Woodside Link

Flood Risk Assessment

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# Executive Summary

<table>
<thead>
<tr>
<th>Proposals</th>
<th>Central Bedfordshire Council propose to construct a new link road, called the Woodside Link, between the Woodside Industrial Estate at Park Road North and a proposed new junction (11A) on the M1. The project is located within and to the east of Houghton Regis. The proposal also includes a new connection from Parkside Drive to the Woodside Link. The proposed road runs through the flood plain of the Houghton Brook, potentially crossing the brook at three locations towards the South West of the scheme and again after it turns north towards the M1 junction. It is proposed to reduce the need for two of these crossings on the line of the new road by diverting Houghton Brook to the northern side of the road. Two new structures will cross the Houghton Brook, one on the main road and one on the Parkside Drive link. Full details of the project proposals drawings are included in Appendix A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood Risk Assessment</td>
<td>An existing EA approved hydraulic model has been adapted and amended for the purposes of identifying fluvial flood risk in the Woodside Link area. The area is identified as Zone 2 flooding on the Environment Agency Flood Map; Zone 2 being defined as a flood risk between the 100 and 1,000 year return period (probability between 1% and 0.1%). The output from the hydraulic modelling study indicates that there is no increase in flood risk as a result on the proposed highway for the 5%, 1% and 1% + CCA events. During the extreme 0.1% (1 in 1000 year) AEP event there is a local increase in water levels upstream of the new Houghton Brook crossing, this is quickly dissipated and does not increase flood risk to any surrounding properties. There is negligible flood risk from other sources.</td>
</tr>
<tr>
<td>Site Drainage</td>
<td>The surface water runoff from the road will be increased due to the impermeable area proposed, but this will be mitigated by the provision of new highway drainage and attenuation ponds with flow rates reduced to match existing greenfield rates.</td>
</tr>
<tr>
<td>Flood Risk Management</td>
<td>As the proposed road in this area is on an embankment the flood risk to the road is negligible.</td>
</tr>
<tr>
<td>Conclusions</td>
<td>It is concluded that there is no increase in flood risk above the existing situation as a result of the road construction. Surface water flooding can be managed through appropriate design.</td>
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1. Introduction

1.1. Purpose of report

1.1.1. This Flood Risk Assessment for the Woodside Link Scheme considers the risk of flooding from all sources i.e. fluvial, pluvial, surface water runoff, groundwater, ponds, other water bodies and overland flows. This report has been prepared in support of the Application for Development Consent for the scheme.

1.1.2. This report also considers the potential impact of the project on flood risk in the wider catchment area.

1.1.3. This Flood Risk assessment is undertaken in accordance with NPPF (March 2012) and the accompanying Technical Guide.

1.2. Location and Project Description

1.2.1. Central Bedfordshire Council propose to construct a new link road, called the Woodside Link, between the Woodside Industrial Estate at Park Road North and a proposed new junction (11A) on the M1, as shown on the plans in Appendix A. The project is located within and to the east of Houghton Regis, as shown in Figure 1 below, with the approximate proposed route of the new road shown as a red bold line. The proposal includes a new link road from Parkside Drive to the Woodside Link, crossing a proposed diversion of Houghton Brook (as indicated by the dark blue dashed line) in Figure 1 below.

![Figure 1: Location Plan](image-url)
1.2.2. The proposed road crosses the existing Houghton Brook at two locations towards the SW of the scheme and again after it turns north towards the M1 junction. It is proposed to reduce these crossings by diverting Houghton Brook (Figure 1 above) to the northern side of the road, leaving only one structure on the main road, Woodside Link Overbridge, as well as the Parkside Drive Overbridge (a new clear span bridge to carry the diverted Parkside Drive across the brook diversion) as shown on Figure 1. The brook diversion is to be designed to maximise bio-diversity and the crossings will be designed to ensure there is no impact on flood risk to property. A typical cross section of the proposed brook diversion is shown in Figure 2. Full details of the project proposals are included in Appendix A.

![Cross-section of the Houghton Brook diversion](image)

**Figure 2: Typical cross section of the Houghton Brook diversion**

1.3. **HRN1 Development**

1.3.1. The HRN1 development is proposed in the area to the west of the M1, this is dissected by the new link road. The development is for residential with the inclusion for potential educational, commercial and retail space. HRN1 is being developed as a standalone scheme. The FRA for the development does not include any implications for the Woodside Link, the drainage for the new development will be dealt with separately and therefore will have no impact on the proposals. The HRN1 development has taken a sequential approach to the laying out of the site and as such housing and retail shall be taken out of the more vulnerable flooding areas with landscaping remaining in the areas susceptible to flooding.

1.4. **A5-M1 Link**

1.4.1. The connection of Woodside Link to the M1 is being developed as a standalone scheme. The FRA for the A5-M1 Link does not have any implications for Woodside Link. The drainage will be dealt with separately.
1.5. Environment Agency Flood Alleviation Scheme

1.5.1. The Environment Agency is proposing to construct a Flood Storage Area within the Houghton Brook catchment area; therefore the drainage strategy and management of flood risk is subject to change. Central Bedfordshire Council are in on-going discussions with the Environment Agency in relation to this matter. At present due to programme and uncertainties, any attenuation and drainage solution for Woodside Link will be dealt with in isolation to the potential flood storage area.

1.5.2. The Environment Agency is also in discussions with the potential HRN1 developer of the area surrounding the Woodside Link, in relation to the cumulative effects of the Flood Risk Assessment. In addition, the Environment Agency is liaising with the Highways Agency in terms of their drainage requirements in relation to the A5 – M1 and new Junction 11A scheme. All schemes are however independent and standalone.
2. **Data**

2.1. **Project Information**

2.1.1. Details of the proposed link road and bridges as well as the brook diversion are included in Appendix A: Roads Layouts - 300117/031/121 and 122; Bridge General Arrangements 300117/34/40/02/001 and 002.

2.2. **Topographic Survey**

2.2.1. The majority of the land is currently open agricultural land with Houghton Brook flowing from west to east through the site and Ouzel Brook flowing from the north to meet Houghton Brook.

2.2.2. The Southern portion of the site currently drains towards Houghton Brook, with land to the north draining towards Ouzel Brook, beyond the extents of Woodside Link.

2.3. **Environment Agency – Flood Map**

2.3.1. The Environment Agency (EA) Flood Map, accessible on their website, shows that there is no Zone 3 flooding in the area of interest. Zone 3 is where flooding would occur at an annual frequency greater than 1%, 1 in a 100 or greater chance of happening in any given year.

2.3.2. There is, however, an area of Zone 2 flooding on the EA Flood Map; Zone 2 shows a flood risk between the 100 and 1,000 year return period (probability between 1% and 0.1%). The remainder of the site in Zone 1 (probability less than 0.1%).
2.3.3. The floodplain shown (Figure 3 above) is largely consistent with the results of the hydraulic model provided to Amey and discussed in Section 2.8.

2.4. Environment Agency – Groundwater

2.4.1. The Environment Agency Groundwater source protection zones accessed on their website indicates that the area of interest is in a Zone 3 (total catchment) groundwater protection zone. In such areas, discharge of surface water by infiltration will require measures to minimise the possibility of pollution of the groundwater.

2.5. Bedfordshire Preliminary Flood Risk Assessment

2.5.1. A Preliminary Flood Risk Assessment (PFRA) has been undertaken by Bedford Borough Council (BBC), Central Bedfordshire Council (CBC) and Milton Keynes Council (MKC) to fulfil their obligations under the Flood Risk Regulations (2009). Each of these councils is defined as a Lead Local Flood Authority. (Refer to Appendix F – Preliminary Flood Risk Assessment).

2.5.2. The PFRA is aimed at providing a high level overview of flood risk from local flood sources and includes flooding from surface water, groundwater, ordinary watercourses and canals and incorporates the following tasks;

- Investigate historic flood incidents
- Prepare an asset register
Prepare a flood risk management strategy for the local area

2.5.3. In order to develop a clear overall understanding of the flood risk across BBC, CBC and MKC, flood risk data and records of historic flooding were collected from at least 20 different local and national sources including the Local Authorities, EA, Internal Drainage Boards, water companies, emergency services and other flood risk management authorities.

2.5.4. 2,468 records were collected and analysed, but no past flood events were found to have had “significant harmful consequences.” As part of this study maps of areas at significant risk of surface water and groundwater flooding have been produced.

2.6. **Geological Information**

2.6.1. The British Geological Survey (BGS) website has been consulted and two boreholes have been located that are relevant to the site, (Refer to Appendix G – British Geological Data):

- Borehole TL025W23 – towards the west of the site
- Borehole TL025W413 – M1 where it crosses the Houghton Brook

2.6.2. The Geotechnical Design Report undertaken by Amey in December 2010, states that “The ground conditions are generally superficial deposits overlying Grey Chalk. The groundwater table in March 2010 was high, about 1 m below ground level through the central portion of the scheme, and slightly deeper at either end.”

2.7. **Hydraulic Model of Houghton Brook**

2.7.1. An existing hydraulic model, produced by Halcrow and subsequently verified by Peter Brett Associates, was received (see Appendix B for full details).
3. **Hydraulic Modelling**

3.1. **Model Amendments**

3.1.1. The existing model has been amended to provide a baseline for comparison, full details are available in the Hydraulic Modelling Report, included in Appendix B. In summary:

- The existing 2010 EA ISIS model (L01_final_domin_com1_ad_V1h_v001.dat) has been extended upstream using additional channel survey data to ensure the entire reach of the watercourse through the study area is included.
- The extended ISIS model has been truncated at the M1 motorway underpass with a downstream boundary established at this location.
- An integrated 1D/2D model has been built to allow for the high likelihood of out of bank flow.
- The inflow hydrographs have been updated to make allowance for the change in catchment plus sensitivity testing has been undertaken using the currently approved EA hydrology.
- As agreed with the EA, the currently accepted EA hydrology has been revised with the updated critical storm duration to specific catchment considered. For completeness and to provide a robust assessment of fluvial flood risk, additional models considering hydrographs derived using alternative methods (ReFH) have been simulated for comparison.

3.1.2. A post development scenario model has been built to represent the changes in the Woodside Link area, the alterations to the model are summarised below, full details are available in the Hydraulic Modelling Report (Appendix B).

- The proposed 300m watercourse diversion has been added.
- A 1m$^2$ cross connection box culvert has been included beneath the proposed road embankment, connecting the old watercourse with the new watercourse and allowing connectivity between the flood plain areas.
- The 2D TUFLOW elevation grid has been amended to include the proposed highway and associated embankments.
- The three offline ponds for surface water drainage attenuation have been incorporated into the ground model, these have been assumed as bank-full for all scenarios to present a most conservative assessment.
3.2. Model Results Summary (refer to Appendix B for full details)

3.2.1. Using the currently accepted EA inflow hydrology parameters (with 3.9hr critical storm duration), modelling showed that during the 5% AEP event on the existing model there are two small pockets of flooding in the vicinity of the electricity substation, the post construction model shows that the peak flows remain in bank. Therefore the effect of the proposed highway on flood risk elsewhere is considered negligible with no increase in flood risk to property during this event.

3.2.2. During the 1% AEP event the existing modelling shows shallow flooding (<300m) occurring on land immediately adjacent to the watercourse. The post development model shows flooding to be generally the same as existing, out of channel flooding levels and areas are shown to be reduced. Additionally, flood risk around the substation is removed. Therefore the effect of the proposed highway on flood risk elsewhere is considered negligible with no increase in flood risk to property during this event.

3.2.3. During the 1% AEP + climate change event the post development scenario shows a slight reduction to the flooding upstream of the new Houghton Brook crossing compared to the existing situation. Again the effect of the proposed highway on flood risk elsewhere during this event is considered negligible. There is no increase in flood risk to property during this event.

3.2.4. During the 0.1% AEP event the existing model shows a significant amount of overland flow throughout the wider floodplain with widespread shallow-depth flooding (up to 300mm) extending approximately 50m from the watercourse. In some low lying areas adjacent to the watercourse maximum depths reach up to 1m. The post development scenario shows a reduction in the flooding depth around the substation. However there is an increase in flood depth and extent immediately upstream of the new Houghton Brook crossing. This backwater effect is dissipated 200m upstream. This local increase results in no additional flood risk to properties.

3.2.5. Simulations using the currently accepted EA inflow hydrology parameters produced maximum flood extents larger than the currently published EA flood maps; suggesting the inflows may be overestimated.

3.2.6. Sensitivity tests undertaken using alternative ReFH inflow hydrology (smaller than EA flows) produced maximum flood outlines consistent with those shown by the published EA flood maps.

3.2.7. Notwithstanding the comparison between the hydrology methods, it is concluded that for events up to and including the 1% AEP + climate change event, the proposed Woodside Link does not result in an increase in flood risk as demonstrated in the Modelling Report (Appendix B).
4.  Flood Risk Assessment

4.1.  Fluvial Flooding – Existing Situation

4.1.1.  With reference to the Environment Agency’s Flood Map (Figure 3) and in conjunction with the analysis of the hydraulic modelling water level results of the existing situation, the site is at risk of flooding in events greater than the 1% AEP event. The location of the flooded area in the 0.1% AEP event is agricultural land and there are no properties at risk in the existing situation.

4.1.2.  More detailed modelling carried out as part of this project indicates only minor localised shallow flooding during the 100 year event. (See Hydraulic Modelling Report, Appendix B for further details)

4.2.  Fluvial Flooding – Scheme Proposals Incorporated

4.2.1.  The output from the hydraulic modelling report indicates that the proposed highway does not have a significant effect on the flood risk elsewhere during the 5%, 1% and 1% + CCA events and does not increase flood risk to property. There is some increase in flood levels in the 0.1% AEP event upstream of the new Houghton Brook crossing but the resulting backwater effect is quickly dissipated and there is no effect on surrounding properties.

4.2.2.  The soffit levels of the two bridges are sufficiently high (compared to the 100 year + CC water level) that there will be negligible risk of blockage of the bridges by vegetation or general debris. (General arrangement drawings for both bridges provide evidence of the generous headroom provided.)

4.2.3.  As the flood risk area has now been accurately defined, development that could be enabled by the Woodside Link can be situated to avoid any areas subject to risk of flooding during the 1 in 100 year + CC event.

4.3.  Surface Water Flooding and Overland Flow

4.3.1.  Reference to the map of surface water flooding from the Preliminary Flood Risk Assessment shows that there is a negligible risk of surface water flooding at this location.

4.3.2.  In line with NPPF Technical Guidance Table 3, Woodside Link forms Essential Infrastructure which can be placed within Flood Zone 2. Therefore the requirements of the sequential test were met.

4.3.3.  The new road will be situated at a higher ground level in comparison to the surrounding ground level, so there will be no future flood risk from overland flows.

4.3.4.  The highway drainage will be designed in accordance with industry standard best practice (refer to Section 5 for further details), therefore there will be no surface water flood risk to the new road or others as a result of the increase in impermeable area. See Section 5 for details of the proposed surface water drainage strategy.
4.3.5. Additional geotechnical drainage will be provided where the ground slopes towards the road in order to prevent ponding against the road structure. This will be collected and will discharge to the attenuation ponds for controlled discharge into the Houghton Brook.

4.4. **Tidal Flooding**

4.4.1. As the site is remote from the coast there will be no risk of tidal flooding.

4.5. **Groundwater Flooding**

4.5.1. The two boreholes from BGS show chalk close to the surface. The groundwater level recorded in borehole TL025W23 is approximately 2 metres from the top of the borehole and in the M1 borehole groundwater is not recorded, presumably because the borehole was taken through the motorway embankment and only extends to 3 metres depth. The low groundwater levels indicate that the likelihood of groundwater flooding is very low.

4.5.2. Reference to the Bedfordshire Preliminary Flood Risk Assessment map of groundwater flooding sites shows that there is a negligible risk of groundwater flooding at this location (Refer to Appendix F – Preliminary Flood Risk Assessment).

4.5.3. The road is elevated above existing ground levels therefore there is no risk of groundwater flooding to the proposed development.

4.6. **Flood Risk to the Wider Catchment**

4.6.1. Flows in the watercourse are not affected by the proposals so the fluvial flood risk to the wider catchment remains unchanged.

4.7. **Climate Change**

4.7.1. The impact of Climate Change has been represented by increasing the river flows in the hydraulic model by 20% and increasing rainfall intensity by 30% in line with NPPF Technical Guidance.

4.8. **HRN1**

4.8.1. HRN1 acts as a standalone scheme in Flood Zone 1 areas and does not increase flood risk since flows are restricted off site and managed by attenuation.
5. Site Drainage

5.1. Existing Site Drainage

5.1.1. Drainage of the existing site is by informal field drainage, draining towards Houghton Brook and Ouzel Brook.

5.2. Proposed Drainage Strategy

5.2.1. Construction of Woodside link results in a higher surface water runoff rate due to the increased impermeable area of the road surface. The surface water disposal has been designed to attenuate the flows from the road to the pre-existing runoff rates, calculated as 5 l/s/ha. (Refer to Appendix D – Highway Drainage Layout & Calculations for detail). To allow for no increased runoff from the site below a 1 in 100 year storm above the pre-existing runoff rates, attenuation is provided in the form of three ponds, the volumes of which are shown in Table 1 below. Refer to Appendix D of the Flood Risk Assessment for locations. A freeboard allowance of 300mm will be included in the design of the ponds in accordance with best practice, this allows for uncertainties in design, settlement and wave action.

<table>
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<tr>
<th>Pond</th>
<th>Impermeable Area (ha)</th>
<th>Attenuation Storage Required (m³)</th>
<th>Attenuation Storage Provided (m³)</th>
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<tr>
<td>1</td>
<td>0.975</td>
<td>600</td>
<td>648</td>
</tr>
<tr>
<td>2</td>
<td>1.049</td>
<td>780</td>
<td>797</td>
</tr>
<tr>
<td>3</td>
<td>3.485</td>
<td>3084</td>
<td>3330</td>
</tr>
</tbody>
</table>

Table 1: Required Attenuation Storage Values

5.2.2. The calculations for the surface water disposal scheme, have been prepared using the WinDES suite of drainage design programmes (Micro Drainage Ltd., version 12.4, 2010) and are included in Appendix D.

5.2.3. An allowance for 30% increase in rainfall has been included to allow for climate change in accordance with NPPF Technical Guidance.

5.2.4. To mitigate the risk of deterioration in water quality of Houghton Brook and groundwater bodies, the drainage design for the scheme includes measures to filter, store and treat surface water through use of the ‘SuDS Management Train’ approach. This approach is detailed in CIRIA C697, The SuDS Manual, and outlines the most appropriate uses and combinations of SuDS measures to treat surface water runoff and improve water quality through each stage of the surface water management system.

5.2.5. The drainage system will serve to intercept surface water runoff from the carriageway and remove pollutants as near to the source before disposal to the on-site conveyance network. This network is formed of the following components:

- Carrier, and fin drains
- Grass swales
- Gullies
- Combine drainage and kerb systems
- Catchpits and manholes
- Pollution control valves
- Oil and petrol interceptors
- Forebays
- Attenuation ponds
- Headwalls
- Culverts

5.2.6. System 1 Surface Water Collection:
This system starts from the junction of Poynters Road and Park Road North roundabout to the junction with Parkside Road North at chainage 950. From Ch.0 to Ch. 330 the road would have a more urban character than the rest of the scheme. It encompasses the roundabout at Porz Avenue, the junction at Wheatfield Road and various pedestrian crossing points; consequently a kerb and gully system would be used over this section. Grass swales would be used for the rest of the system. The collected surface water would be then conveyed in to interceptors located near the attenuation pond, for pre-treatment, and then discharged into the attenuation pond forebay. The water would then be held in attenuation pond 1 and be subject to a controlled discharge to Houghton Brook at the agreed discharge rate of 5 l/s/ha.

5.2.7. System 2 Surface Water Collection:
The network extends from the junction with Parkside Drive to Ch. 1700. Generally a system of grass swales would be used either side of the road. The exceptions are at proposed roundabout (Ch. 1550 approx.) and at the Houghton Brook overbridge and its southern approach (Ch. 1690 to Ch.1760 approx.). At the roundabout a combined kerb and drainage system would be used due to the low longitudinal gradients. At the over bridge a kerb and gully system would be adopted. The collected surface water would be then conveyed to interceptors located near the attenuation pond, for pre-treatment, and then discharged into the attenuation pond forebay. The water would then be held in attenuation pond 2 and be subject to a controlled discharge to Houghton Brook at the agreed discharge rate of 5 l/s/ha.

5.2.8. System 3 Surface Water Collection:
The network extends from north of the proposed overbridge to the Sundon Road roundabout and the M1 Junction 10a roundabout. At roundabouts and junctions a kerb and gully system would be adopted, over most of the rest of the network grass swales would be used. A kerb and gully system would also be used on the northern approach to the Houghton Brook overbridge. The collected surface water would then be conveyed to interceptors located near attenuation pond, for pre-treatment, and then discharged into attenuation pond. The water would then be held in attenuation pond 3 and be subject to a controlled discharge to Houghton Brook at the agreed discharge rate of 5 l/s/ha.

5.2.9. Pollution Control

Oil and petrol interceptors would be provided upstream of the outfalls, these would collect hydrocarbon pollutants and silts. Shut off valves would also be provided upstream of the outfalls to contain the spills until the storage pipes could be emptied. Hardstands would be provided to enable access to the interceptors.

5.2.10. Attenuation Ponds

Outfall into the attenuation ponds would be via a headwall with sediment forebay. The forebay would allow sediment to settle out before entering the attenuation pond. The inlet from the drainage system would be located above the normal pool level and would be provided with erosion protection.

The attenuation ponds would include a semi-permanent pool below the outlet with the base having undulating levels and an irregular shape. Bunding would be provided around the ponds to provide 300mm of freeboard above the maximum water level with a control device located in a chamber downstream of the outlet to limit the pond discharge. The outfall flow would be restricted to a rate equivalent to the green field discharge rate as discussed below.

5.2.11. Greenfield Run-Off

Flood estimation calculations were carried out for the three systems. As all of the catchment areas are less than 0.4km², in accordance with HA 106/04, the ADAS method has been used to calculate the estimated amount of runoff. The Greenfield runoff rates calculated for the sites are as below. Detailed calculations are included in Appendix D (Refer to Appendix D – Highway Drainage Layout & Calculations for detail):

- System 1 = 4.6l/s/ha
- System 2 = 4.6l/s/ha
- System 3 = 4.8l/s/ha

A value of 5l/s/Ha has been adopted in the design of each of the three drainage systems, as referred to in Section 4.1.

5.2.12. Existing Surface Water Drainage
An existing Anglian Water surface water drain connects from the housing estate to the north into Houghton Brook, the route of the diverted Houghton Brook means that the current outfall can no longer be utilised. It is proposed to create a new outfall onto the diverted Houghton Brook on the same line as existing.

A Thames Water surface water drain connects into the current Houghton Brook from the housing development to the south. The current outfall can no longer be utilised due to the diversion of Houghton Brook. It is proposed to divert the pipe and connect it to the remaining section of Houghton Brook adjacent to attenuation pond 1.

5.3. **Flood Risk to the Wider Catchment**

5.3.1. The proposed surface water drainage strategy will manage the runoff from the new road, the storage ponds and regulated discharge will prevent issues with surface water flooding off site and therefore increased flood risk in the wider catchment. By limiting the rate to the existing greenfield run off rate there should be no change compared to the existing situation.
6. Conclusions

6.1. Detailed modelling has shown that there is no increase in flood risk during the 5%, 1%, 1% + CCA AEP events after the proposed development. During the 0.1% AEP event there is a localised increase in water levels, this is dissipated upstream and provides no increased flood risk to surrounding properties.

6.2. There is negligible flood risk from other sources.

6.3. The surface water runoff will be increased due to the impermeable area of the proposed road but this will be mitigated by the provision of attenuation ponds.

6.4. As the proposed road is on an embankment the flood risk to the road is negligible.

6.5. It is concluded and demonstrated by modelling that the construction of the Woodside Link does not increase flood risk to the surrounding property and that a satisfactory means of surface water drainage can be achieved.
Appendix A: Scheme Proposals

300117/031/121 – Preferred Route – Sheet 1 of 2
300117/031/122 – Preferred Route – Sheet 2 of 2
300117/34/40/02/001 – Houghton Brook Overbridge Option 1 – precast beams on RC abutments
300117/34/40/02/002 – Parkside Drive Bridge Option 2 – Precast Beams on Reinforced Concrete Abutments
Appendix B: Hydraulic Modelling Report (December 2013)
Appendix C: Highway Drainage Layout and Calculations

30017/032/101
30017/032/102

Design Treatment Volume System 1: Pond 1
Design Treatment Volume System 2: Pond 2
Design Treatment Volume Final Rate 3: Pond 3

Flood Estimation for Small Catchments: System 1
Flood Estimation for Small Catchments: System 2
Flood Estimation for Small Catchments: System 3

Outfall Assessment: System 1
Outfall Assessment: System 2
Outfall Assessment: System 3
Appendix D: Preliminary Flood Risk Assessment

Available On CD
Appendix E: Geological Data

Available on CD:
Borehole Location to the West of the Site
Borehole Location Near to where M1 spans Houghton Brook