus Removal (%) | 0* | 5  | 23 | 23 | TBC | 0* | 0* | 0* | 0* | 45  | 0* | 0* | 0* | 41  |     | 45  |
| Total Phosphorus Removal (%)     | 28 | 33 | 51 | 62 | ≥39 | 44 | 44 | 22 | 22 | 100 | 39 | 28 | 28 | ≤85 | ≤85 | 100 |

\*Can be increased providing specific, referenced media is used.

- 4.6. The phosphorus removal efficiencies of the onsite treatment trains are outlined in **Table 4.2**. As per CIRIA C808, the particulate phosphorus removal of the SuDS components is already pre-weighted to accommodate the proportion of Total Phosphorus (TP) that is in solid form (55%). The Dissolved Phosphorus removal efficiency has been factored such that it is reflective of the proportion of Total Phosphorus that is soluble (45%).

| Table 4.2 – Total Phosphorus Removal Percentage of Treatment Train |                                                                                                        |                        |                  |    |                      |    |                                          |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|------------------------|------------------|----|----------------------|----|------------------------------------------|
| Treatment Train                                                    | Phosphorus Removal Efficiency of SuDS Component (Average between Dissolved and Particulate Phosphorus) |                        |                  |    | Cumulative Removal** |    | Calculated Phosphorus Removal Efficiency |
|                                                                    | Bio retention Zones                                                                                    |                        | Permeable Paving |    |                      |    |                                          |
|                                                                    | PP                                                                                                     | DP                     | PP               | DP | PP                   | DP |                                          |
| Treatment Train A: Roofs                                           | 44                                                                                                     | 0                      | 19.5             | 0  | 46.15                | 0  | 46.15                                    |
| Treatment Train B: Drives and Private Roads                        | N/A                                                                                                    | N/A                    | 39               | 0  | 39                   | 0  | 39                                       |
| 100% Removal Considered                                            |                                                                                                        | 50% Removal Considered |                  |    | Not Applicable       |    |                                          |

- 4.7. The methodology for calculating the values in the proposed treatment trains can be found in **Appendix 6** and is based on influent concentrations and effluent concentrations from the preceding component.

## 5. Development Nutrient Calculator Calculations

- 5.1. The direct output of the Natural England Budget Calculator can be found in **Appendix 1**. This section shall outline the observations made on the site and shall discuss the results generated by the Natural England Budget Calculator. The figures for the inputs utilised in this section can be found in the **Figures** section to the rear of the report.

| Table 5.1 – Development Nutrient Budget Calculations |                                                                            |                 |
|------------------------------------------------------|----------------------------------------------------------------------------|-----------------|
| Stage 1 – Foul Water Arisings from dwellings         |                                                                            |                 |
| Number of dwellings                                  | 4                                                                          |                 |
| Average occupancy rate                               | 2.40                                                                       |                 |
| Water usage                                          | 120                                                                        |                 |
| Wastewater treatment works                           | Norton-Juxta-Twycross STW                                                  |                 |
| Wastewater treatment works TP permit (mg/litre)      | 2.00 (Current)                                                             |                 |
| Annual wastewater TP load                            | +0.76kg/year (Current)                                                     |                 |
| Stage 2 – Existing Land Use                          |                                                                            |                 |
| Catchment                                            | Mease                                                                      |                 |
| Soil drainage type                                   | Impeded Drainage                                                           |                 |
| Annual average rainfall (mm)                         | 650.1                                                                      |                 |
| Within Nitrate Vulnerable Zone                       | Yes                                                                        |                 |
| Former Land Use                                      | Land Use                                                                   | Area (hectares) |
|                                                      | Greenspace                                                                 | 0.450           |
|                                                      | Commercial/Industrial Urban Land                                           | 0.360           |
| Annual nutrient export (kg TP)                       | -0.36kg/year                                                               |                 |
| Stage 3 – Proposed Land Use                          |                                                                            |                 |
| Proposed Land Use                                    | Land Use                                                                   | Area (hectares) |
|                                                      | Residential Urban Land                                                     | 0.660           |
|                                                      | Greenspace                                                                 | 0.150           |
| SuDS removal efficiency                              | Treatment Train A (0.12 Ha) – 46.15%<br>Treatment Train B (0.121 Ha) – 39% |                 |
| Annual nutrient export (kg TP)                       | +0.73kg/year                                                               |                 |
| Stage 4 – Final Nutrient Budget                      |                                                                            |                 |
| The total annual nutrient load generated             | +1.37kg/year (Current)                                                     |                 |

## 6.Mitigation Proposals

- 6.1. The development shall achieve nutrient neutrality through the acquisition of credits from a third-party marketplace. Prior to commencement, the applicant will secure 1.37 kg Total Phosphorus/year of permanent mitigation credits from an approved provider serving the River Mease catchment.

## 7. Conclusion

- 7.1. As can be seen in this report, the nutrient arisings associated with the development have been extensively considered, along with off-site and on-site mitigation methods. The applicant will acquire credits from a third-party marketplace. The applicant shall achieve Nutrient Neutrality through the proposals and therefore nutrient arisings should not prevent planning permission being granted.

# Figures

For convenience – press “Alt + Left Arrow” to return to the section of the report



Figure 1 – Average Annual Rainfall (mm/year)

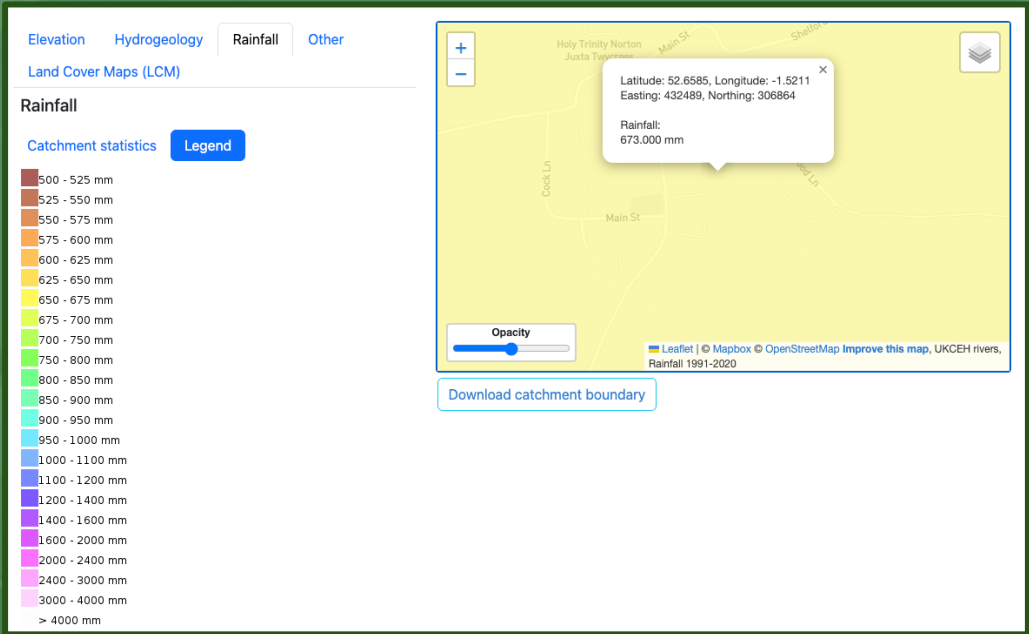
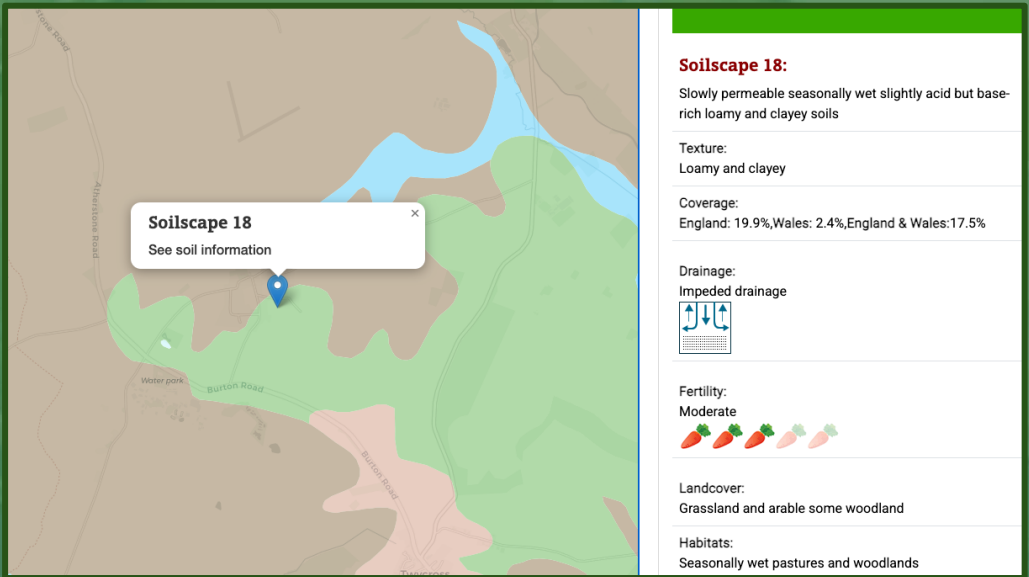


Figure 2 – Underlying Soils



# Appendix 1 – Development Nutrient Budget Calculations

*For convenience – press “Alt + Left Arrow” to return to the section of the report*



| Nutrients from wastewater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                          |                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|------------------------------------------------------------|
| <p>This sheet contains 2 tables. The tables are separated by a heading, which describes the following table.</p> <p><b>Note:</b> You will need to fill in cells B5 to B9 in the first table 'Water infrastructure information'. Cells B10 is automatically calculated and will state '0.00' unless the user inputs have been entered. Cells A11 to A12 and B11 to B12 are automatically generated and will state 'Not applicable' depending on the inputs to cells B5 and B9. You may need to fill in cell C10 depending on the information you entered in cell B9. Cells C5 to C9 and cells C11 to C12 are intentionally blank cells.</p> <p>You do not need to fill in any cells in the second table 'Final calculation of nutrient load from wastewater'. Cells B16 to B18 are automatically calculated and will state '0.00' unless the user inputs have been entered to the first table 'Water infrastructure information'. Cells A19 to A22, cells B20 and B22 are automatically generated and will state 'Not applicable' depending on the user inputs to the first table 'Water infrastructure information'. Cell B15, cell B19 and cell B21 are intentionally blank cells.</p> <p><b>How to fill in the table 'Water infrastructure information'</b></p> <p>Cell B5: Enter the date of first occupancy.</p> <p>Cell B6: Enter the average occupancy rate of the development. The default rate is 2.4, this should not be edited without sufficient evidence.</p> <p>Cell B7: Enter the water usage. This value should be kept at 120 unless other efficiency measures are used.</p> <p>Cell B8: Enter the total number of dwellings or units that will be within the development site as of the project completion date.</p> <p>Cell B9: Choose the receiving wastewater treatment works (WwTW) from the dropdown list.</p> <p>If you select 'Package Treatment Plant user defined' or 'Septic Tank user defined', you must enter their certified value of total phosphorus (TP) in cell C10. Otherwise the default values will be used in the calculation of the nutrient load associated with wastewater.</p> <p>Nutrient permits may be changing for the WwTW you select, from 01/01/2025, 01/04/2027 or 01/04/2030. If the date of first occupancy is in-between changing permit dates, multiple permit limits may be automatically generated in cells B10 to B12. If applicable, up to 3 values for the nutrient loading associated with wastewater will be presented in cell B18, B20 or B22.</p> |                                          |                                                            |
| Water infrastructure information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                          |                                                            |
| Description of required information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Data entry column - user inputs required | Additional data entry column - user inputs may be required |
| Date of first occupancy (dd/mm/yyyy):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 17/04/2025                               |                                                            |
| Average occupancy rate (people/dwelling or people/unit):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2.40                                     |                                                            |
| Water usage (litres/person/day):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 120                                      |                                                            |
| Development proposal (dwellings/units):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 4                                        |                                                            |
| Wastewater treatment works:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Norton-Juxta-Twycross STW                |                                                            |
| Current wastewater treatment works P permit (mg TP/litre):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2.00                                     |                                                            |
| Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Not applicable                           |                                                            |
| Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Not applicable                           |                                                            |
| Final calculation of nutrient load from wastewater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                          |                                                            |
| Description of values generated                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Values generated                         |                                                            |
| Wastewater nutrient loading                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                          |                                                            |
| Additional population (people):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 9.60                                     |                                                            |
| Wastewater by development (litres/day):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1152.00                                  |                                                            |
| Annual wastewater TP load (kg TP/yr):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.76                                     |                                                            |
| Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                          |                                                            |
| Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Not applicable                           |                                                            |
| Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                          |                                                            |
| Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Not applicable                           |                                                            |

## Nutrients from current land use

This sheet contains 2 tables. The tables are separated by a heading, which describes the following table.

**Note:** You will need to enter in cells B5 to B8 in the first table 'Current land use information'. You will need to fill in cells A11 to A27, and B11 to B27 in the second table 'Current land uses'. Cells B28, C11 to C28 are automatically calculated and will state '0.00' unless the user inputs have been entered. Cells D11 to D27 are automatically generated and will state 'Not applicable' depending on automatically generated data in cells C11 to C27. Row 28 is a Total Row. The Total Row states 'Totals' in cell A28 and automatically calculates the total sum of cells B11 to B27 in cell B28 and C11 to C27 in cell C28. Cell D28 is intentionally blank.

### How to fill in the table 'Current land use information'

Cell B5: Choose the operational catchment the site is located within from the dropdown list.

Cell B6: Choose the soil drainage type associated with the predominant soil type within the

development site from the dropdown list.

Cell B7: Choose the annual average rainfall the development will receive from the dropdown list. If

Cell B7: Choose the annual average rainfall the developer

the rainfall volume is not on the list, select the nearest value.

Cell

list.

### How to fill in the table 'Current land uses'

Cell A11: A27: Choose the existing (pre-development) land use to

Cell A11-A27: Choose the existing (pre-development) land use type(s) from the dropdown list

Cells B11-B27: Enter the area in hectares of each land use type.

The nutrient load from current land uses is shown in cells C11-C27 for to

The total nutrient load from current land uses is shown in cell C28 for TP.

### Current land use information

| Description of required information   | Data entry column - user inputs required |
|---------------------------------------|------------------------------------------|
| Operational catchment:                | Mease                                    |
| Soil drainage type:                   | impeded drainage                         |
| Annual average rainfall (mm):         | 650.1 - 675                              |
| Within nitrate vulnerable zone (NVZ): | Yes                                      |

### Current land uses

|                                  | Area (ha) - user inputs required | Annual phosphorus export (kg TP/yr) | Notes on data  |
|----------------------------------|----------------------------------|-------------------------------------|----------------|
| Greenspace                       | 0.45                             | 0.01                                | Not applicable |
| Commercial/industrial urban land | 0.36                             | 0.35                                | Not applicable |
|                                  |                                  | 0.00                                | Not applicable |
|                                  |                                  | 0.00                                | Not applicable |
|                                  |                                  | 0.00                                | Not applicable |
|                                  |                                  | 0.00                                | Not applicable |
|                                  |                                  | 0.00                                | Not applicable |
|                                  |                                  | 0.00                                | Not applicable |
|                                  |                                  | 0.00                                | Not applicable |
|                                  |                                  | 0.00                                | Not applicable |
|                                  |                                  | 0.00                                | Not applicable |
|                                  |                                  | 0.00                                | Not applicable |
|                                  |                                  | 0.00                                | Not applicable |
|                                  |                                  | 0.00                                | Not applicable |
|                                  |                                  | 0.00                                | Not applicable |
|                                  |                                  | 0.00                                | Not applicable |
|                                  |                                  | 0.00                                | Not applicable |
|                                  |                                  | 0.00                                | Not applicable |
| Totals:                          | 0.81                             | 0.36                                |                |

### Nutrients from future land use

This sheet contains one table.

**Note:** You will need to fill in cells A5 to A21 and B5 to B21. Cells B22 and C5 to C22 are automatically generated calculations and will state '0.00' unless the user inputs have been entered. Row 22 is a Total Row. The Total Row states 'Totals:' in cell A22 and automatically calculates the total sum of cells B5 to B21 in cell B22 and C5 to C21 in cell C22.

### How to fill in the table 'Future land uses'

Cells A5-A21: Choose the future (post-development) land use type(s) of landcover present on the new site from the dropdown list  
Cells B5-B21: Enter the area in hectares of each land use type.

The nutrient load from future land uses is shown in cells C5 to C21 for total phosphorus (TP).

The total nutrient load from future land uses is shown in cell C22 for TP.

## Future land uses

| New land use type(s) - user inputs required | Area (ha) - user inputs required | Annual phosphorus export (kg TP/yr) |
|---------------------------------------------|----------------------------------|-------------------------------------|
| Residential urban land                      | 0.66                             | 0.87                                |
| Greenspace                                  | 0.15                             | 0.00                                |
|                                             |                                  | 0.00                                |
|                                             |                                  | 0.00                                |
|                                             |                                  | 0.00                                |
|                                             |                                  | 0.00                                |
|                                             |                                  | 0.00                                |
|                                             |                                  | 0.00                                |
|                                             |                                  | 0.00                                |
|                                             |                                  | 0.00                                |
|                                             |                                  | 0.00                                |
|                                             |                                  | 0.00                                |
|                                             |                                  | 0.00                                |
|                                             |                                  | 0.00                                |
|                                             |                                  | 0.00                                |
|                                             |                                  | 0.00                                |
|                                             |                                  | 0.00                                |
|                                             |                                  | 0.00                                |
| Totals:                                     | 0.81                             | 0.87                                |

#### Nutrients from future land use after sustainable urban drainage system (SuDS) treatment

This sheet contains some table instructions.

**Note:** You will need to fill in cells A5 to A25, cells B5 to B20, cells C5 to C25, cells D5 to E29 and cells F5 to F29. If you are including SuDS to your landscape then you will need to enter values for cells B30 to B35 and cells C30 to G30. All automatically calculated values will state '0.00' unless the user inputs have been entered. Cells H5 to H20 are automatically generated and will state 'Not applicable' unless the total area of the landscape entered is larger than the total area of the landscaped entered into the worksheet. Nutrients, from\_furde\_land\_use, row 30 is a Total Row. The area of the landscaped entered into cells B5 to B20, cells C5 to B29 in cell B30, cells D5 to D29 in cell C30 and cells E5 to G29 in cell C30. Cell C30, cell E30, cell F30 and cell H30 are intentionally blank.

**How to fill in the table 'SuDS information'**

Cells A5 to A29: Enter the name of the SuDS feature and use type(s) of the landscape present on the new site within the SuDS catchment area from the dropdown list. Only landscapers entered into the worksheet titled 'Nutrients, from\_furde\_land\_use' can be entered.

Cells B5 to B29: Enter the area in hectares of each new land use type within the SuDS catchment area.

Cells C5 to C29: Enter the percentage of the flow entering the SuDS feature. If all flow is being diverted to the SuDS feature then this value should be set to 100%.

The annual total phosphorus (TP) loads associated with the landscapers in the SuDS catchment area are automatically calculated in cells D5 to D29.

Cells E5 to E29: Enter the name of the SuDS features used to intercept surface flows can be entered in. Any text can be entered into these cells. Cells F5 to F29: Enter the nutrient removal rates associated with the SuDS features for TP.

Values for column F must be identified by the user and must be specific to the SuDS features being implemented.

The annual TP load removed by the SuDS features are automatically calculated in cells G5 to G29. These values are subtracted from the nutrient budget.

You do not need to fill in column H. Notes on input: i) will state 'Not applicable' unless the total area of each landscaped within the SuDS catchment area exceeds the total area of the landscaped entered into the worksheet. The area of the landscaped entered into the worksheet is 'from\_furde\_land\_use'.

The total nutrient load removed through the SuDS features is shown in cell C30 for TP.

### SuDS information

[illegible]

## Final nutrient budgets

This worksheet contains one table. This table is automatically populated using the outputs from the previous worksheets.

**Note:** You do not need to fill in any cells in the table.

Cells B5 to B8 and cells B10 are automatically calculated and will state '0.00' unless the user inputs have been entered to all of the required worksheets.

Cells A11 to A14, cell B12 and cell B14 are automatically generated and will state 'Not applicable' depending on the user inputs to the worksheet 'Nutrients\_from\_wastewater'.

Cell B9, B11 and B13 are intentionally blank.

This table presents calculations that underpin the final annual nutrient budget for the development site. Up to 3 values for the nutrient budget may be presented in cells B10, B12 and B24 for total phosphorus (TP).

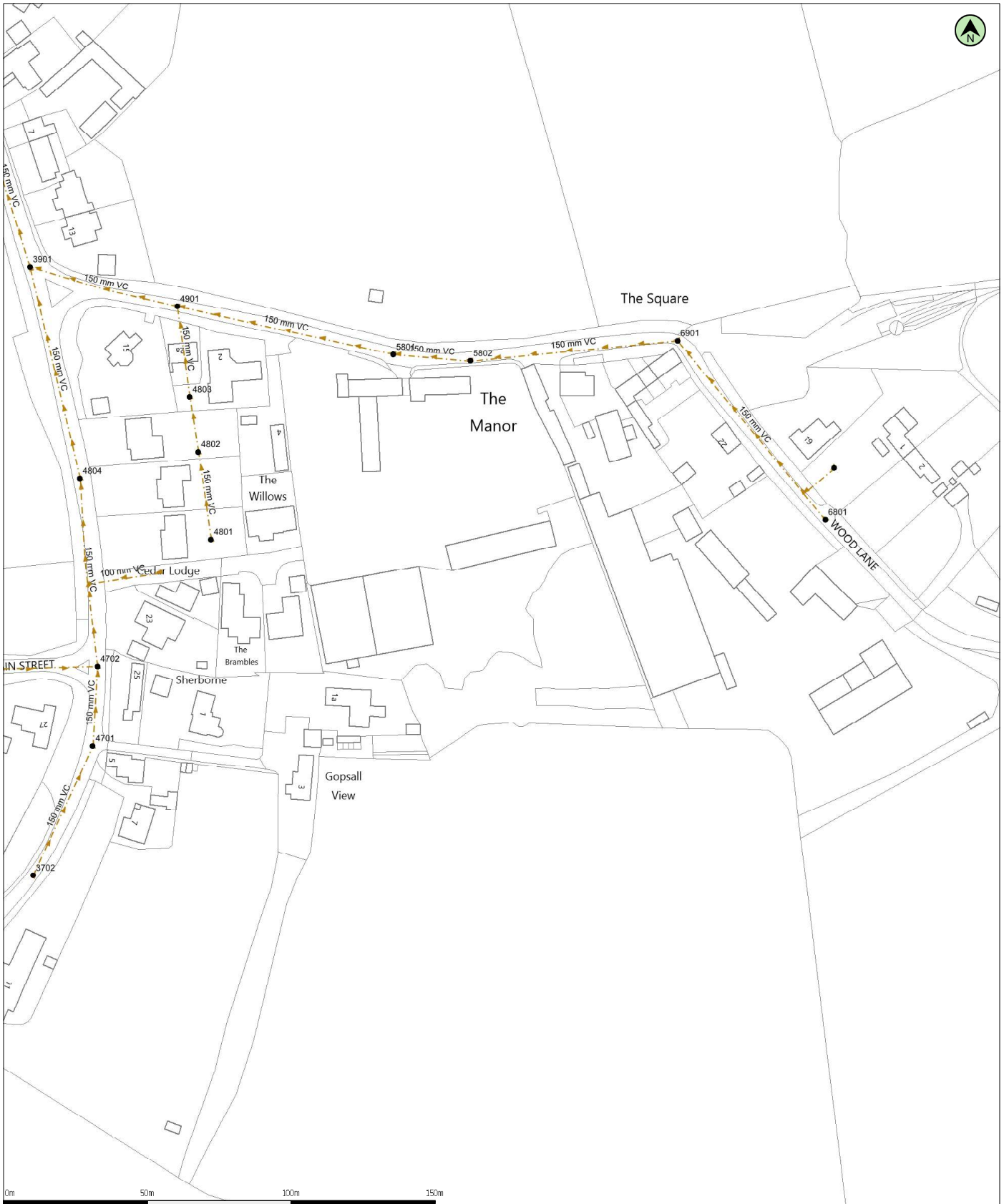
## Total nutrient budget calculations

| Description of values generated                             | Values generated |
|-------------------------------------------------------------|------------------|
| Wastewater TP load (kg TP/year):                            | 0.76             |
| Net land use TP change (kg TP/year):                        | 0.38             |
| TP budget:                                                  | 1.14             |
| TP budget + 20% buffer:                                     | 1.37             |
| <b>Annual nutrient budget</b>                               |                  |
| The total annual phosphorus load to mitigate is (kg TP/yr): | 1.37             |
| <b>Not applicable</b>                                       |                  |
| Not applicable                                              | Not applicable   |
| <b>Not applicable</b>                                       |                  |
| Not applicable                                              | Not applicable   |

## Appendix 2 – Statutory Undertaker Maps

*For convenience – press “Alt + Left Arrow” to return to the section of the report*





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Data updated: 14/12/24

Scale: 1:1250  
Map Centre: 432545.306814

Date: 07/01/25  
Our Ref: 1653380 - 3

Wastewater Plan A3  
Powered by digdat

|                                            |                        |                 |
|--------------------------------------------|------------------------|-----------------|
| Public Foul Gravity/Lateral Drain          | Highway Drain          | Manhole Foul    |
| Public Combined Gravity/Lateral Drain      | Overflow Pipe          | Manhole Surface |
| Public Surface Water Gravity/Lateral Drain | Disposal Pipe          | Abandoned Pipe  |
| Pressure Foul                              | Culverted Water Course | Chamber         |
| Pressure Combined                          | Pumping Station        |                 |
| Pressure Surface Water                     | Fitting                |                 |

|                           |
|---------------------------|
| oliver.allman@stantec.com |
| Twycross                  |
|                           |



Do not scale off this map. The plan and any information supplied with it is furnished as a general guide, is only valid at the date of issue and no warranty as to its correctness is given or implied. In particular this plan and any information shown on it must not be relied upon in the event of any development or works (including but not limited to excavations) in the vicinity of SEVERN TRENT WATER assets or for the purposes of determining the suitability of a point of connection to the sewerage or distribution systems. Reproduction by permission of Ordnance Survey on behalf of HMSO. ©Crown Copyright and database rights 2024. All rights reserved. Ordnance Survey licence number AC0000808122. Document users other than SEVERN TRENT WATER business users are advised that this document is provided for reference purpose only and is subject to copyright, therefore, no further copies should be made from it.

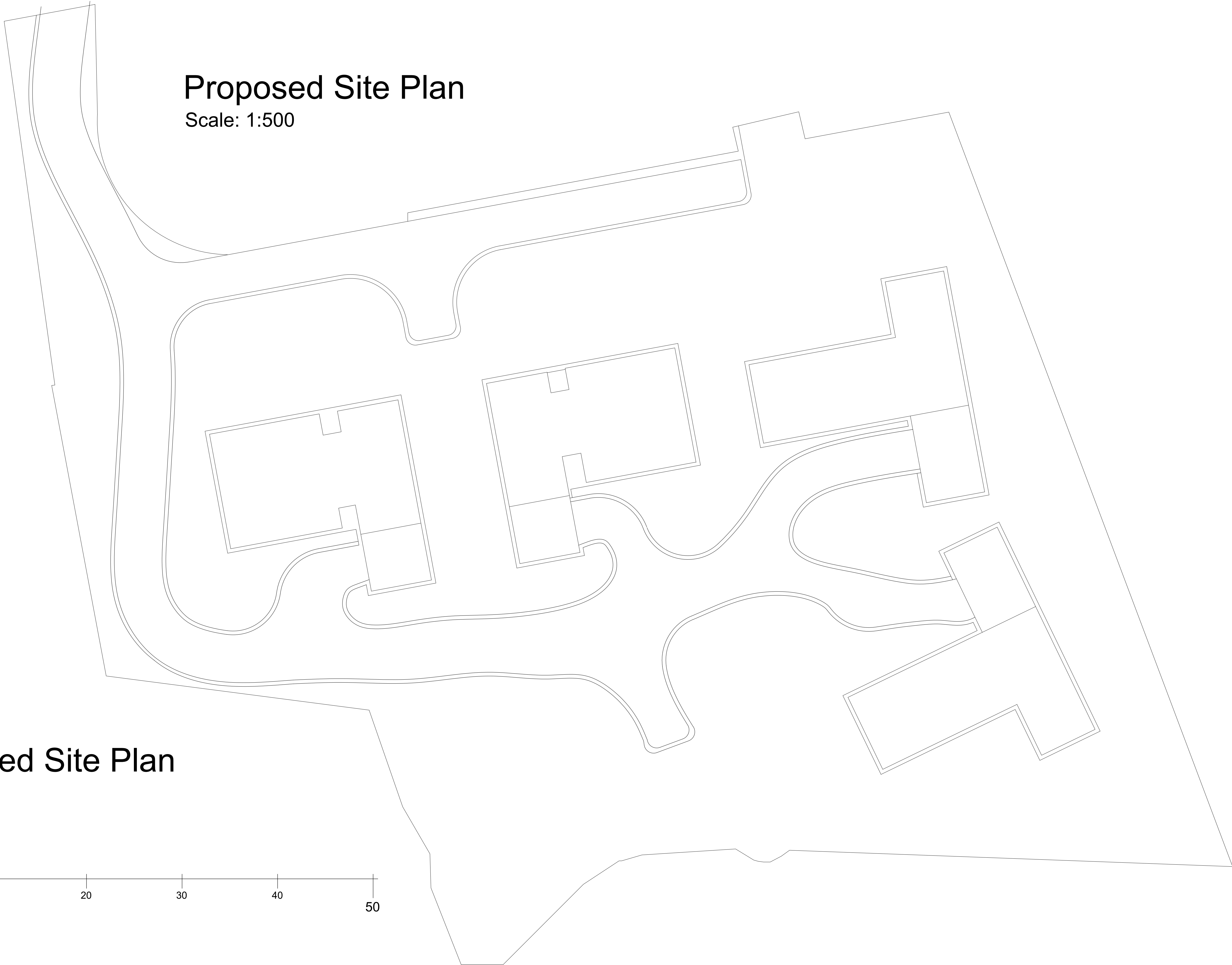
## Appendix 3 – Proposed Site Plan

*For convenience – press “Alt + Left Arrow” to return to the section of the report*



# Proposed Site Plan

Scale: 1:500



# Proposed Site Plan

Scale (m)



NOT TO SCALE

# Appendix 4 – SuDS Maintenance Requirements

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| Table A4.1 – SuDS Maintenance Requirements – Permeable Paving                                                                                                                 |                   |                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CIRIA C753 Maintenance Requirement                                                                                                                                            |                   |                                                                                                                                                                                      |
| Maintenance schedule                                                                                                                                                          | Typical Frequency | Required action                                                                                                                                                                      |
| Regular Maintenance                                                                                                                                                           | Annually          | Brushing and vacuuming (standard cosmetic sweep over whole surface)                                                                                                                  |
| Occasional Maintenance                                                                                                                                                        | As necessary      | Stabilise and mow contributing and adjacent areas.                                                                                                                                   |
|                                                                                                                                                                               | As necessary      | Removal of weeds                                                                                                                                                                     |
| Regular Maintenance                                                                                                                                                           | As necessary      | Remediate any landscaping which through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving                                              |
|                                                                                                                                                                               | As necessary      | Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material |
|                                                                                                                                                                               | Every 10-15 years | Rehabilitation of surface and upper substructure by remedial sweeping                                                                                                                |
| CIRIA C808 Maintenance Requirement                                                                                                                                            |                   |                                                                                                                                                                                      |
| It is unlikely that the permeable paving will be lifted to replace the subsurface layers. The only maintenance activity that is required is sweeping the surface when needed. |                   |                                                                                                                                                                                      |

| Table A4.2– SuDS Maintenance Requirements – Bioretention Systems |                                                                                                                                                                                                          |                   |
|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| CIRIA C753 Maintenance Requirement                               |                                                                                                                                                                                                          |                   |
| Maintenance schedule                                             | Required action                                                                                                                                                                                          | Typical Frequency |
| Regular inspections                                              | Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary. | Quarterly.        |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                    |                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Check operation of underdrains by inspection of flows after rain.                                                  | Annually.                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Assess plants for disease infection, poor growth, invasive species etc and replace as necessary.                   | Quarterly                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Inspect inlets and outlets for blockage.                                                                           | Quarterly                                                        |
| <b>Regular Maintenance</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Remove litter and surface debris and weeds.                                                                        | Quarterly (or more frequently for tidiness or aesthetic reasons) |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Replace any plants, to maintain planting density.                                                                  | As required                                                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Remove sediment, litter and debris build-up from around inlets or from forebays.                                   | Quarterly to biannually                                          |
| <b>Occasional Maintenance</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Infill any holes or scour in the filter medium, improve erosion protection if required.                            | As required                                                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch. | As required                                                      |
| <b>Remedial Actions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Remove and replace filter medium and vegetation above.                                                             | As required but likely to be > 20 years                          |
| <b>CIRIA C808 Maintenance Requirement</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                    |                                                                  |
| <p>Usually, maintenance of these devices simply includes scraping away any built-up sediment at the inlet or on the surface and litter picking. Vegetation may be harvested and pruned at the end of the growing season and devices may be weeded too. If the treatment media is included in the design, it is likely to become exhausted after a number of years and will need to be removed and replaced. This can be facilitated by locating in a basket near the inlet to the device. However, simple soil amendments to enhance P sorption typically do not increase bioretention maintenance needs.</p> |                                                                                                                    |                                                                  |

# Appendix 5 – SuDS Considerations

For convenience – press “Alt + Left Arrow” to return to the section of the report

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Table A5.1 – SuDS Considerations

| Consideration                                                                                                                                                                                                                       | Site Relevance                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Previous land use                                                                                                                                                                                                                   | Owing to the non-intensive use of the site, the site not believed to contain legacy phosphorus.                                        |
| The influent to the system or device must contain phosphorus in adequate levels to achieve the anticipated treatment. If the TP level in the influent is too low, then the anticipated level of treatment may not be met.           | The influent to the system will have adequate levels of phosphorus.                                                                    |
| Treatment flow rate or volume to be treated by the nutrient removal devices                                                                                                                                                         | To be covered within Civil Engineers Drainage Design.                                                                                  |
| TP removal by infiltration to the ground                                                                                                                                                                                            | N/A                                                                                                                                    |
| The SuDS management train should be designed to manage both particulate phosphorus and dissolved phosphorus. The design should demonstrate which of the devices capture particulate P, DP, or both and the quantity of TP captured. | The SuDS management train has been designed to manage particulate and dissolved phosphorus.                                            |
| The nature of treatment media and growth media in devices will have significant consequences for the level of phosphorus removal that the device can achieve.                                                                       | Treatment media will be selected to specifically capture phosphorus.                                                                   |
| DP is bioavailable and represents a significant concern for receiving water quality.                                                                                                                                                | Components have been selected to reduce both DP and PP.                                                                                |
| Maintenance requirements of new, innovative treatment devices cannot always be defined so regular inspection and monitoring may be needed until adequate data and experience is gathered.                                           | SuDS measures deployed on-site are well studied, however they will need to be monitored and regularly inspected to ensure performance. |
| Routine maintenance of SuDS devices to remove sequestered forms of phosphorus before they become bioavailable again is a critical factor in effective phosphorus removal (Clary et al, 2020)                                        | SuDS will be maintained in accordance with CIRIA C753 and CIRIA C808.                                                                  |

|                                                                                                                                                                                           |                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| If maintenance requires removal of vegetation, it must be removed from site and has the potential to be used as commercial or municipal compost feed.                                     | SuDS will be maintained in accordance with CIRIA C753 and CIRIA C808.                                                                               |
| Runoff from surrounding land                                                                                                                                                              | Drainage from surrounding land will not enter SuDS treatment train.                                                                                 |
| Capture or by-pass large rainfall events for sedimentation devices.                                                                                                                       | Civil Engineering Drainage Plan will include exceedance paths for large storm events, in order to not 'flush' and resuspend particulate phosphorus. |
| Sustainability of materials.                                                                                                                                                              | The treatment media is quarried stone, which would have otherwise been installed if the development were not affected by nutrient neutrality.       |
| Effectiveness of 2 <sup>nd</sup> and 3 <sup>rd</sup> devices needs to be considered carefully.                                                                                            | Devices factored accordingly.                                                                                                                       |
| Despite this process being for the reduction of phosphorus pollution, the SuDS management train should still satisfy the requirement of CIRIA C753 and deliver all four 'Pillars of SuDS' | The proposed SuDS are designed to enhance water quality and reduce flood risks by minimising surface water runoff.                                  |
| Sediment capture upstream of ponds, basins and wetlands.                                                                                                                                  | N/A                                                                                                                                                 |

# Appendix 6 – SuDS Removal Calculations

*For convenience – press “Alt + Left Arrow” to return to the section of the report*



| Treatment train        |             |                   |                  |          | A                |             |
|------------------------|-------------|-------------------|------------------|----------|------------------|-------------|
| Particulate Phosphorus |             |                   |                  |          |                  |             |
| Initial PP             | Notation    | PP removal        |                  | Notation | Final PP removal | Notation    |
| 55.00%                 | ip1         | Bioretention zone | 44.00%           | pp1      | 44.00%           | fp1=pp1     |
| 11.00%                 | ip2=ip1-fp1 | Porous pavement   | 19.50%           | pp2      | 2.15%            | fp2=ip2*pp2 |
| 8.86%                  | ip3=ip2-fp2 |                   |                  | pp3      |                  | fp3=ip3*pp3 |
|                        | ip4=ip3-fp3 |                   |                  | pp4      |                  | fp4=ip4*pp4 |
|                        | ip5=ip4-fp4 |                   |                  | pp5      |                  | fp5=ip5*pp5 |
|                        |             |                   | Total PP removal |          | 46.15%           |             |

| Treatment train      |             |                   |                  |          | A                |             |
|----------------------|-------------|-------------------|------------------|----------|------------------|-------------|
| Dissolved Phosphorus |             |                   |                  |          |                  |             |
| Initial DP           | Notation    | DP removal        |                  | Notation | Final DP removal | Notation    |
| 45.00%               | id1         | Bioretention zone | 0.00%            | dp1      | 0.00%            | fd1=dp1     |
| 45.00%               | id2=id1-fd1 | Porous pavement   | 0.00%            | dp2      | 0.00%            | fd2=id2*dp2 |
| 45.00%               | id3=id2-fd2 |                   |                  | dp3      |                  | fd3=id3*dp3 |
|                      | id4=id3-fd3 |                   |                  | dp4      |                  | fd4=id4*dp4 |
|                      | id5=id4-fd4 |                   |                  | dp5      |                  | fd5=id5*dp5 |
|                      |             |                   | Total DP removal |          | 0.00%            |             |

| Treatment train                                      | A      |
|------------------------------------------------------|--------|
| Final Total Phosphorus removal (Total DP + Total PP) | 46.15% |

| SuDS Components       |        |        |
|-----------------------|--------|--------|
| Components            | DP     | PP     |
| Interception          | 41.00% | 34.00% |
| Swale                 | 28.00% | 0.00%  |
| Detention basin       | 28.00% | 5.00%  |
| Retention basin       | 28.00% | 23.00% |
| Pond                  | 39.00% | 23.00% |
| Floating wetland      | 39.00% | 0.00%  |
| Bioretention zone     | 44.00% | 0.00%  |
| Tree pit              | 44.00% | 0.00%  |
| Filter strip          | 22.00% | 0.00%  |
| Filter drain          | 22.00% | 0.00%  |
| Willow bed            | 55.00% | 45.00% |
| Porous pavement       | 39.00% | 0.00%  |
| Vortex grit separator | 28.00% | 0.00%  |
| Oil water separator   | 28.00% | 0.00%  |
| Stormwater filter     | 44.00% | 41.00% |
| Granular media        | 44.00% | 41.00% |
| Rainwater capture     | 55.00% | 45.00% |

| Treatment train        |             |                 |                  |          | A                |             |
|------------------------|-------------|-----------------|------------------|----------|------------------|-------------|
| Particulate Phosphorus |             |                 |                  |          |                  |             |
| Initial PP             | Notation    | PP removal      |                  | Notation | Final PP removal | Notation    |
| 55.00%                 | ip1         | Porous pavement | 39.00%           | pp1      | 39.00%           | fp1=pp1     |
| 16.00%                 | ip2=ip1-fp1 |                 |                  | pp2      |                  | fp2=ip2*pp2 |
|                        | ip3=ip2-fp2 |                 |                  | pp3      |                  | fp3=ip3*pp3 |
|                        | ip4=ip3-fp3 |                 |                  | pp4      |                  | fp4=ip4*pp4 |
|                        | ip5=ip4-fp4 |                 |                  | pp5      |                  | fp5=ip5*pp5 |
|                        |             |                 | Total PP removal |          | 39.00%           |             |

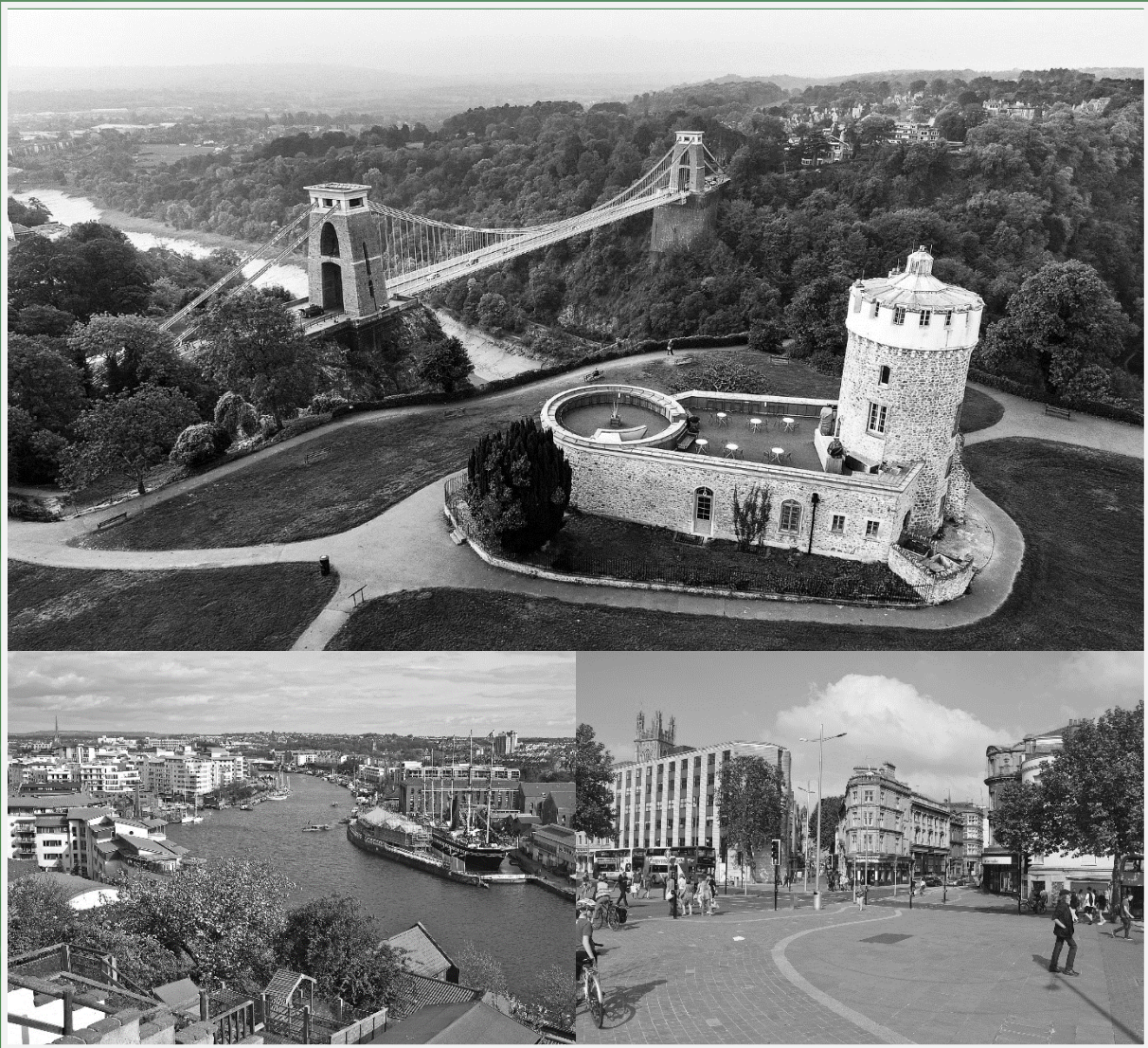
| Treatment train      |             |                 |                  |          | A                |             |
|----------------------|-------------|-----------------|------------------|----------|------------------|-------------|
| Dissolved Phosphorus |             |                 |                  |          |                  |             |
| Initial DP           | Notation    | DP removal      |                  | Notation | Final DP removal | Notation    |
| 45.00%               | id1         | Porous pavement | 0.00%            | dp1      | 0.00%            | fd1=dp1     |
| 45.00%               | id2=id1-fd1 |                 |                  | dp2      |                  | fd2=id2*dp2 |
|                      | id3=id2-fd2 |                 |                  | dp3      |                  | fd3=id3*dp3 |
|                      | id4=id3-fd3 |                 |                  | dp4      |                  | fd4=id4*dp4 |
|                      | id5=id4-fd4 |                 |                  | dp5      |                  | fd5=id5*dp5 |
|                      |             |                 | Total DP removal |          | 0.00%            |             |

| Treatment train                                      | A      |
|------------------------------------------------------|--------|
| Final Total Phosphorus removal (Total DP + Total PP) | 39.00% |

| SuDS Components       |        |        |
|-----------------------|--------|--------|
| Components            | DP     | PP     |
| Interception          | 41.00% | 34.00% |
| Swale                 | 28.00% | 0.00%  |
| Detention basin       | 28.00% | 5.00%  |
| Retention basin       | 28.00% | 23.00% |
| Pond                  | 39.00% | 23.00% |
| Floating wetland      | 39.00% | 0.00%  |
| Bioretention zone     | 44.00% | 0.00%  |
| Tree pit              | 44.00% | 0.00%  |
| Filter strip          | 22.00% | 0.00%  |
| Filter drain          | 22.00% | 0.00%  |
| Willow bed            | 55.00% | 45.00% |
| Porous pavement       | 39.00% | 0.00%  |
| Vortex grit separator | 28.00% | 0.00%  |
| Oil water separator   | 28.00% | 0.00%  |
| Stormwater filter     | 44.00% | 41.00% |
| Granular media        | 44.00% | 41.00% |
| Rainwater capture     | 55.00% | 45.00% |

# ISO 19650 Filing Notation

|                              |                                                |
|------------------------------|------------------------------------------------|
| <b>Project</b>               |                                                |
| 0XXX                         | Project Number                                 |
| <b>Originator</b>            |                                                |
| ENV                          | Enviren                                        |
| <b>Functional Breakdown</b>  |                                                |
| S1                           | Planning submission                            |
| S2                           | Technical submission                           |
| S3                           | Construction Information                       |
| S4                           | As built details                               |
| <b>Spatial Breakdown</b>     |                                                |
| SW                           | Southwest                                      |
| EE                           | East of England                                |
| SE                           | South East                                     |
| WM                           | West Midlands                                  |
| EM                           | East Midlands                                  |
| YO                           | Yorkshire                                      |
| NW                           | North West                                     |
| NE                           | North East                                     |
| LO                           | London                                         |
| OT                           | Other                                          |
| <b>Form</b>                  |                                                |
| DR                           | Drawing                                        |
| GR                           | Diagram                                        |
| TR                           | Textual Report                                 |
| <b>Discipline (relevant)</b> |                                                |
| C                            | Civil Engineering                              |
| E                            | Environmental Engineering                      |
| G                            | Ground Engineering                             |
| O                            | Other Discipline                               |
| T                            | Town and Country Planning and Building Control |
| W                            | Water Engineering                              |
| Z                            | Multiple Discipline                            |
| <b>Number</b>                |                                                |
| 000X                         | Report number                                  |



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