
Appendix D: Water Environment

South Wokingham Distributor Road Options Appraisal – Water Environment Technical Note

October 2013

Introduction

This technical note presents the findings of an appraisal of potential environmental constraints associated with local watercourses and water quality in relation to three aspects of the proposed South Wokingham Distributor Road scheme which comprise the following:

- Three proposed route options for the Proposed South Wokingham Distributor Road: Route Option A (including Route Option A Alternative Links A1, A2 and A3), Route Option B (including Route Option B Alternative Link B1) and Route Option C (including Route Option C Alternative Link C1);
- Six Local Study Areas where improved access across the railway is proposed; and
- Proposed improvements to Waterloo Road / Peacock Lane.

Figures A1a 'Overall Study Area Context and Environmental Constraints Plan' and A1b 'Aerial Photography View' present the three aspects of the scheme in relation to environmental designations and general context. Figure A5 specifically relates to the study area of the Waterloo Road / Peacock Lane improvements. Key water environment features are presented on Figure A3.

These three aspects to the scheme are described in further detail below:

Proposed South Wokingham Distributor Route Options

- Route Option A – Route Option A starts at the A321 Finchampstead Road at the junction with Oakley Drive. It runs approximately west to east, immediately south of the railway and ends just North of the railway line, approximately 300m east of the crossing of Waterloo Road. The proposed route will cross Emm Brook, Public Rights of Way 9 and 10, Easthampstead Road and Waterloo Road.
- Route Option B – Route Option B begins in the same location as Route Option A, on the A321 Finchampstead Road at the junction with Oakley Drive, and runs broadly east, diverting south round the existing detention pond. The route also ends in the same location as Route Option A, just north of the railway line, and crosses the Emm Brook, Public Rights of Way 9 and 10, Easthampstead Road and Waterloo Road.
- Route Option C – This route runs broadly west to east, south of Route Options A and B. It also begins in the same location, on the A321 Finchampstead Road at the junction with Oakley Drive. Route Option C ends north of the railway, in the same location as Route Options A, B and the alternatives. Route Option C crosses the Emm Brook east of Chapel Green, Public Rights of Way 9 and 10, Ludgrove School private access, Heathlands Road, Easthampstead Road and Waterloo Road.

Alternative Alignments in relation to the Route Options

- Route Option A Alternative Link 1 – A link between Route Option B and Route Option A at Knoll Farm. This link provides an alternative route for Route Option A which does not require land from Knoll Farm.
- Route Option A Alternative Link 2 - Link between Route Option A and Route Option B to the west of the existing detention pond. This link provides an alternative route for Route Option A to the south of the detention pond which enables the Easthampstead Road junction to be located further south at the proposed Route Option B Easthampstead Road crossing.

- Route Option A Alternative Link 3 - Link between Route Option A and Route Option B. This link provides an alternative route from Route Option A passing through the existing detention pond to the proposed Route Option B Easthampstead Road crossing.
- Route Option B Alternative Link B1 –This link provides an alternative more southern and straight alignment for Route Option B east of Tesco which does not require land acquisition from Knoll Farm.
- Route Option C Alternative Link C1- Link between Route Option C to the south of the existing detention pond to Easthampstead Road, traveling down Easthampstead Road to re-join Route Option C. This link provides an alternative route for Route Option C to access Easthampstead Road which avoids the Ludgrove School private access and Heathlands Road crossings.

Local Study Areas

Six local study areas (A to F) have also been considered within this note and are identified on Figure A1b.

Footbridges across the railway are proposed at each location. These are likely to have steps and lifts/ramps to provide disabled access. For the purpose of this assessment, at each local study area potential constraints within the highway boundary for minimum of 150m north of the railway and 150m radius south of the railway have been identified.

- Local Study Area A is centred over the A321 Finchampstead Road, over the roundabout intersection with Oakley Drive, and is approximately 140m long.
- Local Study Area B is centred at the Knoll Farm, to the south of Gipsy Lane, and is approximately 60m long.
- Local Study Area C is centred at an existing footbridge over the railway line, to the south of Gipsy Lane, to the east of Local Study Area B, and is approximately 60m long.
- Local Study Area D is centred on the Easthampstead Road Level Crossing, and is approximately 70m in length.
- Local Study Area E is centred over the Waterloo Road Level Crossing, and is approximately 80m in length.
- Local Study Area F is approximately 340m in length, at the point of the South Wokingham Distributor Road roadbridge over the railway line, from below to a point approximately 150m north of the railway line.

Waterloo Road / Peacock Lane Proposed Improvements:

The proposed improvements commences on the corner of Waterloo Road, just north of the woodland parcel to the west, and continues east along Waterloo Road and Peacock Lane until its cessation approximately 300m east of Easthampstead Park. All works are due to be completed within the highway boundary with the exception of works at the junction between Waterloo Road, Old Wokingham Road and Peacock Lane, where some additional land would likely be needed to the south west.

Definitions

Given the relative proximity of the proposed distributor road routes, six local study areas and improvements to Waterloo Road / Peacock Lane, which share some of the same existing baseline, they are herein collectively termed '**the overall study area**'. Where there are differences, they will be referred to as Route Option A, Route Option A Alternative Link A1, A2, or A3, Route Option B, Route Option B Alternative Link B1, Route Option C, Route Option C Alternative Link C1, Local Study Area (A – F) or Waterloo Road / Peacock Lane improvements respectively.

In relation to the three route options where they share the same existing baseline, they will herein be referred to as '**the Site**'.

The term '**Local Study Areas**' will be used to refer to the six areas where work is proposed to improve access across the railway.

The advice presented within the summary of constraints at the end of this technical note must be considered both generic and preliminary at this stage and will need updating when more information becomes available regarding the likely infrastructure scenarios. For ease of reading, the constraints identified within this technical note are colour coded in relation to a 'traffic light system' according to their significance on the scheme. Below identifies the colour coding:

- **Red** – Constraint to Development.
- **Amber** – Constraint to Planning/Major Cost Implication
- **Green** – Manageable constraint through scheme adaptation/mitigation measures/surveys (some cost implications).

Text left in black is not considered to represent any form of constraint and provides background information and/or recommendations to further avoid environmental impacts and/or to enhance the existing environment.

Methodology

The appraisal was undertaken through a desktop review of publically available maps, aerial photographs relevant websites (including the Environment Agency), and a Landmark Envirocheck Report, to identify water environment baseline conditions and key features within and surrounding the route options, Local Study Areas and proposed road improvements. Figure A3 identifies the key water features within the surrounding area. In relation to the route options, key water environment features have been identified which fall within, adjacent to and up to 1km from the route. In relation to the Local Study Areas, features have been identified up to 500m from the proposed works. Key water environment features have been identified within and adjacent to the proposed works area for Waterloo Road / Peacock Lane improvements.

Desk Study

Route Options A (A1, A2 and A3), B (B1) and C (C1)

- The Emm Brook flows east to west through the Site, from East Hampstead Road to the A321 Finchampstead Road. Approximately 380m west of East Hampstead Road, the Emm Brook enters the Site (OS Grid Reference: SU820675) and extends west to the A321 Finchampstead Road. Approximately 400m west of this point, the Brook divides (OS Grid Reference: SU815675), with one stretch extending south, passing under a private track which is located approximately 100m south of the Site, and the other stretch extending north west to the A321 roundabout. The stretch of the Emm Brook from Chapel Green to the A321 Finchampstead Road is classified as a 'main river'¹ by the Environment Agency. All three Route Options (A, B and C) will be constrained by the Emm Brook at the western end of the Site when joining the A321 Finchampstead Road. Route Option B Alternative Link B1 crosses the Emm Brook at a more southerly point to the main Route Option B, both options are constrained. Route Option C will run alongside the Emm Brook for part of its extent through the Site from the A321 roundabout to Easthampstead Road.
- The Emm Brook has a current ecological status of 'moderate potential' and does not require assessment in relation to chemical quality. The Brook is currently classified as being 'at risk'², according to the Environment Agency and is identified as having high levels of nutrients

¹ Main river refers to all watercourses shown as such on the statutory main river maps held by the Environment Agency and DEFRA, and can include any structure or appliance for controlling or regulating the flow of water into, in or out of the channel.

² As part of the river basin characterisation process, the Environment Agency have assessed the pressures on water bodies and the risk of failing to achieve the objectives of the Water Framework Directive by 2015. These assessments do not reflect the current quality or status of a water body, and being 'at risk' does not mean that a water body has already failed its objectives, only that it might do so. The risk assessments have been used to target monitoring programs and to provide the evidence to help develop measures needed to deliver environmental objectives. The Environment Agency have looked at five different categories of potential pressures: alien species; diffuse sources of pollution; point sources of pollution; water abstraction and flow regulation; and physical or morphological alteration to the water body. Further information is in the River Basin Management Plans and in the 'What's in your backyard?' facility on the Environment Agency's website.

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- There are a number of drainage ditches that traverse the Site. In relation to all three route options, a ditch extends from Easthampstead Road, approximately 100m south of the railway, south west for approximately 400m before joining the Emm Brook. At the western edge of the study area, a drainage ditch extends for approximately 500m south from the Emm Brook towards Luckley Road.
 - There is a balancing pond (as shown on Figure A3) approximately 60m west of Easthampstead Road, south of the railway line. Route Option A Alternative Link A3 would pass directly through the balancing pond, whereas the main Route Option A, Route Option A Alternative Link A2 and Route Option B propose to skirt around the pond. Route Option C and its Alternative Link C1 are situated to the south of the balancing pond.
 - Within the overall area of the Site, there is one unnamed waterbody; this is located approximately 260m south of the A321 Finchampstead Road roundabout and is adjacent to the Emm Brook. Route Option C is located approximately 55m east of this waterbody.
 - Adjacent to the Overall Study Area, there are three unnamed waterbodies, these are:
 1. Ludgrove School pond located approximately 100m from the southern Overall Study Area boundary, approximately 155m from Route Option C;
 2. Unnamed waterbody located between Heathlands Road and Easthampstead Road approximately 350m east of the Overall Study Area; and
 3. Unnamed waterbody located approximately 120m east of Easthampstead Road, approximately 350m south of the Overall Study Area.
 - The Overall Study Area does not lie within a Groundwater Source Protection Zone³.
 - In terms of superficial aquifer deposits, the Overall Study Area is underlain by a mix of secondary A, B and undifferentiated deposits⁴. The majority of the secondary A deposits lie close to Emm Brook. In addition, the south western extent of the Overall Study Area, close to the A321 Finchampstead Road, is underlain by Secondary A bedrock aquifers.
 - The extent of the Emm Brook and drainage ditches throughout the Site are classified as being at risk of flooding, with a chance of flooding each year of 1.3% (1 in 75 year) or higher. In addition, to the east of Easthampstead Road, towards Waterloo Road, there is an extent of flood risk of 1.3% just north of Wood's Farm. All Route Options are within the flood risk area at the western end of the Site. The Route Option B Alternative Link would follow a large extent of the flood risk area where it splits from the main Route Option B up towards the A321 Finchampstead Road. Route Option C may also be constrained by flood risk at the western edge of the study area at the A321 Finchampstead Road. All three main routes fall within the flood risk area when crossing Waterloo Road at the eastern end of the Site.
 - There are three water abstractions located approximately 190m south of Route Option A. The abstractions are for General Agriculture use: Spray Irrigation – Direct. There is one abstraction situated approximately 110m south of the Route Option B and C where groundwater is abstracted for Golf Courses: Spray Irrigation – Direct.
 - The following discharge consents are in the vicinity of the three routes and their alternatives:
 1. In relation to Route Option A, the closest consent is located 25m north of the route where Public sewage: Storm Sewage Overflow is discharged into an unnamed stream/river;

³ The Environment Agency have defined Source Protection Zones (SPZs) for 2000 groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. The maps show three main zones (inner, outer and total catchment) and a fourth zone of special interest, which is occasionally apply, to a groundwater source.

⁴ Secondary A - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers. Secondary B - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers. Secondary Undifferentiated - has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

2. The closest consent to Route Option B is located 85m north of the route where Trade Effluent Discharge-Site Drainage is discharged on to land ; and
3. The closest consent to Route Option C is located 10m west of the route for where Sewage Discharges - Final/Treated Effluent - Not Water is discharged into a tributary of the Emm Brook.

Local Study Areas

- Local Study Area A falls within an area which has been designated by the Environment Agency as having a 1.3% risk of flooding. The Emm Brook passes within 50m of Study Area A, north east of the A321 roundabout. The Emm Brook is classed as having moderate potential in relation to ecology.
- There are no ditches within Local Study Areas B, C, D and E.
- Both Local Study Areas B and C are located 100m north of an area with a 0.5% risk of flooding. Whereas, Local Study Areas D and E do not fall within a flood risk area.
- An unnamed waterbody is located adjacent to Big Wood, within the vicinity of Local Study Area F, approximately 540m east of Waterloo Road and approximately 120m south of the railway line. In addition, there is a drainage ditch extending for approximately 915m from London Road south west of Waterloo Road.
- In relation to discharge consents and water abstractions, there are a number within the vicinity of the Local Study Areas, the closest are listed below:
 - The closest discharge consent to Local Study Area A is located 40m north of the Site where Sewage Discharges – Final/Treated Effluent is discharged into the Emm Brook. In terms of water abstractions, there is one abstraction located 330m west of the Local Study Area where surface water is abstracted for Other Industrial/Commercial/Public Services: Non-Evaporative Cooling. There is one abstraction located 330m west of the site where surface water is abstracted for Other Industrial/Commercial/Public Services: Non-Evaporative Cooling;
 - The closest consent to Local Study Area B is located 225m east of site where Sewage Discharges - Final/Treated Effluent is discharged into plateau gravels. There are no licensed water abstractions within the vicinity of this area;
 - The closest consent to Local Study Area C is located 95m east of site where Sewage Discharges - Final/Treated Effluent is discharged into plateau gravels. There are no licensed water abstractions within the vicinity of this area;
 - In relation to Local Study Area D, the closest consent is located 135m east of the site where Public Sewage: Storm Sewage Overflow is discharged into Waterloo Road Stream. There are three abstractions located 380m south of the route where surface water is abstracted for General Agriculture: Spray Irrigation – Direct;
 - There is one discharge consent located within 500m of Local Study Area E, this is located 500m west of the site where Public Sewage: Storm Sewage Overflow is discharged into Waterloo Road Stream. There are no licensed water abstractions within the vicinity of this area; and
 - The closest consent to Local Study Area F is located 370m south of the site where Sewage Discharges - Final/Treated Effluent is discharged into a Tributary of the he Emm Brook. There are no licensed water abstractions within the vicinity of this area.

Waterloo Road / Peacock Lane Improvements (Route D)

- Drainage ditches are present intermittently along the extent of the section of the road which is being considered for improvements. In addition, the majority of the area is underlain by secondary A aquifers.

Summary of Water Environment Constraints

General constraints relating to the Site (including all route options and alternatives, local study areas and Waterloo Road / Peacock Lane improvements) in relation to the water environment include: the potential effects to drainage, local flood risk and the potential for contamination of surface and ground waters.

Emm Brook represents more of a constraint to Route Option B1 and Route Option C, however all three route options meet the Brook. Route Option A crosses the Brook close to the A321 Finchampstead Road roundabout. In addition, the risk of flooding is of greatest relevance to Route Option C, where a proportion (approximately one third) of the route is located in an area classified as being of 1.3% risk of flooding. Local Study Area A also falls within an area which is at 1.3% risk of flooding.

Construction

Potential environmental effects during the construction phase of any route option would require assessment of the following:

Applicable to all Route Options, Local Study Areas and Waterloo Road / Peacock Lane Improvements

- The potential for contamination (including heavy metals, hydrocarbons, suspended solids and construction materials) of surface or groundwater during construction activities and associated effects on sensitive receptors (e.g. adjacent to Emm Brook or nearby ditches etc.). Sources of pollution could be associated with the mobilisation of any historical on site contamination within the Site, general construction activities, siting and operation of site construction compound(s) and the operation of construction vehicles.
- The alteration of drainage patterns and creation of extensive areas of impermeable surface that have the potential to alter the level and rate of surface water run-off and flood risk on and off site. This could result from soil compaction from the operation of construction vehicles and machinery.

Applicable to All Route Options

- The Environment Agency 'General policy regarding culverts', states that no watercourse should be culverted unless there is an overriding need to do so. For all route options, it is likely that the Emm Brook may need to be crossed; this should be done either by bridge or by diverting the watercourse. Culverting can change and reduce the ecological status of water bodies, as well as increasing the risk of blockage.

Operation

Potential environmental effects during the operation phase of any route option would require assessment of the following:

Applicable to All Route Options, Local Study Areas and Waterloo Road / Peacock Lane Improvements

- The potential for contamination of surface or groundwater during operation activities and associated effects on sensitive receptors (e.g. adjacent to Emm Brook and nearby ditches etc.). This potential could result from oil residues and sediments from vehicles, hazardous loads transported by road and any road traffic accidents, which lead to the release of hazardous loads and/or hydrocarbons into the water environment.
- The alteration of drainage patterns and creation of extensive areas of impermeable surfaces that have the potential to alter the level and rate of surface water run-off. This could occur through new areas of hardstanding associated with any of the options or works.

Recommendations

- Culverting of watercourses is not advised. The route option with the least amount of interaction with the Emm Brook, Route Option A or Route Option B, would be preferable although it is noted that all the route options would meet up with the Brook.
- It is recommended that an assessment of the road drainage and water environment should be undertaken as part of further environmental studies prior to submission of a planning application for the proposed routes, Local Study Areas and proposed improvements of Waterloo Road / Peacock Lane.
- Should Route Option A Alternative Link A3, with the intent of removing the balancing pond, be chosen it is recommended that suitable land is identified close by which can provide the equivalent amount of surface water attenuation and minimise the risk of flooding.
- Further consultation should be undertaken with the Environment Agency relating to the design of the chosen route option, works undertaken at Local Study Areas and improvements of Waterloo Road / Peacock Lane, specifically in relation to drainage requirements, the Emm Brook and the replacement of the balancing pond (should it be removed).
- Use of sustainable urban drainage systems is recommended along Route Option B and C to minimise the risk of flooding and to increase road drainage.