



Littlehampton Arun East Bank Tidal Walls Flood Defence Scheme Environmental Statement Non-technical Summary May 2013 We are the Environment Agency. We protect and improve the environment and make it a better place for people and wildlife.

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Acting to reduce climate change and helping people and wildlife adapt to its consequences are at the heart of all that we do.

We cannot do this alone. We work closely with a wide range of partners including government, business, local authorities, other agencies, civil society groups and the communities we serve.

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# Environmental Statement Volume One - Non-technical Summary

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# Approvals

Name	Signature	Title	Date	Version
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Peter Borsberry	NCMPS Project Manager, Environment Agency	30-5-13	1



# Non-Technical Summary

# Introduction

# The scheme

We (the Environment Agency) are proposing to make improvements to the flood defences on the East Bank of the River Arun in the town of Littlehampton in West Sussex. These works (the scheme) between the harbour mouth and 500m north of the A259 road crossing will improve the level of flood protection to protect the town against the kind of flood we would expect once in every 300 years (there being a 0.33% chance of this kind of flood occurring in any one year).

The existing urban flood defences include steel, concrete and masonry walls, and in the more rural area to the north there is approximately 750m of earth embankment. Many of these defences have a short remaining life (less than 10 years) and there are some low points. As a result, they need significant works or replacement to prevent failure or overtopping that would result in serious flooding and damage. Areas at risk of flooding include residential and commercial properties, roads, the railway line and station, an industrial area, footpaths, public slipways and public green areas. In a hundred years time the number or properties at risk will rise significantly (by about 70%) if sea level rises as predicted.

In addition, Arun District Council is proposing to make improvements to the promenade area (public realm works) alongside the lower reaches of the river. Although not required for flood defence purposes, these works have been developed and will be built in combination with the flood protection works. As such, they are considered as part the overall scheme.



The location of the scheme is shown below.

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# Planning and Environmental Impact Assessment

Most of the flood defence works will be along the same alignment as the existing defences and planning permission is not needed for this work (they can be undertaken using the Environment Agency permitted development rights). However, those parts of the scheme that are not along the same alignment do require planning permission, as do the public realm works (under a separate planning application). An environmental impact assessment has been undertaken for the scheme in accordance with the requirements of the EU Environmental Impact Assessment Directive 2011/92/EU.

The findings of the environmental impact assessment are presented in this Environmental Statement.

We are submitting this Environmental Statement with the planning application for the realignment sections of the scheme to the local planning authority (Arun District Council) in accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 2011. The Environmental Statement is also being advertised and made publicly available through our website prior to undertaking the remainder of the scheme under permitted development rights in accordance with Environmental Impact Assessment (Land Drainage Improvement Works) Regulations 1999.

This Environmental Statement is intended to ensure that the planning authority (Arun District Council) and statutory and non-statutory bodies with interests in the environment and members of the public are provided with the information which allows them to comment on the environmental effects of the proposals.

This document is Volume One of the Environmental Statement, the Non-technical Summary. The detailed assessment is reported in Volume Two, the Main Report, with further supporting information provided in Volume Three, the Appendices.

A plan of the scheme and sections for which planning permission is required are shown below.



# Alternative Options Considered

We considered a range of options when developing the scheme. The options of doing nothing or of simply maintaining the existing flood defences were discounted during the appraisal process as both would have led to an unacceptable increase in flood risk over time, particularly with rising sea levels.

We then considered a number of different engineering solutions to improve the defences including deferring improvement works until a later date, repairing and raising the existing defences now, constructing a new rock revetment, embankment or sheet

piled wall, and making slight variations to the alignment of the defence where there is enough space.

These options were subject to detailed appraisal of cost, engineering considerations, environmental risk (and opportunities) and consultation with stakeholders and the public.

Some of the key decisions we made during this process include:

- deferring works until a later date where possible as this would avoid unnecessary works and environmental impact
- rejecting rock revetments as there is not enough space and they would have unacceptable environmental impacts.
- selecting sheet steel piling in many places due to space limitations
- choosing embankments (either existing or new) in the rural area to the north where space permits, which would enable more sympathetic landscape design
- choosing a realignment option in order to create inter-tidal habitats and space for water. We selected a realignment option after it received wide support from environmental specialists.

In Reaches 1 and 2, we worked in partnership with Arun District Council to progress an option which enables significant public realm improvements in line with the Council's waterfront strategy for Littlehampton.

# The scheme

The scheme will extend along the East Bank of the River Arun for approximately 2.5km from the harbour mouth to 500 metres north of the A259 crossing. It has been divided into six reaches as shown above and summarised below.

- Reach 1 (Arun Parade): we will build a new steel sheet piled wall 300m long and up to 1.3m higher than the existing wall, immediately riverward of it. The wall will be capped using concrete. Extensive public realm improvements will include high quality landscaping with planting, lighting, handrails, seating areas, steps and ramps to provide access. The promenade will be raised to maintain views to the river.
- Reach 2 (Pier Road): this is very similar to Reach 1, with the new wall being 150m long and up to 1m higher than the existing wall. The public realm improvements works will continue into this reach. The promenade will be raised to maintain views to the river.
- Reach 3 (walkway): no works currently planned
- Reach 3 (private frontage): we will build a new steel sheet piled wall 100m long and up to 1m higher than the existing wall in the north, immediately riverward of the existing wall. The detailing of surfaces and garden reinstatements are being discussed with individual landowners.
- Reach 4 (Pharos Quay): we will build a 40m long wall along the edge of the pavement next to Pharos Quay, and a new steel sheet piled wall 0.9m higher than the existing wall to link with the pedestrian footbridge. Landscaping, planting and a new handrail will be provided. There will be a new viewing platform, and new planting and handrails.

- Reach 5 (Arun View public house and wharfs): the river-facing walls of the Arun View public house will be flood-proofed using concrete and flood glass units. The walls alongside residents' patios will be raised using flood glass. The existing defences at Railway Wharf will be raised (up to 0.4m) on the landward side.
- Reach 6 (non realigned): in the southern part, we will build a steel sheet piled wall to a height of 0.8m along 600m of the existing flood defence embankment. Further north, we will raise 200m of the existing embankment. We will replace failing erosion protection on the riverside of the embankment, and this will be seeded to improve riverbank vegetation.
- Reach 6 (realigned): we will create additional saltmarsh and mudflat habitat in Reach 6 by removing part of the riverside embankment and using the material to build a new embankment closer to the A259 road.

Throughout the scheme we will replace all current access to the river and pontoons. We will also replace all other lighting, handrails, road signs and other street furniture.

Plans showing the alignment and design details of the proposed works are provided at the end of this document.

# Construction

# Advance works and site set-up

Many of the steel piles required have already been delivered by sea, and the remainder will also be delivered in this way. Further advance works will be needed to divert existing services, to assess the condition of flood defences, to clear the sites of reptiles and vegetation and to treat invasive weeds.

The main construction compound will be located in Reach 5 at Railway Wharf, where the sheet piles are currently being stored. Satellite compounds with staff welfare facilities will be provided for Reaches 1 and 2 in Arun Parade and in Reach 6.

# Main construction activities

Sheet piling will be transported by pontoon along the river, except for Reach 6. It will be installed in Reaches 1, 2, 4 and 6 using a large crane or excavator, using a vibration method and, where needed, a percussion impact hammer.

We expect work to progress from the south end of the Reach 1 heading north, with a second piling gang working at the same time in Reach 2, again heading south to north, in order to minimise the time needed and associated disruption. After the piles are in place, they will be capped with concrete. The landscape works to the promenade will then follow. In Reach 3 the limited space means that piles will be driven from a barge on the river.

In Reach 5 small land-based equipment will be used to build the defences at Railway Wharf and install the glass panel floodwalls at the Arun View pub.

In Reach 6, we will realign the embankment and make repairs to the erosion protection using lorries and excavators. The new embankment will be built behind the existing embankment, and material from the existing one will be shaped to create suitable levels for saltmarsh to grow. Soil from the local area will be brushed over the erosion protection to encourage plants to start growing quickly over these features.

# Managing traffic during construction

We have carefully selected the routes to be used by construction vehicles and plant. We will also take other highway management measures to minimise disruption to local residents, visitors and local businesses, and maintain maximum possible access and car parking during construction. These have been defined in our Traffic Management and Logistics Plan (available as part of the Environmental Statement).

# Our expected construction programme

We have programmed construction to avoid impacts during the main tourist season as much as possible, and also to minimise percussion (hammer) piling during fish migration and bird breeding seasons. After mobilisation in October 2013, we intend to start construction of Reaches 1 and 2 in November 2013, aiming to complete most of the public realm works and reopen Pier Road to traffic in time for the main tourist season of 2014. Works are likely to continue into July 2014 in Arun Parade, with the final works being completed in Reach 6 in August 2014 (i.e., complete in just under a year).

Working hours are likely to be 8.00am to 6.00pm Mondays to Fridays and 8.00am to 1.00pm Saturdays. Deliveries and certain other activities will be further restricted as described later in this Non-technical Summary and in the Environmental Statement.

# Managing our impact on the environment

We are committed to protecting the environment and people during the construction of the scheme. Some disruption to the environment and local people is unavoidable, but we will do all we can to minimise and manage any adverse effects through the application of mitigation measures.

All mitigation measures identified in the Environmental Statement needed to protect the environment during construction and operation of the scheme will be incorporated into the contract documents by means of an Environmental Action Plan. It includes information on where each mitigation measure applies, its objective, how and by whom the action will be carried out, and how it will be monitored. The Environmental Action Plan will be used to ensure that the environmental mitigation and enhancement measures are fully implemented.

# After the scheme is built

The Environment Agency has statutory permissive powers, but not a duty to construct and maintain works in the interests of flood and coastal risk management. However, we will continue to undertake annual inspections of the tidal flood defences to asset the condition of the flood defences.

Arun District Council will be responsible for the maintenance of the landscaping works in Reaches 1 and 2.

# Consultation

We presented scheme options to the public and key stakeholders at a consultation event in March 2010 followed by targeted stakeholder meetings. A detailed environmental appraisal of the short listed options was undertaken by statutory consultees at a workshop also in March 2010. We used consultation to help generate and evaluate alternative design options. We selected the most economically viable options which meet environmental objectives and reflect the views of the public and statutory consultees. During detailed design of these options we have continued engaging with key stakeholders through meetings and newsletters.

In this way, comments and concerns raised by the public and consultees have been fed into the design and helped improve the scheme.

# Environmental impacts and the action we will take

# **Noise and Vibration**

The existing noise along the riverbank comes from a range of sources typical of a town centre location, including road traffic.

Temporary increases in noise during construction are unavoidable, particularly in Reaches 1 to 5, but these increases will be short term (up to 70 days at any location) and only during the day time. Measures to minimise any nuisance to nearby residents have been included in the Environmental Action Plan. Construction activities in Reaches 1 and 2 are programmed to avoid work during the main tourist season as far as possible.

Piling is also likely to give rise to vibration, and where this is close to properties this is expected to cause some impact, in particular in Reaches 1 to 4. To minimise this we will use resonance-free vibrators, which have successfully reduced the effects of piling on buildings in similar circumstances elsewhere. We have made calculations using British Standard methods to determine the consequences, and this has indicated no effects on the fabric of buildings, but some possible disturbance to residents. As a precautionary measure, we will survey buildings and monitor vibration so that any effects can be identified if they develop, and measures taken to avoid damage. We will keep property owners and residents fully informed on the nature and timing of the works.

# Archaeology and heritage

There are no nationally important historic features or sites along the line of the defences. The nearest such feature, Littlehampton Fort Scheduled Monument, is on the opposite bank of the River Arun, about 100m south west of Reach 1 and will not be affected.

There are eleven listed buildings around the historic core of Littlehampton to the east of Reach 3, and the scheme overlaps the River Road Conservation Area in Reaches 3, 4 and 5. There are also four nearby buildings on Arun District Council's list of 'buildings or structures of special character' (the lighthouse at the southern end of Arun Parade, Riverside Autos, The Arun View public house, and East Pier), and South Terrace Area of Special Character (another District designation) abuts Reaches 1 and 2. The only direct effect on any of these is the rebuilding and waterproofing of the riverside wall of the Arun View pub, but once the scheme is built, this public house will benefit from improved protection against flooding, and will look similar in appearance to the existing building.

We will monitor the effects of vibration on buildings of historic interest.

The one known archaeological site within the footprint of the scheme is evidence of former harbour walls and wharf features in Reach 3. Our site walkover in Reach 6 has also identified remains of a wooden jetty, and some sources record a lime kiln and an old quay in this Reach. Other heritage features near to the scheme include remains of two mills, harbour features (wharf, swing bridge, boat winch) and a water treatment facility, and cast iron railings around the quay wall at Pharos Quay.

The handrails at Pharos Quay will be removed and will be replaced if their condition is suitable. Otherwise a new handrail of a suitable design will be provided.

Other features might be disturbed either by excavation (former river walls and buried archaeology, if present) or vibration (former swing bridge). Work adjacent to the existing river wall in Reaches 1 and 2 might expose the tops of historic river walls, and our archaeological supervisor will record any such structures exposed. Similarly, our archaeologist will inspect Reach 6 after topsoil stripping to record any significant features such as wharf or lime kiln remains. If piling encounters obstructions, it is possible that these could be archaeologically significant, and we will make appropriate inspections and recording.

Buried sediment and organic remains associated with former channels of the river (known as "palaeoenvironmental" deposits) are very likely. Potential impact to such deposits within the river cannot be avoided and is the only impact that cannot be reduced through mitigation measures. However, this impact will be limited to the very narrow footprint of the piling in Reaches 1 to 4.

The completed scheme will have a minor benefit by improving flood protection for the River Road Conservation Area, 'Cairo Club' listed building and a number of the District designations.

# **Biodiversity (wildlife)**

The closest nature sites are the nationally important Climping Beach Site of Special Scientific Interest, which supports vegetated shingle and sand dunes and a Local Nature Reserve, and county designated Littlehampton Golf Course and Atherington Beach Site of Nature Conservation Importance (grassland and shingle beach). Piling noise may cause some disturbance of birds within the Site of Special Scientific Interest but as the distance is considerable (approximately 100 metres) our measures to reduce noise impacts on people should also ensure no significant impact on birds.

The scheme will result in very small losses of inter-tidal mudflat, but this will be more than compensated for by the managed realignment works in Reach 6, where the embankment will be set back and bioengineered to form a new embankment along the highways embankment. This will allow us to create 0.27 hectares of new mudflat and 0.7 hectares of new saltmarsh, which, after losses are accounted for, will result in a gain of 0.75 hectares of inter-tidal habitat.

The tidal River Arun supports various fish species including migratory sea trout and eels. These could be disturbed or harmed by certain types of pile driving. We will therefore use vibration method of piling, which has been shown to have no measurable effect on fish. Where other methods of piling are necessary, the work will be carried out during agreed times outside the fish migration season or using other mitigation as agreed with our fisheries specialists to ensure no harmful impacts.

Surveys have identified that birds, bats, reptiles and badgers could be present in Reach 6 during construction. These species are legally protected, and we will therefore take precautionary measures, including ecological works (under licence from Natural England where necessary) to remove species from risk. In particular, any reptiles will be relocated to a nearby site before construction begins, and trees will be checked for bats and, if necessary, any bat will be relocated before tree removal. We will use good practice procedures for work near water to ensure that no contaminants or silt are released that could affect wildlife species or habitats.

These measures for avoiding or minimising our impact to wildlife have been developed in consultation with Natural England, the Royal Society for the Protection of Birds and our own Fisheries and Biodiversity specialists. With these measures in place, no significant adverse effects are expected and there will be a small benefit from the creation of inter-tidal habitat in Reach 6.

# **Ground conditions**

There are no protected geological sites or soils with high sensitivity near to the scheme. The natural geology includes coastal and tidal river deposits overlying chalk bedrock. The chalk holds significant groundwaters, and the overlying deposits have high leaching potential meaning that any contamination on the surface could reach the groundwater. However, there are no protected groundwaters in the area and no abstractions within 500 metres of the scheme.

The site and its surroundings have a long history of industrial land uses, and our investigations have identified the possibility of asbestos in older buildings and low levels of contamination of man-made ground in Reaches 1, 3, 5 and 6. Such contamination poses a potential risk to construction workers and nearby people if uncovered or disturbed during construction, and could affect water resources and biodiversity if released into the environment. However, we will put standard mitigation measures in place to ensure that any contaminated material is identified, treated and disposed of in a suitable manner to ensure no harmful impacts arise.

There will be no impacts during operation of the scheme.

# Landscape, townscape and visual issues

Temporary changes to the local landscape and townscape will be inevitable during construction due to the presence of large equipment and general construction. This will result in visual impacts for those living or working close by, with the greatest such effects in Reaches 1, 2, 4 and 6. The other Reaches are largely screened by existing buildings. People experiencing the greatest impact on views will include those on the sea front promenade, The Green, Arun Parade, the riverside promenade and Pier Road; residents and traders on Pier Road, River Road, Britannia Quay and Pharos Quay; and boat users on the Arun. We have programmed construction to avoid the main tourist season as far as possible, and we will minimise the effects through actions set out in the Considerate Contractors Scheme. This will include measures such as maintaining a tidy site, taking care with the levels and direction of temporary lighting, and providing localised visual screening if required.

The scheme, once complete, will improve the landscape and townscape of the east bank of the River Arun, particularly in Reaches 1, 2, 4 and 6, where the changes are more extensive. In Reaches 3 and 5, the smaller scale of the flood defences, will result in no significant change to the townscape.

Along Pier Road and Arun Parade (in Reaches 1 and 2) the scheme will improve townscape character by improving paving materials, reducing visual clutter and providing new high quality seating, street furniture and lighting. The link between the sea front and riverside promenades will be wider than the existing promenades, and there will be no changes to the levels in the southern part of the scheme. However, views west from Pier Road and from Arun Parade to the river will be restricted by the raised height of the defences and promenade.

At the footbridge and Wharf Road (in Reach 4) there will be slight effects due to the visual separation of the river from the footpath and road, although views will be possible from a new raised viewing area. The higher flood defences will have a slight impact on the character of the Conservation Area. There is insufficient space for replacing the three trees that will be removed, but new ground cover planting will compensate for their loss to some degree.

In the more rural north (in Reach 6), the loss of trees along the A259 road embankment will remove the screening of the road and vehicles, but replacement planting will, in

time, replace this. The flood embankments will be planted or seeded with appropriate coastal vegetation and their engineered elements will be low key to minimise visual intrusion. Consequently, there will be no significant impacts on landscape character once the replacement native planting has established, and ultimately there will be a slight improvement as the new areas of inter-tidal habitat establish.

# Land use and socio-economy (people)

Construction alongside areas of public access, particularly along Arun Parade and Pier Road, will, inevitably, cause some disruption. We expect these roads will be closed from November 2013 until May 2014, with the closure of Arun Parade extending into July 2014. The Arun View public house may also need some short closures. However, to minimise this disruption to residents, visitors and businesses, we have programmed construction to avoid the peak tourist season as much as possible; pedestrian access and provision for deliveries will be maintained throughout, as will strong lines of communication; and we will provide temporary signage (e.g. "businesses open as usual") to minimise the effect on traders.

Once operational, the scheme will provide better flood protection to residential, commercial and recreational areas and roads and the railway. It will also deliver an improved promenade area with extensive landscaping, improved lighting and new handrails in Reaches 1 and 2, improved access to the river in Reaches 1 to 3 and improved planting throughout Reaches 1 to 4. It is envisaged that the long term impacts will represent major benefits, both for local residents and businesses, and for visitors and the local economy.

# Traffic and transportation

Construction will require deliveries of materials and construction plant. However, we have already delivered most of the sheet piling by sea for storage at the Railway Wharf in Reach 5 and we will be transporting it to where it is needed by river to minimise impacts on the road network (the remainder will also be delivered by sea). Where road deliveries are necessary, we have selected the main access routes to avoid busy shopping areas and minimise the use of narrow residential streets, and deliveries will be restricted to avoid weekends and peak hours.

The highest number of lorries (about 18 per day) will be associated with construction of the embankment in Reach 6 where delivery of materials by river is not possible. This will be routed via A-roads and the B2187. Overall, construction is likely to result in low level increases in traffic on residential roads (River Road, Quayside, Wick Street, Arundel Road, Franciscan Way, East Street, Fitzalan Road and South Terrace), which will have some local impact, but this traffic increase is not expected to have a noticeable effect on the wider area and other road users.

A number of temporary road closures will be required on local roads. We expect Arun Parade will be closed from November 2013 to July 2014, Pier Road from November 2013 to May 2014, River Road will be closed between the junction with Wharf Road and Pharos Quay, starting in February 2014 for eight weeks, then traffic will be restricted to a single lane for 12 weeks, and River Road will be closed between the junction with Wharf Road and Pharos Quay at the junction adjacent to the pedestrian footbridge, for four to eight weeks from January 2014. These closures will also affect car parking on Arun Parade.

In order to minimise the effects of traffic and road closures, we have prepared a Traffic Management Plan (available within the Environmental Statement), which we will agree with Arun District Council, outlining how we will minimise Heavy Goods Vehicles traffic movements, plan and restrict deliveries to quieter times of day, restrict the speed of Heavy Goods Vehicles, keep highways clear of mud and debris, and minimise restrictions on parking along Arun Parade. Surrey Street car park and the car park on

South Terrace will remain open. Appropriate diversion routes will be provided in reaches where road closures are required, and we will maintain access to business and commercial areas. We will ensure that there is no impact on access for emergency services.

Moving sheet piling along the river could disrupt boat movement. Therefore, we will agree all movements with Littlehampton Harbour Board and we will give priority to commercial shipping. Access to the pontoons in Reaches 2 and 3 will be temporarily restricted, but this will be outside of the tourist season and alternatives will be provided. Once work is complete, access will be reinstated. Full access to the Royal National Lifeboat Institution station will be maintained at all times.

We will maintain pedestrian access to Reaches 1 and 2 throughout the construction period and pedestrian access to commercial premises on Pier Road will also be maintained. Replacement street lighting in Reaches 1 and 2, and improved access to the river in Reaches 1, 2 and 3 by new ramps, steps and pontoons where possible will benefit pedestrians and users of the river.

With these measures in place, the impacts on road and river users during construction will be slight, but cannot be eliminated completely. The completed scheme will have significant benefits for roads, the railway and public access by reducing the risk of disruption due to tidal flooding.

# Water resources

Potential impacts on surface water and groundwater are only likely to arise during the construction period.

Our contractors will strictly follow guidance on pollution prevention to avoid causing contamination during construction, especially when working near water. For example, the risk of fuel spills will be minimised by restricting refuelling to designated areas which do not drain to ground or watercourses, and by using secondary containment (such as drip-trays or bunds).

There is a risk that installing the piles may disturb sediment on the river bed, and additional sediment may get into the river from earthworks. A contractor's Piling Risk Assessment Report is a requirement for piling works of this nature, and amongst other things will identify specific methods for minimising sediment re-suspension. In Reach 6 we will undertake the earthworks behind the existing embankment before removing the existing riverside embankment, to ensure no runoff of soil into the Arun. The contractor will also prepare a sediment management plan and a pollution response plan. These measures will focus on protecting the river during construction.

We have assessed the scheme for its compliance with the Water Framework Directive, (which sets environmental quality objectives for all surface waters and groundwaters) and this has concluded that the scheme is compliant and makes a small contribution to the quality of the Arun water body by creating some intertidal habitats.

The completed scheme will have a major beneficial effect by providing a better standard of flood protection. It is not anticipated to have any effect on water levels outside of those that would occur under sea level rise, and will not result in any increase in flood risk on the west bank of the Arun.

# Planning

The likelihood and impacts of flooding in Littlehampton will be significantly reduced by this scheme which will support the local community economically and environmentally over many years. This reflects the principles set out in the National Planning Policy Framework. The scheme will also help to meet these principles by including measures

to maintain and enhance wildlife and the built and natural landscape, and safeguard and improve vehicular and pedestrian access.

Similarly, by reducing flood risk the scheme will help to meet the objectives of the Regional Spatial Strategy and Local Plan policy, including those of the waterfront strategy for Littlehampton. These plans promote good design, improvements to public realm and amenities and protection of the town, countryside and nature.

# **Cumulative impacts**

An assessment has been undertaken of the potential for cumulative impacts with other approved schemes. Only one relevant development has been identified, the redevelopment of two buildings comprising Riverside Autos and the adjacent former engineering works. However, these developments have been taken into account during scheme design, and no significant cumulative impacts have been identified.

There is also a proposal from West Sussex County Council for the possible future raising of Pier Road. There are no design proposals for this works at present. However, it is likely that if this goes ahead, it would be built under the permitted development powers of West Sussex County Council in combination with the proposed scheme. Construction could result in additional noise impacts on local businesses, but the noise associated with road raising is likely to be lower than that associated with construction of the flood defences.

In the long term, raising the level of Pier Road would create a more level road surface, reducing the current dip towards the river and the apparent height of the proposed steps and defences. It would also increase the width of level walkway adjacent to the river. The combined effect of raising Pier Road in the long term would therefore be to add to the beneficial effects of the public realm improvements of this scheme in this area.

# Conclusion

Building the scheme is a major operation which will cause disruption to local people and businesses, as well as to wildlife and other environmental features. The disruption will last from October 2013 until May 2014 in most areas, extending into July 2014 in Arun Parade and into August 2014 in the rural area to the north of Littlehampton; i.e., for less than a year. Through consultation and by undertaking an Environmental Impact Assessment, we have sought to avoid or minimise these impacts. The measures include:

- Timing of the works to minimise disruption during the main tourist season and avoid effects on fish migration
- Moving reptiles from the scheme area to a suitable receptor site
- Measures to prevent pollution to the river or harm to construction workers from contaminants
- Measures to prevent nuisance from noise, dust and vibration
- Measures to maintain pedestrian access and minimise restrictions for vehicles

The flood defence scheme is expected to bring significant long term benefits to Littlehampton by reducing the risk of flooding to a large area of the town containing housing, businesses, transport links and public spaces as well as a Conservation Area and listed buildings. The public realm improvements in Reaches 1 and 2 will bring further benefits for tourism and also provide a better promenade area for local residents. The new higher defences will inevitably lead to some loss of views across the River Arun. We have tried to reduce the effect of this by raising the promenade or footpath and by the use of glass panels in the Arun View public house.

The defences will impact on a small area of mudflat habitat in the river, but the habitat created by moving the embankments in Reach 6 will more than compensate for this loss and bring an overall benefit to wildlife in the river.

# Comments

Copies of the Environmental Statement together with copies of the plans and supporting information will be made available for inspection by Cian Cronin during normal office hours at the following address:

Planning and Economic Regeneration

Arun District Council

Arun Civic Centre

Maltravers Road

Littlehampton

**BN17 5LF** 

Copies of the Environmental Statement can be purchased for  $\pounds150$  for a hard copy, or  $\pounds15$  in CD format, on application in writing to Cian Cronin at the above address.

Further copies of this Non-technical Summary are available free of charge at the same address.

Comments can be made by writing to Cian Cronin at the same address within 21 days of publication of the Environmental Statement.

Only comments that relate to parts of the scheme for which planning permission is sought (Reach 4 Pharos Quay and Reach 6 Realignment) will affect the determination of the planning application.

For those parts of the scheme that we intend to construct using permitted development rights, we will publish an advert in two local papers and also on the Environment Agency website consultation page. The Environmental Statement will be a supporting document to this advert, and comments relating to the likely environmental impacts of these works should be made to the address stated on the advertisement, within 28 days of the publication date.

During this time, a copy of the Environmental Statement, together with copies of the planning application and supporting information, will be available for inspection by Cian Cronin at the above address and by Peter Borsberry at:

**Environment Agency** 

Guildbourne House

Chatsworth Road

Worthing

Comments relating specifically to the public realm enhancements should be made as directed in the instructions associated with the planning application submitted by Arun District Council.



of feature lighting within the waterfront balustrading or handrails to steps is currently being considered.



# OVERALL DESIGN INTENT

The public realm design for Reaches 1 and 2 proposes a simple, well-coordinated clutter free waterfront with improved pedestrian access and circulation. A new sheet piled vertical flood defence wall will be installed directly riverward of the existing piled wall and capped with a decorative precast coping. In Reach 1 the wall will be generally 1.3m higher than the existing defence and 0.5m higher than the new river promenade level. In Reach 2 the wall will generally be 1.0m higher than the existing defence and 0.2m higher than the new river promenade level. Replacement waterfront balustrade will be provided on top of the precast coping for health and safety reasons. This aims to be visually light weight in design to maintain views to the river.

The level difference between existing and proposed will be transitioned using a combination of pedestrian and seating steps, planting terraces and ramps. The arrangement of these elements will be arranged in a simple repetition along the whole length of Reach 1 and 2. A new footpath adjacent to Arun Parade in Reach 1 will be provided at the lower level. Extensive public realm works landward side will comprise high quality in-situ decorative concrete paving, planting complementing the coastal landscape character, bespoke timber seating, low terraced corten steel walls to the planting and a high quality co-ordinated range of replacement street furniture such as litter bins, finger post signs and lighting. Accessibility features including steps and ramps will be located on desire lines and access points to adjacent land uses. Access to the river will be maintained and improved where practicable by new ramps, steps or portoons. In Reach 1 the fish kiosk will be moved westwards and the promenade widened in this locality to provide more waiting and circulation space.

For Reaches 1 and 2 the materials, furniture and planting for the public realm will be inspired by Littlehampton's surrounding natural context. They will be selected to provide a unified, robust, simple and understated public realm which complement the surrounding natural context and will not compete visually with the more brightly coloured buildings along the waterfront. The character of the planting will aim to mimic the natural shoreline coastal planting (naturalistic, not formal). Attractive coastal species, preferably indigenous to the West Sussex coastline or suitability for environment and of low maintenance will be chosen. Replacement lighting in Reaches 1 and 2 using high quality light fittings to enhance the public realm and the incorporation of feature lighting within the waterfront balustrading or handrails to steps is currently being considered.

KEY			
	Planning Application Boundary	A	Fing
$\bigcirc$	Visualisations (see drawing 3483_PL_002)	http:	10m Coli
	Cross Sections (see drawing 3483_PL_003)	_100	(Doi
	Exposed Aggregate Promenade and Footpaths	4.9'	Han
D	Raised Table Pedestrian Crossing		Sea
	Balustrade to Length of Waterfront		of S
00000000000000000000000000000000000000	DDA Compliant Graded Route with Balustrade		
54	Large Bespoke Benches		
Constanting of the local division of the loc	Large Benches with Backrests		
8	Litter Bins		
1 El	Cycle Stands		

	Fingerpost Sign
	10m Street Lights with Timber Columns
	(Double and Single Lantern)
	DDA Compliant Steps with Handrails
1	Timber Cladding to Large Concre

NOTES

REFER TO ENG

Seating Steps Terraced Planting Through Layer of Self Binding Gravel

PRELIMINARY



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LOCATION PLAN

1. Do not scale from this drawing.
 2. All dimensions are in metres unless noted otherwise.
 3. All levels are in metres above Ordnance Datum Newlyn
 To BE READ IN CONJUNCTION WITH LANDSCAPE MASTERPLAN REACH 01
 SHEETS 01 40.

	Halcrow Group Limited Burderop Park, Swindon, Wiltshire. SN4 0QD Tel. +44 (0) 1793 812479 & Fax +44 (0) 1793 812089
	www.halcrow.com
	A CH2M HILL COMPANY
	LDA Design Kings Wharf, The Quay, Exeter, EX2 4AN 1: 01392 200 430 - F 01392 200 431
	<b>l d </b> Ā d e s i g n
	Project
L	ITTLEHAMPTON ARUN, EAST BANK
	LANDSCAPE AND PUBLIC REALM
	Drawing
	LANDSCAPE MASTERPLAN
	REACH 01
	JILLIZ UL J

Drawn by	KB (LDA)	Date:	May 2013	
Checked by	SJT (LDA)	Date:	May 2013	
Authorised by	SJT (LDA)	Date:	May 2013	
Drawing No.			Revision	
	3483_PL_102			
Drawing Scale:	1:200 @ A1			
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KFY				
	Planning Application Boundary	A	Fingerpost Sign	NOTES:
$\bigcirc$	Visualisations (see drawing 3483_PL_002)	Http	10m Street Lights with Timber Columns	<ol> <li>All dimensions are in metres u</li> <li>All levels are in metres above</li> </ol>
	Cross Sections (see drawing 3483_PL_003)		(Double and Single Lantern)	TO BE READ IN CONJUNCTION WITH LANDSO SHEETS 01 & 02.
	Exposed Aggregate Promenade and	4.9	Handrails	REFER TO ENGINEER'S DRAWINGS 463457-CI AND 463457-CIVIL-103-P1
	Re-surface Existing Carriageway		Timber Cladding to Large Concrete Seating Steps	This map is reproduced from Ordnand the permission of Ordnance Survey or
M	Raised Table Pedestrian Crossing		Terraced Planting Through Layer of Self Binding Gravel	copyright. Unauthorised reproduction in and may lead to prosecution or civil
	Balustrade to Length of Waterfront			Environment Agency, 100026380, [20
5.4	Large Bespoke Benches			
officially	Large Benches with Backrests			
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	Cycle Stands			EHAMPTON
				Marina <sup>th</sup>
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Ņ				(CH)
	<b>—</b> 0 10m	F		The Mill
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Revision By Checked Approved Date Description

Client







CROSS SECTION D- D'

# NOTES:

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CROSS SECTION LOCATIONS



Revision By Checked Approved Date Description

Client

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Drawing No.

Drawing Scale:

CAD Filename: 3483\_Sections

SJT (LDA

3483\_PL\_106

1:10 @A1



May 2013

Revision

Date:

Plot Scale:



PRELIMINARY



# OVERALL DESIGN INTENT

The proposals for Reach 3 comprise a new section of steel sheet piled wall with a new reinforced concrete capping beam with an up stand wall. The existing ground levels are typically 3.6/3.8m AOD and the flood protection level is 4.8m. The wall lies in the vicinity of two residential blocks to River Road - Britannia Quay and The Waterside, as well as a workshop to the north. The proposals lie within the Conservation area, therefore will need to be sensitive to this context.

To the rear of the residential gardens the impact of the new river defence is to be mitigated locally through the use of appropriate brick cladding to the inside face of the concrete wall or glass floodwall panels within the wall in the vicinity of Britannia Quay to maintain garden and ground floor views to the river. The brick will be chosen to complement the adjacent red brick residential properties. The glass flood wall panels are indicative only and are subject to financial contributions: otherwise the detail will be the same as for the Waterside residential area. The gardens will be reinstated by consultation and agreement with residents and/or owners. No works are planned until year 20 in the southern part where the existing defences are adequate when the existing concrete cap will be raised

	NEW FLOOD WALL- STEEL SHEET PILES WITH RE
$\rightarrow$ $\swarrow$ / L	NEW FLOOD WALL- BRICK CLAD OR GLASS WALL
	GARDENS TO BE REINSTATED BY AGREEMENT V OWNERS/ RESIDENTS.
$\searrow$	FOR MORE INFORMATION AND ENGINEERING DETAILS REF 463457-CIVIL-300, 301 AND 302
7/	GLASS FLOODWALL PANELS FOR BRITANNIA QUAY ARE IN ONLY AND ARE SUBJECT TO FINANCIAL CONTRIBUTIONS,
	DETAIL TO BE AS THE WATERSIDE DEVELOPMENT.
/ × /	
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	Revision By Checked Approved Date Descr
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	Environme
	AGENCY
.0m ×/ /	Halcrow Group Limited Burderop Park, Swindon, Wiltshire. SN4 0QD Tel. +44 (0) 1793 812479 & Fax +44 (0) 1793 812089
+ /	www.halcrow.com
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	LANDSCAPE AND PUBLIC RI
	Drawing
$\langle \rangle$	
	Drawn by KB (LDA) Date:
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CH 03 - NO WORK REQUIRED	Urawing Scale: 1-200 @ A1
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# NOTES:

Do not scale from this drawing.

- All dimensions are in metres unless noted otherwise
- . All levels are in metres above Ordnance Datum Newlyr





# OCATION PLAN

	NEW FLOOD WALL- STEEL SHEET PILES WITH REINFORCED CONCRETE CAP
	NEW FLOOD WALL- BRICK CLAD OR GLASS WALL PANELS
AL	GARDENS TO BE REINSTATED BY AGREEMENT WITH OWNERS/ RESIDENTS.

ORE INFORMATION AND ENGINEERING DETAILS REFER TO -CIVIL-300, 301 AND 302

Revision By Che	oked Approved Date	Desc	iption
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Halcrow Group Lin Burderop Park, Swindi TeL +44 (0) 1793 8124 www.halcrow.com A CH2M HILL C	nited n, Witshire. SN4 0QD 79 & Fax +44 (0) 1793 81208 COMPANY	Yalo	row
Project			
ITTLEHAI LANDSC	MPTON ARU APE AND PU	N, EAS <sup>-</sup> IBLIC R	T BANK EALM
	SCAPE MAS REACH 0	TERPL/ 3	AN
Drawn by Checked by	KB (LDA)	Date:	May 2013
Authorised by	SJT (LDA)	Date:	May 2013
Drawing No,	3483_PL_1	07	Revision





# TYPICAL SECTION (1:25 @ A1)





RECONSTITUTED STONE STEPS 350 X 150 X 1000MM, TOP STEP TO BE 400 X 150 X 1000MM, SQUARE PROFILE SILVER GREY, LIGHTLY TEXTURED FINISH WHITE VISIBILITY STRIP SUPPLIER: MARSHALL'S OR OTHER EQUIVALENT AGREED

CONCRETE TACTILE CORDUROY PAVING 400 X 400 X 50MM. SQUARE EDGE PROFILE. NATURAL, TEXTURED FINISH. SUPPLIER: MARSHALL'S OR OTHER EQUIVALENT AGREED

KERB TO MATCH EXISTING KERBS ALONG RIVER ROAD

RAISED RECONSTITUTED STONE EDGING TO MATCH STEPS. 50mm HIGH ALONG LANDWARD SIDE OF PLANTED SLOPE

FLUSH RECONSTITUTED STONE EDGING TO MATCH STEPS ALONG RIVERWARD SIDE OF PLANTED SLOPE

# PLANTED SLOPE (1:3) PROPOSED PLANTING TO BE LOW LEVEL AND GROUNDCOVER COMPRISING BOTH EVERGREEN

MODIFIED AND RE-USED HERITAGE STYLE RAILINGS ELEVATION (1:20 @ A1)



NOTE: FURTHER WORK IS NEEDED TO ASCERTAIN THE VIABILITY OF RE-USE IN RELATION TO BUILD ABILITY, STRUCTURAL INTEGRITY AND CURRENT DESIGN STANDARDS, HOWEVER IT IS THE INTENTION TO RETAIN AND RE-USE WHERE POSSIBLE.

EXISTING RAILINGS MODIFIED (SHORTENED) AND FIXED WITHIN/ TO WALL. RAILINGS TO HAVE AT LEAST A 15mm VERTICAL STRUT. (EXTENTS AND FIXING TBC)

APPROXIMATE SIZE OF ORIGINAL RAILINGS TO BE SHORTENED.

PCC RIVER WALL REFER TO ENGINEER'S DETAILS



CAD Filename: 3483_Reach 3 and 5 Plan Plot	Drawing Scale:	1:150	@ A1
	CAD Filename:	3483_Reach 3 and 5 Plan	Plot



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Drawn by	KB (LDA)	Date:	May 2013
Checked by	SJT (LDA)	Date:	May 2013
Authorised by	SJT (LDA)	Date:	May 2013
Drawing No.	3483_PL_111	1	Revision
Drawing Scale:	1:200 @	A1	
CAD Filename:	3483 Reach 3 and 5 Plan	Plot Scale	ə:

# OVERALL DESIGN INTENT

The design for Reach 6 focuses on re-establishing bio-diveristy and ecological richness into the area. Working with the flood defence scheme, the proposals look to mitigate against the impact of the adjacent A259, introduce new areas for wildlife along the River Arun, and retain where possible existing habitats and vegetation. The main elements of the scheme are:

# New Native Trees and Native Understorey Planting Located along the embankment of the A259, Native trees will be planted

at regular intervals to screen views of the A259. Understorey planting will also the planted along the entirety of the embankment to aid in mitigating against noise and screening. Native species/ species local to the area are to be planted, this will ensure the current character of the area is

# Grass Seed Mixes to Embankment

The grass seed mixes specified within the scheme have been chosen to be native to the UK and of local provenance where possible. The two mixes have been chosen to grow in the different conditions within the scheme i.e. the harsher and wetter conditions of the riverward embankment side and the more sheltered landward side. The wildflower mix to be used on the landward side of the embankment has been chosen to encourage butterflies and bees into the scheme whilst providing seasonal interest and colour.

# Grass Seed Mixes to Groynes

To enhance the appearance and protection of the existing flood embankments, additional scour protection is to be added to the surface. On top of the new Open Stone Asphalt a 100mm layer of topsoil is to be added with an even coverage of Coastal Grass Seed Mix. Once the grass is fully established the groynes will appear as green banks along the rivers edge.

# Additional Topsoil along Southern Sheet Pile Wall

The topsoil along the proposed sheet pile wall in the southern area of the scheme is to be raised to within 200mm of the top of the wall. By doing this the views of the sheet piling will be vastly reduced along this stretch of the River Arun. Topsoil will also be brushed into the new OSA surfacing along this stretch. This will allow vegetation to establish within the OSA a merge into the grasses above. A coastal grass seed mix is to also be added to aid in the regeneration of this area.

with the densities

WILDFLOWER GRA	SS SEED	MIX	COASTAL GRASS	SEED MIX		
SPECIES	%	]	SPECIES	%		
Hard Fescue	25	1	Perennial Rye Grass	20		
Sheeps Fescue	20	1	Slender Red Fescue	40		
Chewings Fescue	15	1	Hard Fescue	15		
Slender Creeping Red Fescue	15	1	Smooth Stalked Meadow Grass	12		
Brown top Bent	5	]	Sea Couch Grass	8		
Ox-eye Daisy	2	1	Creeping Bent	3		
White Melliot	1	1	Brown Top Bent	2		
Yarrow	1	1	To be sown at 8g/m2			
Kidney Vetch	1	1				
Cornflower	1	1	INTER-TIDAL HAB	ITATS		
Common Knapweed	1	1	ADVERSE IMPACTS ON INT HABITATS (SALTMARSH, IN	TER-TIDAL		
Greater Knapweed	1	MUDFLATS, BRACKISH WATER AND COASTAL GRASSLAND) WILL BE MIT				
Lady's Oat Grass	1	1	VORKING.			
Tufted Vetch	1	1	INTER-TIDAL ME WILL BE			
Common Vetch	0.75	1	COMPENSATED BY CREAT	ING HABITAT IN		
Garlic Mustard	0.75	1				
Foxglove	0.5	1	STATEMENT FOR ESTIMATED HABITA LOSSES AND GAINS RESULTING FRO SCHEME.			
Teasel	0.5	1				
Field Scabious	0.5	1	MONITORING SURVEYS OF SALTMARSH WILL BE CARF	THE REALIGNED		
Musk Mallow	0.5	1	PERIOD OF 1, 3 AND 5 YEA WHICH WILL MEAN SURVE	RS POST WORKS YS BEING		
Cowslip	0.5	COMPLETED IN 2015, 2017 AND 2019.				
Red Clover	0.5	1				
Cow Parsley	0.5	1				
Meadow Cranesbill	0.25	-				
Marjoram	0.25	1				
Small Scabious	0.25	1	4			
Dandelion	0.25	1				
Γο be sown at 5g/m2		-				

## ROAD EMBANKMENT PLANTING MIX

CANOPY SPECIES	NAME	SIZE	%
Alnus glutinosa	Alder	14-16cm	10
Betula pubescens	Downy Birch	10-12cm	15
Fagus sylvatica	Beech	14-16cm	10
Populus tremula	Aspen	14-16cm	5
Carpinus betulus	Hornbeam	10-12cm	5
Salix fragilis	Crack Wilow	10-12cm	5
UNDERSTOREY SPECIES			
Cratageus monogyna	Hawthorn	60-80cm	10
Viburnum opulus	Guelder Rose	60-80cm	5
Prunus spinosa	Blackthorn	60-90cm	5
Corylus avellana	Hazel	60-90cm	10
Cornus sanguinea	Dogwood	60-90cm	5
Sambucus nigra	Elder	3L	3
llex aquifolium	Holly	3L	5
Salix cinerea	Grey Willow	60-80cm	7



RED LINE BOUNDAR

OASTAL SEED MIX. O BE APPLIED AT A RATE OF 8g/m<sup>2</sup> EVENLY ND ACCORDING TO MANUFACTURER'S WILDFLOWER GRASS SEED MIX TO BE APPLIED AT A RATE OF 5g/m<sup>2</sup> EVENLY AND ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

OPEN STONE ASPHALT TO REPLACED EXISTING EMBANKMENT PROFILE TOPSOLL IS TO BE APPLIED TO LANDWARD SIDE OF OSA TO SCREEN SHEET PLING ALONG SOUTHERN SECTION OF THE SCHEME. TOPSOLL TO BE AT LEAST 20mm BELOW TOP OF SHEET PLING WITH A SMOOTH PROFILE. TOPSOLL IS TO ALSO BE BRUSHED INTO OSA SUPRACE. COASTAL GRASS SEED MIX TO BE APPLIED TO ALL AREAS OF TOPSOLL

EXISTING SALTMARSH TO BE RETAINED AND PROTECTED DURING CONSTRUCTION

NEW NATIVE TREE AND SHRUB PLANTING. TYPICAL NATIVE TREE SPECIES INCLUDE ALIVUS GLUTINGSA, BETULA PUBESCENS AND FAGUS SYLVATICA. TYPICAL NATIVE UNDERSTOREY SHRUB SPECIES INCLUDE CRATAGEUS MONOCYNA, YIBURNUM OPULUS, PRUNUS SHNOSA, CORYLUS AVELLANA, AND CORNUS SANGUINEA.

SANGUINEA.

PROPOSED SALTMARSH. REFER TO SECTION 7.4 IN ENVIRONMENTAL STATEMENT.

EXISTING MUDFLATS TO BE RETAINED

REPTILE RECEPTOR AREA. AREA TO BE PROTECTED DURING CONSTRUCTION.

NEW 4m ACCESS TRACK REINFORCED TURF TO BE USED ALONG LENGTH OF TRACK. RE-SEEDING MAY BE NEEDED ALONG EDGE OF TRACK. WILDLFOWER GRASS SEED MIX IS TO BE SPREAD EVENLY OVER ANY AFFECTED AR DEAS

EXISTING TREES TO BE RETAINED CANOPIES AND ROOTZONES TO BE PROTECTED DURING CONSTRUCTION, REFER TO RPS DWG'S JSL2151\_703 & JSL2151\_702

EXISTING TREES TO BE REMOVED, REFER TO RPS DWG'S JSL2151\_703 & JSL2151\_702

EXISTING VEGETATION TO BE RETAINED REFER TO RPS DWG'S JSL2151\_703 & JSL2151\_702

EXISTING VEGETATION TO BE REMOVED REFER TO RPS DWG'S JSL2151\_703 & JSL2151\_702

NOTES:

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OCATION PLAN

TO BE READ IN CONJUNCTION WITH DWG 3483\_PL\_113 LANDSCAPE MASTERPLAN REACH 6 SHEET 02

REFER TO ENGINEER'S DETAILS 463457-CIVIL-600-P3, 463457-CIVIL-601-P3, 463457-CIVIL-602-P2, 463457-CIVIL-603-P2 AND 463457-CIVIL-604-P2

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ENVIRONMENT AGENCY

alcrow Group Limited urderop Park, Swindon, Wiltshire. SN4 0QD

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TO DWG 3483

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LDA Design Kings Wharf, The Quay, Exeter, EX2 4AN T: 01392 260 430 F: 01392 260 431

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ITTLEHAMPTON ARUN, EAST BANK LANDSCAPE AND PUBLIC REALM

# LANDSCAPE MASTERPLAN REACH 6 SHEET 1 OF 2

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Drawing No.			Revision
Authorised by	SJT (LDA)	Date:	May 2013
Checked by	SJT (LDA)	Date:	May 2013
Drawn by	KB (LDA)	Date:	May 2013

Plot Scale

CAD Filename: 3483\_Reach 6 Plan

# OVERALL DESIGN INTENT

The design for Reach 6 focuses on re-establishing bio-diversity and ecological richness into the area. Working with the flood defense scheme, the proposals look to mitigate against the impact of the adjacent A259, introduce new areas for wildlife along the River Arun, and retain where possible existing habitats and vegetation. The main elements of the scheme are:

New Native Trees and Native Understorey Planting Located along the embankment of the A259, Native trees will be planted at regular intervals to screen views of the A259. Understorey planting will also the planted along the entirety of the embankment to aid in mitigating against noise and screening. Native species/ species local to the area are to be planted, this will ensure the current character of the area is retained.

# Grass Seed Mixes to Embankment

The grass seed mixes specified within the scheme have been chosen to be native to the UK and of local provenance where possible. The two mixes have been chosen to grow in the different conditions within the scheme i.e. the harsher and wetter conditions of the riverward embankment side and the more sheltered landward side. The wildflower mix to be used on the landward side of the embankment has been chosen to encourage butterflies and bees into the scheme whilst providing seasonal interest and colour.

# Grass Seed Mixes to Groynes

To enhance the appearance and protection of the existing flood embankments, additional scour protection is to be added to the surface. On top of the new Open Stone Asphalt a brushed layer of topsoil is to be added with an even coverage of Coastal Grass Seed Mix. Once the grass is fully established the groynes will appear as green banks along the rivers edge.

Additional Topsoil along Southern Sheet Pile Wall The topsoil along the proposed sheet pile wall in the southern area of the scheme is to be raised to within 200mm of the top of the wall. By doing this the views of the sheet piling will be vastly reduced along this stretch of the River Arun. Topsoil will also be brushed into the new OSA surfacing along this stretch. This will allow vegetation to establish within the OSA a merge into the grasses above. A coastal grass seed mix is to also be added to aid in the regeneration of this area.

SPECIES	%	SPECIES %
lard Fescue	25	Perennial Rye Grass 20
Sheeps Fescue	20	Slender Red Fescue 40
Chewings Fescue	15	Hard Fescue 15
Slender Creeping Red	15	Smooth Stalked 12 Meadow Grass
Brown top Bent	5	Sea Couch Grass 8
Ox-eye Daisy	2	Creeping Bent 3
White Melliot	1	Brown Top Bent 2
Yarrow	1	To be sown at 8g/m2
Kidney Vetch	1	
Cornflower	1	INTER-TIDAL HABITATS
Common Knapweed	1	HABITATS (SALTMARSH, INTER-TIDAL
Greater Knapweed	1	MUDFLATS, BRACKISH WATER AND COASTAL GRASSLAND) WILL BE MITIGATED
Lady's Oat Grass	1	BY MEANS OF SENSITIVE WORKING.
Tufted Vetch	1	ANY LONG TERM LOSS OF INTER-TIDAL HABITAT ALONG THE SCHEME WILL BE
Common Vetch	0.75	COMPENSATED BY CREATING HABITAT IN THE REACH & REALIGNMENT, SEE TABLE IN
Garlic Mustard	0.75	SECTION 7.4 OF ENVIRONMENTAL
Foxglove	0.5	LOSSES AND GAINS RESULTING FROM THE
Teasel	0.5	
Field Scabious	0.5	SALTMARSH WILL BE CARRIED OUT OVER
Musk Mallow	0.5	A PERIOD OF 1, 3 AND 5 YEARS POST WORKS, WHICH WILL MEAN SURVEYS
Cowslip	0.5	BEING COMPLETED IN 2015, 2017 AND 2019.
Red Clover	0.5	*
Cow Parsley	0.5	EAST V GROYNES \
Meadow Cranesbill	0.25	150mm LSA FIL
Marjoram	0.25	OF THE OSA
Small Scabious	0.25	EVENLY OVER
Dandelion	0.25	

## ROAD EMBANKMENT PLANTING MIX

		10203001		
CANOPY SPECIES	NAME	SIZE	%	
Alnus glutinosa	Alder	14-16cm	10	1
Betula pubescens	Downy Birch	10-12cm	15	1
Fagus sylvatica	Beech	14-16cm	10	1
Populus tremula	Aspen	14-16cm	5	1
Carpinus betulus	Hornbeam	10-12cm	5	1
Salix fragilis	Crack Wilow	10-12cm	5	1
UNDERSTOREY SPECIES				ľ
Cratageus monogyna	Hawthorn	60-80cm	10	
Viburnum opulus	Guelder Rose	60-80cm	5	k
Prunus spinosa	Blackthorn	60-90cm	5	1
Corylus avellana	Hazel	60-90cm	10	1
Cornus sanguinea	Dogwood	60-90cm	5	1
Sambucus nigra	Elder	3L	3	1
llex aquifolium	Holly	3L	5	1
Salix cinerea	Grev Willow	60-80cm	7	1

Understorey shrub planting to be in groups of min. 3, and max.7 Understorey shrub planting to be in groups of min. 3, and max. with the densities shown. Species to be randomly placed, avoiding straight lines, within 1m of edge of planting area. Random drifts of 3-7 plants not to be planted parallel with neighboring drifts.



a go a

REPTILE RECEPTOR AREA AREA TO BE PROTECTED DURING CONSTRUCTION LOGS/ WOOD FROM VEGETATION CLEARANCE TO BE USED TO CREATE HIBERNACULAR.

EXISTING SALTMARSH TO BE RETAINED IN EXISTING CONDITION

EXISTING TREES AND SHRUBS ALONG A259 EMBANKMENT IN THE NORTH TO BE RETAINED AND PROTECTED DURING CONSTRUCTION IN ACCORDANCE WITH BS 5837:2012

GALVANISED STEEL 1500mm HIGH PALISADE FENCING WITH CONCRETE POSTS

GALVANISED STEEL PALISADE GATE

EXISTING PUBLIC FOOTPATH TO FORESHORE TO BE RETAINED

EXISTING TREES AND SHRUBS ALONG LOWER EMBANKMENT TO BE CLEARED.

LANDWARD SIDE OF NEW FLOOD EMBANKMENT TO HAVE A WILDFLOWER GRASS SEED MIX APPLIED EVENLY ALONG THE LENGTH.

NEW PLANTING TO BE PLANTED ALONG THE LENGTH OF THE ROAD EMBANKMENT TO SCREEN VIEWS OF/ FROM THE A259 AND REDUCE NOISE POLLUTION IN THE SITE. NATIVE TREES AND UNDERSTOREY SHRUBS TO BE USED TO INCREASE BIODIVERISTY WITHIN THE SCHEME

PROPOSED NEW BUND TO LINK EXISTING RAISED BUND TO MANAGED

A259 ROAD EMBANKMENT

REALIGNED DEFENSES

EAST WEST FLOOD EMBANKMENTS TO BE RETAINED TO ACT AS GROYNES WITH ADDITIONAL SCOUR PROTECTION. 150mm OSA AND 150mm LSA FILTER LAYER. TOPSOIL TO BRUSHED OVER THE ENTIRETY OF THE OSA SURFACING. COASTAL GRASS SEED MIX TO BE APPLIED EVENLY OVER THE TOPSOIL AT A RATE OF 8g/m<sup>2</sup> IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS

EAST WEST FLOOD EMBANKMENTS TO BE RETAINED TO ACT AS GROYNES WITH ADDITIONAL SCOUR PROTECTION. 150mm OSA AND 150mm LSA FILTER LAYER. TOPSOIL TO BRUSHED OVER THE ENTIRETY

THE MANUFACTURER'S RECOMMENDATIONS

PROPOSED ADDITIONAL INTER-TIDAL MUDELAT 0.22ha.

RIVERWARD SIDE OF NEW FLOOD EMBANKMENT TO HAVE A

COASTAL GRASS SEED MIX APPLIED EVENLY ALONG THE LENGTH.

AREA TO BE LEFT TO NATURALLY REGENERATE

EXISTING MUDFLAT TO BE RETAINED

PROPOSED SALTMARSH 0.70ha

OF THE OSA SURFACING. COASTAL GRASS SEED MIX TO BE APPLIED

EVENLY OVER THE TOPSOIL AT A RATE OF 8g/m<sup>2</sup> IN ACCORDANCE WITH

REFER TO DWG 3483 PL 112

RED LINE BOUNDAR



COASTAL SEED MIX. TO BE APPLIED AT A RATE OF 8g/m² EVENLY AND ACCORDING TO MANUFACTURER'S DATIONS ILDFLOWER GRASS SEED MIX D BE APPLIED AT A RATE OF 5g/m<sup>2</sup> EVENLY

ACCORDING TO MANU COMMENDATIONS.

EXISTING SALTMARSH TO BE RETAINED AND PROTECTED DURING CONSTRUCTION

W ROAD EMBANKMENT PLANTING EW ROAD EMBANKMENT PLANTING. PPICAL NATIVE CANOPY AND UNDERSTOREY PECIES TO BE PLANTED. SEE ROAD MBANKMENT PLANTING SCHEDULE FOR SPECIFIC SPECIES.

AST WEST FLOOD EMBANKMENTS D BE RETAINED AND ACT AS GROYNES WITI DDITIONAL SCOUR PROTECTION.

PROPOSED SALTMARSH. REFER TO SECTION 7.4 OF ENVIRONMENTAL STATEMENT



\*

XISTING MUDFLATS

ADDITIONAL INTER-TIDAL MUDFLAT TO BE LEFT TO NATURALLY REGENERATE

REPTILE RECEPTOR AREA. AREA TO BE PROTECTED DURING CONSTRUCTION.

EXISTING TREES TO BE RETAINED CANOPIES AND ROOTZONES TO BE PROTECTED DURING CONSTRUCTION, REFER TO RPS DWG'S JSL2151\_703 & JSL2151\_702

EXISTING TREES TO BE REMOVED, REFER TO RPS DWG'S JSL2151\_703 & JSL2151\_702

EXISTING VEGETATION TO BE RETAINED REFER TO RPS DWG'S JSL2151\_703 & JSL2151\_702

EXISTING VEGETATION TO BE REMOVED REFER TO RPS DWG'S JSL2151\_703 & JSL2151\_702



NOTES Do not scale from this drawing.

All dimensions are in metres unless noted otherwise

All levels are in metres above Ordnance Datum Newlyn

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ITH DWG 3483\_PL\_112 D BE READ IN CON ANDSCAPE MASTE

REFER TO ENGINEER'S DETAILS 463457-CIVIL-600-P3, 463457-CIVIL-601-P3, 463457-CIVIL-602-P2, 463457-CIVIL-603-P2 AND 463457-CIVIL-604-P2

Revision By Checked Approved Date



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Kalcrow

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LDĀDESIGN

LITTLEHAMPTON ARUN. EAST BANK LANDSCAPE AND PUBLIC REALM LANDSCAPE MASTERPLAN

## REACH 6 SHEET 2 OF 2 Drawn by KB (LDA) Date: May 2013 Checked by SJT (LDA) Date: May 2013 SIT (LDA May 201: Drawing N 3483\_PL\_113 Drawing Scale: 1:1000 @ A1 CAD Elename: 3483 Beach 6 Plan

Plot Scale

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