



Wormald Burrows Partnership Limited
Civil Engineering Consultants

HOUSING DEVELOPMENT
WALPOLE FARM, STANSTED MOUNTFITCHET
SUDS MAINTENANCE PLAN

SEPTEMBER 2015

E3273-maintenance-plan-rev0



12a – 18a Hitchin Street Biggleswade, SG18 8AX

Web: <http://www.wormburp.com>

Tel: (01767) 317 244 Fax: (01767) 325 434

Email: engineer@wormburp.com

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Client: Bloor Homes/Martin Grant Homes.
Engineer: Wormald, Burrows Partnership Limited
12a – 18a Hitchin Street
Biggleswade
Bedfordshire SG18 8AX
Tel: (01767) 317 244
Fax (01767) 315 434

Date: September 2015

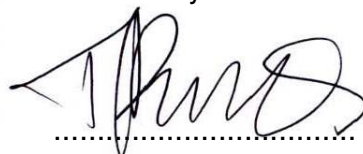
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Written By:



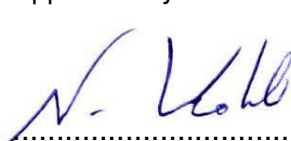
Tim Burrows
Associate Director

Checked By:



Tim Burrows
Associate Director

Approved By:



Nick Kohli
Director

Status: Final

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Flood Attenuation Maintenance Plan

FLOOD ATTENUATION AND LANDSCAPE MANAGEMENT PLAN: HOUSING DEVELOPMENT AT WALPOLE FARM, STANSTEAD MOUNTFITCHET.

1.0 Introduction to Flood Attenuation Systems

Flood Attenuation is an environmentally friendly approach to managing rainfall that uses landscape features to deal with surface water. The implementation of flood attenuation at Walpole Farm aims to:

- Control the flow, volume and frequency of water entering and leaving a development area
- Provide attractive surroundings for the community
- Reduce the incidence of flooding downstream of the current site
- Create opportunities for wildlife

2.0 Flood Attenuation at Walpole Farm, Stansted Mountfitchet.

The proposed drainage network has been modelled and it has been shown that the greatest benefit is to be derived from the new residential development proposals by regulating the development flows into Ugley Brook.

Stormwater flows currently enter Ugley Brook via a network of land drainage pipes and ditches, these flows, combined with upstream flows, then pass through two brick arch culverts crossing under Cambridge Road and High Lane respectively before progressing, via a ditch system, to the outskirts of Stansted Mountfitchet village where they then enter a culverted system part way along Gail End Road, prior to ultimately discharging into Stansted Brook.

The proposed drainage system is designed to regulate incoming flows generated from the development site, to prevent flooding of the future housing development at Walpole Farm and particularly to control the flow of water exiting the site, using attractive landscape features.

- Surface water will be collected from the site and conveyed to the retention pond system via a traditional piped network along with a series of swales/ditches and filter drains where site layout allows.
- To control the extreme flood event flows, 3 large linked Flood Retention Ponds will regulate flows exiting the site to a sustainable level. A hydrobrake flow control device will be employed to control flows at the outfall at an agreed rate.

- The Flood Retention Ponds are 'wet' ponds, designed to provide habitat for a wide variety of fauna and flora as well as providing a waterbody feature to enhancing the setting of the housing development.
- Downstream of the site outfall a 'Stilling' pond will be constructed which will slow flow velocities from upstream allowing for solids and sediment to settle, thus further improving water quality not only from flows from the proposed development but also to those originating from upstream.
- Safety is of paramount importance and, for that reason, as well as providing suitable planting and growing conditions, a 0.75 metre wide horizontal shelf will be formed around the perimeter of the water body, 20 cm below the standing water level; this will allow reeds, rushes and other planting to establish and this planting will mask the edge of the pond. Inside of the shelf, the base of the pond will gently fall away at a gradient of 1:4 towards the centre, with the lowest part of the pond set around 1.5 metres below standing water level. As reeds will not grow at water depths in excess of one metre or so, the centre of the pond will remain as an open water body, clear of reed growth.

3.0 Managing the Flood Attenuation Controls

Flood Attenuation at the Walpole Farm housing development has been designed for easy maintenance and will comprise:

- Regular month to month care - litter collection, grass cutting and checking the inlets and outlets where water enters or leaves the Flood Relief Pond into Ugley Brook.
- Occasional tasks - managing pond vegetation and removing any silt that builds up in the ponds, stilling pond and connecting watercourses.
- Remedial work - repairing damage where necessary

Other than this, it is not anticipated that the works will cause undue expenditure into the future.

A typical flood retention pond is illustrated below, showing reed growth that has only established around the perimeter of the pond. This photograph is of a recent development designed by the Wormald Burrows Partnership Ltd. at Cranfield, Bedfordshire, taken 3 years after construction of the pond.



4.0 Walpole Farm Housing Development Flood Attenuation Management

4.1 Watercourses

Watercourses are to be kept clear of obstructions and they will require periodic inspection throughout the year to ensure that they are maintained in a clean and tidy condition, with all litter, rubbish and material that could possibly cause obstruction to flow being removed off site.

At less frequent intervals, maintenance and de-silting operations should be undertaken, with the object of maintaining the capacities of the watercourses.

The locations of the watercourses are shown on **E3112/1/A** in **Appendix A**.

ACTION:

- *Undertake monthly inspections of the northern watercourse and College Brook and remove off site all litter, rubbish and material that could possibly cause obstruction to flow.*
- *At annual intervals undertake inspections of each of the watercourses to establish the extent to which siltation has occurred and determine whether this will have materially reduced the capacity of the watercourse to carry the anticipated flows.*
- *Excavate silt and plant growth throughout the main channel and, depending on location, quantity and content, either spread on the adjacent banks or cart off site.*

4.7 Flood Retention and Stilling Ponds

As previously described, the Flood Retention Ponds will develop wetland vegetation around its edge, with the centre of the pond remaining clear of reeds.

This state will continue for many years, until such time as there is a sufficient build-up of silt and decayed vegetation in the base of the pond that reduces the water depth to a metre or so, that allows the reeds to grow towards the centre of the pond. If siltation is allowed to continue without its occasional removal, this will reduce the area of open water and adversely impact on the visual amenity provided by the pond. The design of the flood control mechanism is such that, if the pond is not maintained over a much extended period of time, siltation will not adversely affect the functioning of the pond as a Flood Retention feature; however, it is strongly recommended that the pond is maintained as follows:

ACTION:

- *Undertake an inspection of the ponds at 5 yearly intervals to assess the degree of silt build-up. In the event that the area of clear water is significantly reduced, the depth of water between the standing water level and the top of silt should be surveyed. If the clear water depth is less than 1.2 metres, taken at a distance of 15 metres from the pond wall, then the pond should be de-silted to reinstate the original design dimensions of the pond base.*
- *De-silting should be carried out during a period of low rainfall, at a time that it can be anticipated that major storms will not occur. It should always be noted that the pond will fill up rapidly over a period of a few hours in the event that a critical storm occurs. The work would be*

best undertaken during late summer, possibly August or September, removing silt and vegetation from site.

4.8 Flood Control

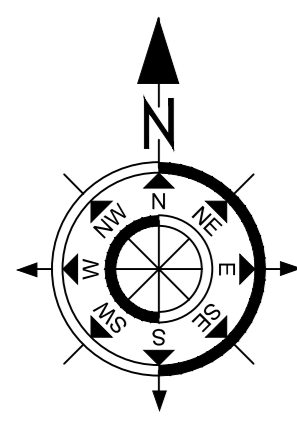
The outlet from the Flood Control Ponds is at the North-eastern end of the ponds and discharges into the Stilling Pond; the outlet consists of a weed control weir, hydrobrake chamber, 300mm diameter pipe.

ACTION:

- At quarterly intervals, undertake checks on the outlet from the pond and ensure that the hydrobrake chamber and end of the pipe is clear of weed growth and silt; also that the other end of the pipe where it outfalls into the stilling pond. Particular note should be made of the length of pipe between inlet and outlet and that it is clear of silt and debris. Remove accumulated vegetation and rubbish off site.*
- At annual intervals and following extreme storm events, undertake an assessment of the structural integrity of the control and and repair as necessary.*

APPENDICES

APPENDIX A



Existing 900mmØ
culvert to be removed.
New drainage channel
extended as shown

Final route of
pumped rising main
to be confirmed by
Thames Water

Existing 1250x650mm
culvert to be extended
to facilitate road widening

Proposed outfall restricted
to green field discharge
QBAR = 33.10/s

Total Flood storage
volume ≈ 1700m³

Proposed rising
main route

Existing pipe
diverted to
new ditch

Drainage Key

- Pipes**
- Proposed Adoptable Foul Water Sewer
 - Proposed Adoptable Surface Water Sewer
 - Existing Pipes
 - Swale, Ditch or Filter Strip
- Manholes**
- Proposed Adoptable Type A or Type B Manhole
 - Proposed Flow Control Manhole

Rev.	Description	Date	Drawn By	Checked By
A	Site Layout Updated, drainage amended to suit.	01/09/15	TJB	NK

PRELIMINARY

Written dimensions to be taken. Do Not Scale off the drawing.
Any discrepancies, written or scaled, should be brought to the attention of the engineer immediately.
This drawing is to be read in conjunction with the relevant Bills of Materials and the Local Authority Specification.
All relevant information identifying the unavoidable risks has been passed to the planning supervisor for inclusion in the Health and Safety plan.
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 **Wormald Burrows Partnership Limited**
Civil Engineering Consultants
134 The Horns Street, Epping, Essex, SS16 3BA
Tel: (01787) 317244 Fax: (01787) 315434
Web: www.wbpartnership.com
Email: enquire@wbpartnership.com



Project: **Stansted Mountfitchet Walpole Farm**

Drawing Description: **Drainage Strategy Plan**

Client: **BLOOR HOMES**
Drawing Number: **E3112/1/A**

Scale: **1:500 @A0**

Drawn By: **DTK** Checked By: **ST**
Date: **21.05.13** Date: **23.05.13**

Certified by Afnor UK



APPENDIX B

FLOOD ATTENUATION AND LANDSCAPE MAINTENANCE – SUMMARY

REGULAR MAINTENANCE

1	LITTER MANAGEMENT	
1.1	Pick up all litter in flood attenuation, watercourse and Landscape areas and remove from site	12 visits monthly
2	GRASS MAINTENANCE (– all cuttings to wildlife piles)	
2.1	Mow all grass verges, paths and amenity at 35-50mm with 75mm max. Leaving grass in situ	As required or monthly
2.2	Mow all margins to channels and other water features at 75mm with 100mm max. as wildflower areas	4-8 visits as required Annually
2.3	Wildflower areas strimmed to 50mm in Sept or at end of school holidays Or Wildflower areas strimmed to 50mm on 3 year rotation 30% each year	1 visit annually 1 visit annually
3	INLETS AND OUTLETS	
3.1	Inspect monthly, remove silt from slab aprons and debris. Strim 1m round for access	12 visits monthly
4	HARD SURFACES	
4.1	Sweep all paving regularly and in autumn after leaf fall.	1 visit

OCCASIONAL TASKS

5	INSPECTION AND CONTROL CHAMBERS	
5.1	Annual inspection, remove silt and check free flow	1 visit
6	WETLAND AND POND VEGETATION	
6.1	Wetland vegetation to be cut at 100mm on 3 – 5 year rotation. 30% each year. All cuttings to be removed to wildlife piles or from site.	As required
7	SILT MANAGEMENT	
7.1	Inspect pond, annually to assess silt accumulation	1 visit

7.2	Excavate silt, stack and dry within 10m of the water feature, but outside the design profile where water flows; spread, rake and overseed or cart off-site, depending upon quantity.	As required
8		
NATIVE PLANTING		
8.1	Remove lower branches where necessary to ensure good ground cover to protect soil profile from erosion.	1 visit annually
9		
REMEDIAL WORK		
	Inspect Flood attenuation system regularly to check for damage or failure. Undertake remedial work as required.	As required

APPENDIX C

MAINTENANCE SCHEDULE

1.0 GENERAL REQUIREMENTS

Maintenance activities comprise

- Regular Maintenance
- Occasional Tasks
- Remedial Work

Generally

Frequency

Litter

Collect all litter or other debris and remove from site at each site visit.

Monthly

- Avoid** use of weedkillers and pesticides to prevent chemical pollution
- Avoid** de-icing agents wherever possible to allow bio-remediation of pollutants in permeable surfaces.
- Protect** all permeable, porous and infiltration surfaces from silt, sand, mulch and other fine particles.

2.0 FILTER STRIPS AND SWALE TO CENTRAL AREA AND GREEN SPACE

- **Filter strips** are grass verges next to hard surfaces that allow runoff to flow through vegetation, thereby removing silt and pollution.
- **Swales** are linear, flat bottomed grassed or vegetated channels that convey water from one place to another which can also store water and allow it to soak into the ground.

FILTER STRIPS AND SWALES

Regular Maintenance

Frequency

Grass

Mow amenity grass access paths and verges surrounding swales and filter strips at 35-50mm minimum and 75mm maximum or as specified.

Monthly or as required

Mow filter strips and swales at 100mm with 150mm maximum to filter and control runoff in normal grass swales removing first and last cut in season if grass is longer than 150mm removing cuttings to wildlife piles on site.

Monthly or as required

Where marsh or wetland develops in the swale due to wet conditions then cut annually, or as required, at 100mm removing cuttings to wildlife piles on site

Annual or as required

Occasional Tasks

Where there is a build-up of silt on the filter strip, swale, under-drained swale or at inlets, i.e. 50mm or more above the design level, then remove and spread on site. Undertake when ground is damp in autumn or early spring and transplant turf and overseed to original design levels.

As required

Spread excavated material on site above top water level design profile, e.g. top of banks, in accordance with E.A. Waste Exemption Guidance.

Remedial Work

All damage to be made good to design profile unless there is a design flaw.

As required

3.0 FLOOD ATTENUATION POND and WETLAND

□ **Flood attenuation ponds** are depressions in the ground that store water. Water levels rise after rain and then drop to the normal level as the excess soaks into the ground or is released slowly to a watercourse or drain. Some water is often held back in a pond or wetland for final 'polishing' treatment or amenity interest.

□ **Wetlands** are mainly aquatic vegetation around the periphery of the pond.

PONDS AND WETLANDS

Regular Maintenance

Grass

Mow grass access paths and verges surrounding basins, ponds and wetlands areas at 35mm-50mm minimum and 75mm maximum or as specified to provide a cared for appearance and allow pedestrian access.

Frequency

Monthly or as required

Mow rough grass areas for occasional access or habitat reasons at 100mm and maximum 150mm with cuttings removed to wildlife piles

As required 4-6 times annually

Grass areas not required for access may be managed for wildlife interest and to reduce costs.

Annually or as required

2 cuts in July and September or 1 cut annually in September or October as specified and cuttings removed to wildlife piles.

Wetland vegetation

Cut (strim) at 100mm with cuttings removed to wildlife piles September - October or

Annually or as required

Maintain as a mosaic to be cut 25-30% in any one year at 100mm in September or October with cuttings removed to wildlife pile.

Where silt accumulates on apron or area in front of inlet or outlet then remove and land apply within design profile of water feature.

Where silt accumulates more than 150mm in base of wetland undertake a phased removal of silt subject to Client approval.

Confirm whether a liner is present to hold water or prevent pollution of groundwater and protect.

Remove silt as instructed but not more than 30% of pond or wetland area at any one time and to an agreed depth but not subsoil layer.

Annually or every 3 years as required

Retain as much representative existing vegetation as possible to ensure rapid re-colonisation of open areas.

Spread excavated material on site above design profile, e.g. top of banks, in accordance with E.A. Waste Exemption Guidance.

Remedial work

Although not usually required this may be needed due to damage to liners or control structures.

Frequency

Undertake as design details or as required

4.0 INLETS, OUTLETS, CONTROLS, AND INSPECTION CHAMBERS

□ **Inlets and outlets structures** may be surface structures or conveyance pipes with guards or headwalls. They must be free from obstruction at all times.

□ **Flow control structures** can be protected orifices, slots weirs or other controls at or near the surface to be accessible and easy to maintain. They may be in baskets, in small chambers or in the open.

□ **Inspection Chambers** and rodding eyes are used on bends or where pipes come together and allow cleaning of the system if necessary. They will have been designed out of the system where possible.

INLETS, OUTLETS, CONTROLS AND INSPECTION CHAMBERS

Regular Maintenance

Inlets, outlets and surface control structures

Inspect surface structures removing obstructions and silt as necessary.

Check there is no physical damage.

Strim vegetation 1m min. surround to structures and keep hard aprons free from silt and debris

Frequency

Monthly

Monthly

Inspection chambers and below ground control chambers

Remove cover and inspect ensuring water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt.

Undertake inspection after leaf fall in autumn

Annually

Occasional Maintenance

Check topsoil levels are 20mm above edges of baskets and chambers to avoid mower damage

As

necessary

Remedial work

Unpack stone in basket features and unblock or repair and repack stone as design detail as necessary.

As required

Repair physical damage if necessary.

As required

5.0 OVERFLOWS AND FLOOD ROUTES

□ **Overflows** are overland across weirs, through gratings or within chambers and must be kept clear at all times to protect areas from flooding. They allow onward flow when part of the flow control system is blocked.

□ **Flood routes (exceedance routes)** allow water volumes that exceed the capacity of the flow control system to pass through or round the site without causing damage to property. These routes must be clear of obstructions at all times.

OVERFLOWS AND FLOOD ROUTES

Regular Maintenance

	Frequency
Overflows. Jet pipes leading from overflow structures annually and check by running water through the overflow. Check free flow at next water feature – inlet to basin or chamber.	Annually
Overflows. Remove any accumulated grass cuttings or other debris on top of grass weirs or stone filled baskets overflows.	Monthly
Flood Routes. Make visual inspection. Check route is not blocked by new fences, walls, soil or other rubbish. Remove as necessary.	Monthly

Remedial

Overflows. If overflow is not clear then dismantle structure and reassemble to design detail.	As required
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6.0 ORNAMENTAL PLANTING AND EXISTING VEGETATION

□ **Ornamental Trees** - All ornamental planting to be kept weed free and pruned using secateurs to keep the shrubs to an agreed and reasonable size.

□ **Native Trees and Shrubs** – All native planting to be allowed to grow freely removing overhanging branches as required.

PLANTING AND EXISTING VEGETATION - Review

Regular Maintenance

Grass maintenance

Amenity Grass - Mow all grass verges, paths and amenity grass at 35-50mm with 75mm max.

Frequency

16 visits

All cuttings to remain in situ

Rough grass – Mow at 75-100mm but not to exceed 150mm

4 - 8 visits

All cuttings to wildlife piles

Wildflower areas strimmed to 50mm in Sept-Oct , or

1 visit

Wildflower areas strimmed to 50mm July and Sept, or

2 visit

Wildflower areas strimmed to 50mm on 3 year rotation 30% each year

1 visit

All cuttings to wildlife piles

Ornamental tree & shrub planting.

4 visits

Weed all shrub beds as detailed spec as necessary.

Cut back planting from lights, paths and visibility sight lines in late autumn and as necessary.

Cut hedges slightly tapered back from base with flat top at specified height.

Do not mulch planting adjacent to permeable/ porous paving surfaces.

Remove stakes and ties from trees when no longer needed for support and within 3 years of planting.

Protect from strimmer damage and remove competitive growth until well established.

Native trees & shrub planting.

1 visit

Prune to shape in year 1.

Protect trees from strimmer damage and remove competitive growth until well established.

Remove stakes and ties from trees when no longer needed for support and within 3 years from planting.

Existing trees

1 visit

Check existing trees for safety.

Replace trees and shrubs which fail in the first five years after planting.

Carry out tree surgery as necessary.

7.0 SPILLAGE – EMERGENCY ACTION

Most spillages on development sites are of compounds that do not pose a serious risk to the environment if they enter the drainage in a slow and controlled manner with time available for natural breakdown in a treatment system. Therefore small spillages of oil, milk or other known organic substances should be removed where possible using soak mats as recommended by the Environment Agency with residual spillage allowed to bio-remediate in the drainage system.

In the event of a serious spillage, either by volume or of unknown or toxic compounds, then isolate the spillage with soil, turf or fabric and block outlet pipes from chamber(s) downstream of the spillage with a bung(s). (A bung for blocking pipes may be made by wrapping soil or turf in a plastic sheet or close woven fabric.)

Contact the Environment Agency immediately.

8.0 QUERIES REGARDING DESIGN FEATURES.

In the event questions arising in respect of the drainage design for the new housing development at the Walpole Farm site, or in relation to flood control design features, contact Wormald Burrows Partnership Ltd.

Civil Engineering Consultants,
12A – 18A, Hitchin Street,
Biggleswade,
Bedfordshire,
SG18 8AX.

Tel: (01767) 317244 Fax: (01767) 315434

Email tim@wormburp.com