ARUN DISTRICT COUNCIL:SS/6/06/ 26/07/2006

Environment Agency

South Stoke Bridge

Environmental Report



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Summary

Introduction and Background

The Environment Agency is investigating bridge refurbishment and replacement options for South Stoke Bridge which crosses the River Arun in West Sussex. The bridge provides land access for a tenant farmer and is a public footpath. This Environmental Report is an opportunity for the Environment Agency to inform interested parties about the proposed works to the bridge, and an assessment of its environmental implications.

The proposed project is driven by the fact that South Stoke Bridge is now in need of repair or replacement. In 1997 Archibald Shaw (Consulting Civil and Structural Engineers) undertook an assessment of the bridge for the Duke of Norfolk's Estate which owns the land on either side of the bridge. This revealed that the structure was very weak and should be closed to all vehicular traffic. Since this assessment, the Environment Agency has been advised by engineering consultants to strengthen or replace South Stoke Bridge. The current legal opinion is that the Agency is presently bound to maintain the bridge to at least the standard to which it was built. If this work were not carried out, then the bridge would be at risk of collapse which would be a health and safety risk and could lead to detrimental impacts to the Arun Banks Site of Special Scientific Interest (SSSI) and the public footpath.

On the basis of this advice the Environment Agency closed the bridge in June 2005. The tenant farmer is using an alternative route to access his site. The public right of way that crosses the bridge is currently closed.

The Environment Agency has a statutory duty to consider the environmental impact of all their actions and to protect and improve the environment where they can. They aim to produce a net positive environmental effect for each project. An Environmental Impact Assessment (EIA) has therefore been undertaken to evaluate the environmental impact of the preferred option, to assess how these impacts can be mitigated and to identify how they can improve the environment.

The Environment Agency is committed to applying environmental best practice, and following its procedures for EIA, it has been determined that a Level 2 assessment is required for the proposed works. The Environmental Report will accompany the planning application and land drainage consent application.

Alternative Options Considered

- Option 1 - Do Nothing
- Option 2 - Do Minimum
- Option 3 - New Deck
- Option 4 - Refurbishment
- Option 5a- Replace with Bailey Bridge

- Option 5b - Replace as Existing
- Option 5c - Replace – New Truss Arrangement
- Option 5d - Replace with Pre-Cast Concrete
- Option 5e - Replace with In-Situ Concrete
- Option 5f - Replace with Steel/Concrete Composite
- Option 6 - Remove
- Option 7 – Replacement Bridge Off-line

Preferred Option
An evaluation of options was undertaken against engineering and environmental criteria. This identified the preferred option as Option 5b; replace as existing with a steel bridge with a 20 tonne carrying capacity and a width of 3.6m. This width and load bearing are increased from the existing to allow the bridge to be used by Environment Agency Flood Defence Operations. They currently have to negotiate with Network Rail to use the railway crossing in the field to the south east of the bridge.

Construction Methodology
Key activities to be undertaken include:

- Access;
- site facilities and contractors compound;
- temporary works; crane platform and bridge propping;
- demolition of existing bridge;
- installation of new piles and abutments;
- erection of new South Stoke Bridge;
- reinstatement and site clearance.

Existing Environment
South Stoke Bridge is located approximately 3km north of Arundel (National Grid Ref TQ 026 101) on a tidal reach of the River Arun. The Village of South Stoke is situated to the south of the bridge. A narrow track provides the only access to the bridge. A public right of way crosses the bridge, forming part of a wider network of public rights of way situated along both banks of the River Arun.

The bridge lies within the Sussex Downs Area of Outstanding Natural Beauty (AONB) and spans a new cut of the River Arun. This new cut and the adjacent old river channel are part of the Arun Banks Site of Special Scientific Interest (SSSI).

A River Corridor and water vole survey was carried out in November 2004 (Babtie Brown and Root). The survey recorded water vole signs in the field drains and wet ditches. It is unlikely they are present in the main river.

Bird species are likely to occur in all the habitats in the survey area, including the reed beds and ground vegetation.

The River Arun has a public right of navigation on the tidal waters, and recreation includes boating, canoeing and angling. Migratory salmonids, in particular sea trout, are present in the river. They migrate upstream to spawn in the upper reaches. The main migratory period is during July and August.

South Stoke Bridge, also known as Stoke Cut Bridge, is a structure of industrial archaeological interest. It was probably constructed in 1840 by the Commissioners of Sewers as an accommodation bridge for access to land which would otherwise be cut off, following the excavation of a new river channel or 'cut' across a loop of the River Arun (John Mills, West Sussex County Council Archaeologist, Pers. Comm.). The bridge is associated with a named engineer; Thomas Dunn of Manchester.

Environmental Impacts and Proposed Mitigation Measures

Potential key issues which have been identified and relate to the construction of the phase of the project and are summarised below

- Loss of access to a public right of way on the southern flood embankment
- Disturbance to breeding birds and loss of nesting habitat
- Potential disturbance of bat roosts
- Disturbance and potential spread of Japanese Knotweed
- Disturbance of migratory salmon
- Significant levels of noise and vibration generated by pile driving activities
- Disruption to public navigation on the River Arun
- Pollution of the watercourse
- Removal of the South Stoke Bridge, a monument of archaeological interest
- Disturbance or destruction of archaeological remains and deposits of palaeoenvironmental interest
- Increased traffic movements on the access track causing disturbance to local residents.

To address these impacts the following mitigation measures will be implemented:

- Temporary diversions for the footpath will be put in place with adequate signage.
- Vegetation clearance will be undertaken during the winter months prior to the breeding bird season (before March), and will be kept cleared during the construction period.
- An arboriculture and bat survey will be undertaken prior to tree clearance; advice will be sought from a qualified ecologist if presence of bats is confirmed.
- Re-planting of trees, hedgerows and reedbed.
- An Environmental Management Plan will be produced by the Contractor with methodology for avoiding further spread of Japanese knotweed.

- Avoid piling during the main salmonid migratory period (July and August). Prepare method statement and programme for piling operations and submit to EA Ecological Appraisal for advice on mitigation.
- Alternative piling methods will be used which generate reduced levels of noise and vibration. Piling operations will be restricted to day time working only with no piling at weekends
- Consultation with relevant river user groups, adequate signage on the river and on local notice boards, provision of traffic light system, lighting at night and a safety boat on site.
- Provision of netting to catch debris, sediment trap during piling operations, adherence to pollution prevention guidance notes, submission of method statements to Environmental Management.
- Drawing and recording of the bridge by an industrial archaeologist and coring/borehole investigations of site of new abutments.
- Production of a traffic management plan.

This scheme does not allow for many environmental enhancement opportunities. There is an opportunity to provide an educational interpretation board giving information on the creation of Stoke Cut, the construction of the bridge and Thomas Dunn and his works. This could include reference to any new information on the ancient river environment.

Other environmental enhancements include the potential for reedbeds to be incorporated as marginal vegetation surrounding the gabion baskets in the scour protection. This will provide a dual role; good habitat cover and longer term stabilisation of the abutments.

The increased width and carrying capacity will benefit Environment Agency Flood Defence Operations, who will be able to access the north of the bridge to undertake maintenance of the flood embankments. They currently have to travel a longer route which involves crossing a railway line.

Conclusion

By replacing the bridge the Environment Agency are maintaining safe access across the River Arun for the right of way and the tenant farmer for the future. As explained above this also benefits the Environment Agency Flood Defence Operations Team.

Provided the recommended mitigation measures are implemented, the project will not result in any significant impacts, and will contribute to Environment Agency aims of creating a better place.

1 Introduction and Background

1.1 Study Area

South Stoke Bridge is located approximately 3km north of Arundel on the River Arun (see Figure 1). The Duke of Norfolk's Estate owns the land on either side of the bridge. At this site the River Arun comprises a new cut, across which the present bridge spans, and an old cut off river meander. Both channels are designated as part of the Arun Banks Site of Special Scientific Interest (SSSI). The site is within the South Downs Area of Outstanding Natural Beauty (AONB) (see Figure 2).

1.2 Background to the Problem

The proposed project is driven by the fact that South Stoke Bridge is now in need of repair or replacement. The bridge was built around 1840 by predecessors to the Environment Agency. The local commissioners at the time built a 0.5km navigation cut to bypass a 2.5km loop in the river, and the bridge was constructed to allow access to the land isolated by the new cut. In 1989 the abutments were showing signs of distress and so the National Rivers Authority (NRA) constructed a piled "temporary" support in the river alongside the south abutment to jack the bridge deck and relieve the load on the abutments.

In 1990 the Environment Agency engaged Archibald Shaw (Consulting Civil and Structural Engineers) to advise on options for strengthening or replacing the bridge. This exercise included undertaking a diver inspection of both abutments, a topographic survey, and a condition assessment of the bridge deck. Their report concluded that the bank seats were not subjected to adverse scour, but that many of the truss elements required replacing because of severe corrosion. In 1997 Archibald Shaw undertook an additional assessment of the bridge for the Duke of Norfolk's Estate. This revealed that the structure was very weak and should be closed to all vehicular traffic.

Since this assessment, the Environment Agency has been advised by engineering consultants to strengthen or replace South Stoke Bridge. The current legal opinion is that the Agency is presently bound to maintain the bridge to at least the standard to which it was built. If this work were not carried out, then the bridge would be at risk of collapse which would be a health and safety risk and could lead to detrimental impacts to the SSSI and public footpath.

On the basis of this advice, the Environment Agency closed the bridge in June 2005. The tenant farmer is using an alternative route to access his site. The public right of way that crosses the bridge is currently closed.

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1.3 Purpose and Structure of the Document

This Environmental Report documents the environmental assessment of the proposed works to the bridge and is an opportunity for the Environment Agency to inform interested parties of the associated environmental implications.

The Environment Agency has a statutory duty to consider the environmental impact of all their actions and to protect and improve the environment where possible. The EA aims to produce a net positive environmental effect for each project. An Environmental Impact Assessment (EIA) has therefore been undertaken to evaluate the environmental impacts of the preferred option, to assess how these impacts can be mitigated and to identify how they can improve the environment.

This Environmental Report describes the EIA process that has been undertaken and the findings.

1.3.1 The Environmental Impact Assessment Process

EIA is an iterative process that identifies, predicts and evaluates the likely effects of a proposed project upon the environment. The information from the EIA will enable decision-makers to take account of these effects when determining whether or not a project should go ahead. By evaluating the likely effects of a project we can compare different options and seek opportunities to minimise the environmental impact and enhance the environment as a result of the project.

The Environment Agency has developed procedures for carrying out EIA which are in accordance with national regulations and current best practice. This Environmental Report complies with these procedures.

1.3.2 Regulatory Context and Purpose of this Document

The Environment Agency is committed to applying environmental best practice, and following its procedures for EIA, it has been determined that a Level 2 assessment is required for the proposed works. The Environmental Report will accompany the planning application and land drainage consent application.

This Environmental Report documents the Level 2 EIA process outlining the options considered, the consultation process, the existing environment, and an assessment of impacts and opportunities for environmental enhancements. It includes an Environmental Action Plan (EAP) which will outline how environmental impacts will be managed and mitigated throughout the development process. This Environmental Report is structured according to the Environment Agency Management System (AMS) EIA procedures.

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Table 1-1 Structure of the Environmental Report

Section	Title	Details
1	Introduction and background	Outlines the EIA process, the legislative context, the purpose of the document and the structure.
2	Description of the proposed project	Describes the options considered and the outline design.
3	Consultation	Outlines the consultation process to date including comments made in response to the Scoping Report.
4	The existing environment, assessment of impacts and mitigation measures	Outlines the existing environment, documents the assessment of impacts, outlines proposed mitigation and residual effects and identified opportunities for enhancements of each environmental receptor.
5	Conclusions and recommendations	Summarises the significant environmental effects and mitigation measures for each environmental receptor.
6	Environmental Action Plan	Outlines actions and targets to minimise environmental impacts of the project.
	Appendices	These contain supporting information.

1.4 Scoping

A Scoping Report was produced during May 2005 (Babtie Brown and Root, 2005) which considered the potential environmental impacts of the proposed refurbishment or replacement options for South Stoke Bridge. The Scoping Report was the first step in the EIA process and identified the key environmental issues through a review of existing information, site visits and consultation with Environmental Agency specialists and external bodies such as English Nature, English Heritage and Countryside Agency.

Within the Scoping Report a number of potential impacts of the proposed options and opportunities for enhancements were identified. Table 1-2 provides a summary of these environmental impacts.

Table 1-2 Summary of environmental impacts identified in the Scoping Report

Receptor	Potential impacts
Human Beings	Disruption to tenant farmer and users of the Public Right of Way during construction. Disruption to river users caused by temporary closures of the river.
Flora and Fauna	Loss of hedges adjacent to the bridge structure; debris may fall into the river during construction impacting on fish and SSSI features; disturbance to breeding birds and other features of the SSSI.
Water	Potential for pollution of the River Arun caused by construction material falling into the river.
Landscape	Visual impact of new structure
Cultural Heritage	Potential damage to the existing bridge and other archaeological remains in the area.

The Scoping Report was issued for consultation to obtain feedback on the proposed options and their potential impacts. Section 3 provides details of the consultation process and how responses have been taken into account.

1.5 Project Objectives

The purpose of the project is to determine the current state of South Stoke Bridge and to assess what options are available to ensure that the Environment Agency fulfils its legal obligation of maintaining the current access and any other relevant legal/statutory obligations.

The following are the environmental objectives:

Planning and Policy

- To work within the aims and objectives of relevant local plans and policies.

Human Beings

- To maintain the current provision of the public right of way facilities.
- To minimise any disruption to human beings during the construction phases of any of the options.

Flora and Fauna

- To avoid or minimise any potential impact on the features of the SSSI.
- To progress opportunities for including mitigation measures and/or ecological enhancements in the area of the proposed project.

Landscape and Visual Amenity

- To avoid or minimise negative impacts on landscape (the bridge is located within an AONB) and ensure that the design of the bridge is in keeping with the site location.

Archaeology and Cultural Heritage

- To avoid or minimise any potential impacts on the features of archaeological interest in the area, in particular South Stoke Bridge itself.

Water

- To ensure all proposals fully consider any potential pollution impacts on the River Arun.

Traffic and Transport

- To consider any opportunities for maximising the use of the river for materials delivery and any waste removal.

Use of Natural Resources

- To explore opportunities for re-using any spoil from construction works in the immediate vicinity of the site.
- To consider the use of recycled materials in any bridge reconstruction.

The aims of this Environmental Report are:

- to document the Environment Agency's environmental approach to the project;
- to identify any potential significant environmental impacts, mitigation measures, opportunities for enhancement as well as actions to be undertaken in the next stage of the project;
- to provide a mechanism for consultees to comment on and contribute to the environmental aspects of the project development.

2 Description of the Proposed Project

2.1 Physical Characteristics

South Stoke Bridge is a steel structure spanning the river supported by concrete abutments built into the river bank providing both pedestrian and vehicle access. The original timber deck has been replaced with a concrete deck. In 1989 additional supports were constructed consisting of a piled "temporary" support in the river alongside the south abutment to jack the bridge deck and relieve the load on the abutment.

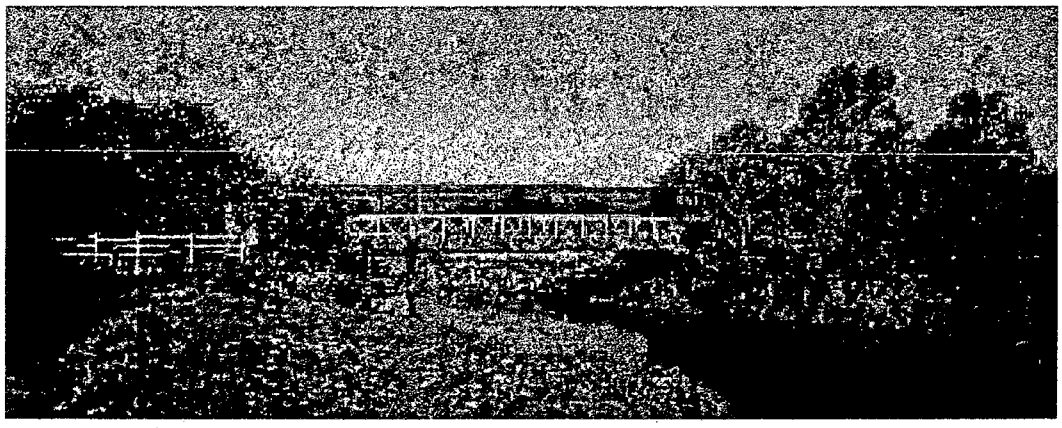


Photo 1 South Stoke Bridge looking upstream

In order to provide appropriate access a range of options has been considered including both the refurbishment of the existing structure and its replacement.

2.2 Alternative Options Considered

Option 1 - Do Nothing
This option would consist of a complete cessation of all maintenance activities which would result in the continued deterioration of the bridge and eventual failure. This would not fulfil the Environment Agency's legal obligation. The load carrying capacity of the bridge would deteriorate over time.

Option 2 - Do Minimum
This option would involve cleaning and painting the bridge. However, there would be continuing deterioration of the inaccessible areas of the bridge and eventual failure. Load carrying capacity would not be improved over the existing standards leading to health and safety implications.

Option 3 - New Deck
This option would involve cleaning and painting the bridge and replacing the deck slab with new timber or steel deck. Whilst this would remove the overstress, the capacity of the bridge would still be less than 3 tonnes.

Option 4 - Refurbishment
This option would involve cleaning and painting the bridge and replacing the deck slab with timber or steel and replacing the corroded and under strength elements. It may be possible to increase the load carrying capacity to HA* loading.

Option 5a- Replace with Bailey Bridge
This option would entail the removal of the bridge and replacement of it with a bailey bridge. The new bridge would be wider and longer than the existing bridge.

Option 5b - Replace as Existing
This option would entail the replacement of the existing bridge with a new bridge of a similar structural form. The new bridge would be wider and longer than the existing bridge.

Option 5c - Replace – New Truss Arrangement
This option would be as above, but with a different truss arrangement. The new bridge would be wider and longer than the existing bridge.

Option 5d - Replace with Pre-Cast Concrete
The replacement bridge would consist of pre-cast beams with a concrete deck slab cast in-situ. The new bridge would be about the same overall width as the existing bridge but would be longer.

Option 5e - Replace with In-Situ Concrete
The replacement bridge would consist of a cast in-situ beam and slab concrete deck. The new bridge would be about the same overall width as the existing bridge but would be longer.

Option 5f - Replace with Steel/Concrete Composite
The replacement bridge would consist of fabricated steel plate girders with a concrete deck slab cast in-situ. The new bridge would be about the same overall width as the existing bridge but would be longer.

Option 6 - Remove

* In the UK, the current highway bridge loadings comprise HA, which is a Uniformly Distributed Load (UDL) and knife edge load designed to represent the normal traffic stream, and HB which was designed to model an extreme load caused by a single heavy vehicle.

This would involve the removal of the current bridge, with no replacement being provided. However this would require further discussion with the Duke of Norfolk's estate and the legal obligations of the Environment Agency would need to be considered.

Option 7 – Replacement Bridge Off-line
During the initial options workshop, the Project Team were asked to progress the option. This would involve the construction of a new bridge to replace the existing structure on a new alignment. This option would require the construction of new abutments and involve the demolition of the present bridge once the replacement bridge was in place. The replacement bridge could be of any of the forms described in option 5 but it is likely that the bridge would be longer than the existing structure.

The key environmental issues associated with each of the options were assessed within the Scoping Report (Babtie Brown and Root, 2005). A summary of these are provided in Table 2-1 below

Table 2-1 Key environmental issues associated with each of the alternative options

Option	Potential Impacts
Option 1 Do Nothing	- Failure of the bridge resulting in loss of access for farmer and loss of footpath. - Failure of the bridge and therefore potential for debris to fall in the river impacting on the SSSI and water quality. - Visual impact as bridge continues to deteriorate. - Bridge does not meet current health, safety and design standards and therefore failure to fulfil the Environment Agency's legal obligations.
Option 2 Do Minimum	- Failure of the bridge resulting in loss of access for farmer and loss of footpath. - Failure of the bridge and therefore potential for debris to fall in the river impacting on the SSSI and water quality. - Potential for pollution of watercourse during paint spraying activities. - Localised impact on air quality during paint spraying activities. - Bridge does not meet current health, safety and design standards and therefore failure to fulfil the Environment Agency's legal obligations.
Option 3 New Deck	- Potential for pollution of watercourse during paint spraying activities. - Localised impact on air quality during paint spraying activities. - Bridge does not meet current health, safety and design standards and therefore failure to fulfil the Environment Agency's legal obligations.
Option 4 Refurbish	- Potential for pollution of watercourse during paint spraying activities. - Potential for debris to fall in the river during construction, impacting on features of the SSSI and water quality.

Option 5 Replace	- Loss of hedges adjacent to the bridge structure on the north and south banks (dependent on timing, this has the potential to impact on breeding birds). - Potential for debris to fall in the river during construction, impacting on the SSSI features and water quality. - Disturbance to the river bed/water quality if "jack up plant" is used within the river.
Option 6 Remove	- Removal of the bridge resulting in loss of access for farmer and loss of public footpath. - Removal of an existing landscape feature. - Does not fulfil the Environment Agency's statutory obligation to promote recreation and to preserve public access to areas of natural beauty.
Option 7 Replace Off-line	- Impact and loss of river bank during construction of new foundations. - Loss of hedges adjacent to the bridge structure on the north and south banks (dependent on timing, this has the potential to impact on breeding birds). - Potential for debris to fall in the river during construction impacting on features of the SSSI and water quality. - Disruption to aquatic life and associated impacts caused by piling of new foundations.

Further Development

An assessment was made of the benefits of increasing the replacement bridge option from a 7.5 tonne carrying capacity to a 20 tonne carrying capacity. This additional load bearing would enable the bridge to be used by Environment Agency Flood Defence Operations. They require access to the land on the north of the bridge for maintenance of the flood embankment. They currently have to negotiate with Network Rail to use the railway crossing in the field to the south east of the bridge. In addition to the increase to 20 tonne, it would also be necessary to increase the width of the bridge from 3m to 3.6m.

2.3 Preferred Option

Following an evaluation of options against various engineering and environmental criteria, the preferred option was selected as Option 5b, replace as existing; a steel bridge but with a 20 tonne carrying capacity and a width of 3.6m (see Figure 3.1 and 3.2).

The do nothing, do minimum, refurbish, new deck and remove options would not have met the Environment Agency's legal obligations or current health, safety and design standards.

Realignment off-line would have significant environmental impacts with relation to the increase in area of hard standing and new abutments.

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All of the replace options developed meet the key objectives of the project in terms of performance and there is no particular technical advantage to differentiate between these options in terms of performance.

The bailey bridge and wooden bridge would need to be replaced at least once within the 120 year appraisal period, with environmental impacts associated with each replacement, whereas the steel bridge has a design life of 120 years.

The existing steel truss bridge has become a feature within the existing landscape and from the landscape consultation would be the preferred option in terms of maintaining the landscape vista.

2.4 Main Project Activities

The following is a summary of project activities that will be undertaken:

- Access

Access to the site will be on the narrow unmade track via South Stoke village (see Figure 1). This is a private road and an access arrangement will need to be made with the owner. The track is considered to be too tight for articulated vehicles so goods and equipment will be delivered to site on rigid bodied vehicles up to a 20 tonne maximum carrying capacity. The footpath over South Stoke Bridge is currently closed due to health and safety reasons, this will remain closed during the construction period. The footpath that runs along the south bank of the River Arun will be temporarily diverted around the boundary of the site compound (see Figure 2).

- Site facilities and contractors compound

The field to the east of the access track (see Figure 2) is the most appropriate location for the site compound. The field is an area of pasture with a number of mature trees. The layout of the site compound has been designed around these trees, one tree will require removal. The top soil will be removed and stored on site for replacement following completion of construction. The site compound will provide space for offices, messing and welfare facilities for equipment and materials as well as an area for dismantling and assembling the bridge and an area for vehicle turning.

An additional smaller compound will be situated on the area of existing hard standing immediately north of the bridge. This compound will only be for large plant (mini digger & piling rig), formwork, reinforcement and Portaloo.

The compound areas will be securely fenced off to prevent unauthorised access.

- Temporary works; crane platform and bridge propping

The proximity of the working area to the river and the associated problems with soft banks will mean that some form of temporary works are required to enable

the crane to be sited close enough to the bridge to increase its capacity and reach. It is proposed that the temporary works will consist of 12 tubular piles driven into the river bed. Each pair of piles will have a cross head beam fitted for the crane platform to sit on. See Appendix 1 for a detailed sketch of the proposed temporary crane platform.

Due to the weight of the existing and new bridge, propping will be required to allow for segmental dismantling and installation. The propping of the existing bridge will comprise 4 tubular piles driven into the river bed. Each pile will have a cross head beam fitted to allow propping of the bridge. Temporary restraints and spreader beams will also be incorporated into the temporary works. This will reduce the headroom of the existing bridge by approximately 900mm.

- Demolition of existing bridge

The existing deck will be cut into segments and prepared for lifting. Each segment will be lifted out in stages and transferred to the south bank for processing and recycling. Once the concrete deck has been removed the exposed section of steel truss will be cut away from the existing bridge and lifted onto the south bank for processing. Once the bridge is removed the existing abutments and wing walls will be broken down to accommodate the new abutments and gabion scour protection.

- Installation of new piles and abutments

The piles will be installed to the north and south abutments using a mini-piling rig, on tracks. This weighs only 3.5 tonnes so can be lifted across the river by crane. All silted water produced during piling operations will be pumped into a sediment tank before being introduced back to the river.

Once the abutment piles have been installed, excavation for the abutment can commence. Formwork and reinforcement will be lifted across the river using the crane. Concrete can be lifted across in a concrete skip or transferred by concrete pump truck.

The new abutments will require gabion scour protection. These will be constructed within trench sheeted excavations at low tide conditions, with additional sump pumping as required.

- Erection of new South Stoke Bridge

The new bridge components will be delivered in sections to site. The bridge will be assembled into halves on site. When completed, each half will be lifted into position and temporarily supported by the bridge propping until both sections are spliced together. The final stage is the installation of the deck sections (if not already fitted). On completion of the installation of the new bridge, the approaches will be reinstated and safety fencing installed.

- Reinstatement and site clearance

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Removal of temporary works will be conducted in reverse order. Piles will be removed using the site crane with vibrating hammer. Piles that can not be removed will be cut 1m below existing river bed level. The site compound will be reinstated and seeded to landowners requirements.

2.4.1 Construction Programme

A detailed construction programme is being developed. It is anticipated that works will be scheduled to begin in April 2006, to be completed by November 2006.

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3 Consultation

Ongoing consultation is recognised as an important process to enable views of interested parties to be taken into account in project development.

3.1 Pre-Scoping Consultation

A letter describing the proposed scheme and the alternative options being considered was sent internally to the Environment Agency Specialist Teams inviting their input into the option development process. Responses which were obtained from this exercise were incorporated into the Scoping Report. Specialist teams contacted at this stage are listed in Table 3.1, together with details of their responses and how these were addressed.

Table 3-1 Summary of Scoping consultation with Environment Agency Specialists

Specialist Team	Summary of Reply	Corresponding Action
Conservation/Fisheries	Comments provided at options workshop. Main point is presence of sea trout in the River Arun. May result in restrictions on timing of works.	Fisheries were contacted. Information has been included in the Environmental Report.
Landscape	The preferred option should be a like for like replacement.	
Archaeology	Details provided on Sites and Monuments Records.	Information included in Scoping Report.
Recreation	Most important thing to consider is the fact that the bridge carries a public footpath in an Area of Outstanding Natural Beauty, and any proposal which would result in the loss of the footpath would not be in line with our duties to promote access to areas of natural beauty.	
Flood Defence Operations	Currently can not use the bridge to move machinery across to undertake weed cutting and other flood defence operations. May be able to use the refurbished bridge depending on the carrying capacity.	
Development Control	No comments to make.	
Environmental Management	No comments to make.	

3.2 Scoping Consultation

In addition to the internal consultees a number of statutory and key external consultees were sent the Scoping Report to introduce them to the project, inviting feedback on the options and potential impacts identified. Those consulted are listed in Table 3.2 along with a summary of their comments.

Table 3-2 Summary of scoping consultation with external consultees

Organisation	Summary of Reply	Corresponding Action
Arun District Council	No response to date.	
Duke of Norfolk's Estate (Arundel Estates)	Prefers option 5a, replace with Bailey Bridge as it is the easiest to construct. Options 1, 2 and 3 are unacceptable.	
Countryside Agency	No response to date.	
English Heritage	No comments to make.	
English Nature	The final work will require assent from English Nature as it is likely to affect a SSSI. Major concerns are to ensure the SSSI is not polluted or damaged by the works. The SSSI is used by a large number of nesting birds and disturbance during the breeding season should be avoided if possible. Access routes should minimise the impact on the reedbed and try to avoid increasing hard standing.	Production of an Appendix 3 form (CRoW Act, 2000). Access routes will be from the village, no access through the SSSI.
Sussex Downs Conservation Board	Preferred options 4 and 5. Options 1, 2 and 3 unacceptable as it does not meet legal requirements. Option 5a unacceptable as it only has a 30+ year life.	
West Sussex – County Archaeologist.	South Stoke Bridge is a structure of industrial archaeological interest of the mid-1800s. Replacement or removal of the bridge would have a significant impact on the structure. Deposits of palaeo-environmental interest may be affected by new abutment works.	Mitigation and enhancements discussed with Environment Agency Archaeologist prior to inclusion in the Environmental Report.

3.3 Environmental Report Consultation

This Environmental Report has been circulated to internal and external consultees. A summary of their responses are detailed below in Table 3.3 and 3.4. This publication will be accompanied by advertising in accordance with the planning application.

Specialist Team	Summary of Reply	Corresponding Action
Biodiversity	Concerned by the potential presence of water voles on the length of bank that will require stimming for the temporary crane platform. Provides information for potential mitigation measures that can be applied.	Meetin on site with biodiversity officer to survey river bank and if appropriate agree mitigation measures.
Landscape	Requested that the paintwork of the bridge is to be to the original colour (as Thomas Dunn intended). Requested that the information board to be provided should use line drawings for the archaeological recording of the bridge. Also a tree protection and re-planting plan to be produced.	Searches will be undertaken to determine the original colour of the paintwork. No tree protection is required, re-planting covered in tree survey report and associated drawings.
Archaeology	Need to recognise the potential damage to archaeological remains resulting from the construction of the main site compound. The likelihood of damage will be dependent on how much penetration there is through the topsoil, Steve can advise. Should excavation of a cell be required to contain Japanese knotweed, the work should be monitored by an archaeologist. If cores are taken and peat identified, then the peat should be dated and if appropriate analysed to inform of past environmental conditions within the catchment.	Confirmed with Archaeological officer the depth of excavation of top soil and agreed the use of a protective lining. Site Investigation has revealed that there is no natural ground under the abutments, it consists of brickwork and a concrete plinth.
Recreation	Satisfied with the ER.	
Flood Defence Operations	No comments	
Development Control	No comments	
Environmental Management	No comments	

Organisation	Summary of Reply	Corresponding Action
Arun District Council	01/02/2006 no response received to date	
Duke of Norfolk's Estates	No comments	
Countryside Agency	01/02/2006 no response received to date	
English Heritage	No comments	
English Nature	English Nature assent to the works detailed in the Appendix 3 notice subject to the work adhering with the following conditions: A survey of vegetation to be removed by the proposal, to look for field signs of *Schoenoplectus* species. If no *Schoenoplectus* plants are found the work can proceed as stated. If *Schoenoplectus* species are found in the area to be removed they must be sampled for laboratory confirmation of whether the rare hybrid which is part of the site interest features namely *Schoenoplectus lacustris* sub-species *tabernaemontani x triqueter* is present. Field signs do not accurately identify this sub-species and must be supported by laboratory confirmation. If the interest feature hybrid is present in the area to be removed then the works **cannot go ahead** without resulting in significant damage to the SSSI interest features. If this is the case an alternative method and/or mitigation must be agreed with English Nature.	A survey of the vegetation to be removed will be undertaken and further surveys under a high powered microscope to ascertain the presence of the hybrid will be undertaken where necessary. Further mitigation may involve translocation, this will be discussed with English Nature if presence of the hybrid species is confirmed.
Sussex Downs Joint Committee	01/02/2006 no response received to date	
John Mills – County Archaeologist	The archaeological coring, by means of boreholes and trial pits should help to ascertain the character and quality of archaeological deposits on the river banks, and to determine at an early stage before construction whether any further archaeological mitigation work may be	Site Investigation has revealed that there is no natural ground under the abutments, it consists of brickwork and a concrete plinth. Confirmed with

Organisation	Summary of Reply	Corresponding Action
	warranted. If this exercise is carried out properly, the stop-and-report solution should only be needed if unanticipated archaeological remains unexpectedly come to light. It would be useful to make clear in section 2.4 (main project activities) to make clear just when the industrial archaeological recording of the existing bridge and the archaeological coring/test pitting at each end would take place. If preparatory works for creation of the temporary site compound involve any ground excavations, it would be better to arrange for these works to be monitored by an archaeologist so that any site recording can be carried out straight away.	Archaeological officer the depth of excavation of top soil and agreed the use of a protective lining.

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4 Existing Environment, Assessment of Impacts and Mitigation Measures

4.1 Methods of Assessment

This Environmental Report has been produced following the issue of an earlier Scoping Report. The aim of the Scoping Report was to identify all possible effects that the flood defence works may have on the environment; it was also the aim of the report to 'scope out' issues which were determined not to be relevant. The effects identified may have been positive or negative, direct or indirect, temporary or permanent and of varying severity.

Effects on the environmental receptors have been assessed at each phase of the scheme (construction and operation/maintenance) and consideration given to the following features of impact:

- **Geographical level** - This assesses whether the impact of the project upon the receptor will be on a national, regional or local level.
- **Direct or Indirect** – This assesses whether the impact will affect receptors in the immediate locality of the project, or whether it will influence features or processes which in turn result in indirect environmental impacts.
- **Timescale** – This assess the duration of the impact on the environmental receptor, which may be temporary, associated with the construction activities, or permanent, as a longer-term effect of the project once operating.
- **Reversibility** – Consideration is given to whether potential impacts are reversible or irreversible.
- **Beneficial/adverse** – this will identify whether the impact is likely to be beneficial (positive and favourable) to the environmental receptor, or adverse (negative or damaging) or neutral, causing no change to the baseline conditions.
- **Cumulative Effects** – Other schemes or developments in the area have been considered which may result in cumulative impacts in association with this project.

Consideration of the **magnitude** of effect versus the **importance** or **sensitivity** of the receptor determines the degree of **significance** of beneficial and adverse effects. The magnitude of effect is identified using the features of impact listed above. The sensitivity of the receptor is determined by its level of statutory or non-statutory protection, its vulnerability or rarity, views of consultees, specialist expertise and professional judgement, as appropriate for that receptor. Table 4.1 provides a matrix illustrating how these aspects are combined to identify the significance of an effect.

		Importance/Sensitivity of Receptor		
		LOW	MEDIUM	HIGH
Magnitude of Effect	VERY LOW	Negligible	Negligible	Minor
	LOW	Negligible	Minor	Moderate
	MEDIUM	Minor	Moderate	Major
	HIGH	Moderate	Major	Major

Generally, categories of the degree of significance can be described as follows:

- **Negligible** – Effect is only very slightly detectable/noticeable, or is undetectable and of no significance.
- **Minor** – Effect is slightly detectable/noticeable and of some temporary and localised effect, of a reversible nature.
- **Moderate** – Effect is fairly easily detectable/noticeable and of either temporary or permanent effect, unlikely to exceed local influence.
- **Major**- Effect is easily detectable/noticeable and likely to be of permanent, long-term significance, with irreversible implications exceeding the local area.

Potential effects for the project are discussed for each receptor and summarised in the Environmental Impacts Matrix in Section 5.

Mitigation measures provide a description of measures formulated to prevent or reduce impacts to an acceptable level and where possible offset any significant effects on the environment. The 'acceptable level' is determined by appropriate legislation and good practice guidance, and the views of consultees. Mitigation measures are detailed in the text under each receptor and are also summarised in the Environmental Impacts Matrix (Section 5).

Residual effects refer to those that remain after taking account of the proposed mitigation measures. The significance of these residual effects is assessed.

The **Environmental Action Plan** is a tool by which the potential significant effects identified within the ER can be managed and mitigation measures implemented. The objectives, actions and targets set out in the EAP will be monitored through the detailed design, construction and post-construction stages of the project to ensure that the mitigation measures outlined in the ER are properly implemented (see EAP, Section 6).

4.2 Human Beings

4.2.1 Baseline Conditions

There is a public footpath across the bridge which is part of a wider network of public rights of way in the Sussex Downs AONB which is understood to be a popular location for walkers (see Figure 2 for routes). However the footpath has been closed since June 2005 for health and safety reasons.

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The river has a public right of navigation on the tidal waters, and recreation includes boating, canoeing and angling. A number of trade organisations use the River Arun for river cruises from Littlehampton Harbour.

Public fishing is licensed on the right bank of the River Arun between Arundel (downstream of the South Stoke Bridge site) and Ford Railway Bridge (downstream of Arundel). Fishing is not permitted along the stretch of river at South Stoke Bridge.

The setting is rural and generally very quiet. South Stoke village is situated to the south of the bridge. There are approximately 10 properties in the village, including the church. The nearest residential property is within 60 metres of the bridge. A major noise source in this area is the mainline railway running across the old Arun channel at South Stoke.

4.2.2 Assessment of Impacts

Construction Phase

Local Residents

The potential for increased noise during the construction phase, particularly the piling operations and the cutting of the bridge, may result in a moderate adverse impact on the local residents of South Stoke village.

Public Rights of Way

The public right of way across the bridge has been suspended since June 2005 for health and safety reasons. During the construction phase of the project the footpath will remain closed. The distance travelled to the next river crossing is 1.5 km. The project is therefore predicted to have a moderate beneficial impact in allowing the public footpath to be reopened followed bridge reinstatement.

During the construction phase, the footpath along the south bank will require a diversion around the contractor working area (see Figure 2). This is considered to be a minor adverse impact due to the short diversion route.

The potential for increased noise during the construction phase may lead to decreased enjoyment for users of the public right of way, particularly given its quiet rural setting.

Navigation

There will be disruption to navigation during the construction phase. This is likely to include reduced headroom, restricted access using half the river channel at a time. It will also require complete closure during certain phases of the works for health and safety reasons e.g. demolition of the existing bridge. At this stage, it is thought that only one river cruiser would be affected by the temporary closures of the bridge, however, it only operates at weekends. It is considered to have a moderate adverse impact on river users.

Operational Phase

The replacement of the bridge will mean an improved access over the River Arun for both the tenant farmer and the PRoW. The additional capacity and width of the bridge will also eliminate the need for the operational plant used by the Environment Agency having to cross the main railway line thus removing the risks associated with crossing a mainline track.

4.2.3 Mitigation

Local Residents
Working hours will be agreed as part of the planning application and agreed with the Environmental Health Officer. Alternative piling methods will be used which are known to generate lower levels of noise and vibration. Piling operations will be restricted to day time (09.00 to 1700) with no piling at the weekends.

Local residents will be informed of the works and kept up to date with progress through letter drops. An emergency contact number for the contractor will be provided on the letters as well as being available on a site information board.

Public Rights of Way
A temporary diversion order will be sought from Arun District Council for the PRoW that will be impacted by the site compound. Signage will be provided to users of the PRoWs to inform them of the timing of works and diversions planned in advance of the works. The signage will include information about the project and contact details for both general enquiries and complaints. Notices will be placed on suitable local notice boards e.g. community centres, civic hall, leisure centres etc.

Liaison will be undertaken with the Duke of Norfolk's Estate (Arundel Estates) to ensure that works are not programmed over sensitive time periods and they are kept informed of the progress of the works.

Following construction all PRoWs will be returned to existing or improved condition.

Navigation
Discussions have been undertaken with the Environment Agency's Waterways Team, and the following mitigation measures are proposed:

- keep closures to an absolute minimum;
- publish notices in local press in advance and during the works;
- maintain notice boards at all launching sites and moorings and at port of Littlehampton;
- maintain warning signs on the banks upstream and downstream of the works;

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- maintain a contact telephone number for boaters to call in advance to check whether navigation is open and whether safe passage can be arranged;
- make sure a safety boat is available;
- ensure that the works are well lit at night in case of boaters passing when the site is closed;
- hold a meeting with the main user groups on the river so they are able to comment on the proposed navigation plan;
- enforcement of restricted speed limits.

The site will be left in a safe and tidy condition with construction barges tied up securely, allowing safe passage under the bridge for the river cruiser at weekends.

Further consultation with EA Waterways is recommended who may have additional mitigation measures.

4.2.4 Residual Impacts

Local Residents
There will still be a moderate residual impact from the piling operations, however the operations are temporary and will be undertaken during day time hours.

Public Rights of Way
An external complaints procedure will be developed to respond to complaints received by users of rights of way and recreational users during construction and for a limited period following re-instatement of the footpath. Provided the mitigation is in place, the effects are assessed to be negligible during construction, with long term benefits due to re-opening of the footpath across the bridge.

Navigation
There will still remain periods during the construction phase where the river will need to be closed completely due to health and safety reasons, particularly during the process of lifting the old bridge out and positioning the new bridge. Following the mitigation measures detailed above will ensure that the boating community can be warned well in advance of the closures, but there will inevitably still remain a minor adverse impact on river users.

4.3 Ecology and Nature Conservation

4.3.1 Baseline Conditions

This section describes the key features of ecological and nature conservation interest within the study area for the proposed works on South Stoke Bridge. The study area includes the immediate vicinity of the scheme together with any

adjacent areas that could be affected due to the requirements of species present.

International and National Designations
South Stoke Bridge is located within the Arun Banks SSSI, valued for its wetland habitats and associated species. The site includes a section of the upper tidal stretch of the River Arun and an old abandoned meander loop (see Figure 1). The cut-off meander still receives some water flow and contains a range of habitats including extensive reedbed. The SSSI has a rich and varied flora which includes one nationally uncommon plant; glaucous bulrush hybrid (*Schoenoplectus lacustris* sub-species *tabernaemontani x triqueter*).

The main river is deep and tidal and thus supports little vegetation in the main channel. Bank side communities however are well established and consist of reedbeds in deep water with rich shallow water communities behind them. See Appendix 2 for full citation and Figure 2 for SSSI boundaries.

Local Designations
The site is located adjacent to a Site of National Importance for Nature Conservation and a Site of Local Importance for Nature Conservation (See Figure 2 for location).

Previous Surveys
A River Corridor Survey (RCS) and a targeted water vole (*Arvicola terrestris*) survey were undertaken by Jacobs-Babtie on 2nd November 2004. The survey provides a flora species list, and any potential for the presence of protected species based on field signs and habitat type.

For the RCS a single stretch of the River Arun was surveyed; from approximately 200m upstream to 300m downstream of South Stoke Bridge. Outlined below is a brief overview from that survey:

All of the plant species recorded during the survey are common and widespread. None are specially protected under wildlife legislation, nor are they Priority species in the UK National Biodiversity Action Plan (UKBAP), listed under local BAP, or otherwise of conservation concern. However, due to the sub-optimal time of year for the survey, the survey results should not be considered conclusive.

Where the bridge meets the land on both banks, it is bordered by a hedge which is dominated by hawthorn (Crataegus monogyna), but also includes blackthorn (Prunus spinosa), dog rose (Rosa canina) and privet (Ligustrum vulgare).

Water vole field signs were found within the field drains. The habitat within the wet ditches where water vole signs were not present has potential for water

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voles. It is unlikely that they occur on the main river, but reedbeds in slacks on the margins of the river may support them (see Figure 2).

Bird species are likely to occur in all the habitats in the survey area, including the reedbeds and ground vegetation.

During the survey no evidence was found of any other protected faunal species.

A small patch of Japanese knotweed (Fallopia japonica) was noted to the east of the study area (see Figure 2). This is an invasive species and once introduced to a site can propagate rapidly. It is an offence under the Wildlife and Countryside Act, 1981 'to plant or otherwise encourage the growth of' this species.

Protected Species
A tree survey has been undertaken to determine the height clearance required for access to the site and removal of the other trees and vegetation in the site area. It has been identified that the alder in the main site compound has high bat potential due to a metre long crack in its trunk.

Fisheries
The River Arun has a good mix of coarse fish populations in the middle and lower reaches. These are predominantly bleak *Alburnus alburnus*, dace *Leucisus leucisus*, roach *Rutilus rutilus*, rudd *Scardinius erythropthalmus*, chub *Leuciscus cephalus*, eels *Anguilla anguilla*, bream *Abramis brama*, carp *Cyprinus carpio*, tench *Tinca tinca* and pike *Esox lucius* in the middle and lower reaches. These species are thought to live and breed successfully within the Arun system, but eel populations may be threatened by a nematode parasite (EA, 1999).

Migratory salmonids, in particular sea trout (*Salmo trutta trutta*), are present within the River Arun. Spawning occurs in the upper reaches, the fish will pass under South Stoke Bridge to reach these spawning grounds (Atlantic Salmon Trust, 2005 EA, Fisheries Pers. Comm). The main migratory period is during July and August.

4.3.2 Assessment of Impacts

Construction Phase
On the basis of information gathered from the ecological survey and other existing information, it is anticipated that the construction phase of the works will have the following impacts:

Designated Sites
Arun Banks SSSI is designated for its wetland habitats and reedbeds which support a number of different breeding birds. The construction of the bridge is

likely to cause disturbance to these species and loss of habitat. The loss of habitat is considered to be a moderate adverse impact.

Habitats
Loss of hedges adjacent to the bridge. The hedgerow is largely comprised of hawthorn, a common species, however it is located within the SSSI and has potential as a habitat for breeding birds. There is considered to be a Moderate Adverse impact on these hedges.

The crane platform will require 12 piles to be driven into the riverbed and part of the riverside (at the downstream end). This will involve the loss of a 10m stretch of reedbeds. This is important as potential breeding habitat for bird species such as the reed warbler. The loss of habitat can be considered to be a Moderate Adverse impact.

Removal of overhanging branches along the road designated for site access and removal of a larch tree from the proposed contractors compound. This is considered to be a Minor Adverse Impact.

Japanese Knotweed
Disturbance to and potential spread of Japanese knotweed. The previous stand of Japanese knotweed (noted during the November 2004 survey) was outwith the study area. However, given its invasive nature it is prudent to assume it may have spread. Without mitigation, this would be a Major Adverse impact on the SSSI.

Protected Species
Disturbance to breeding birds. The works programme is scheduled to begin in March and be completed by the end of August. This coincides with the bird breeding season (March 1st to August 31st). Nesting birds are afforded protection under the Wildlife & Countryside Act, 1981. This impact is considered to be Major Adverse.

Disturbance to other protected species such as water voles. Water voles breed between March and October, which coincides with the scheduled programme of works. Assuming water voles are present in the drain parallel to the River Arun, and not in the main river channel this impact is considered to be Minor Adverse.

There is the potential for disturbance to bat roosts if present in the alder tree in the proposed main site compound, this is considered to be moderate adverse.

Fisheries
The piling operations and subsequent piled structures could pose a significant disturbance and barrier to migratory salmonids. This would be considered a Major Adverse impact.

Operational Phase

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There is a small increase in the area of hard standing of the abutment on the north of the bridge within the SSSI. The area will increase by one metre on each side.

4.3.3 Mitigation

Designated Sites
An "Appendix 3 form (EA procedure for works in a SSSI) has been completed with the mitigation below detailed within it (see Appendix 3 of this ER). This has been submitted to English Nature with the Environmental Report for approval. English Nature have assented to the works providing the following conditions are adhered to:

- A survey of vegetation to be removed by the proposal, to look for field signs of *Schoenoplectus* species. If no *Schoenoplectus* plants are found the work can proceed as stated.
- If *Schoenoplectus* species are found in the area to be removed they must be sampled for laboratory confirmation of whether the rare hybrid which is part of the site interest features namely *Schoenoplectus lacustris* sub-species *tabernaemontani x triqueter* is present. Field signs do not accurately identify this sub-species and must be supported by laboratory confirmation.
- If the interest feature hybrid is present in the area to be removed then the works **cannot go ahead** without resulting in significant damage to the SSSI interest features. If this is the case an alternative method and/or mitigation must be agreed with English Nature.

A copy of the letter of assent is provided in Appendix 3.

Habitats
Potential spread of Japanese Knotweed will be controlled through the preparation by the contractor of a Construction Environmental Management Plan (EMP). This will include a strict methodology to be followed when moving earth and using machinery to avoid further spread of the plant.

The hedgerows, reedbeds and overhanging branches will be removed in the winter months prior to site workings. This needs to be supervised by an experienced ecologist. If an active bird's nest is found, it will be marked and a 5m buffer zone will be maintained around the nest. The nest will be left undisturbed for six weeks and then subject to a further inspection by the ecologist. If no evidence of nesting birds remains, then the hedge may be felled.

Any trees removed either for the siting of the contractors compound or along the access track, will be replaced following site clearance. The reed beds will also be replanted with additional lengths created around the scour protection.

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Protected Species
Site clearance will be undertaken in the winter months prior to site start-up. This will avoid impacts on nesting birds.

The alder tree in the proposed main site compound will be surveyed using an endoscope. If no signs of bats are detected the tree will be cut down within 24 hours. Further mitigation will be provided by an experienced ecologist if the bat roost is established.

Fisheries
Records of the noise monitoring, undertaken during piling will be submitted to the Environment Agency Ecological Appraisal Team. This will be added to their database of noise levels from different forms of piling and river works in order to established a best practice methodology.

4.3.4 Residual Impacts

Designated Sites
Providing the mitigation measures above are adhered to, there is considered to be only minor residual impacts.

Habitats
Assuming the Construction EMP is adhered to, the risk of Japanese knotweed spread is reduced to a Minor Adverse Impact.

Protected Species
Provided site clearance is undertaken in winter, supervised by an ecologist, the impact on nesting birds is reduced to Minor Adverse.

Provided bat surveys are undertaken and any subsequent mitigation is adhered to, the impact on bats is reduced to negligible.

4.4 Air and Climate

4.4.1 Baseline Conditions

There are no designated Air Quality Management Areas (AQMAs) within the Arun area.
The site is located in a fairly remote location and there are no major roads close to the site

4.4.2 Assessment of Impacts

Potential impacts on air quality and climate for this scheme will be limited to temporary construction related activities, i.e. exhaust emissions arising from vehicle movements to and from the site. This will be addressed through the preparation and adherence to a Construction EMP.

4.5 Landscape and Visual Amenity

4.5.1 Baseline Conditions

South Stoke Bridge falls within the Sussex Downs Area of Outstanding Natural Beauty (AONB). The Sussex Downs AONB 'encompasses the full rolling sweep of chalk downland in East and West Sussex plus an extensive area of the Weald to the north-west'.

The statutory framework for AONB is provided by the Countryside and Rights of Way Act, 2000. The Act places a statutory duty on relevant authorities to have regard to the purpose of conserving and enhancing the natural beauty of the AONB when exercising or performing any functions affecting land in the AONB.

The Sussex Downs AONB is currently being considered for National Park status; the current anticipated timetable is for the Secretary of State to make a decision in 2006 and for the South Downs National Park Authority to be set up in 2008.

Consultation was held with the Countryside Agency and the Environment Agency's landscape architect. The Countryside Agency had no comments to make, however, the Environment Agency's landscape architect felt that the least intrusive impact would be to replace the bridge with a structure that reflects the same qualities as the original bridge's design.

4.5.2 Assessment of Impacts

Construction Phase
From a landscape and visual perspective, the key impact will be during the dismantling of the existing bridge and the reassembly of the new one. This would create a temporary Moderate Adverse visual impact for users of the PROW and visitors to the site. There will also be an impact due to the loss of the hedgerows and any trees until these become re-established.

Operational Phase
There are not considered to be any permanent landscape and visual impacts arising from the scheme as the bridge will be replaced with a structure of similar qualities.

4.5.3 Mitigation

Any trees removed either for the siting of the contractors compound or along the access track, will be replaced following site clearance. The reedbeds will also be replanted with additional planting around the area of scour protection.

4.5.4 Residual Impact

The loss of hedgerows and reedbeds will be a permanent loss. Although they will be replanted, it will be a number of years before they become established

so this impact will remain Moderate Adverse. Once the new structure is in place there will be no further impact on users of the PROW and site visitors.

4.6 Water

4.6.1 Baseline Conditions

Water Resources

There are no licensed surface water abstractions within the immediate vicinity of South Stoke Bridge. The nearest is 3.5km to the south at the Chalk Springs Trout Fishery in Arundel. Most of the Lower Arun Catchment is underlain by chalk aquifers, and there is some licensed groundwater abstraction within the South Stoke area, one of which is within 1km of South Stoke Bridge (EA, 2005).

Drainage

The River Arun has a large catchment area and includes the confluence of the River Rother and upstream tributaries. The River Arun extends 25.5 miles downstream from its source at Pallingham to the coast at Littlehampton (EA,1999).

Water Quality

There are no water quality data for the stretch of the River Arun immediately surrounding the bridge. The following table provides details of water quality data from 2 sites upstream and 1 site downstream of South Stoke Bridge (Data taken from Environment Agency My Backyard Data Maps).

Table 4-1 Water quality data

Monitoring Location	Distance from South Stoke Bridge	River Quality Target	1998	1999	2000	2001
R. Stor- R Arun – Conf - R Chitt Conf	13 km upstream	Grade 4	✓	✓	✓	✓
R Rother (west Sussex) – R Arun Conf – Sutton Stream Conf	15 km upstream	Grade 2	✓	✓	✓	✓
Black Ditch – R Arun – Clapham STW	7 km downstream	Grade 4	✓	✓	✓	✓

Key

	Grade 2		Grade 4		Grade 5
✓	Pass	✓	Marginal		

4.6.2 Assessment of Impacts

Construction Phase

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The key impacts on water quality arising during the construction phase are outlined below:

- the potential for falling debris to enter the river during the bridge dismantle;
- the disturbance of sediment during piling;
- pollution from concreting works;
- potential for oil/fuel spills.

In the absence of mitigation, the significance of these impacts is considered to be Moderate Adverse.

Operational Phase

There are not considered to any permanent impacts on water quality once the new bridge structure is in place.

4.6.3 Mitigation

The following mitigation is recommended to ameliorate the effects arising during the construction phase:

- Adherence to Pollution Prevention Guidance.
- Preparation of a Pollution Response Plan.
- The erection of netting under the bridge prior to construction. This will trap any construction debris before it enters the water.
- A sediment tank will be installed during the piling operation. This will separate the silt from the water before releasing the 'clarified water' back into the river.
- Agree method statements for all works affecting the water course with EA Environmental Management.

Erection of netting or crash deck to catch any debris that may drop or fall into the river below.

4.6.4 Residual Impacts

Provided the mitigation is in place, the impacts on water quality are considered to be minor.

4.7 Land Use

4.7.1 Baseline Conditions

The area immediately adjacent to the site is farmed (South Stoke Farm), and there is a Public Right of Way which goes across South Stoke Bridge itself. An assessment of the impacts on the PRoW is provided in Section 4.2 above. The village of South Stoke is situated on the south side of the bridge.

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The fields to the north of the River Arun lie within the South Downs Environmentally Sensitive Area (ESA). The River Arun and the old cut off meander lie within the Arun Banks SSSI.

4.7.2 Assessment of Impacts

Construction Phase

Some direct impacts on land use from these works will result from surface disturbance brought about by work during the construction phase including access, storage or working areas. In addition, the location of the site compounds to be used during the construction phase will result in a temporary change in land use over this period.

The contractor's compound will be located in the field to the east of the access track. This is currently an area of improved grassland. Site access will be via the narrow, unmade track east of the church. The site compound will comprise the offices, messing and welfare facilities, storage facilities for equipment and materials, an area for dismantling large elements of the existing bridge, and an area for assembly of the new bridge and a vehicle turning facility. Disruptions caused by this change in land use are considered to be Minor Adverse.

Access over the bridge for the tenant farmer will remain closed during the construction period.

4.7.3 Mitigation

The temporary change in land use while the site compound is in place will last for approximately six months. Disruption during this period will be minimised through the preparation and adherence to a Construction EMP. This will ensure that work is only undertaken during core hours (to be confirmed with Environmental Health Officer). The site compound will be maintained in an orderly condition and reinstated to its former land use at the end of construction.

Alternative access arrangements are currently in place for the farmer; these will be continued until construction of the new bridge is completed.

4.7.4 Residual Impacts

Provided the Construction EMP and EAP are adhered to, no significant land use impacts are forecast.

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4.8 Cultural Heritage, Archaeology and Material Assets

4.8.1 Baseline Conditions

South Stoke Bridge, also known as Stoke Cut Bridge, is a structure of industrial archaeological interest. It was probably constructed in 1840 by the Commissioners of Sewers as an accommodation bridge for access to land which would otherwise be cut off, following the excavation of a new river channel or 'cut' across a loop of the River Arun (John Mills, West Sussex County Council Archaeologist, Pers. Comm.). The bridge is associated with a named engineer; Thomas Dunn of Manchester.

4.8.2 Assessment of Impacts

Construction Phase

Following data searches and discussions with key consultees, the following impacts have been identified:

- Piling process/creation of new abutments cutting into alluvial deposits of the riverbank and potential removal of deposits of palaeoenvironmental interest (such deposits include sequences of pollen and organic remains);
- Potential for uncovering archaeological artefacts during construction.

Operational Phase

Following data searches and discussions with key consultees, the following impacts have been identified:

- Removal of the bridge, a monument of industrial archaeological interest

4.8.3 Mitigation

It is proposed to replace the bridge with a similar structure.

Mitigation will need to be in agreement with the Environment Agency Archaeologist and the key consultees such as the County Archaeologist and English Heritage. It may include some or all of the following:

- Adequate drawing and recording of bridge by an industrial archaeologist prior to on-site works;
- Archaeological recording e.g. by coring or borehole investigation of sites of new abutments prior to on-site works.

The County Archaeologist has suggested the following enhancement opportunities following the assembly of the new bridge:

- Educational interpretation board giving information on the creation of Stoke Cut, the construction of the bridge and Thomas Dunn and his works. This could include reference to any new information on the ancient river environment.

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4.8.4 Residual Impacts

Provided appropriate mitigation is undertaken, the residual impact is considered to be Minor-Moderate positive, as the finding and recording of archaeological remains is of benefit to the community and wider society.

4.9 Traffic and Transport

4.9.1 Baseline Conditions

The South Stoke Bridge is normally used by farm vehicles and walkers. The main access to the site is via a track from the village of South Stoke, to the south. There is no track to the north of the bridge. However the bridge has been closed for health and safety reasons since June 2005.

Main roads within the study area include the A284, London Road and the A27, Chichester Road, which converge around Arundel.

To the north, close to the town of Amberley, is the B2139 New Barn/Turnpike Road.

The London to south coast railway line lies to the East of the study area. Amberley station is situated 2 km north of South Stoke.

Estimates of the total number of traffic movements associated with the works have been obtained from the Contractor. During peak periods i.e. site setup, de-mobilisation and material deliveries, approximately 5 – 20 fixed axle 20t trucks will visit the site per day. On a normal construction day this is expected to decrease to approximately 1 or 2 vehicles.

4.9.2 Assessment of Impacts

Construction Phase

It is proposed to access the site from South Stoke village via the narrow, unmade track to the east of the church (see Figure 2). There will be temporary minor adverse impacts on local residents when machinery and equipment are delivered to site. Due to the narrowness of the access track, it is likely that temporary closures will be required in order to manoeuvre the large vehicles.

Operational Phase

Potential for heavy site machinery to damage the surface of the access track. Impact is considered to be moderate adverse.

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4.9.3 Mitigation

Access arrangements to all parts of the site will be agreed with landowners prior to commencing the works.

The impact of traffic movements would be mitigated by the development of a Traffic Management Plan, which would form part of the Construction EMP. This will control the number of vehicle movements, the time of day when vehicles can enter and leave the site, and the routes which vehicles associated with the works can take.

A pre-start condition (photographic) survey of the road surfaces will be undertaken and at the completion of the project the roads will be reinstated to the pre-existing condition.

4.9.4 Residual Impacts

Providing the traffic management plan is adhered to and the road surface is reinstated to the existing condition, the residual impacts are expected to be minor.

4.10 Soil, Geology and Hydrogeology

4.10.1 Baseline Conditions

Soils and geology play an important part in determining the environmental character and land use of an area. Geological features can be designated at National or Regional level. There are no designated geological features within 2km of the study area.

Historic Mapping from 1879 indicates that the land has always been farmed and there is no evidence of previous contaminating land uses. The land surrounding the river will have rich alluvium deposits suggesting soils rich in nutrients.

A Geotechnical survey will be undertaken prior to construction. This will determine what the ground conditions are around the abutments to enable development of the engineering solution (a separate EIA has been produced for these investigations).

4.10.2 Assessment of Impacts

Construction Phase

In general there is not expected to be any impact on soil, geology or hydrogeology. The historic mapping shows that the land has always been farmed so it is unlikely that any contaminated land would be encountered. The works are proposed to be undertaken during the summer months, therefore reducing the chances of impacts from flooding.

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The top soil in the site compound may be adversely impacted through compression by heavy machinery.

4.10.3 Mitigation

To protect the topsoil the top 100mm will be removed. This will be stored in a bund around the perimeter of the site compound. The topsoil will be replaced and re-seeded following completion of the works.

4.10.4 Residual Significance

Provided the mitigation measures are adhered to there is not expected to be any residual impact.

4.11 Use of Natural Resources

4.11.1 Baseline Conditions

Minimisation of natural resource use will be a major consideration at detailed design stage.

4.11.2 Assessment of Impacts

Construction Phase
There is the potential for use of natural materials in the construction of the new bridge, but the impact is considered to be minor adverse.

The likely waste materials from the removal of the existing bridge and associated structures will include; the steel bridge, concrete deck, brick abutments and residual material from the excavation of the new abutments.

The bridge has a 120 year design life. Within this period the only maintenance required is periodical rub down and re painting. No further materials are anticipated to be used.

4.11.3 Mitigation

If natural materials are needed, they will be procured from sustainable sources in accordance with Environment Agency Guidance.

A site Waste Management Plan will be produced prior to commencement on site. This reference document will be a live working document and will be updated during the detailed design stage.

Recycling of inert materials will be undertaken where available and practical. Potential for the brick material from the existing abutments to be used in the gabion scour protection.

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4.11.4 Residual Impact

Provided the above mitigation above is adhered to, it is unlikely there will be any residual impacts.

5 Conclusions and Recommendations

Receptor/ Environmental Resource	Description of Effect	Effect (Adverse/ beneficial)	Significance of Impact (Major, Moderate, Minor)	Mitigation Measures	Residual Significance (Major, Moderate, Minor, No Significant Impact)
Human Beings	Increased noise during construction, particularly piling operations	Adverse	Moderate	Working hours will be agreed with Local Authority Environmental Health as part of the planning application. Alternative piling methods will be used which will minimise the levels of noise and vibration Piling operations will be restricted to day time working with no piling at weekends. Residents will be informed of the works through letter drops and kept informed as the construction progresses.	Moderate
	Public Right of Way across the bridge will remain closed for health and safety reasons. Replacement of the bridge following completion will allow safe passage over the river.	Beneficial	Moderate	Signage that shows the diversion route will be maintained during the construction phase. The footpath will be reinstated following completion of the bridge.	Moderate

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Receptor/ Environmental Resource	Description of Effect	Effect (Adverse/ beneficial)	Significance of Impact (Major, Moderate, Minor)	Mitigation Measures	Residual Significance (Major, Moderate, Minor, No Significant Impact)
	Public Right of Way on the south bank will need to be diverted around the contractors compound	Adverse	Minor	A temporary diversion order will be sought from Arun District Council. The footpath will diverted a short distance around the perimeter of the site compound. The footpath will be reinstated following completion of the bridge.	No significant impact
	Disruption to navigation from the presence of the temporary crane platform, potential for the river to be closed for temporary periods over the summer months.	Adverse	Moderate	Detailed mitigation is provided in Section 4.2.3. Early consultation with relevant user groups and the port authorities will be undertaken, notices will be published informing boaters of the closure, signs will be erected on the river warning users, lights and a safety boat will be provided on site.	Minor
	Replacement of South Stoke Bridge, providing a safe passage over the River Arun for the tenant farmer and users of the Public Right of Way. Provision for EA Ops another benefit.	Beneficial	Moderate		Moderate

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Receptor/ Environmental Resource	Description of Effect	Effect (Adverse/ beneficial)	Significance of Impact (Major, Moderate, Minor)	Mitigation Measures	Residual Significance (Major, Moderate, Minor, No Significant Impact)
Flora & Fauna	Impact on Arun Banks SSSI	Adverse	Moderate	An Appendix 3 form which includes the mitigation detailed below will be submitted to English Nature for sign-off.	Minor
	Disturbance and potential spread of Japanese knotweed (present in field adjacent to South Stoke Farm but outside of the working site area).	Adverse	Major	Preparation of a Construction Environmental Management Plan to include methodology on how to avoid further spread of the plant.	Minor
	Disturbance to breeding birds, the proposed construction period is March to August which will impact on the breeding bird season (March to July).	Adverse	Major	Hedgerows, reedbeds and overhanging branches/trees will be removed during the winter period (prior to March). This will be supervised by an experienced ecologist. Vegetation will need to be kept clear until construction begins.	Minor
	Loss of vegetation, 10 m of reed bed on the downstream side of the bridge for the temporary crane platform, removal of hedgerows either side of the bridge and overhanging trees and limbs on the access routes.	Adverse	Moderate	Any trees, hedgerows and reedbeds removed will be replanted following the completion of the construction works.	Minor

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Receptor/ Environmental Resource	Description of Effect	Effect (Adverse/ beneficial)	Significance of Impact (Major, Moderate, Minor)	Mitigation Measures	Residual Significance (Major, Moderate, Minor, No Significant Impact)
	Potential Impact on bat roosts if present in alder tree to be removed.	Adverse	Moderate	Alder tree in the proposed main site compound will be surveyed using an endoscope. Further mitigation will be supplied by an experienced ecologist if a bat roost is established.	No significant impact.
	Migratory salmonids are known to pass along the River Arun to spawning grounds upstream from the bridge. Potential disturbance from piling operations and obstruction in the watercourse.	Adverse	Major	Records of the noise monitoring, undertaken during piling will be submitted to the Environment Agency Ecological Appraisal Team. This will be added to their database of noise levels from different forms of piling and river works in order to established a best practice methodology.	Minor
Air & Climate	Localised decrease in air quality from exhaust emissions arising from vehicle movements to and from site.	Adverse	Minor	Preparation and adherence to construction EMP.	No significant impact
Landscape and visual amenity	General impact on local landscape during the construction works with contractor's compound, machinery and dismantling of the bridge.	Adverse	Moderate	It is a temporary impact that can be minimised by good house keeping on site.	Minor

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Receptor/ Environmental Resource	Description of Effect	Effect (Adverse/ beneficial)	Significance of Impact (Major, Moderate, Minor)	Mitigation Measures	Residual Significance (Major, Moderate, Minor, No Significant Impact)
	Removal of vegetation, trees along access route and in contractors compound, and hedgerows adjacent to the bridge.	Adverse	Moderate	Replanting of trees and hedgerows.	Minor
Water	Potential for falling debris to enter the river during the dismantling of the bridge.	Adverse	Moderate	Erection of netting and crash deck under the bridge prior to construction.	Minor
	Disturbance of sediment during piling of the abutments.	Adverse	Moderate	Use of a sediment trap during piling operations. This will separate silt from the water before being released back into the river.	Minor
	Pollution of the water course from other construction works eg concreting.	Adverse	Moderate	Adherence to Pollution Prevention Guidance (PPG's). Prepare a method statement for concrete works and submit to Environmental Management for approval. Preparation of a Pollution Response Plan.	Minor
Land use	The site compound will require a parcel of land on the south of the river.	Adverse	Minor	Permission will be required from the landowner in advance of construction starting	No significant impact

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Receptor/ Environmental Resource	Description of Effect	Effect (Adverse/ beneficial)	Significance of Impact (Major, Moderate, Minor)	Mitigation Measures	Residual Significance (Major, Moderate, Minor, No Significant Impact)
	Access over bridge for the tenant farmer will remain closed during the construction period. Replacement of the bridge following completion will allow safe passage over the river	Beneficial	Moderate	Alternative access arrangements are currently in place for the farmer, these will be continued until construction of the new bridge is completed.	Moderate
Cultural heritage archaeology and material assets	Removal of South Stoke Bridge, a monument of archaeological interest.	Adverse	Moderate	Adequate drawing and recording of the bridge by an industrial archaeologist prior to works on site. All mitigation will be in agreement with EA Archaeologist, County Archaeologist and English Heritage.	Minor (minor beneficial recording of features of archaeological interest)
	Piling process, excavation for new abutments cutting into alluvial deposits of the river bank removing deposits of palaeoenvironmental interest.	Adverse	Minor	Archaeological recording eg by coring or borehole investigations of sites of new abutment prior to on site works.	No significant impact (minor beneficial recording of features of archaeological interest)
Traffic and transport	Temporary closures of the access track whilst large vehicles are manoeuvred into site.	Adverse	Minor	Closures are expected to be temporary, no more than half a day. Land owners and local residents will be informed in advance of the date, time and duration of these closures.	Minor

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Receptor/ Environmental Resource	Description of Effect	Effect (Adverse/ beneficial)	Significance of Impact (Major, Moderate, Minor)	Mitigation Measures	Residual Significance (Major, Moderate, Minor, No Significant Impact)
	Increased traffic on the track in the form of contractor's vehicles and site machinery.	Adverse	Minor	Traffic management plan which will form part of the Construction EMP.	Minor
	Heavy site machinery damages the surface of the road.	Adverse	Moderate	Pre-start photographic survey of the roads. Road surface will be reinstated to the existing condition.	Minor
Soil, geology and hydrogeology	Top soil in contractor's compound will need to be removed.	Adverse	Minor	Topsoil to a depth of 100mm will be stripped from the compound area and placed in a bund along the east of the compound for reinstatement later.	No significant impacts
Use of natural resources	Use of natural resources in the construction of the new bridge.	Adverse	Minor	Recycling of inert materials into new bridge elements where feasible. Natural materials (if required) will be procured from a sustainable source. EA NEAS Officer can advise on suppliers.	No significant impacts

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5.1 Overall Impact of Scheme

The environmental effects arising from the replacement of South Stoke Bridge have been identified in Table 5.1 above. Key issues which have been identified are summarised below

- Diversion of a public right of way
- Potential to reinstate a public right of way currently closed due to health and safety reasons
- Improved H&S for EA Ops
- Disturbance to breeding birds, loss of nesting habitat
- Potential disturbance of bat roosts
- Disturbance and potential spread of Japanese Knotweed
- Disturbance of migratory salmon
- Significant levels of noise and vibration generated by pile driving activities
- Disruption to public navigation on the River Arun
- Pollution of the water course
- Removal of the South Stoke Bridge, a monument of archaeological interest
- Disturbance or destruction of archaeological remains and deposits of palaeoenvironmental interest
- Increased traffic movements on the access track causing disturbance to local residents.

To address the key impacts the following mitigation measures will be implemented:

- Temporary diversions for the footpath will be put in place with adequate signage.
- Vegetation clearance will be undertaken during the winter months prior to the breeding bird season (before March), and will be kept cleared during the construction period.
- An arboriculture and bat survey will be undertaken prior to tree clearance; advice will be sought from a qualified ecologist if presence of bats is confirmed.
- Re-planting of trees, hedgerows and reedbed.
- Environmental Management Plan will be produced by the contractor with methodology for avoiding further spread of Japanese knotweed.
- Avoid piling during the main salmon migratory period (July and August). Prepare method statement for piling operations and programme and submit to EA Ecological Appraisal for advice on mitigation.
- Alternative piling methods will be used to minimise levels of noise and vibration. Piling operations will be restricted to day time working only with no piling at weekends

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- Consultation with relevant river user groups, adequate signage on the river and on local notice boards, provision of traffic light system, lighting at night and a safety boat on site.
- Provision of netting to catch debris, sediment trap during piling operations, adherence to pollution prevention guidance notes, submission of method statements to Environmental Management.
- Drawing and recording of the bridge by an industrial archaeologist and coring/borehole investigations of site of new abutments.
- Production of a traffic management plan.
-

This scheme does not allow for many environmental enhancement opportunities. There is an opportunity to provide an educational interpretation board giving information on the creation of Stoke Cut, the construction of the bridge and Thomas Dunn and his works. This could include reference to any new information on the ancient river environment.

Other environmental enhancements include the potential for reedbeds to be incorporated as marginal vegetation surrounding the gabion baskets in the scour protection. This will provide a dual role; good habitat cover and longer term stabilisation of the abutments.

The increased width and carrying capacity will benefit Environment Agency Flood Defence Operations, who will be able to access the north of the bridge to undertake maintenance of the flood embankments. They currently have to travel a longer route which involves crossing a railway line.

Conclusion

By replacing the bridge the Environment Agency are maintaining safe access across the River Arun for the right of way and the tenant farmer for the future. As explained above this also benefits the Environment Agency Flood Defence Operations Team.

Provided the recommended mitigation measures are implemented, the project will not result in any significant impacts, and will contribute to Environment Agency aims of creating a better place.

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6 Environmental Action Plan

6.1 Introduction

This Environmental Action Plan (EAP) summarises the actions required to implement the project in accordance with the Environmental Report (ER). The EAP sets out specific objectives and targets defining the way in which the Environment Agency wishes to complete works during the implementation phase of the project (e.g. detailed design, construction and post-construction phases). It also details roles and responsibilities of those involved in the proposal, and refers to all **temporary** and **permanent** works.

The Contractor will produce a Contract Environmental Management Plan (EMP) in which many of the environmental impacts will be addressed with specific method statements. This will include measures such as actions for reducing water pollution incidents, impacts of noise and vibration and a traffic management plan. The Contractor will use this document to inform all workers on site of the environmental implications of the scheme and how to address them.

6.2 Contractual Status

The EAP forms part of the contract for works documentation and is incorporated within the specification and/or as Works Information. The Environment Agency (NEAS Officer) will have agreed that the EAP is satisfactorily integrated and will advise the EIA consultant on the number of copies to be provided.

6.3 Summary of Environmental Action Plan Procedures

The Environmental Action Plan details how the environmental assessment process will continue through to the completion of the proposal and how the protection, conservation, mitigation and enhancement measures for this proposal will be delivered by the Contractor on behalf of the Environment Agency. It forms part of the published scheme objectives, and as such forms the Environment Agency's commitment to deliver environmental outputs in the form specified.

6.4 Environmentally Significant Changes

Any potential change in design, work processes or implementation must be communicated with the NEAS Officer immediately who will assess significance and decide whether consultation and/or an ER or EAP Addendum is required. If changes to the scheme are proposed during construction, the following procedure should be followed:

- Communicate as early as possible with all who need to know that a change is proposed, identifying who requested the change and why it was requested (Contractors Project Manager CPM).

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- If adverse environmental implications are identified, consider alternative options to the proposed change (CPM).
- Seek approval from the EA Project Manager and NEAS Officer.

6.5 Communicating the EAP

Prior to the commencement of construction works, the NEAS Officer/Environmental Consultant/ECW will explain the EAP to the implementation team. Monitoring and programme arrangements will also be advised.

6.6 Environment Incident Reporting System

An Environmental Incident shall be defined as an occurrence of a failure of an environmental target or the occurrence of an environmental impact. Environmental Incidents must be reported by the Contractor. If necessary the NEAS Officer and Environmental Consultant will complete the Environmental Incident Report Form and advise on appropriate measures to limit impacts.

6.7 Role of the Environmental Staff and Specialists

The NEAS Officer will specify roles, competencies and staff to carry out environmental responsibilities according to the relevant Work Instructions. On larger capital works, an ECW will normally be appointed.

6.8 EAP Drawings

Key environmental constraints and opportunities are summarised on the Indicative Landscape Plan and are described in detail in the body of the EAP. The Indicative Landscape Plan should provide context for the site, scale and orientation but should not be read without reference to the rest of EAP document itself.

Table 6-1 Environmental Action Plan

Ref.	Objective	Action	Target	Responsibility	Reference to further information	Monitoring & Observation	Further Action Required (Y/N)
Information in these columns must be considered within the design and implementation process.						*These columns to be completed during construction monitoring stage*	
A. PRIOR TO CONSTRUCTION							
1	HUMAN BEINGS						
1.A.1	Minimise disruption to the public rights of way that runs along the southern river bank.	Discuss and agree temporary changes to footpaths and other access routes.	Agree with interested parties how footpaths should be temporarily diverted.	Contractors Project Manager	Environmental Report (JB, 2006) Indicative Landscape Plan	Log all communications and project consultations	Yes. Consultation with Arun District Council. Obtain relevant agreements with landowners.
1.A.2		Post signs in relevant locations along the footpath informing users of the temporary diversion.	Signs erected prior to diversion implemented.	Contractors Project Manager	Information from consultation with Arun District Council.		Yes. Production and erection of signs.
1.A.3	Maintain closed public right of way that crosses South Stoke Bridge.	Discuss and agree existing restrictions for closed public right of way.	Maintain closed public right of way.	Contractors Project Manager	Existing temporary closure order from Arun District Council.		Yes. Maintain existing signs for closed footpath.
1.A.4	Minimise disruption to river users.	Identify in the construction programme when closures of the River Arun will be required.	Bridge closures should be programmed for as short a time as possible.	Contractors Project Manager	Email from Allison Thorpe (Waterways Team) dated 29/09/2005 Construction Programme.		
1.A.5		Discuss and agree the methodology for temporary closures of navigation on the River Arun.	Produce a plan for dealing with boating during construction	Jacobs Babtie Project Manager	Email from Allison Thorpe (Waterways Team) dated 29/09/2005	Log all communications and project consultations	Yes. Consultation with EA Waterways Team (Carl Bagwell or John Morgan).
1.A.6		To inform the main river user groups (in particular the trade users and Littlehampton Harbour Board) of the temporary disruption and closure of navigation at South Stoke Bridge.	Ensure appropriate interested parties are aware of the changes/restrictions to navigation on the River Arun Through: Hold a meeting with the main user groups to discuss and comment on the plan - publish notices in local press - maintain notice boards at all launching sites and moorings and in Littlehampton Harbour - provide a contact telephone number for boaters to call in advance to check whether navigation is open.	Jacobs Babtie Project Manager	Plan produced in the action above.		Yes. Consultation with main river user groups

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Ref.	Objective	Action	Target	Responsibility	Reference to further information	Monitoring & Observation	Further Action Required (Y/N)
Information in these columns must be considered within the design and implementation process.						*These columns to be completed during construction monitoring stage*	
1.A.7	Maintain safe passage for river users when appropriate.	Ensure that the following is in place prior to construction beginning: - signs erected up and downstream of the bridge informing river users of the works ahead and whether navigation is closed or open. - temporary traffic light system to allow access through half the river - provision of a safety boat on site - ensure works are well lit at night.	Prevent accident or injury to boaters.	Contractors PM	Plan produced in the action above.		
1.A.8	Minimise damage/disruption from noise and vibration in local area. In particular relating to piling works.	Contractor to develop noise and vibration method statement with reference to *BS 5228 Noise and vibration control on construction and open sites.*	Agree hours of work with local Environmental Health Department.	Jacobs Babtie	Planning application	Log all communications and project consultations	Yes. Liaise with local planning authority.
1.A.9		Inform local residents of planned work and programme for piling through letter drops/house calls.	Ensure all local residents are fully aware of the proposed impacts of piling and the construction programme.	Contractors Project Manager	Environmental Report (JB, 2006).		
2	FLORA AND FAUNA						
2.A.1	Avoid disturbance and potential spread of Japanese knotweed (presence in field adjacent to South Stoke Farm but outside of the working site area).	Preparation of Environmental Management Plan which will include methodology on how to avoid further spread of the plant.	Ensure all actions are undertaken to avoid the spread of this invasive weed.	Contractors Project Manager	Environmental Report (JB, 2006) Indicative Landscape Plan		
2.A.2	Identify trees and limbs that require removal for site access.	All trees/limbs to be removed will be surveyed by an aboriculturist prior to removal. Tree works will be carried as per appropriate British Standards: i.e. BS 5837:1991 Trees in Relation to Construction & BS 3998:1989 Recommendations for Tree Works	Prevent damage to trees that are remaining	Jacobs Babtie	Proposed Site Vegetation Clearance Document (Mowlem, 2005). Report following aboricultural survey.	Survey undertaken 30/01/2006. Report and drawing (0014305/CR/D3/PA5) produced.	Yes. The tree in the main site compound area to be removed will require an endoscope survey prior to removal. This will determine the presence of bats in the fissure.
2.A.3	Ensure protection of bird nest sites from damage or destruction.	Removal of vegetation and trees out with the breeding bird season (prior to March). Continue to strim vegetation until construction begins.	Prevent damage or disturbance to breeding birds.	Contractors Project Manager	Proposed Site Vegetation Clearance Document (Mowlem, 2005). Report following aboricultural and bat survey to be produced.		
2.A.4	Minimise impacts on bats.	Tree to be removed from the main site compound will be surveyed for the presence of bats prior to removal.	Prevent damage or disturbance to protected species and/or habitat.	Jacobs Babtie	Proposed Site Vegetation Clearance Document (Mowlem, 2005) Tree survey report and drawing (0014305/CR/D3/PA5).	Report following the bat survey to be produced.	Yes. Engage a bat endoscope survey.

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Ref.	Objective	Action	Target	Responsibility	Reference to further information	Monitoring & Observation	Further Action Required (Y/N)
Information in these columns must be considered within the design and implementation process.						*These columns to be completed during construction monitoring stage*	
2.A.5	Minimise impacts on interest feature of the Arun Banks SSSI *Schoenoplectus lacustris* sub-species *Tabernaemontani x ttriqueter.*	To undertake a survey of the vegetation to be strimmed for the temporary crane platform. If any *Schoenoplectus* species are present a sample will be taken. The samples will be examined under a high powered microscope to determine whether they are the sub-species hybrid (differences in the papillose glumes). If the species is confirmed to be present in the temporary works area mitigation measures will be discussed with and approved by English Nature prior to work commencing. This may include translocation of any plants.	Prevent damage to an interest feature of the Arun Banks SSSI	Jacobs Babtie EIA coordinator	English Nature Assent for the works letter dated 18th October 2005		Yes undertake survey of vegetation to be strimmed for the temporary crane platform to confirm presence/absence of the hybrid species.
2.A.5	Minimise impacts on otters and water voles.	Reed and sedge bankside vegetation will be strimmed to deter water voles from using the banks. An ecologists will visit the site 2-3 weeks prior to commencement of works to survey the banks for presence of water voles. Furhter mitigation if required will be provided following this survey. The tree adjacent to the bridge on the north east side will be pollarded. Leaving the trunk in situ, a potential site for an otter holt.	Prevent damage to water voles, otters and their associated habitat.	Jacobs Babtie EIA coordinator.	Environmental Report (Jacobs Babtie, 2006)	Alexie Gilmartin (Environment Agency Biodiversity Officer) should be consulted following the survey.	Yes.
3	AIR AND CLIMATE						
3.A.1	No specific issues identified at this stage.						
4	LANDSCAPE AND VISUAL AMENITY						
4.A.1	No specific issues identified at this stage.						
5	WATER						
5.A.1	Prevent pollution of the River Arun.	Agree method statements for all works affecting the watercourse with EA Environmental Management e.g concrete works, piling of the abutments.	Ensure Method Statements are agreed and in place prior to construction.	Contractors Project Manager	Environmental Report (JB, 2006)	Log all communications and project consultations	Yes, Consultation with EA Environmental Management (John Frake 08708 506 506).
		Preparation of a Pollution Response Plan.	Ensure pollution response plan is completed prior to construction.	Contractors Project Manager	Environmental Report (JB, 2006).		
6	LAND USE						
6.A.1	Procurement of land for site compound.	Ensure any necessary agreements or consultation is undertaken on the location of site compound.	Location of site compound is agreed.	Environment Agency Project Manager	Indicative Landscape Plan	Log all communications and project consultations	Yes. Consultation with relevant land owners.

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Ref.	Objective	Action	Target	Responsibility	Reference to further information	Monitoring & Observation	Further Action Required (Y/N)
Information in these columns must be considered within the design and implementation process.						*These columns to be completed during construction monitoring stage*	
6.A.2	To maintain access for the tenant farmer to his fields on the north of the bridge.	Ensure the tenant farmer is informed of the works and has access to his fields.	Maintain current access arrangements for the tenant farmer.	Environment Agency Project Manager	Environmental Report (JB, 2006)		
7	CULTURAL HERITAGE, ARCHAEOLOGY AND MATERIAL ASSETS						
7.A.1	To make an archaeological recording of the existing bridge.	Employ an industrial archaeologist to draw and record the existing bridge.	Archaeological record completed prior to construction.	Environment Agency Archaeologist	Environmental Report (JB, 2006) Construction Programme	Record of bridge	Yes. Consultation with County Archaeologist.
7.A.2	To minimise the impact on buried alluvial deposits of palaeoenvironmental interest.	If piling for the abutments is required out side of the existing hard standing Steve Kemp (EA Archaeologist) should be contacted to discuss mitigation measures.	Prevent damage to buried alluvial deposits of palaeoenvironmental interest.	Environment Agency Archaeologist Jacobs Babtie EIA Coordinator	Environmental Report (JB, 2006) Construction Programme. Results of Site Investigation (January 2006)		Yes.
7.A.3	To minimise the impact of excavation of topsoil in the site compound area.	Top 30 cm only of top soil will be stripped. A protective layer will be placed on the ground before the crushed concrete material is laid.	To minimise the impacts on buried alluvial deposits and archaeology.	Contractors Project Manager			Yes.
8	TRAFFIC AND TRANSPORT						
8.A.1	Agree access arrangements.	Inform local residents and landowners of access arrangements and discuss temporary closures with them.	Agree timing of temporary road closures.	Contractors Project Manager	Environmental Report (JB, 2006). Indicative Landscape Plan	Log all communications and project consultations	Yes. Consultation with local residents and landowners.
8.A.2	Minimise disturbance to residential and business properties and other road users.	Produce a Traffic Management Plan	Adoption of TMP	Contractors Project M	Environmental Report (JB, 2006).	Log all communications and project consultations	Yes. Liaison with Local Authority
8.A.3	Record condition of road surface prior to construction.	Undertake a condition (photographic) survey of the access track and surrounds prior to the commencement of work.	Completion of condition survey.	Contractors Project Manager			Yes. Undertake photographic survey.
9	GEOLOGY, TOPOGRAPHY, HYDROGEOLOGY AND GEOMORPHOLOGY						
9.A.1	To protect top soil removed from area of site compound.	Topsoil to a depth of 100mm will be removed and placed in a bund along the perimeter of the compound area. Bund will not exceed 2m in height.	To prevent damage to the top soil structure so it can be replaced following completion of the works.	Contractors Project Manager	Environmental good practice on site (Ciria, 2005)		
10	USE OF NATURAL RESOURCES						
10.A.1	Active promotion of sustainable policies.	Materials used are from local sources and from as sustainable a source as is reasonably practical.	Proportion of recycled materials is as high as is practical and economically justifiable.	Contractors Project Manager			Yes.
10.A.2	Ensure all timber is from sources managed in a sustainable way.	Contractor to prepare a procurement strategy to cover labelled timber.	All timber purchased is from labelled sources (FSC). Contractor to maintain data to demonstrate chain of custody for all timber used in construction.	Contractors Project Manager		Contractor to maintain documentation to illustrate source.	Yes

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Ref.	Objective	Action	Target	Responsibility	Reference to further information	Monitoring & Observation	Further Action Required (Y/N)
Information in these columns must be considered within the design and implementation process.						*These columns to be completed during construction monitoring stage*	
11	OTHERS						
11.A.1	Establish Site Waste Management Plan procedures	Develop Site Waste Management Plan.	Waste management plan produced prior to construction	Contractors Project Manager			Yes.
11.A.2		A waste management license will be required for the removal of waste from site, including the bridge structure.	Site Waste Management Plan produced prior to construction	Contractors Project Manager			Yes.
B. DURING CONSTRUCTION							
1	HUMAN BEINGS						
1.B.1	Minimise disruption to the users of the public rights of way.	Implement temporary diversion order for footpath on southern bank of the river and footpath around the site compound on the north of the river. Maintain signage for both footpaths.	Maintain public rights of way,	Contractors Project Manager	Indicative Landscape Plan Temporary footpath order.		Yes.
1.B.2	Minimise disruption to river users.	Implement the actions agreed in the plan produced to deal with boating during construction (1.A.3).					Yes.
1.B.3	Maintain safe passage for river users when appropriate.	Ensure that the following is maintained during construction: - signs erected up and downstream of the bridge informing river users of the works ahead and whether navigation is closed or open. - temporary traffic light system to allow access through half the river - provision of a safety boat on site - ensure works are well lit at night.	Prevent accident or injury to boaters.	Contractors Project Manager	Plan produced in the action 1.A.3		Yes.
1.B.4	Minimise damage/disruption from noise and vibration in local area. In particular relating to piling works.	Ensure the employment of Best Practicable Means and any specific measures discussed with the Environmental Health Officer.	Compliance with scheme noise and vibration method statement	Contractors Project Manager	Piling Method statement		Yes.
1.B.5		Site Working Hours will be Monday – Friday 0700 – 1700. Pile driving Monday – Friday 0900 – 1700. Saturday 0800 – 1300 (only if permitted following written consent from the project manager or Environment Agency, no pile driving).					Yes.
2	FLORA AND FAUNA						

ARUN DISTRICT COUNCIL:SS/6/06/ 26/07/2006

Ref.	Objective	Action	Target	Responsibility	Reference to further information	Monitoring & Observation	Further Action Required (Y/N)
Information in these columns must be considered within the design and implementation process.						*These columns to be completed during construction monitoring stage*	
2.B.1	Avoid disturbance and potential spread of Japanese knotweed (presence in field adjacent to South Stoke Farm but outside of the working site area).	Implement actions identified in the Environmental Management Plan.	Ensure all actions are undertaken to avoid the spread of this invasive weed.	Contractors Project Manager	Indicative Landscape Plan Environmental Management Plan		Yes.
2.B.2	Ensure protection of bird nest sites from damage or destruction.	Continue to strim vegetation during the construction phase.	Prevent damage or disturbance to breeding birds.	Contractors Project Manager			Yes.
2.B.3	Minimise impacts on migratory salmon.	Undertake noise monitoring to aid the future assessment of piling impacts on migratory fish species.	Better understand the impacts of noise from piling on migratory fish species.	Contractors Project Manager			Yes. Noise monitoring information to be given to Environment Agency Ecological Appraisal Team (Andy Willo).
3	AIR AND CLIMATE						
3.B.1	To minimise emissions to air.	Ensure that plant is switched off when not being used.	Ensure all operatives are aware of the restrictions	Contractors Project Manager			
4	LANDSCAPE AND VISUAL AMENITY						
4.B.1	To maintain an acceptable site appearance during construction.	Fence the construction compound during the construction period. The fence will: • Clearly delineate the compound boundary; • Deter unauthorised access; • Be fixed to the ground sufficiently to prevent accidental movement; • Be maintained as necessary.	Compound securely fenced and maintained.	Contractors Project Manager			
4.B.2		Maintain the compound and all working areas in a tidy and orderly manner throughout the contract period.	No valid complaints.	Contractors Project Manager			
5	WATER						
5.B.2		Implementation of method statements that have been agreed with EA Environmental Management.	No pollution incidents	Contractors Project Manager	Method statements		Yes.
5.B.3		Implementation of pollution response plan.	No pollution incidents	Contractors Project Manager	Pollution response plan		Yes.

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Ref	Objective	Action	Target	Responsibility	Reference to further information	Monitoring & Observation	Further Action Required (Y/N)
Information in these columns must be considered within the design and implementation process.						*These columns to be completed during construction monitoring stage*	
5.B.4		Chemical and oil storage should be sited on an impervious base within a liquid tight bund. Keep sufficient spill kits on site at all times so that one can be deployed to any part of the construction working area within 15 minutes. Check all machinery working within five metres of the top of the bank of a watercourse daily for fuel and oil leaks. All re-fuelling will be undertaken in a bunded area away from the River Arun.	No pollution incidents	Contractors Project Manager			
5.B.5		They must contain absorbent materials, booms for containing spills on water and the means of attaching them to the banks, empty containers for catching leaking fluids and appropriate personal protective equipment	Spill kits correctly stocked and in place. Operatives trained in the use of spill kits should be on site at all times.	Contractors Project Manager			
5.B.6	Ensure that wet concrete and concrete washings do not come in direct contact with the watercourse.	Implementation of method statements that have been agreed with EA Environmental Management.	No pollution incidents	Contractors Project Manager			
6	LAND USE						
6.B.1	To maintain access for the tenant farmer to his fields on the north of the bridge.	Maintain communication links with the tenant farmer and ensure he has access to his fields.	Maintain current access arrangements for the tenant farmer.	Contractors Project Manager	Environmental Report (JB, 2006)		
7	CULTURAL HERITAGE, ARCHAEOLOGY AND MATERIAL ASSETS						
7.B.1	Ensure that any archaeological remains are recognised, investigated and recorded.	If any archaeological finds are located, work on site should stop immediately and the EA Archaeologist should be contacted for further action.	Reduce impact on any archaeological finds.	Contractors Project Manager	Results of site investigation (January 2006).		Yes.
8	TRAFFIC AND TRANSPORT						
8.B.1	Limit disruption to local traffic movements.	Compliance with agreed TMP including numbers, times and routes of journeys.	Limit disruption to local residents and businesses.	Contractors Project Manager	Traffic management plan		Yes.
9	GEOLOGY, TOPOGRAPHY, HYDROGEOLOGY AND GEOMORPHOLOGY						
9.B.1	No specific issues identified at this stage.						
10	USE OF NATURAL RESOURCES						
10.B.1	Ensure all timber purchased is from sources managed in a sustainable way.	Contractor to maintain data to demonstrate chain of custody for all timber used in construction.	All timber purchased is from FSC (or equivalent) certified sources	Contractors Project Manager		Contractor to maintain documentation to illustrate source.	Yes.
11	OTHERS						

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Ref.	Objective	Action	Target	Responsibility	Reference to further information	Monitoring & Observation	Further Action Required (Y/N)
Information in these columns must be considered within the design and implementation process.						*These columns to be completed during construction monitoring stage*	
11.B.1	Waste recycling	Contractor to document arisings from site.	Where possible, achieve 10% reduction in construction waste (excluding contaminated materials)	Contractors Project Manager		Contractor to maintain waste documentation.	Yes.
11.B.2		Contractor to provide segregated waste collection points on site and to inform all operatives of their use.	Segregation of waste for ease of recycling and disposal	Contractors Project Manager	Site Waste management plan.		Yes.
11.B.3	waste management procedures	Implementation of Site Waste Management Plan	Waste management plan adhered to.	Contractors Project Manager	Site Waste management plan.		Yes.
11.B.4		Keep a copy of the waste carriers licence on site, keep copies of the transfer notes, and undertake spot checks/audits on the waste carrier.	To use only licensed waste carriers.	Contractors Project Manager	Site Waste management plan.	Contractor to maintain documentation	Yes.
C. POST CONSTRUCTION							
1	HUMAN BEINGS						
1.C.1	Ensure adequate reinstatement of public rights of way.	Re-instate all access and footpaths to original routes. Remove all temporary fencing and signage.	No continuing disturbance to footpath users	Contractors Project Manager			Yes.
1.C.2	Ensure adequate reinstatement of the river for public navigation.	Remove all temporary works and piles (or cut piles back into river bed).	No continuing disturbance to river users.	Contractors Project Manager			Yes.
1.C.3		Inform river users of reinstated navigation using the same communication routes as prior to construction, local user groups and notice boards.	River users are fully aware of the reinstated navigation.	Contractors Project Manager			Yes.
2	FLORA AND FAUNA						
2.C.1	Minimise impacts on vegetation.	Carry out tree, hedgerow and reedbed replacement and maintenance.	Reinstate to existing condition.	Contractors Project Manager			Yes.
3	AIR AND CLIMATE						
3.C.1	No specific issues identified at this stage.						
4	LANDSCAPE AND VISUAL AMENITY						
4.C.1	Minimise the impact of the site compound and construction.	Removal of temporary fencing, signs and other debris.	Remove and reinstate as necessary to leave in a tidy state.	Contractors Project Manager			Yes.
4.C.2	Minimise impacts on landscape.	Carry out tree replacement in the main site compound. Return visits required over period of recovery.	Reinstate to existing condition.	Contractors Project Manager			Yes.
5	WATER						
5.C.1	No specific issues identified at this stage.						
6	LAND USE						

ARUN DISTRICT COUNCIL:SS/6/06/ 26/07/2006

Ref.	Objective	Action	Target	Responsibility	Reference to further information	Monitoring & Observation	Further Action Required (Y/N)
Information in these columns must be considered within the design and implementation process.						*These columns to be completed during construction monitoring stage*	
6.C.1	Minimise impact on land use	Return site compounds back to former use, replace top soil and re-seed with appropriate native grass seed (dependent on land owners requirements).	All land taken restored to former use.	Contractors Project Manager			Yes.
7	CULTURAL HERITAGE, ARCHAEOLOGY AND MATERIAL ASSETS						
7.C.1	Any archaeological recording requirements are undertaken	Processing and analysis of data from all archaeological works.	Interpretive report detailing results of all archaeological works	Environment Agency Archaeologist			Yes.
7.C.2		Submission of report to relevant parties, EA Archaeologist, County Archaeologist, English Heritage.	Acceptance of archaeological archive by appropriate parties.	Environment Agency Archaeologist			Yes.
7.C.3	Implement archaeology enhancements.	Erection of information /education board. Content of the board should be produced in conjunction with County Archaeologist.	Information/ education board erected following completion of construction works.	Environment Agency Archaeologist			Yes
8	TRAFFIC AND TRANSPORT						
8.C.1	Ensure that there are no defects due to traffic movements.	Post construction condition survey of access road and remedial works if necessary are undertaken.	Access roads are reinstated to former condition.	Contractors Project Manager	Pre-start condition survey.		Yes.
9	GEOLOGY, TOPOGRAPHY, HYDROGEOLOGY AND GEOMORPHOLOGY						
9.C.1	No specific issues identified at this stage.						
10	USE OF NATURAL RESOURCES						
10.C.1	No specific issues identified at this stage.						
11	OTHERS						
11.C.1	No specific issues identified at this stage.						

ARUN DISTRICT COUNCIL:SS/6/06/ 26/07/2006

ARUN DISTRICT COUNCIL:SS/6/06/ 26/07/2006

7 References

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Babtie Brown and Root (2005) South Stoke Bridge Scoping Report.

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Environment Agency (2005) www.environment-agency.gov.uk

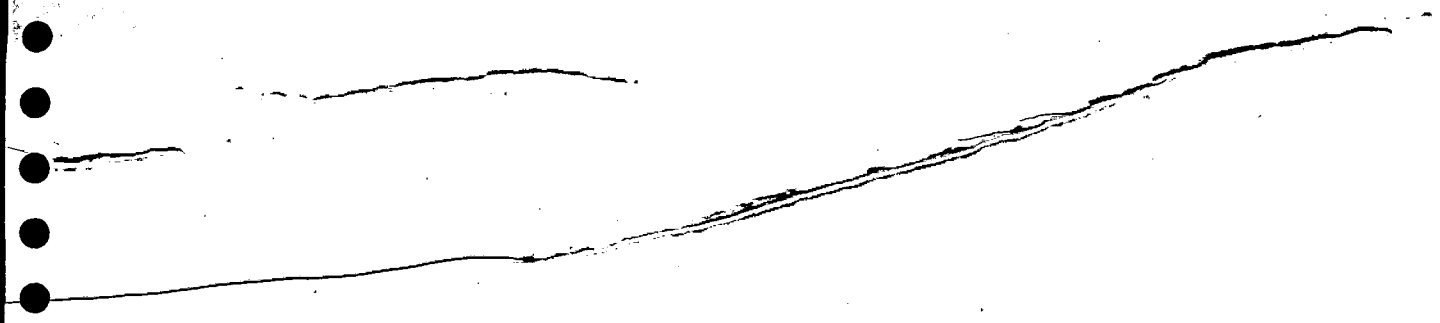
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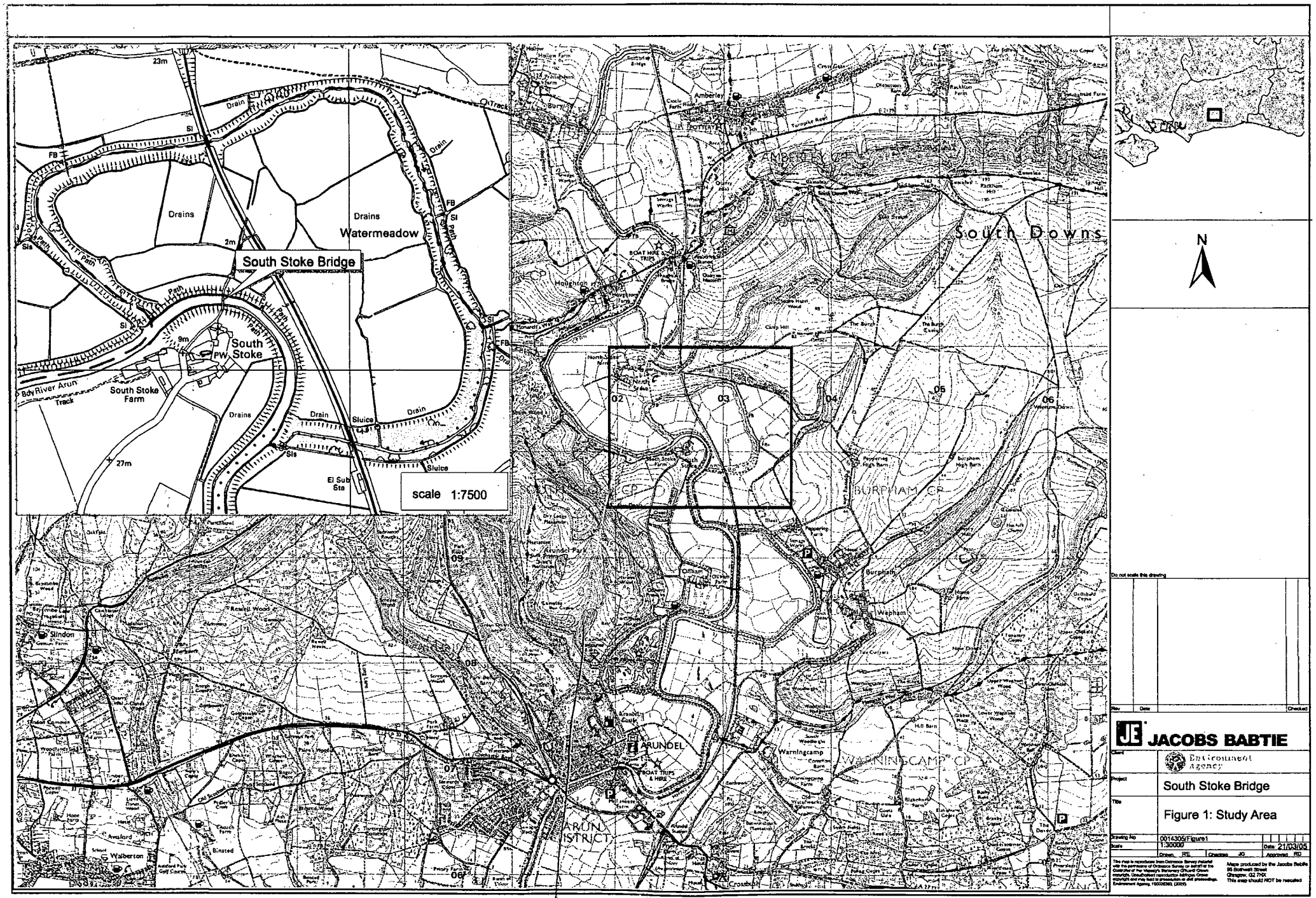
8 Abbreviations

AONB	Area of Natural Beauty
AQMA	Air Quality Management Area
BAP	Biodiversity Action Plan
CPM	Construction Project Manager
CSA	Countryside Stewardship Agreement
EA	Environment Agency
EAP	Environmental Action Plan
ECW	Environmental Clerk of Works
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ER	Environmental Report
ESA	Environmentally Sensitive Area
NRA	National Rivers Authority
PROW	Public Right of Way
RCS	River Corridor Survey
SSSI	Site of Special Scientific Interest

ARUN DISTRICT COUNCIL:SS/6/06/ 26/07/2006

Figures





JACOBS BABTIE

Client: Environment Agency

Project: South Stoke Bridge

Title: Figure 1: Study Area

Drawing No: 0014305/Figure1

Scale: 1:30000

Date: 21/03/05

Drawn: RE Checked: JG Approved: RD

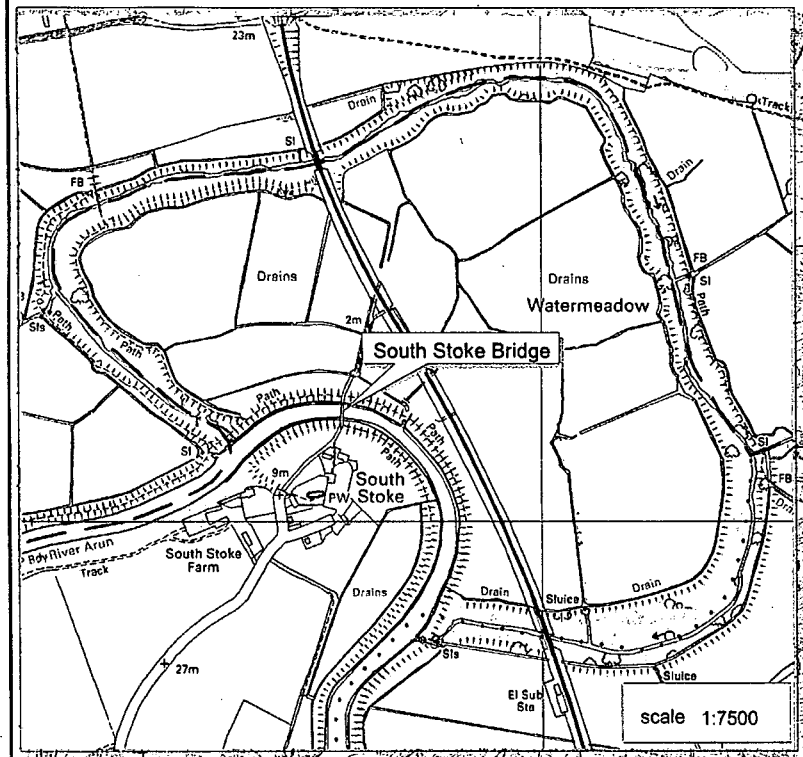
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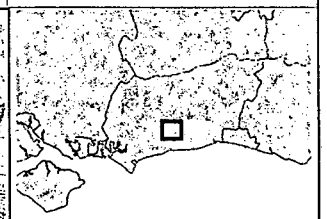
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Client: Environment Agency

Project: South Stoke Bridge

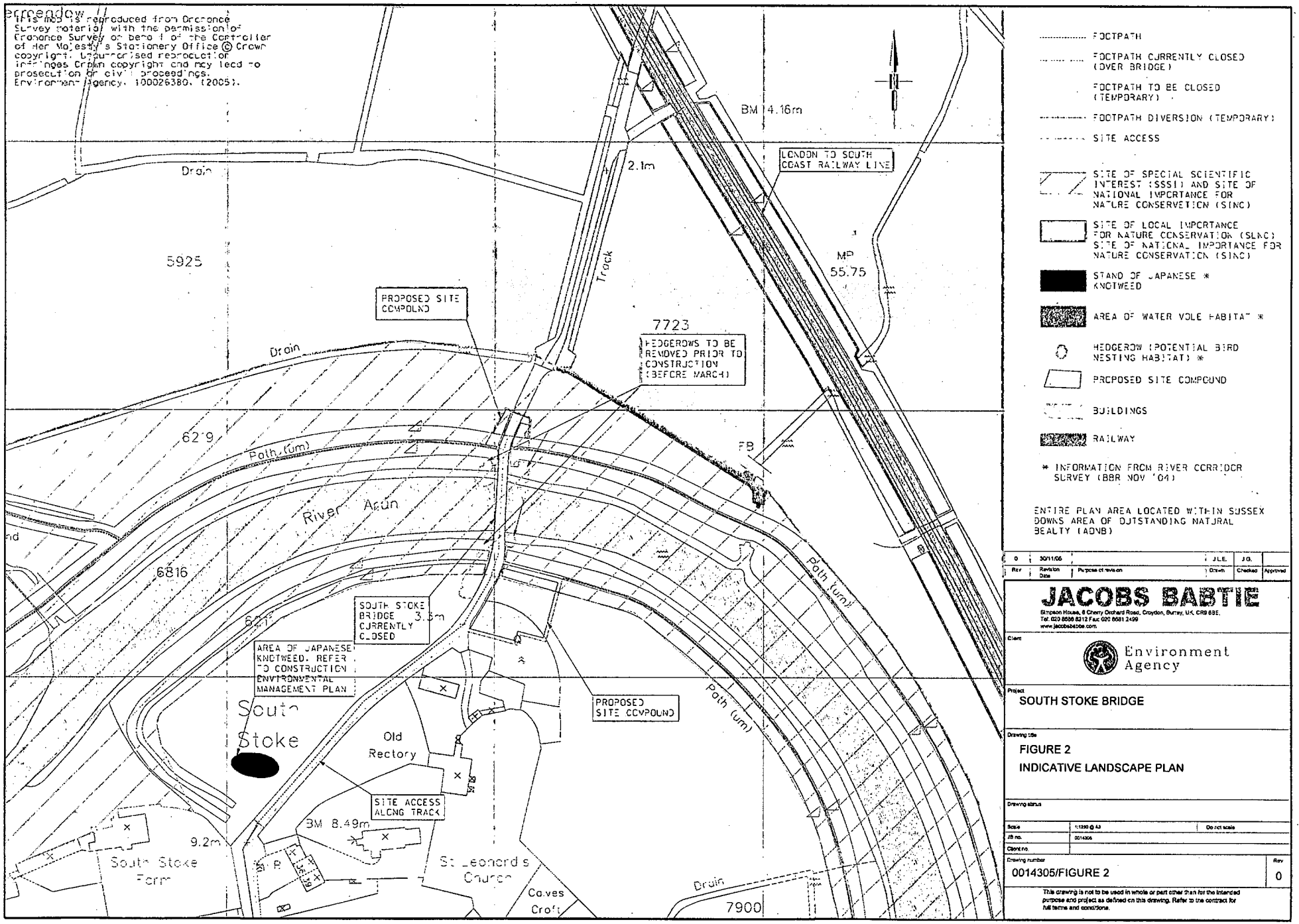
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Approved	RD		

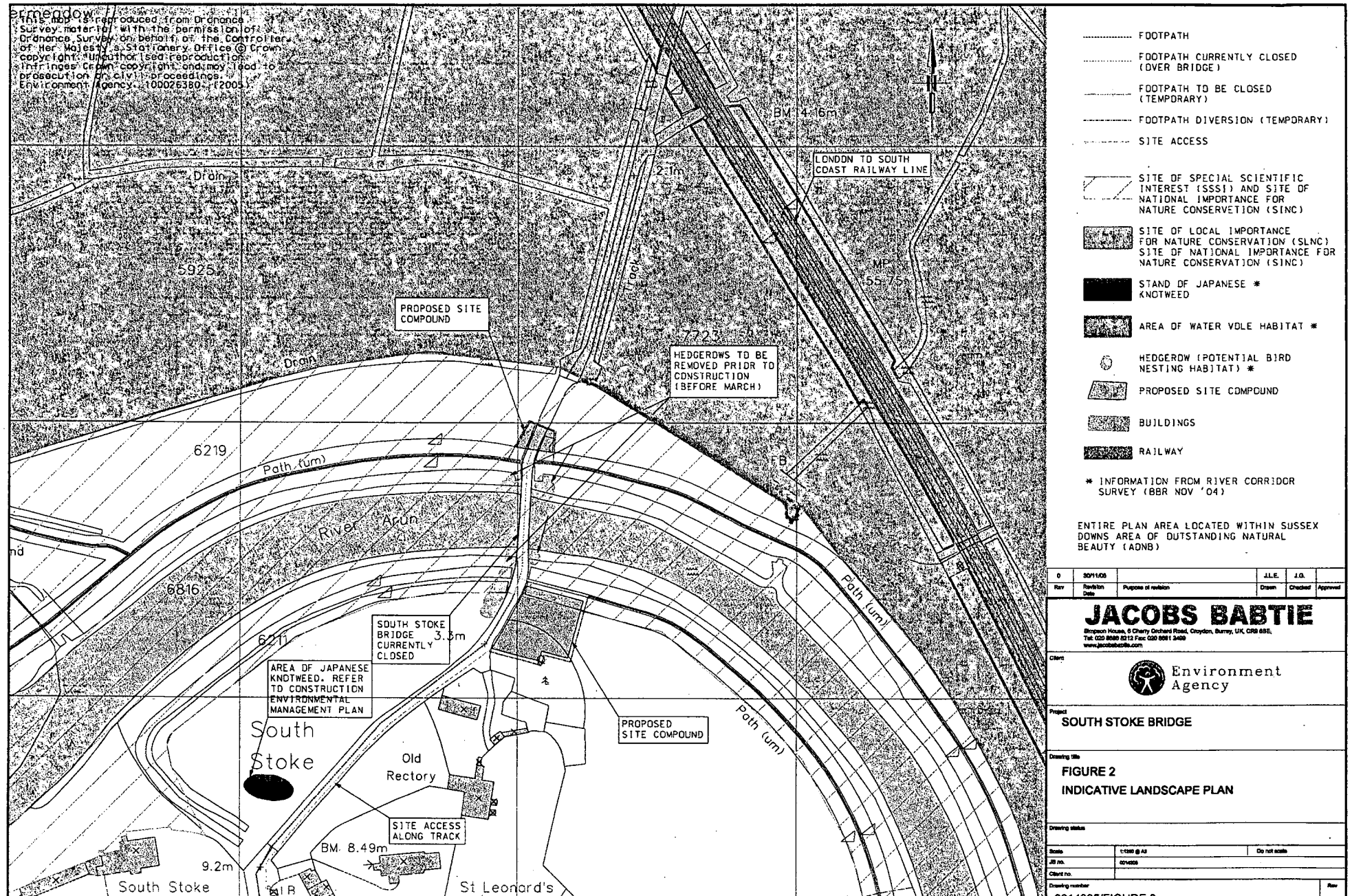
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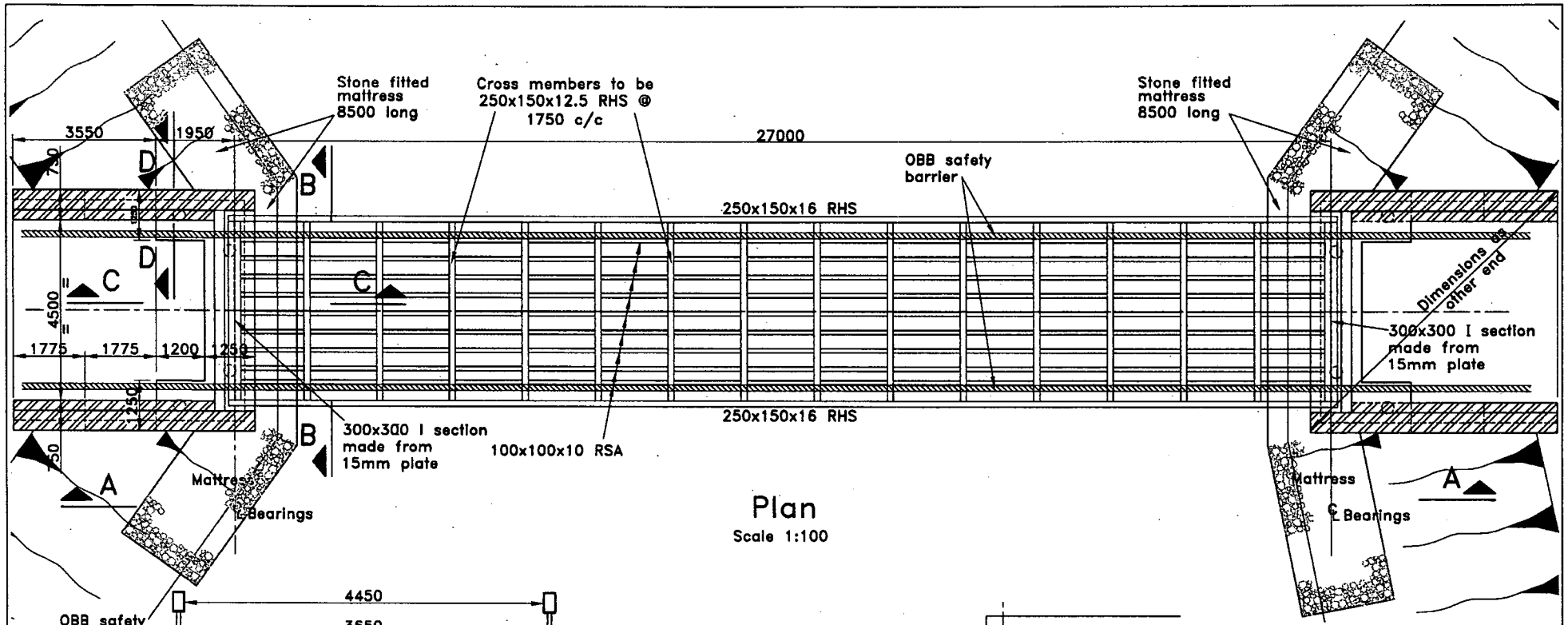
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Rev	Revision Date	Purpose of revision	Drawn	Checked	Approved
4	18.11.05	Jacobs logo added	BMB	PG	PG
3	18.11.05	Abutment foundations amended	BMB	PG	PG
2	10.11.05	NEW ABUTMENTS & WINGWALLS ADDED	BMB	PG	PG
1	27.10.05	Bridge widened	JEB	PG	PG
0	27.10.05	First issue	BMB	PG	PG

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Tel: 020 8686 5212 Fax: 020 8681 2489
www.jacobsbabtie.com

Client: Environment Agency

Project: SOUTH STOKE BRIDGE

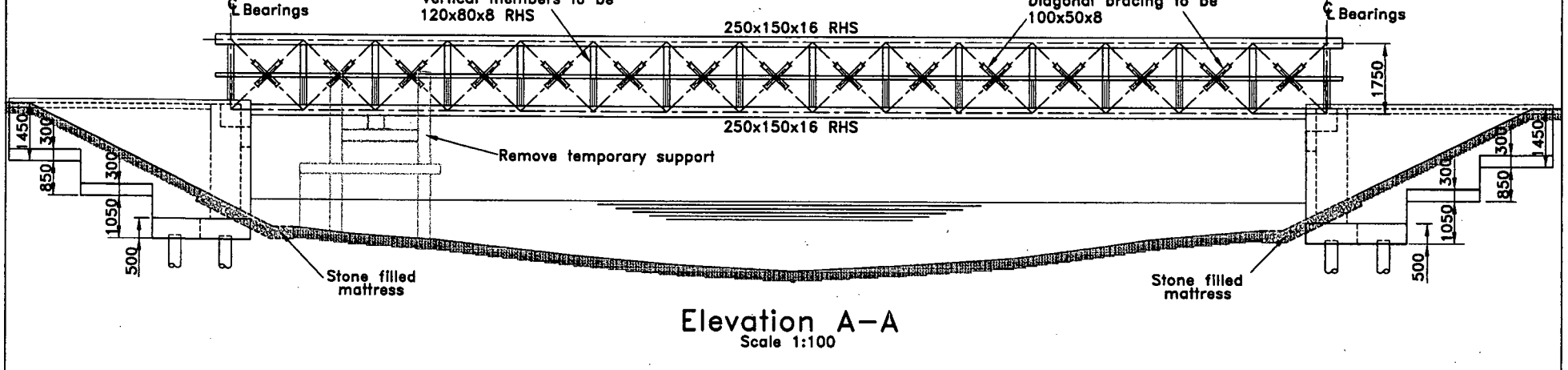
Drawing title:
FIGURE 3.1
PLAN OF
REPLACEMENT STEEL TRUSS BRIDGE

Drawing status

Scale	1:50 & 1:100@A3 — Do not scale
JB no.	0014305
Client no.	
Drawing number	0014305 / 4 / 01
Rev	4

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ARUN DISTRICT COUNCIL:SS/6/06/ 26/07/2006



Elevation A–A
Scale 1:100

Notes

All dimensions are in millimetres unless noted otherwise.

Rev	Revision Date	Purpose of revision	Drawn	Checked	Approved
3	18.11.05	Jacobs logo added	BMB	PG	PG
2	18.11.05	Abutment foundations & river bed elevation amended	BMB	PG	PG
1	14.11.05	Temporary support added	BMB	PG	PG
0	10.11.05	First issue	BMB	PG	PG

JACOBS BABTIE
Simpson House, 6 Cherry Orchard Road, Croydon, Surrey, UK, CR0 6BE
Tel: 020 8686 8212 Fax: 020 8681 2469
www.jacobsbabtie.com

Client: Environment Agency

Project: SOUTH STOKE BRIDGE

Drawing title: FIGURE 3.2 ELEVATION OF REPLACEMENT STEEL TRUSS BRIDGE

Drawing status

Scale	1:50 & 1:100@A3	Do not scale
JB no.	0014305	
Client no.		

Drawing number: 0014305 / 4 / 02 Rev 3

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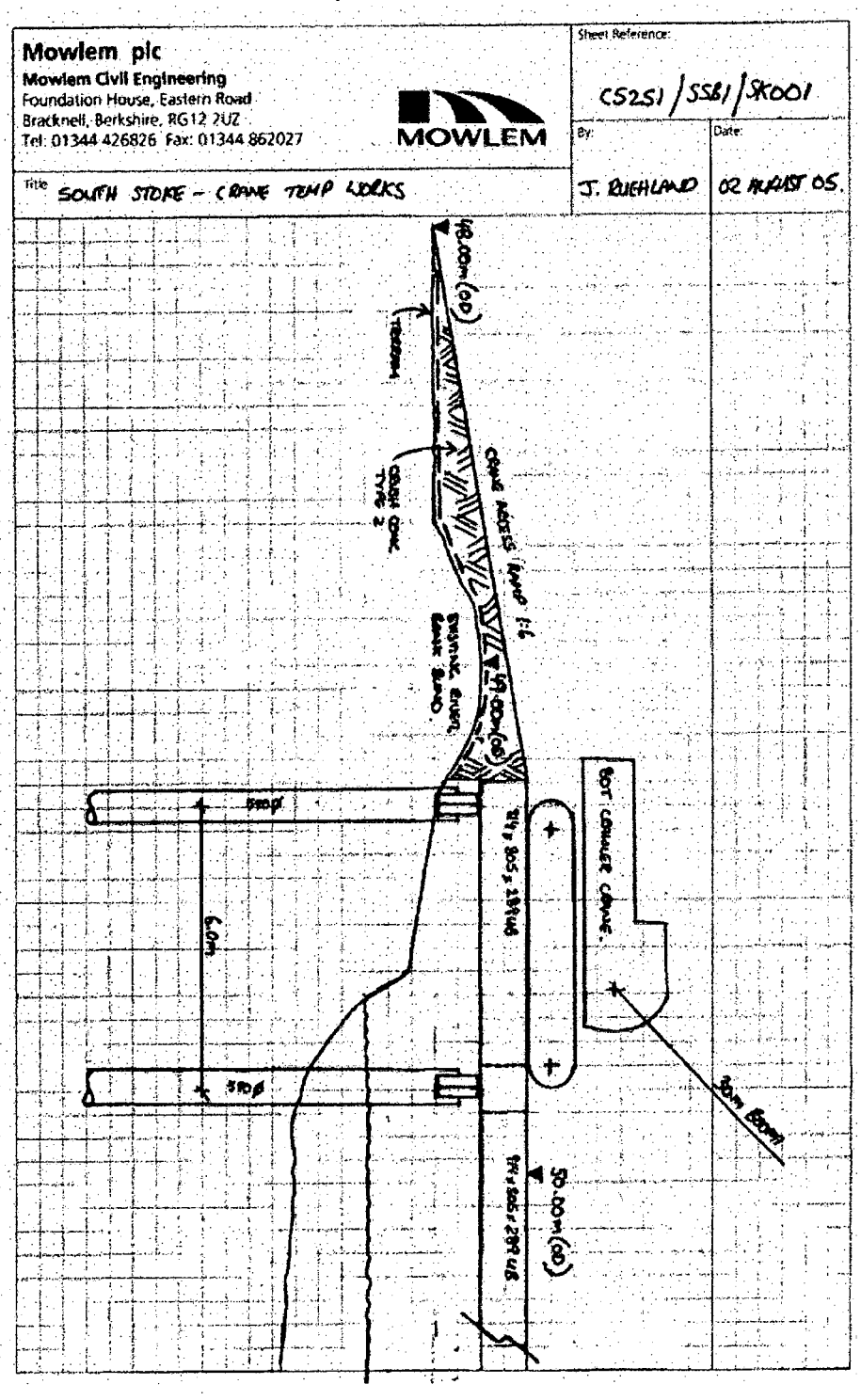
Appendices

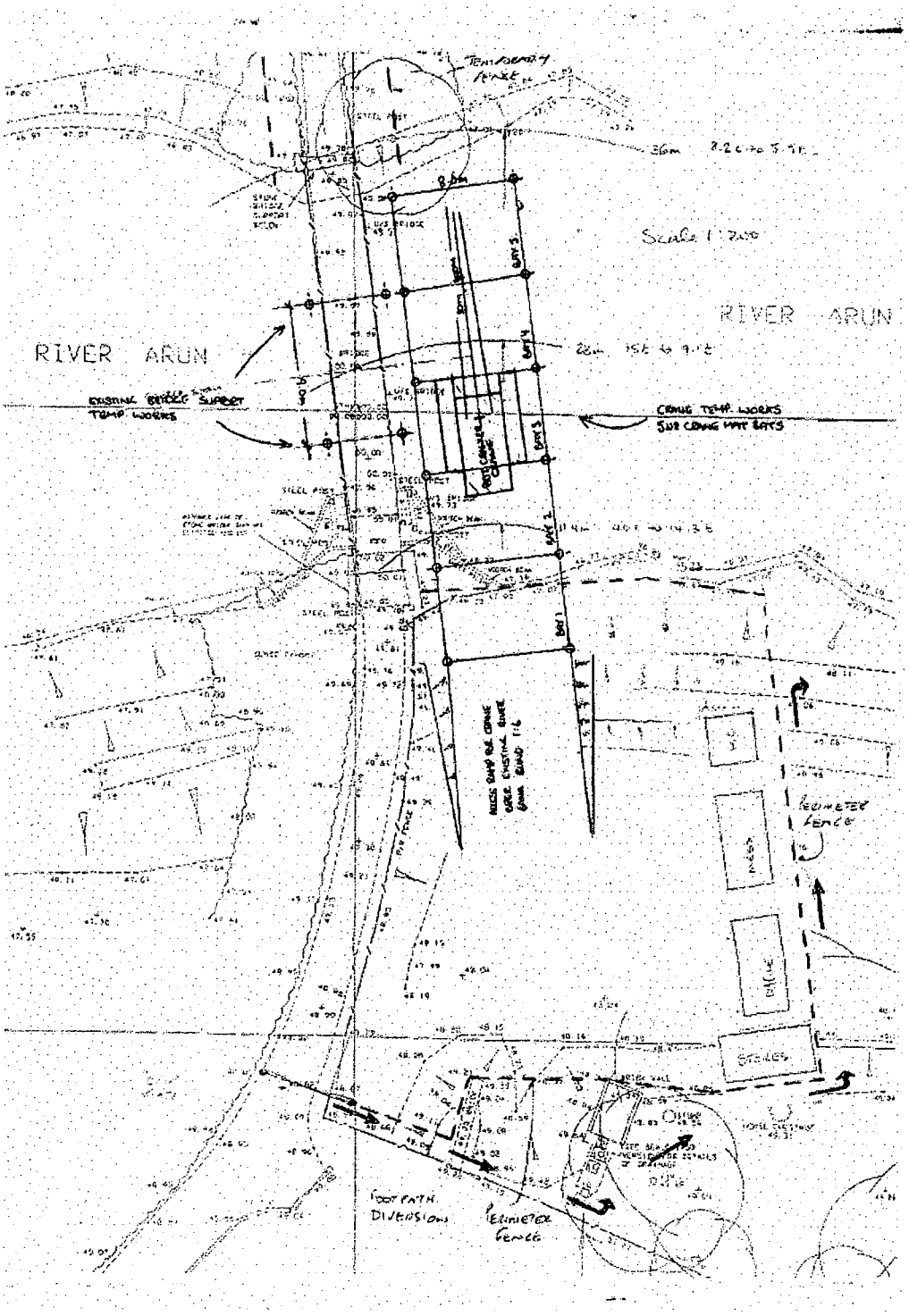
ARUN DISTRICT COUNCIL:SS/6/06/ 26/07/2006

Appendix 1

Sketches of temporary works

Appendix 1 Sketch of temporary crane works




RIVER ARUN
RIVER ARUN
Scale 1:200
EXISTING BRIDGE SUPPORT TEMP. WORKS
CRANE TEMP. WORKS SUB CRANE MAT BAYS
BAY 1
BAY 2
BAY 3
BAY 4
BAY 5
FOOT PATH DIVERSION
FOOTPATH
STABLES
OFFICE

ARUN DISTRICT COUNCIL:SS/6/06/ 26/07/2006

Appendix 2

Arun Banks Site of Special Scientific Interest (SSSI) citation

COUNTY: WEST SUSSEX SITE NAME: ARUN BANKS

DISTRICT: ARUN; HORSHAM

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981.

Local Planning Authority: ARUN DISTRICT COUNCIL, Horsham District Council

National Grid Ref: TQ 029100 Area: 25.1 (ha.) 62.0 (ac.)

Ordnance Survey Sheet 1:50,000: 197 1:10,000: TQ 01 SW, 00 NW

Date Notified (Under 1949 Act): 1954 Date of Last Revision: 1980

Date Notified (Under 1981 Act): 1985 Date of Last Revision: –

Other Information:

Reasons for Notification:
The site includes an upper tidal stretch of the River Arun and on old abandoned meander loop. The cut-off meander still receives some water flow and contains a range of habitats including an extensive reed bed. The site has a rich and varied flora which includes one nationally uncommon plant.

The River Arun was straightened in 1839 leaving an old meander loop which was partly sealed in 1963 when the banks of the river were raised. The reduced water flow in the meander and the decline in management of its embankments has led to a range of habitats including reed bed, fen, tall herb and woodland communities. The tidal nature of the main river is shown by the presence of bankside communities in which plants associated with brackish water occur. The berm between the river and the embankment supports a rich smell fen community. The embankments of the river consist of wet grassland but a steep river cliff supports scrub and woodland. Drainage ditches on the landward side of the embankments carry tall fern communities.

Much of the former open water channel of the meander is now dominated by common reed *Phragmites australis* with reed sweet grass *Glyceria maxima*. Reed warblers breed in this tall fen. Shallow water communities by the riverbank are dominated by reed canary-grass *Phalaris arundinacea*. Much of the meander's embankments are covered by scrubby woodlands in which ash *Fraxinus excelsior*, white willow *Salix alba*, pedunculate oak *Quercus robur*, wild privet *Ligustrum vulgare* and blackthorn *Prunus spinosa* are dominant. There is a more open area which is dominated by ruderal herbs, particularly bramble *Rubus fruticosus*.

The main river is deep and tidal and thus supports little vegetation in the main channel. Bankside communities, however, are well established and consist of reed beds in deep water with richer shallow water communities behind them. These latter communities are dominated by reed sweet grass and reed canary-grass and include plants of brackish water such as sea club-rush *Scirpus maritimus*, glaucous bulrush *Schoenoplectus tabernaemontani* and the nationally uncommon hybrid *Schoenoplectus lacustris* sub-species *tabernaemontani x triqueter*, a plant which is now restricted to four rivers in the country. The berm is dominated by water mint *Mentha aquatica*, fleabane *Pulicaria dysenterica* and silverweed *Potentilla anserina*, with patches of meadowsweet *Filipendula ulmaria*, hemlock water dropwort *Oenanthe crocata*, yellow flag *Iris pseudacorus* and the locally uncommon marsh mallow *Althaea officinalis*. The river embankments and an adjacent field are dominated by rushes *Juncus* species but the steep river cliff (at TQ 024099) has been colonised by ash woodland and elder *Sambucus nigra* scrub.

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The ditches support tall fen communities of common reed, rushes, bur-reeds *Sparganium* species and false fox sedge *Carex otrubae*.

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Appendix 3

Appendix 3 form (EA procedure for works in a SSSI)

CROW Appendix 3

The CROW Act 2000 and Environment Agency Works - Formal Notice

ENVIRONMENT AGENCY

Environment Agency Formal Notice to English Nature/Countryside Council For Wales

Requirements of Section 28H of the Wildlife & Countryside Act 1981 as incorporated by the Countryside and Rights of Way Act (CROW) 2000.
Duty in relation to carrying out operational activities within or capable of affecting Sites of Special Scientific Interest (SSSI).

1. Agency Region and Area Office	Sussex Area, Southern Region
2. Name of SSSI(s):	Arun Banks
3. Type of activity:	Replacement of South Stoke Bridge
4. Predicted 28 day date for EN/CCW Response (under S28 H (3)):	Monday 16th January 2006
5. Agency reference no *or* location / name of river if part of Agency operational maintenance programme:	River Arun
6. National Grid reference:	TQ 026 101
7. Description of proposal:	Access and site compound All access to the site will be on the narrow unmade track via South Stoke village. The contractor's compound will be situated in the field to the east of the access track (see Figure 2) An additional smaller compound will be situated on the area of hard standing immediately north of the bridge. Temporary Works Due to the proximity of the working area to the river and the associated problems with soft banks a temporary crane platform is required. The temporary works will consist of 12 tubular piles driven into the river bed. Propping of the existing bridge is required, this will comprise 4 tubular piles driven into the river bed. Demolition of old bridge The existing deck will be cut into segments and once removed the exposed section of steel truss will be cut away from the existing bridge and lifted onto the south bank for processing. The existing abutments and wing walls will then be broken down to accommodate the new abutments and gabion scour protection. Piling for new bridge The piles will be installed to the north and south abutments using a mini-piling rig, on tracks. All silted water produced during piling operations will be pumped into a sediment tank before being introduced back to the river. Once the abutment piles have been installed, excavation for the abutment can commence and the blinding placed. The new abutments will require gabion scour protection. This will be constructed within trench sheeted excavations at low tide conditions, with additional sump pumping as required. Installation of new bridge The bridge will be assembled into halves on site, when completed each half will be lifted into position and temporarily supported by the bridge propping until both sections are spliced together. Construction programme The proposed construction period is from March 2006 to August 2006.

8. **Is the proposed activity within (wholly or partially) the SSSI boundary?**	Yes

9. If within the SSSI and on the OLD list, and/or outside the SSSI boundary, what aspect of the proposed operation is likely in the Agency view to adversely affect the notified interest of the SSSI?

The Environment Agency (EA) are not aware of any significant adverse affects that the proposed works are likely to cause to the interest of the SSSI.

Potential anticipated minor impacts on species/natural environment and proposed mitigation measures are limited to the following: -

The proposed works will be undertaken during the breeding bird season, the works are likely to cause a low level of disturbance to birds using the surrounding habitats including the reedbeds. The hedgerows adjacent to the bridge and approximately a 10m length of reedbed on the downstream sides of the bridge will require removal prior to construction.

The hedgerows and reedbeds will be removed in the winter months prior to site workings. This will be supervised by a experienced ecologist, the vegetation will continue to be strimmed during the construction phase to discourage nesting. Following completion of the works a replanting scheme will replace any vegetation removed. Additional reedbeds will be planted around the scour protection.

Access will be from South Stoke Village, along the narrow access track. There will be no access through the SSSI.

10. Name & job title of Environmental Officer:	Jane Gilbert Environmental Scientist	**Date form sent to EN/CCW:** 16th December 2005

For Agency use only, once EN/CCW response received		
11. EN/CCW comment on notice:	*Please circle one of following:* 1) assent 2) assent with conditions/advice 3) refusal 4) no response **Please ensure that the EN/CCW Response is attached to this Formal Notice.**	
12. Name & job title of EN/CCW Officer:		**Date of receipt of EN/CCW response:**

→ Andy Gk → NCf
cc. Richard Tw

ENGLISH NATURE

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Rupert Clubb
Sussex Area Manager
Saxon House
Little High Street
Worthing
West Sussex
BN11 1DH

Your ref: BWA0014305/CR/G034
Our ref: SD/ARU.B/ASS/05-06/2

ENVIRONMENT AGENCY
23 JAN 2006
SUSSEX AREA OFFICE

18th October 2005

Dear Rupert Clubb

ARUN BANKS SITE OF SPECIAL SCIENTIFIC INTEREST
Assent of English Nature

Proposal: **South Stoke Bridge access for temporary works and demolition of the old bridge and permanent replacement with similar but longer replacement**

Location: **Adjacent South Stoke Bridge, South Stoke, West Sussex TQ026 101**

Assent ref: **SD/ARU.B/ASS/05-06/2**

Thank you for your letter and summary documents sent on your behalf by Jacobs Babtie detailing the above proposal, works, summarising the EIA and proposing mitigation.

English Nature assents to the proposals contained in the Appendix 3 notice dated the 16 December 2006 under Section 28H of the Wildlife and Countryside Act (as amended by CRoW Act 2000). This work is subject to adherence with the following conditions:

- A survey of the vegetation to be removed by the proposal to look for field signs of *Schoenoplectus* species. If no *schoenoplectus* plants are found the work can proceed as stated.
- If *Schoenoplectus* species are found in the area to be removed they must be sampled for laboratory confirmation of whether the rare hybrid which is part of the site interest features namely *Schoenoplectus lacustris* sub-species *tabernaemontani* x *triqueter* is present. Field signs do not accurately identify this sub-species hybrid and must be supported by laboratory confirmation.
- If the interest feature hybrid is present in the area to be removed then the works **cannot go ahead** without resulting in significant damage to the SSSI interest features. If this is the case you must agree an alternative method and/or mitigation with English Nature.

There will be temporary moderate loss of habitat and permanent loss to a small increase in hard standing. In addition to the conditions English Nature welcomes the offer to replant the reedbed with native local provenance reedbed and addition of reedbed around the edge of the scour. In addition English Nature welcomes the

relaying of the hedge using native-local provenance species.These mitigation measures will help to minimise the impacts upon the SSSI and biodiversity.

If you have questions regarding the SSSI please contact me at English Natures Sussex and Surrey Team Office. I am on annual leave from the 20th January to 13th February 2006.

Yours sincerely

Dr Louise Bardsley
Conservation Officer