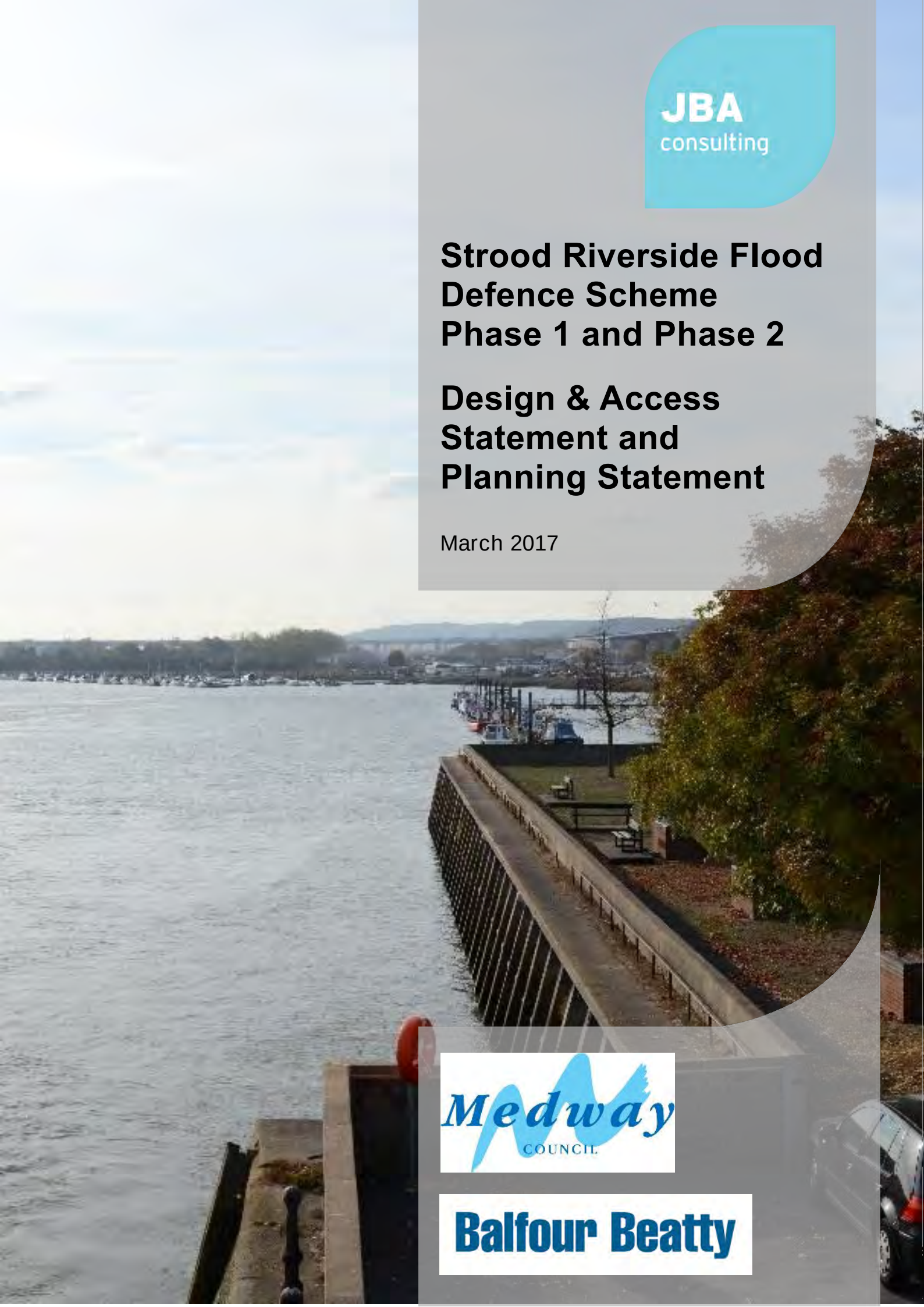

Strood Riverside Flood Defence Scheme Phase 1 and Phase 2

Design & Access Statement and Planning Statement

March 2017

JBA Project Manager

Oliver Francis
JBA Consulting
35 Perrymount Road
Haywards Heath
West Sussex
RH16 3BW

Revision history

Revision Ref / Date Issued	Amendments	Issued to
V1-1 / 13 March 2017		Balfour Beatty
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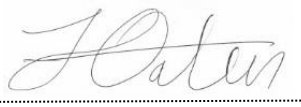
Contract

This report describes work commissioned by Balfour Beatty on behalf of Medway Council an order placed on the 16th September 2016. Balfour Beatty's representative for the contract was Paul Wright. Jamie Oaten and David Revill of JBA Consulting carried out this work.

Prepared by:  Jamie Oaten MEnvSci PhD
Environmental Consultant

Reviewed by:  David Revill BSc MSc CEnv MIES
Principal Environmental Consultant

Purpose

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1 Introduction

1.1 Background

Medway Council wishes to develop a scheme that will improve the level of flood protection at Strood Riverside. This will support policies within the Medway Local Development Plan to allow the eventual redevelopment of land running along Strood Waterfront.

1.2 Purpose of the Design & Access Statement and Planning Statement

This Design & Access Statement and Planning Statement has been prepared to support Full Planning Applications for the proposed scheme. It has been produced in accordance with the requirements and recommendations of the Commission for Architecture and the Built Environment (CABE), the Government's advisor on architecture, urban design and public space. CABE has produced a guidance document on *Design and access statements: How to write, read and use them* (2006)[1]. Medway Council's guidance document *Validation of planning applications* (2011)[2] has also been used in the production of this document.

The purpose of this document is to present information on the design concepts and principles of the proposed scheme and explain the reasoning behind how the design has been developed. In addition, it identifies the need for the proposed scheme and describes how it accords with relevant national, regional and local planning policies.

It provides information in relation to:

- The scheme objectives;
- The key features of the scheme;
- The character and context of the scheme area including opportunities and constraints;
- Relevant planning policy guidance;
- Details of consultations with stakeholders that have informed the design and development of the scheme;
- The design proposals including design principles and concepts and how these have evolved; and
- How access requirements are being met.

The design of this scheme has been based on an understanding of the site and its key features, which have informed the development of a set of design principles that ensure that the proposed scheme delivers an appropriate standard of design, whilst meeting the overarching project objective of reducing flood risk to the Strood area.

2 Project description

2.1 Scheme rationale

The proposed scheme aims to improve the standard of flood protection for two sites in Strood, bordering the River Medway. This will facilitate the future development of each site and forms a key element of Medway Council's Strood Riverside development project. However, the future redevelopment proposals themselves are not part of this scheme; they will be developed separately and will be subject to a separate consent application in due course.

2.2 Site description

The scheme proposes to construct flood defence structures to better protect two sites, situated adjacent to the River Medway in Strood, from flooding. The location of these two sites is shown in Figure 2-1. The two sites are referred to as:

[1] CABE. 2006. *Design and access statements: How to write, read and use them.*

[2] Medway Council. 2011. *Validation of planning applications.*

- Phase 1 (Civic Centre)
- Phase 2 (Strood Riverside)

The Phase 1 (Civic Centre) site is a 34,374m^2 in size and is located to the south of Rochester Bridge. It is bordered by the A2 (High Street) to the north, the River Medway to the east, Jane's Creek, a small inlet of the River Medway, to the south, and the Medway Valley railway line to the west.

The Phase 2 (Strood Riverside) site is 62,720m^2 in size and is situated approximately 250m to the north of Rochester Bridge. The site is bordered by Kingswear Gardens housing estate, which is not included in the scheme, to the south, the River Medway to the east, the North Kent Line railway to the west, and houses along Cranmere Court to the north.

Figure 2-1: Strood flood defence scheme site plan

The Phase 1 site comprises Strood Civic Centre and associated car parking area. Medway Archives and Local Studies Centre is the main building on the site, and is located next to the Medway Council Work Depot Yard. Immediately adjacent to the archives is a building used to manage CCTV operations across the town, whilst a small building for ambulance drivers to rest during shifts is situated towards the north-western corner of the site. Several commercial properties situated on the A2 (High Street) border the east of the site, including a petrol station, vehicle repair/servicing garage, and a public house. Rochester Bridge is Grade II listed and borders the east of the site, close to the river frontage. Next to this, to the east of the Esplanade, is a small area publicly accessible green space. There is also an area of publicly accessible amenity land on the river frontage within the southern part of the site, which comprises open space with trees. To the west of this area is a Pump House operated by Southern Water.

The Phase 2 site contains a large storage warehouse and adjacent brownfield land. Canal Road runs along the river frontage of this site, before turning eastwards and uphill into Riverside Link. The Riverside Tavern public house is located on Canal Road. A short distance to the south of the pub, next to Canal Road, is Strood Pier, which is used for mooring by a small number of boats. Strood Railway Station and associated car park is situated off Canal Road next to the western boundary of the site. The Riverside Tavern, Strood Pier and Strood Railway Station are to remain and do not form part of the Phase 2 site.

Towards the east of the site are the Thames and Medway Canal lock gates, which are currently disused, with a new sheet pile defence with reinforced concrete capping beam constructed across it. The gates are located next to an area of brownfield land bordering the River Medway, which is backed at the eastern end by Medway Metals Ltd recycling centre.

2.3 Flood risk and existing flood defences

Both the Phase 1 and Phase 2 sites are at significant risk of flooding. The main risk is tidal flooding from the River Medway although the Phase 1 site is also at significant risk of surface water flooding.

Both sites are protected by existing flood defence structures. The main defence structure protecting the Phase 1 site consists a timber piled defence with a reinforced concrete flood wall built on top of the capping beam. Along the Jane's Creek frontage, the defence becomes less uniform and comprises sections of timber piles with mass concrete infill with a continuation of the reinforced concrete flood wall. The site is low lying with much of the site less than 4.0m Above Ordnance Datum (AOD).

The Phase 2 site can be split into two distinct sections separated by the former Thames and Medway Canal. The existing river frontage in the western portion of the site comprises a masonry pitching revetment between Strood Pier and the Riverside Tavern. The Riverside Tavern itself is protected by a low height flood wall.

There is no formal frontage for the eastern portion of the site although land levels through this section are generally higher than those in the west. A new sheet pile defence with reinforced concrete capping beam was installed across the former canal as part of the works to construct the Riverside Link road. Much of the site is relatively low lying with ground levels typically between 4.0mAOD and 4.5mAOD, although the recently constructed Riverside Link was constructed to a level above 6.0mAOD.

Flood modelling was carried out to inform the design and development of the scheme. Flood extents from the Environment Agency's North Kent Coast Model[3] are shown in Figure 2-2.

It is evident that the existing defences are overtopped by a 1 in 20-year flood event and this affects almost the entirety of both sites. In larger events, residential properties to the north and east of the Phase 2 site in Cranmere Court and Wingrove Drive are also flooded by water flowing across the site. Flood levels for a 1 in 200-year event with the effects of climate change are shown in Table 2-1and demonstrate the significant depth of flooding possible in an extreme event.

The current flood defences are inadequate. Discussions with the Environment Agency concluded that to permit future regeneration of these sites both sites would need to be ground raised above the flood level for a 1 in 200-year tidal flood in 2115 (6.01mAOD).

[3] North Kent Coast Model - Simplified version, JBA Consulting 2014

Figure 2-2: Flood extents from the North Kent Coast Model (contains Ordnance Survey data © Crown copyright and database right 2015)

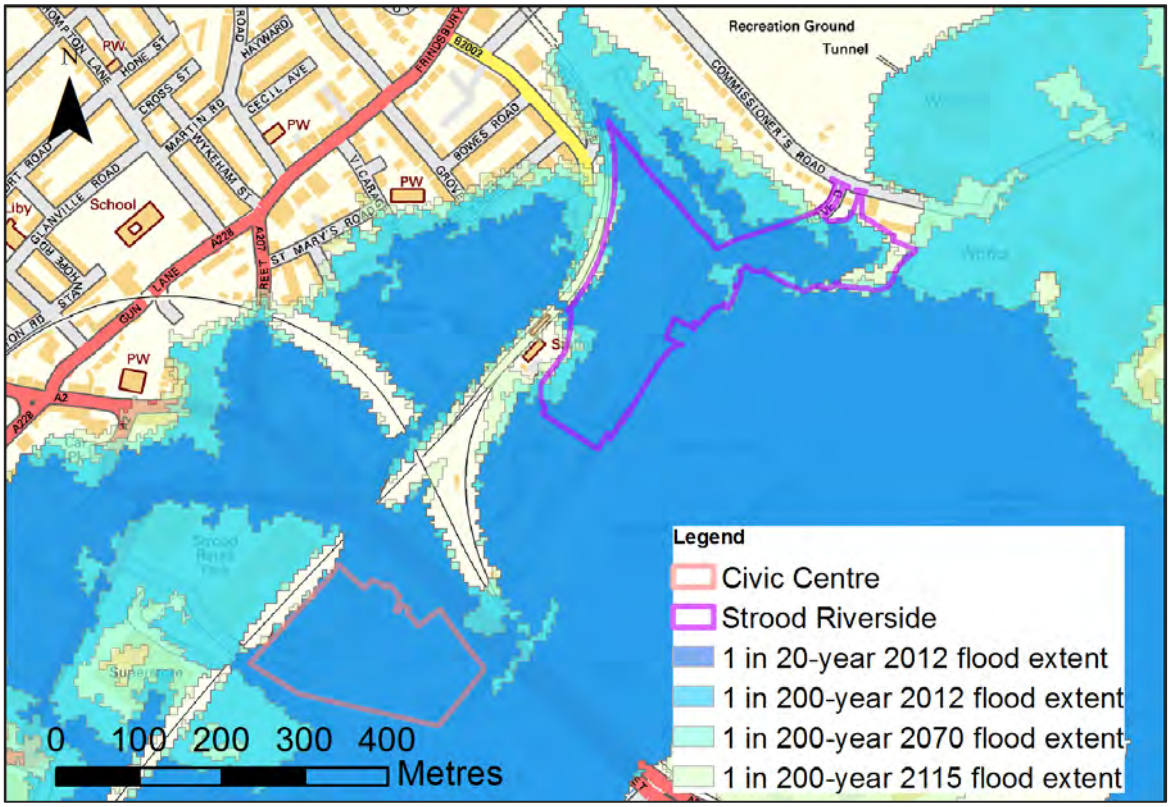

Table 2-1: Still water levels within climate change predictions during a 1 in 200-year flood event

Year	Phase 1 (Civic Centre)	Phase 2 (Strood Riverside)
Present Day*	5.03mAOD	5.04mAOD
2070	5.44mAOD	5.46mAOD
2115	5.97mAOD	6.01mAOD

*using 2012 water levels

2.4 Proposed scheme

Approximately 1,025m of new sheet pile wall will be constructed across the Phase 1 and Phase 2 sites. Ground levels across much of the two sites will also be raised to 6.0mAOD.

The proposed layout of the scheme on the Phase 1 and Phase 2 sites is shown in Figure 2-3 and Figure 2-4, respectively.

2.4.1 Phase 1 (Civic Centre) site

At the Phase 1 site, a new steel sheet pile wall will be constructed along the river frontage to a height of 6.0mAOD. A reinforced concrete capping beam will be positioned on top of the sheet pile wall taking the overall defence height to 6.1mAOD (exceeding the predicted 1 in 200-year flood event level).

Along Jane's Creek, a short (3m to 4m) length of sheet pile wall will be installed in-front of the existing flood defence wall adjacent to the railway embankment/bridge. This is needed to tie the new flood defence structure into high ground on the railway embankment and ensure protection to the entire site. Along the remainder of Jane's Creek, the new sheet pile wall will be located 2m landward of the existing concrete flood wall.

The new sheet pile wall will then divert landward at the point where the current river wall also diverts landward (a short distance east of the Pump House) and continue along the landward side of the Esplanade towards Rochester Bridge. This is to avoid raking piles, which are piles that extend

diagonally downwards, located behind the existing timber wall defence in this area. As it approaches Rochester Bridge, the new wall sheet pile will divert northwards and continue to follow the Esplanade towards its junction with the A2 (High Street).

Two lines of secondary sheet piles will also be installed adjacent to Jane's Creek. This secondary line is required to ensure the stability of the primary sheet pile wall and will be connected using tie rods (metal rods buried below ground that connect the two lines of sheet piles together). These will be positioned parallel to the new steel sheet pile wall, 10 m and 19m landward for western and eastern sections, respectively. They have been separated and aligned in this way in order to avoid an ambulance driver rest centre. The tie rods will be placed at 3.2m intervals for the western section, and 4.2m intervals for the eastern section, between the secondary line of piles and new steel sheet pile wall. Both the secondary line of sheet piles and the tie rods will be buried below existing ground levels and will not be visible.

A section of the current flood wall along Jane's Creek between the Pump House and the railway embankment/bridge will be cut off just below silt level once the new sheet pile walls have been installed. This is because this section of wall is in a very poor state of repair and is at risk of collapsing.

The current flood defence structures alongside the Pump House and the amenity area next to the Esplanade will be retained. The amenity area will be raised to 5.1mAOD with light weight fill material. This area will be landscaped with pedestrian and cycle access provided from the east and west.

Ground raising will be undertaken across much of the Phase 1 site. In addition, the Civic Centre building will be demolished, whilst the CCTV building and ambulance drivers building will be retained. A cycle path and footpath through the site will be constructed linking between the Esplanade and access road beneath the railway bridge.

Vehicular access ramps will be installed to enable vehicular access to the ground raised area from both east and west, and to the Pump House building.

2.4.2 Phase 2 (Strood Riverside) site

At the Phase 2 site, a new steel sheet pile wall will be constructed to a height of 6.0mAOD between Strood Pier and land adjacent to Medway Metals Ltd. The new sheet pile wall will have a reinforced concrete capping beam, which will take the overall defence height to 6.1mAOD. The new sheet pile wall will be located between 2m and 10m landward of the existing river wall and will not extend into the River Medway at any point.

The new sheet pile wall will follow the alignment of the existing wall from Strood Pier to the Riverside Tavern public house. It will then break and restart to the east of Riverside Tavern, continuing in a north-eastern direction where it will tie-into the Thames and Medway Canal lock gates. From here the wall will continue in a north-eastern direction before terminating at raised ground to the east of Medway Metals Ltd recycling centre. Between the Riverside Tavern and Medway Metals Ltd the new sheet pile wall will typically be set back between 5m and 10m to provide space for riparian habitats to develop.

Small-scale maintenance works to the existing masonry flood wall between Strood Pier and the Riverside Tavern may also be undertaken to ensure the stability of the structure.

All buildings on the Phase 2 site except the Riverside Tavern will be demolished, with most of the site ground raised to 6.0mAOD. A graded slope will be constructed around Riverside Tavern up to the raised ground level.

The proposed scheme also involves the raising and realignment of Canal Road from Watermill Gardens to the Riverside Link. Vehicular access to the Riverside Tavern will be provided. Vehicular access to Strood Railway Station will also be realigned and raised to 6.0mAOD. In order to prevent adverse settlement, the new highways will be constructed on top of a Geogrid platform supported on a regular grid of precast concrete bearing piles. Utilities within the existing Canal Road will be diverted to the new road alignment.

The landward boundary of the raised land on the Phase 2 site along the existing railway embankment and the boundary of the adjacent residential properties on Cranmere Court and Wingrove Drive will comprise a graded slope of reinforced earth. These will be positioned a minimum of 5m from the property and railway boundaries.

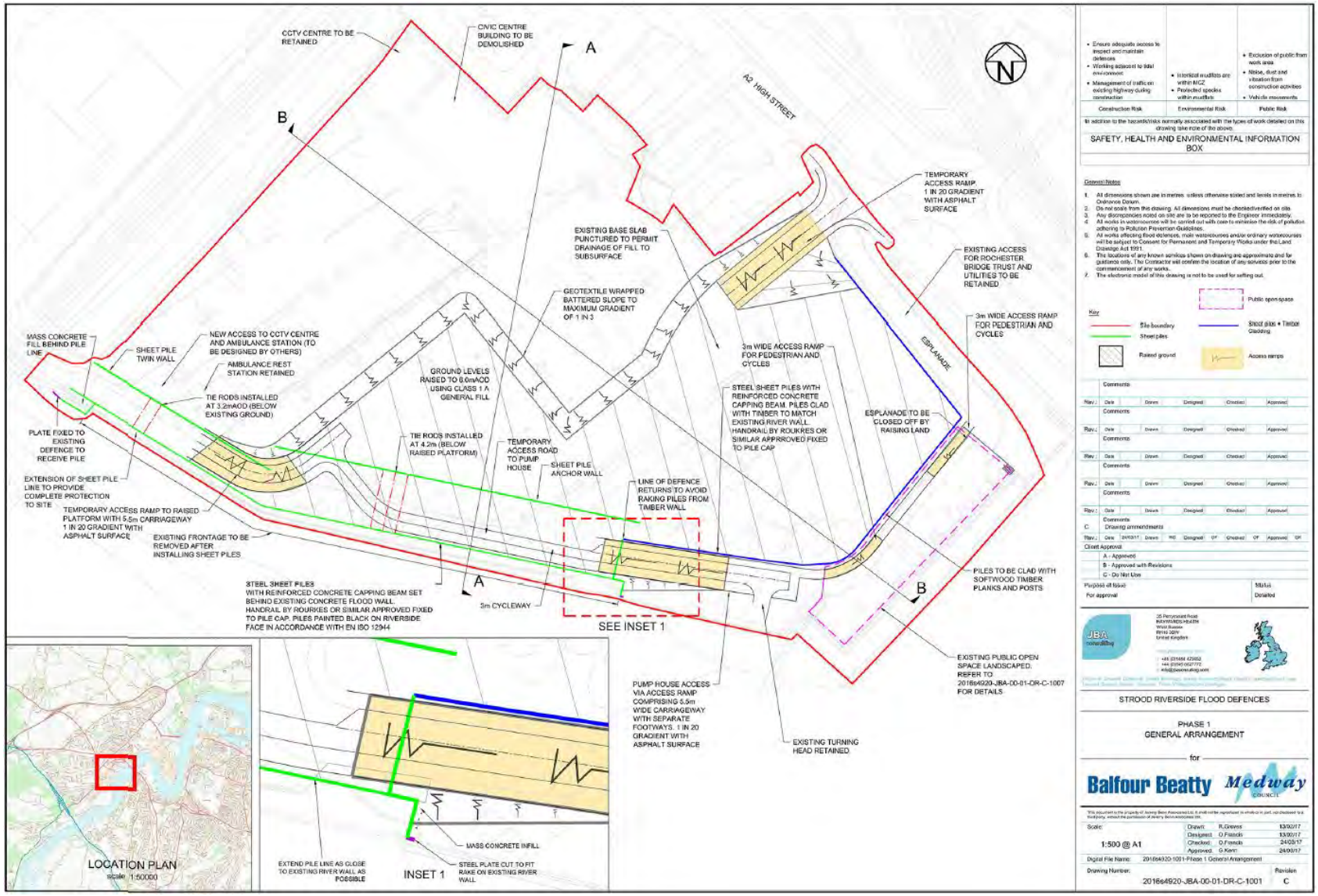

Figure 2-3: Proposed general arrangement of scheme for Phase 1

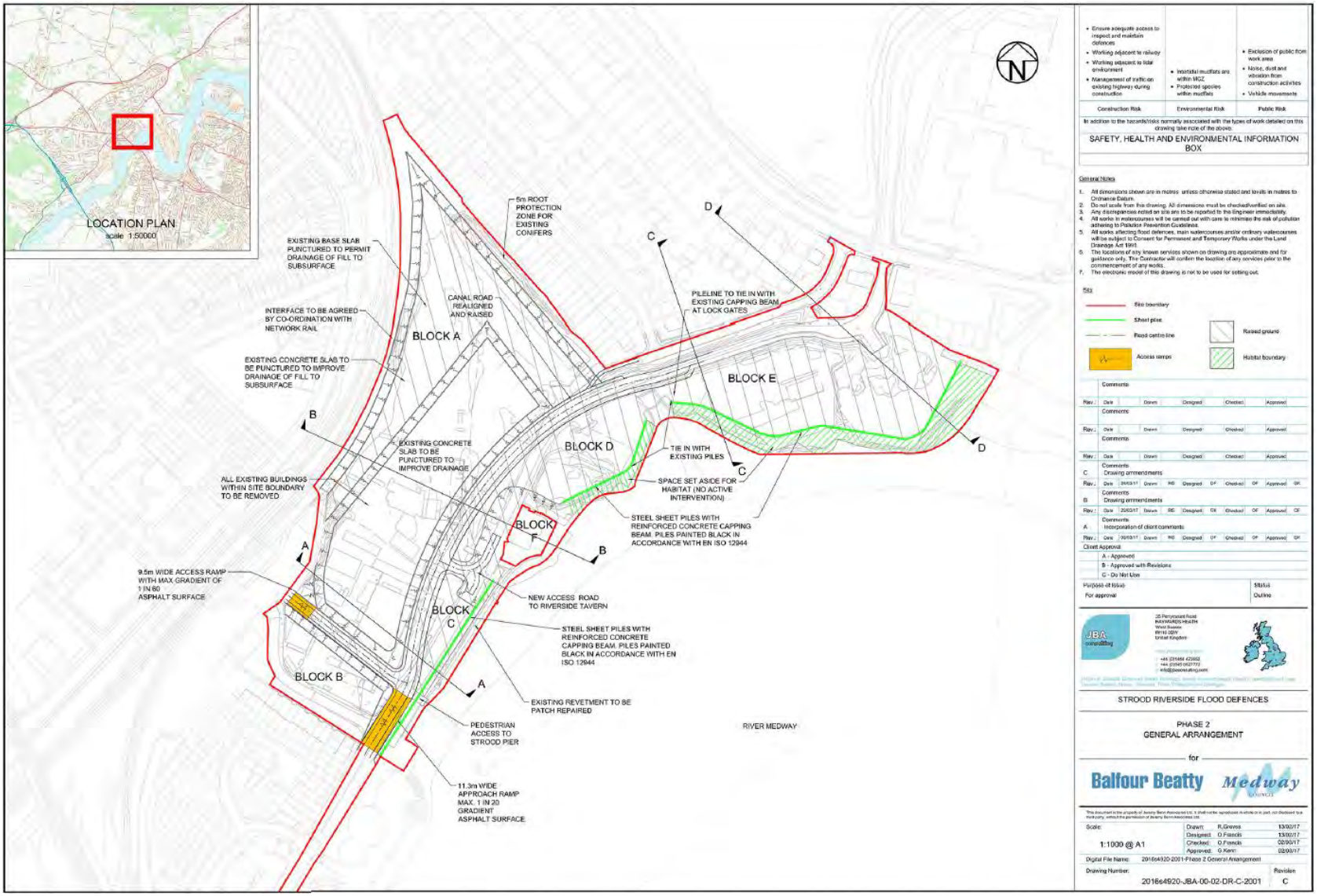

Figure 2-4 Proposed general arrangement of scheme for Phase 2

2.5 Environmental baseline

The environmental context of the sites is shown in Figure 2-5, and summaries the proceeding text, detailing the current landscape character, environmental features and designations, and social and economic context of the sites.

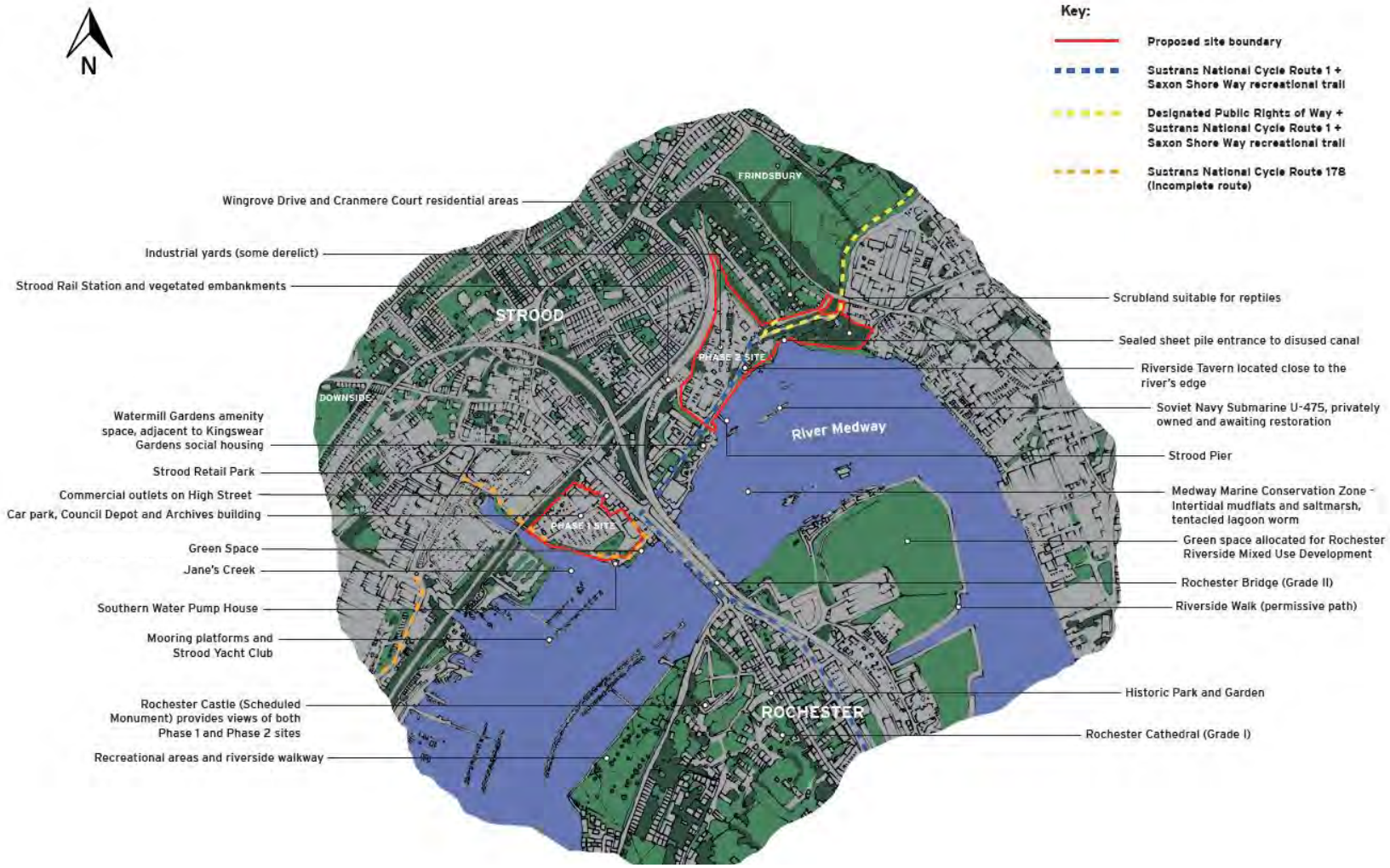

Figure 2-5 Environmental baseline of Strood

2.5.1 Landscape character

Figure 2-6 shows the current broad landscape character areas and land use of the two sites.

The overall landscape character of the Phase 1 site is an urban patchwork of hardstanding areas and a car park, light industrial buildings, retail units and open green spaces with a riverside setting (Figure 2-7). Views of Rochester Castle and other historic buildings and grounds are available across the River Medway. A large proportion of the Phase 1 site provides car parking facilities for visitors to Medway. To the north of the site is the Medway Council Work Depot Yard and Medway Archives building, which has an industrial character that blends with the small row of retail outlets to the north-east of the site. Within the east of the site is a large area of disused hard standing forming a patchwork of concrete and asphalt areas left from the demolition of the former Civic Centre and iconic Aveling and Porter building. Towards the south-west part of the site, the small river inlet of Jane's Creek has been subject to illegal tipping and has shopping trolleys and other unwanted waste scattered in the mudflats (Figure 2-8). Along the southern and eastern extents there are several landscaped amenity spaces with several ornamental semi-mature trees, as well as the Pump House owned by Southern Water (Figure 2-9).

The overall landscape character of the Phase 2 site area is predominantly industrial with a few areas of riverside scrubland. Canal road which passes through the proposed site, and forms a section of National Cycle Route 1, provides a link between the surrounding residential communities to the south-west and north-east (Figure 2-10) and to Strood Railway Station (Figure 2-11). Open views across the River Medway of industrial areas, residential areas, boats and other maritime elements are available between Watermill Gardens, a landscaped promenade and play area, and the Riverside Tavern, a local public house. Large industrial buildings and derelict hard standing areas surrounded by palisade fencing dominate the area west of Canal Road and limit views beyond (Figure 2-12). East of Canal Road is a thin strip of land featuring grass strips, benches, a pier, and areas of derelict land and scrubland (Figure 2-13). Beyond the Riverside Tavern there are areas of derelict land and scrubland leading down to the riverside edge, vegetation in these areas filter some views of the river (Figure 2-14).

2.5.2 Environmental context

The River Medway adjacent to the sites is designated as Medway Marine Conservation Zone (MCZ). The MCZ encompasses the section of the river from Rochester downstream to its mouth at Sheerness. The MCZ protects one species, the nationally scarce Tentacled Lagoon Worm *Alkmaria romijni*, and eight habitats including intertidal and subtidal sediments. Mudflat and saltmarsh habitat in the river adjacent to both the Phase 1 and Phase 2 sites are protected as priority habitats, designated under Schedule 41 of the Natural Environment and Rural Communities Act (2006).

A Preliminary Ecological Assessment (PEA) has been carried out to identify habitats present within and surrounding the sites, and potential for protected and notable species. Much of the two sites comprise scrubland, amenity grassland and trees, with bare ground and buildings. Scrubland may provide suitable habitat for reptile species within the Phase 2 site, and the Pump House and Riverside Tavern have potential to support bat roosts. Adjacent to the sites are estuarine habitats within the Medway MCZ, which are likely to support high numbers of fish and overwintering birds.

Rochester Bridge is Grade II listed and intersects the Phase 1 and 2 sites, joining Strood and Rochester over the River Medway (Figure 2-15). The proposed flood defence scheme will not require works to the bridge structure. Across the River Medway in Rochester is Rochester Castle, a Scheduled Monument, and Rochester Cathedral, a Grade I listed building, which sit within a Historic Park and Garden. There are a number other historic features within the site areas, including the remains of Second World War defence infrastructure and several maritime wreck sites.

2.5.3 Social and economic context

Residential areas close to the proposed development site include Kingswear Gardens, Cranmere Court and Wingrove Drive. Adjacent to the Phase 1 site, situated on the A2 (High Street), is a petrol station, vehicle repair/servicing garage, restaurants/food outlets, and retail outlets. Immediately adjacent to the Phase 2 site is the Riverside Tavern public house, Watermill Gardens children's play area, and Strood Railway Station.

Recreation activities and usage of the River Medway include sailing and motor cruising, rowing, angling and other water sports. There are multiple activity centres and user groups situated on the River Medway who use the section of river adjacent to the scheme area.

There are several permissive public access routes that cross through and around the Phase 1 site. The Sustrans National Cycle Route 178 is located close to the river. This is currently an incomplete route; however, there are plans to connect it with the Sustrans National Cycle Route 1 'Garden of England' long distance cycle route that follows Canal Road and Wingrove Drive within the Phase 2 site (Figure 2-16). Close to the Phase 2 site, there is a public right of way (PRoW) connecting Cranmere Court with Commissioner's Road to the north-east of the site (RR8). There are also two local cycle routes that follow the boundary of the site to the south-east; one along the road between Canal Road and the train station, and another along the path, which follows the riverside edge of the pier.

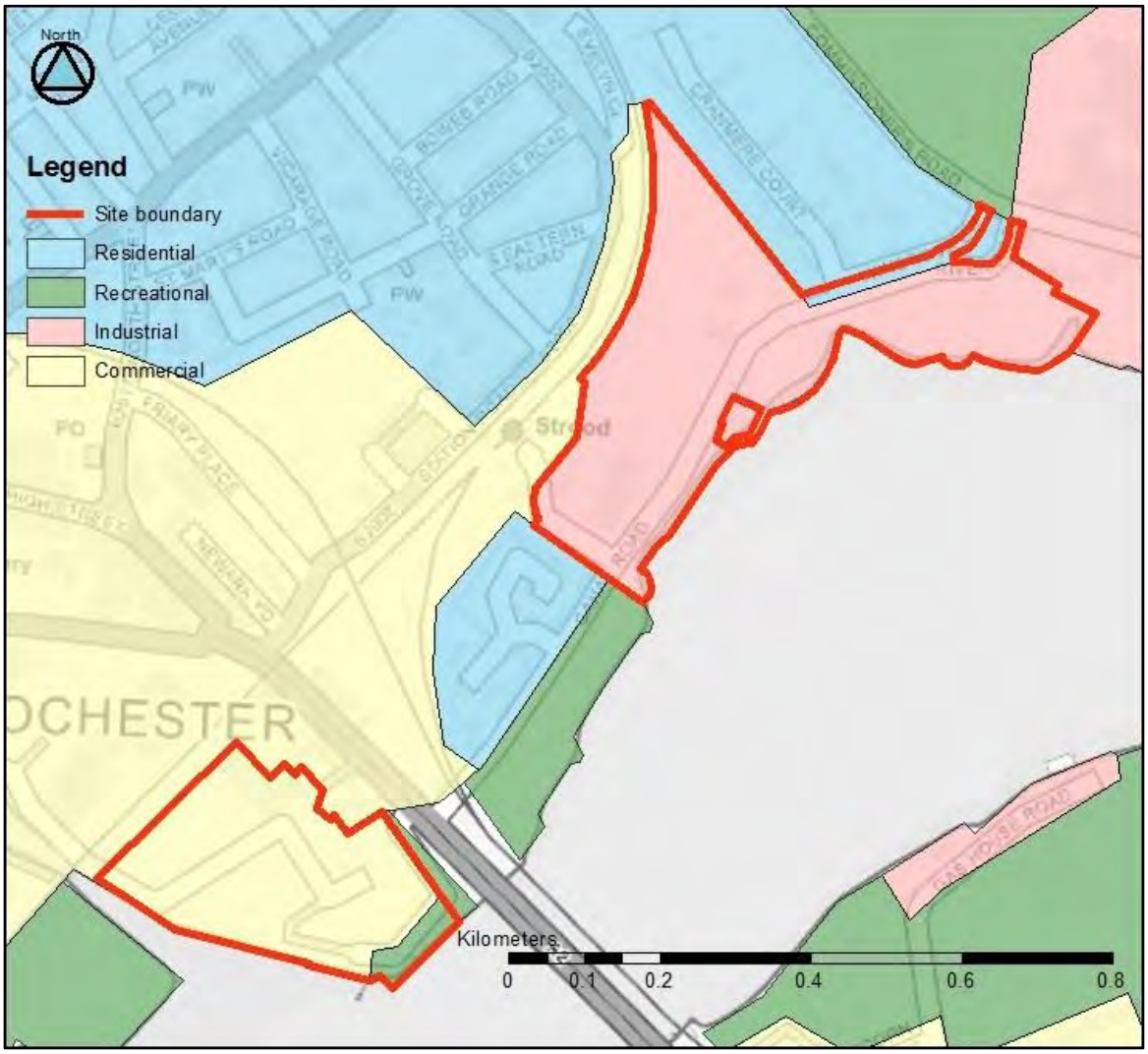

Figure 2-6: Existing land use and landscape character of the Phase 1 and Phase 2 sites

Figure 2-7: Phase 1 site from Rochester Bridge, with Civic Centre car park and buildings, publicly accessible green space, and Esplanade

Figure 2-8: Phase 1 site from the railway embankment bridge to the west, looking along the western boundary of the site, adjacent to Jane's Creek

Figure 2-11: Pump House on the Phase 1 site

Figure 2-9: Residential properties on Cranmere Court

Figure 2-10: View of Phase 2 site from Strood rail station

Figure 2-12: Phase 2 site waterfront looking west from the Riverside Tavern towards Strood Pier

Figure 2-13: Strood Pier and industrial storage areas to the west of the Phase 2 site

Figure 2-14: Scrubland and Riverside/Canal Road to the east of Riverside Tavern on Phase 2 site, with Thames and Medway Canal lock gates just visible on the left

Figure 2-15: Rochester Bridge and publicly accessible green space from Phase 1 site

Some existing land uses within the Phase 1 and Phase 2 sites will remain.

The CCTV building and associated access located towards the western boundary of the Phase 1 site needs to remain as it provides an important service within Strood and cannot easily be relocated. This is also the case for the adjacent ambulance station; a small building for ambulance drivers to rest during shifts.

The public amenity along the waterfront of the Phase 1 site to the west of Rochester Bridge will also remain publicly accessible open space. This area will be ground raised and will then be landscaped and terraced to provide open green space and trees.

The Riverside Tavern situated on the waterfront of the Phase 2 site is also not incorporated into the proposed scheme and will remain.

Strood Waterfront, encompassing the Phase 1 site, is designated as an Action Area in the Medway Local Plan (2003). Therefore, it is allocated for regeneration purposes to include residential dwellings and community amenities such as riverside walks.

Creation of new residential development and the provision of affordable housing is stated in policies H1 and H3 within the Local Development Plan.

Land along Canal Road within the Phase 2 site, reference ME254 in the Local Development Plan, meets the appropriate size thresholds for development.

Figure 2-16: National Cycle Route 1 from the east along Riverside on the Phase 2 site

2.5.4 Movement and access

Highways access

The A2 (High Street) provides vehicular and pedestrian access to the east of the Phase 1 site and links Strood with Rochester across Rochester Bridge (Figure 2-17). Access to the Phase 1 site off the A2 is vis the Esplanade, which runs parallel to the bridge and the river frontage of the Phase 1 site. An access road running from the A228 (Knight Road) past Strood Retail Park, also provides vehicular and pedestrian access to the west of the Phase 1 site.

The Phase 2 site is accessed via Canal Road, which connects into the A2 250m to the west. To the east of the Phase 2 site, Canal Road connects into Commissioner's Road.

Figure 2-17: Proposed point of access to the Phase 1 site via the A2 (High Street)

Pedestrian and cycle access

Further pedestrian and cycle access to the Phase 1 site is provided by National Cycle Route 178. To the Phase 2 site, the National Cycle Route 1 'Garden of England' runs over Rochester Bridge (A2/High Street) and along Canal Road. A PRoW, (RR8), joins Commissioner's Road and Cranmere Court to the north-east and two local cycle routes run from Strood rail station to Canal Road, and along the waterfront.

2.5.5 Opportunities and constraints

The landscape appraisal and other environmental and site assessment work undertaken to inform the scheme (detailed in section 4.3) has identified a range of constraints and opportunities. Key constraints and opportunities are described below in Table 2-2.

Table 2-2: Opportunities and constraints for the scheme arising from the baseline environment

Opportunities	Constraints
Set back line of defence to provide space for new intertidal habitat creation at the northern end of the Phase 2 site.	The River Medway and its range of important and protected habitats and species.
Removal of current defences on Phase 1 site provides space for new intertidal habitat creation along Jane's Creek.	Existing site users that are to remain such as the CCTV building, ambulance drivers rest centre, and the Riverside Tavern.
Improve amenity value of the green open space area on the Phase 1 site.	Adjacent site users/owners such as the Pump House and Kingswear Gardens residential properties.
Improve public access routes including the Sustrans National Cycle Route 178 (Phase 1) and National Cycle Route 1 (Phase 2).	Maintaining public access across the sites during construction.

3 Planning policy context

3.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) forms the basis of development plan making in England and is a material consideration in planning decisions. The NPPF details the Government requirements for the planning system, as well as providing a framework within which councils and local communities should produce planning documents, reflecting the priorities and needs of the relevant community.

A core theme of the NPPF is the delivery of sustainable development and it confirms the three dimensions to sustainable development as economic, social and environmental. Paragraph 14 emphasises this by stating *"At the heart of the National Planning Policy Framework is a presumption in favour of sustainable development".*

Paragraph 17 of the NPPF sets out 12 core planning principles that should underpin plan making and decision taking.

- Proactively drive and support sustainable economic development to deliver the infrastructure that the country needs.
- Support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change.
- Encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is not of high environmental value.

The NPPF also outline Government policy relating to 13 key theme set out across separate sections of the guidance. Those applicable to the proposed development are as follows are describe in **Table 3-1**.

Table 3-1: Themes within the NPPF of relevance to the proposed scheme

Theme	Summary	Relationship to proposed development
Building a strong, competitive economy	The Government is committed to securing economic growth, and the planning system should do everything it can to support sustainable economic growth.	The proposed scheme allows economic growth by facilitating future development of land for building businesses, infrastructure, services or housing.
Meeting the challenge of climate change, flooding and coastal change	Planning plays a key role in reducing greenhouse gas emissions, minimising vulnerability and providing resilience to the impacts of climate change. Local planning authorities should adopt proactive strategies to mitigate and adapt to climate change, taking full account of flood risk, coastal change and water supply and demand considerations.	The proposed scheme will reduce the flood risk to the site, allowing future development, and surrounding infrastructure to be resilient to flooding due to climate change.
Conserving and enhancing the natural environment	The planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible. Planning policies and decisions should encourage the effective use of brownfield land, provided it is not of high environmental value.	The proposed scheme facilitates the re-use of previously developed land for future development, preventing the use of undeveloped land to future economic and social infrastructure needs. It also allows room for intertidal habitat to retreat due to sea level rise in the face of climate change, due to the setting back of flood defences.

Section 10 of the NPPF concerns meeting the challenge of climate change, flooding and coastal change. In paragraph 100, it states that where development is necessary, it should be made safe

without increasing flood risk elsewhere. The proposed scheme's primary objective is to reduce flood risk to site and elsewhere, in order to allow future use of the site to be made safe, and be resilient to climate change.

3.2 Medway Local Plan

Medway Council are currently in the process of updating their Local Plan for 2012 – 2035, which is anticipated to be adopted in 2019. It will contain strategic level and development management policies, land allocations, minerals and waste, and a policies map. This will provide for the number of homes and jobs, supporting infrastructure, such as transport, health facilities, schools, and parks that an area and its growing population needs over this time. It will replace the Medway Local Plan 2003.

The Medway Local Plan 2003 sets out the strategy, objectives and detailed policy for guiding development in Medway. The overarching development strategy for the plan area is to prioritise re-investment in the urban fabric. This is to include the redevelopment and recycling of under-used and derelict land within the urban area, with a focus on the Medway riverside areas and Chatham, Gillingham, Strood, Rochester and Rainham town centres, in accordance with Policy S1.

Strood Waterfront, encompassing the Phase 1 site, is designated as an action area in the Medway Local Plan 2003, as per Policy S10. Therefore, it is intended for regeneration to include residential dwellings, and community amenities such as riverside walks. Creation of new residential development and the provision of affordable housing is stated in policies H1 and H3 within the Local Development Plan. Land along Canal Road within the Phase 2 site, reference ME254 in the Local Development Plan, meets the appropriate size thresholds for development and has been earmarked to have the potential to contribute to these policies within Medway. Another section of land along Commissioner's Road, reference ME375 has also been identified to provide 100 units of housing. The Medway Strategic Land Availability Assessment (SLAA) 2014 has further identified Strood Waterfront along Canal Road as potential sites for employment between 2018 and 2023, and for housing development and retail between 2023-2028. Therefore, the proposed scheme is required in order to allow for the redevelopment of this land to achieve the policies set out by Medway Council in the Local Development Plan.

3.3 Supplementary Planning Documents (SPDs)

3.3.1 Strood Riverside Development Brief

The Strood Riverside Development Brief, which was adopted as SPD in 2006, was prepared to reinforce the masterplan proposals and to market development opportunity for the area. It details substantial plans for the Phase 2 site, describing a regeneration agenda, which is intended to facilitate the redevelopment of the site into a vibrant residential community with a mix of new homes and tenure types. The brief recognises that the delivery of a comprehensive scheme for the entirety of the site requires creating flood protection along a significant stretch of the riverside.

The brief reports that the Environment Agency have indicated that land raising would be their preferred option for providing defence from tidal flooding through removing the site from the floodplain. This approach would also provide a safe means to 'cap' any potential contamination risk on-site whilst maintaining the existing riverside biodiversity. In accordance with the Planning Policy Guidance Note 25 (PPG25), a Government produced document on development and flood risk practice, the development must accord with the following requirements:

- Defence of a residential site to a 1 in 200-year flood level (5.5mAOD).
- Ground floor finished floor level of 5.8mAOD for normal housing where living accommodation is provided at ground level, and 6.1mAOD for normal housing where sleeping accommodation is provided at floor level.
- Mixed uses or car parking may be provided at lower levels of protection as long as a safe exit is provided to the 5.8mAOD level.
- Open maintenance access has to be provided to a width of 15m from the flood defence/embankment top, or 10m if agreed with the Environment Agency.
- A 'dry' access route of 5.5mAOD, ideally 5.8Maod, is to be provided to the protected area.

The development brief also state that any proposed flood defence works must respect the site's biodiversity, and there should be no net loss of existing inter-tidal habitat. furthermore, a detailed flood risk assessment will be required to support any planning application for development on the site. All the necessary flood alleviation measure will need to put into place prior to the first occupation of any development.

4 Design

4.1 Options appraisal

An options appraisal process was undertaken in 2015 to identify a preferred option for the scheme. This process considered a range of key issues associated with the various scheme options including design requirements, technical feasibility, cost and environmental constraints and opportunities. Options were assessed against technical, environmental, social, economic and climate change adaptation criteria.

All options involved raising the ground level to the design flood level of 6.0mAOD.

It was realised that there were fewer feasible options available for the waterfront defence for the Phase 1 site due to its geometry and waterfront on both sides. A sloping frontage (e.g. revetment) would mean large loss of developable land. Therefore, the use of piling was considered the only viable option, either along the existing line of defence, set back from the line, or on a line to cut off Jane's Creek. These allow a large enough area for developable land to be created.

The following options for the Phase 2 site were identified during the appraisal stage:

- Option 1: Repair and replacement of existing revetment along the alignment of the existing defence or bank line, with slopes of 1:5 (1A), 1:10 (1B), and 1:20 (1C).
- Option 2: Similar to Option 1 but with the line of defence directed landward of Riverside Tavern to allow it to remain, in the western part of the site.
- Option 3A: Construction of new revetment with rock armour or blockwork along the alignment of the existing defence or bank line.
- Option 3B: Similar to Option 3A, but with the revetment topped by a 1.5m high reinforced concrete flood wall, and with a smaller extent of rock armour toe protection.
- Option 4A: Construction of a sheet pile wall following the existing line of defence or bank line, with concrete cap, designed to a height of 6mAOD.
- Option 4B: Similar to Option 4A, but with the alignment set back from the existing line of defence or bank line, landward of Riverside Tavern, in the western part of the site.
- Option 5: A combination of repair and replacement of existing revetment (Option 1) to the east of the site, and a setback sheet pile wall (Option 4B) to the west.

Option 5 was recommended as the preferred option for the Phase 2 site, as it allows the Riverside Tavern to remain precluding the need for land purchase, as well as maximising the developable area of land in the western portion of the site. It also provides a gentler gradient and more natural frontage over the eastern section of the site.

4.2 Design evolution

Due to various design constraints identified during the subsequent detailed design process, the proposed scheme has now shifted away from option 5 for the Phase 2 site. It is now more similar to option 4A and 4B.

In the eastern part of the site, the revetment will not be replaced to avoid in river works. Instead a new defence line setback from the river will be constructed in the form of a steel sheet pile wall. This will allow room for the retreat of intertidal habitat due to climate change induced sea-level rise, decreasing the severity of any future coastal squeeze impacts.

The line of defence will extend behind the Riverside Tavern, in the form of a graded slope, to allow it to remain. Access will be provided from the raised ground behind. Portions of land will also be left at current levels to allow it to be used as under croft parking in future developments.

The design for the Phase 1 site has also undergone minor design iterations. The alignment of the flood wall has moved landward of the existing line of defence. It largely follows the direction

of alignment, apart from along the southern edge, where the alignment returns landward, just before the Pump House, and continues along the landward side of the Esplanade before terminating at an intended access point at the junction of the A2 (High Street). This is to avoid raking piles, which are piles extending diagonally downwards behind the existing timber wall defence. It also diverts around the amenity area along the waterfront of the Phase 1 site, allowing it to remain as publicly accessible open space. To the west of the site, the sheet pile line has been extended towards the railway bridge, with a short section (3 to 4m) riverwards of the existing line of defence, to provide complete protection to the site. The northern portion of land on the Phase 1 site will also be left at current level to allow it to be used as undercroft parking in future developments. The CCTV building will also remain as it is an important asset to the Medway area and not easily relocated. A secondary line of piles has also been included to provide extra stability to the new sheet pile wall via ties, and has been aligned to allow the ambulance driver rest centre to remain.

4.3 Environmental assessment

Environmental assessments have been undertaken to identify sensitive environmental features in the scheme area. Medway Council confirmed that a statutory Environmental Impact Assessment (EIA) would not be required for the scheme.

The environmental assessments were integrated into the design process and influenced many aspects of the detailed design. They are summarised in **Table 4-1**.

Key environmental issues that have been identified include:

- Suitable habitat for reptile species in north-eastern presence of Phase 2 site, and two buildings with potential to support roosting bats.
- Medway MCZ and intertidal mudflat habitat adjacent to site.
- Potential archaeological remains present on both sites including possible remains of a Medieval bridge abutment on the Phase 1 site.
- Contamination hotspots including hydrocarbons and some asbestos containing material within shallow Made Ground deposits on the Phase 2 site.
- Social impacts to residents during construction that could affect local people and properties, public access and amenity space, and river users.

Mitigation measures were identified to address any significant environmental issues. In addition, some environmental enhancement measures were developed and incorporated into the scheme to ensure it achieved the overarching project objectives.

Consultation was undertaken with various departments of the Environment Agency, including flood risk, contaminated land, biodiversity and fisheries departments, on the outcomes of the assessments. Other stakeholders consulted during the environmental assessment process included the Marine Management Organisation (MMO), Sustrans, Royal Society for the Protection of Birds (RSPB), Kent Wildlife Trust and Kent County Council.

Table 4-1: Summary of environmental assessments as part of this project and planning application

Environmental assessment	Purpose and scope
Ecological Appraisal	An Ecological Appraisal has been undertaken following CIEEM guidance. It assesses the impacts of the proposed scheme to the ecology of the scheme area and surrounding land. Considers all ecological aspects but focus on potential impacts on reptiles, bats and the Medway MCZ.
Landscape and Visual Assessment (LVA)	A LVA has been prepared based upon guidance in Guidelines for Landscape and Visual Impact Assessment, 3rd edition (GLVIA3), published by the Landscape Institute and the Institute of Environmental Management and Assessment (IEMA). It assesses the potential changes to the local landscape and the sensitivity of the landscape to these changes. It also considers impacts on visual amenity as a result of the proposed scheme.
Heritage Desk-Based Assessment (DBA))	A DBA has been prepared following CIfA guidance. It takes into consideration all known records relating to the scheme area to gauge the archaeological potential of the site. Information on designated sites, local Historic Environment Records, historical maps and photographs, and other sources, are used to create a comprehensive overview of the history and prehistory of

Environmental assessment	Purpose and scope
	the site. This is supplemented with information gained through an archaeological Watching Brief of the Ground Investigation works. Potential impacts associated with the scheme and its construction to archaeological and heritage features have been assessed.
Hydromorphic Audit and Water Framework Directive (WFD) Impact Assessment	The Hydromorphic Audit assesses the current hydromorphology of the river system and any possible impacts that the proposed scheme may cause. The audit includes a WFD Impact Assessment, which assesses the potential impacts of the scheme on the WFD status of the adjacent surface water and groundwater bodies.
Phase I Preliminary Risk Assessment and Piling Risk Assessment	A Phase I Preliminary Risk Assessment has been carried out to identify potential sources of contamination, receptors and pathways. It draws upon the results of recent Ground Investigation surveys, water sample analysis and gas monitoring, as well as historic information regarding the site and its use. A Piling Risk Assessment has been prepared to assess the potential for the piling operations to cause land and water contamination.
Construction Environmental Management Plan (CEMP)	A CEMP has been produced that sets out the proposed measures to be implemented during construction to avoid, minimise or mitigate any construction effects on the environment and the surrounding community.
Flood Risk Assessment (FRA)	A FRA has been prepared following guidance published by the Environment Agency. It describes the results of flood modelling with and without the proposed new flood defences, and assesses whether there is a risk of increased flooding to third parties as a result of the proposed scheme.

4.4 Stakeholder engagement

A Stakeholder Engagement Plan (SEP) was developed to guide and record stakeholder engagement during the design process. The plan followed *Building Trust with Communities* guidance developed by the EA, which encourages the project team to engage with stakeholders early on to understand their concerns, interests, and priorities. Each stakeholder has different levels of influence on the direction and outcomes of the scheme. The guidance identifies four discrete engagement levels depending upon the level of interest and influence individual stakeholders have in the scheme. These include: partnership, where the stakeholder is part of the project team and decisions cannot be taken forward without their agreement; involve, where the stakeholder is regularly involved in the decision-making process and has influence over decisions; consult, where advice is actively sought from the stakeholder on specific subjects or issues, and; inform, where stakeholders are informed of the project and invited to provide comments or information. Considerable focus was applied identifying and evaluating an appropriate approach to be adopted for engagement level.

Stakeholders were grouped and a range of engagement methods and approaches were assigned for each group to gain their input effectively. A variety of engagement methods were used including statutory consultation meetings, site visits and meetings, and delivery of an environmental scoping letter to provide information on the proposed scheme and facilitate a means of communication. A communications record for the consultations has been kept throughout the project, which includes records of meetings and other communications.

Landowners were a focus for engagement on the alignment of the scheme, particularly on the Phase 1 site where the CCTV building, ambulance drivers' building and amenity area are to be retained, and on the Phase 2 site surrounding the Riverside Tavern and Strood Railway Station. The Environment Agency was also engaged to inform on the design and construction of the scheme, and to identify any associated environmental issues.

Key comments received as a result of the consultation process included:

- Requirement of characterisation of made ground and any contamination present, which is to be managed appropriately (Environment Agency).
- Consideration to be given future use of land, and to create suitable land drainage (avoiding standing water on made ground) and outfalls (Environment Agency).
- Obligation to prevent loss and where possible enhance biodiversity and habitat, particularly regarding mudflat and saltmarsh within the Medway Estuary (EA).

- Effects to environmentally designated sites, including the Medway MCZ, are not anticipated (Natural England)
- The sites are outside Ministry of Defence (MoD) safeguarding area (MoD)

4.5 Design principals and concepts

The following design principles have been developed for key aspects of the design.

4.5.1 Use

This scheme will be used to alleviate the risk of flooding to both sites, which is required to satisfy national and local planning guidance and policies (NPPF, PPG25), to facilitate the future development of the sites as part of the wider aspirations for the area. The location of the two sites within a long-established neighbourhood means that there is a broad range of community facilities within walking distance. The location of the sites close to an established community, retail and open space facilities, adjacent to the town centre and close to public transport nodes such as the railway are positive characteristics which need to be maximised through the provision of safe, direct, convenient and interesting pedestrian routes.

Parts of the Phase 1 site's current land use will remain. This includes the Pump House, which is used to pump surface water to the River Medway, and ambulance driver rest centre, and the CCTV building. These are important infrastructure in the area and will therefore be integrated into this scheme.

Within the Phase 2 site, the Riverside Tavern will remain. The scheme is sensitive to the continued use of this asset, providing appropriate vehicular and pedestrian access to it. The flood defences in the north-eastern part of the Phase 2 site will also be set back from the river's edge to enable the development of new inter-tidal habitats in the future.

4.5.2 Amount

Approximately 97,094m^2 of land is within the site boundaries. Approximately 1,025m of steel sheet pile wall be constructed. The amount of development being undertaken in this scheme is in accordance with relevant national planning policy, that dictates the level of flood protection required before future redevelopment. Generally, the amount of development has been limited as much as possible in order to allow any future regeneration on site the flexibility to produce the most efficient and suitable development.

4.5.3 Layout

In making adjustments to the alignment of the defences, a balance has been achieved between a range of factors. The scheme has sought to set back defences from the water's edge in the north-eastern part of the Phase 2 site so as to protect and enhance the biodiversity value of the habitat within the Medway Estuary. This has been balanced against providing more space for future development on site in the south-western part of the Phase 2 site. Furthermore, in order to maintain access to Riverside Tavern and to not encroach into its boundary, a graded slope around the southern, western and northern boundaries will be constructed. To ensure the stability of the Phase 1 scheme over its 100-year design life it is necessary to construct the flood wall with large steel sheet piles, and anchor them to secondary sheet piles further inland. The removal of parts of the current flood wall which are at risk of failing is also necessary. Other constraints that have dictated the layout of the Phase 1 site include the land uses which are to remain. The secondary line of piles has been split to avoid the ambulance drivers rest centre, provisions have been made to allow access to the Pump House, and the amenity area has been accommodated by diverting the sheet pile wall landward.

4.5.4 Scale

The scale, in terms of height, of the defences is determined by the required standard of flood protection they must deliver, and is similar in scale to adjacent sections of river wall. To deliver the required standard of protection (1 in 200-year) the finished heights of the flood walls across the scheme is 6.1mAOD, and the finished height of raised ground is 6.0mAOD. The overall length of the flood wall is approximately 1,025m.

4.5.5 Landscaping

Much of this scheme will be left as bare ground. This is to increase the efficient use of resources, as any significant amounts of landscaping put in place in this scheme is likely to be removed

during future regeneration. However, the amenity area fronting the Medway Estuary on the Phase 1 site will be landscaped and reinstated as open green space following ground raising (Figure 4-1).

Paving surfaces will be resin-bound aggregate to provide a smooth, even and well-laid surface to avoid tripping.

Figure 4-1: Indicative photomontage of landscape works as part of the scheme to the publicly accessible green space on the Phase 1 site

4.5.6 Appearance

The form and appearance of the defences have been developed in order to respect the characteristics of the areas within which they are located.

Key examples of this are in relation to the scheme design on the Phase 1 site close to the publicly accessible green space, and the diversion of the flood wall landward. The steel sheet piles are to be painted black, with anti-corrosive paint, in accordance with EN ISO 12944 (international standard on corrosion protection of steel structures using protective paint).

Hand rails topping the flood walls will also be the same, or very similar, to the ones used in nearby developments in Rochester. This will give a consistent appearance to the Medway area, giving it a 'sense of place'.

Figure 4-2 to Figure 4-6 show a series of indicative photomontages of the scheme.

Figure 4-2: Indicative photomontage of ground raising and access ramp from the A2 (High Street) on the Phase 1 site

Figure 4-3: Indicative photomontage of the Phase 1 site from the A2 (High Street)

Figure 4-4: Indicative photomontage of the Phase 2 site from Watermill Gardens

Figure 4-5: Indicative photomontage of the Phase 1 site from Rochester Castle

Figure 4-6: Indicative photomontage of the Phase 2 site from Rochester

5 Proposed detailed design

This section provides an overview of the key elements of the scheme. It also explains the engineering, environmental, and landscape considerations that have informed the proposed design elements. Please refer to section 2.3 for the overall general arrangement of the scheme.

5.1 Phase 1 (Civic Centre) site

5.1.1 Railway embankment to Pump House bordering Jane's Creek

The relevant general arrangement for this part of the scheme is shown in Figure 5-1. A steel sheet pile wall will be constructed 2m landward of the existing line of defence. This will consist of AZ38-700 steel sheet piles with a crest level of 6.0mAOD, and a toe level of -8.0mAOD. A reinforced concrete capping beam will create an overall height of 6.1mAOD. Two secondary lines of piles, or anchor walls, will be constructed approximately 10m and 19m landwards of the new sheet pile wall, for western and eastern sections, respectively, in a parallel alignment. They have been split into two, and the western section aligned closer to the new sheet pile wall towards the railway embankment, in order to avoid the ambulance driver rest centre. Ties rods at 3.2m intervals (for the western section) and 4.2m intervals (for the eastern section), buried 1m below existing ground levels, will help anchor the new wall in place. Crest level of these piles will be 4.0mAOD and toe level -1.0mAOD. Anchor walls will be installed first, followed by the new sheet pile wall, which will be tied back to the anchor wall as construction progresses. At the western end of the new sheet pile wall, a short section of sheet piling is necessary within Jane's Creek to protect more of the site, with a mass concrete fill behind the pile line. A small section of road will remain unprotected from flooding. A steel plate will be fixed to the existing defence in order to receive the first pile of the new wall. The existing concrete wall and earth is to be removed after driving sheet piles. The existing wall ties for the current wall will be removed prior to the installation of sheet piles, and the wall will be broken just below silt level and lifted out after the new sheet pile wall is complete. The new steel sheet piles are to be painted black, with anti-corrosive paint, in accordance with EN ISO 12944 (international standard on corrosion protection of steel structures using protective paint).

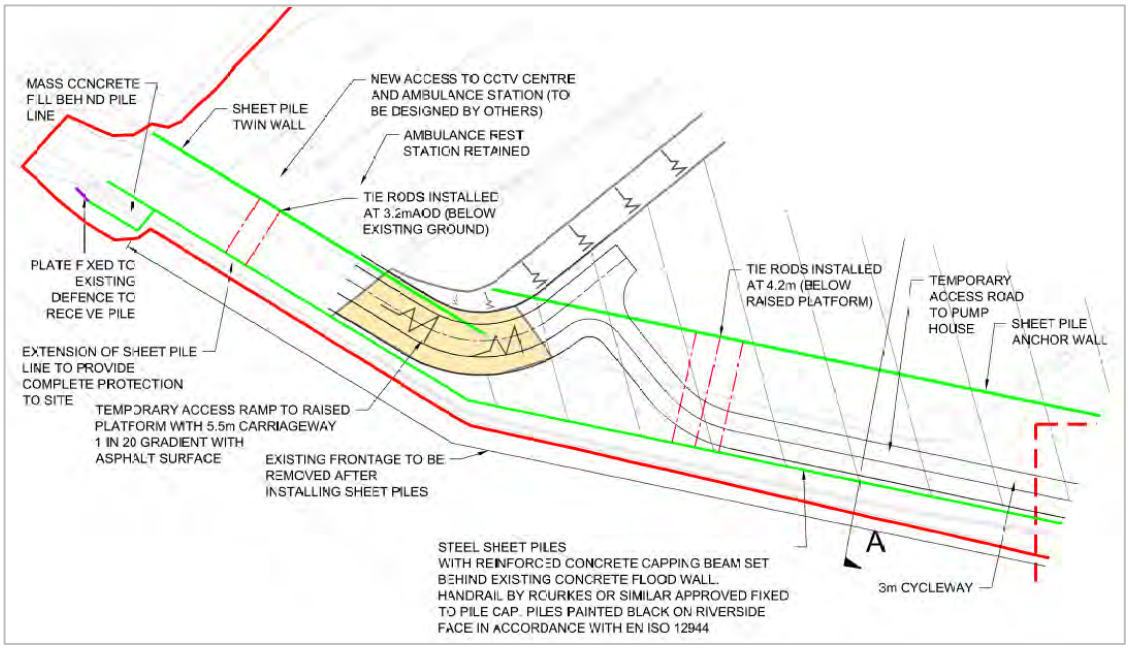

Figure 5-1: Clip of general arrangement between railway embankment and Pump House on the Phase 1 site

5.1.2 Pump House

The relevant general arrangement for this part of the scheme is shown in Figure 5-2. The alignment of the steel sheet pile wall will move landwards where the current alignment also shifts landwards, at a point just east of the Pump House. The new sheet pile wall, consisting of three pairs of 7m long AZ20-700 pile between one pair of 11m long AZ26-700 piles, will follow the landward alignment of the Esplanade. This is to avoid raking piles associated with the current timber flood wall along this section of river. Before the new wall returns landwards, piles will extend as close to the existing river wall as possible. A mass concrete infill behind a steel plate fitted on the rake of the existing river wall will also be constructed at this junction. A reinforced concrete capping beam will top the steel sheet pile wall, with a finished height of 6.1mAOD. Hand rails designed by Rourkes, or a similar, approved, alternative will be fixed to the pile cap.

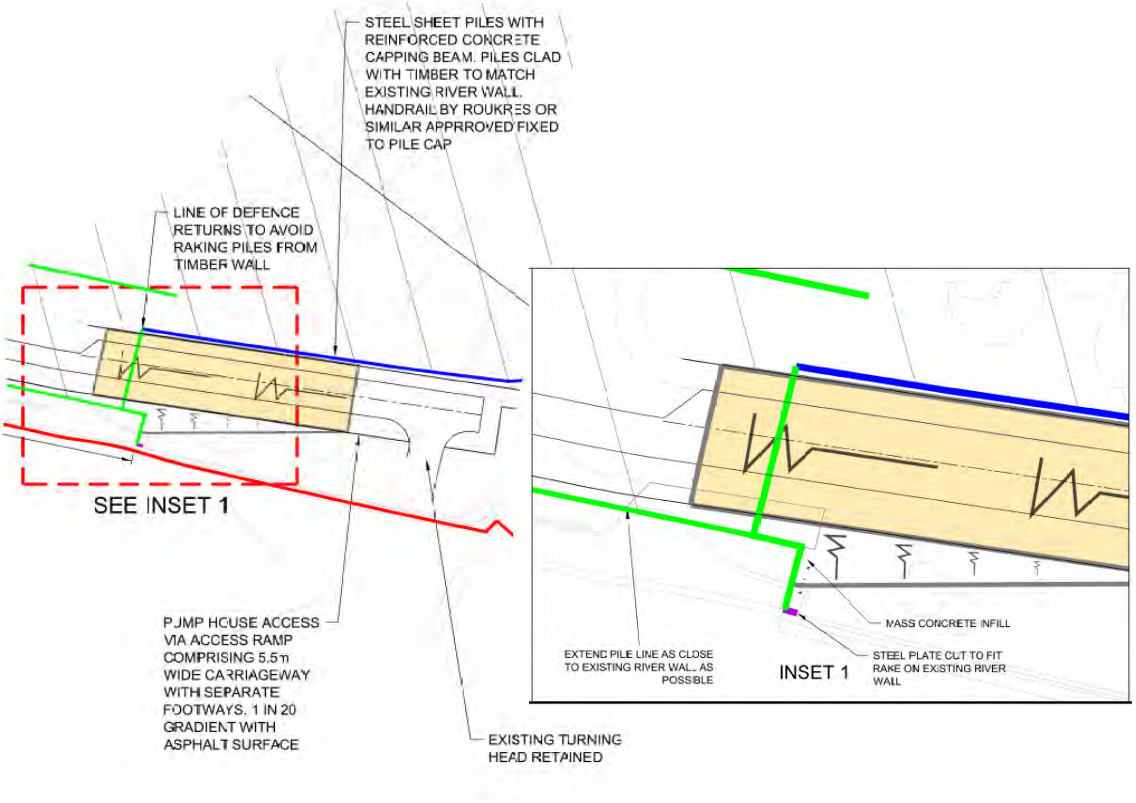

Figure 5-2: Clip of general arrangement around the Pump House on the Phase 1 site

5.1.3 Pump House to Rochester Bridge

The relevant general arrangement for this part of the scheme is shown in Figure 5-3. The alignment of the new wall will follow the landward alignment of the Esplanade towards Rochester Bridge.

A more detailed general arrangement for the amenity area is shown in Figure 5-4. The existing amenity area will be raised to 5.1mAOD with a light weight fill material and finished with a layer of topsoil. The finished level will be 100mm below the height of the current concrete wall, which will be strengthened with a concrete ground beam and act as a retaining wall. Timber retaining walls will be constructed at the eastern and western edge of the amenity area. The amenity area will be reinstated with approximately 8 native trees, 507m2 of amenity grass seed mix and 320m2 of low maintenance planting. Steps in the southeast corner of the amenity area will be constructed and lead to an asphalt footpath along the waterfront. Hand rails designed by Rourkes, or a similar, approved, alternative will be fixed to the concrete ground beam and steps. The existing railings on the riverside of the concrete wall will be removed and the existing steps to the south west of the amenity area, that provide access to and from the river, will be retained and incorporated into the scheme design. An asphalt cycle path and footpath with ramped access will run along the northern extent of the amenity area adjacent to the new sheet pile wall. The sheet pile wall will be clad with timber to match the existing timber retaining wall along the river frontage.

The frontage of new sheet pile wall, constructed from three pairs of 7m long AZ20-700 pile between one pair of 11m long AZ26-700 piles, will be clad with timber extending up to 6.1mAOD to the raised land behind. This area will be landscaped to a design to be agreed with Medway Council and Rochester Bridge Trust.

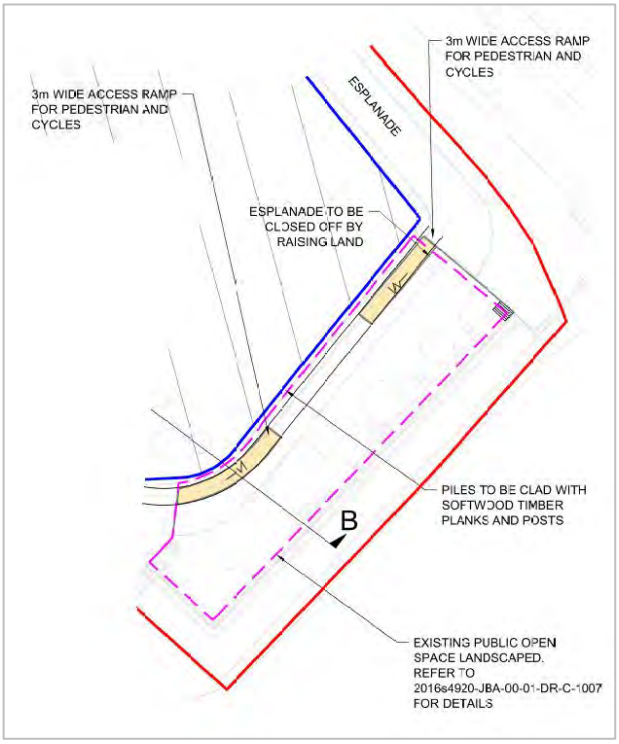

Figure 5-3: Clip of general arrangement between Pump House and Rochester Bridge on the Phase 1 site

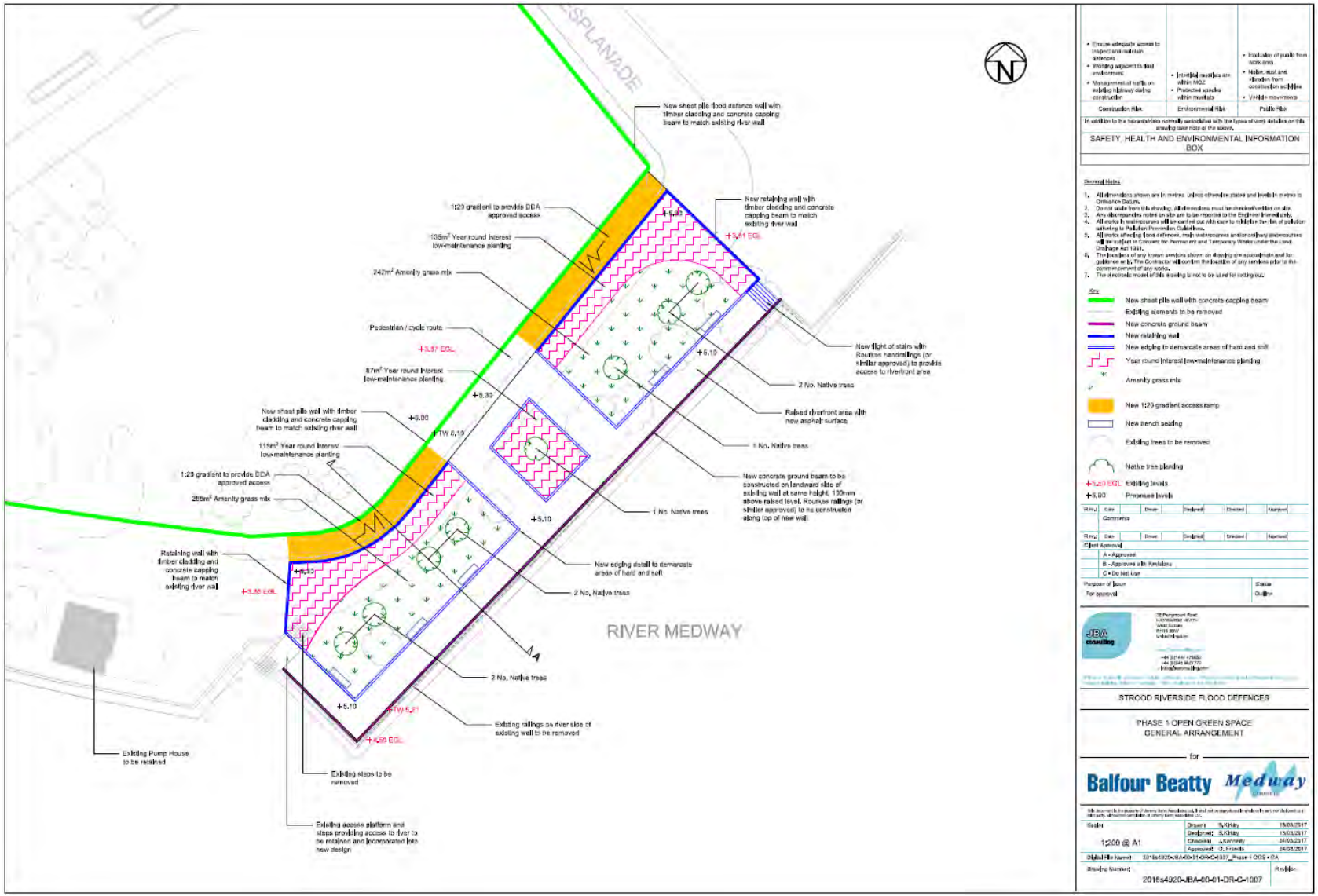

Figure 5-4 Proposed general arrangement for amenity area on Phase 1 site

5.1.4 Rochester Bridge to High Street (A2)

The relevant general arrangement for this part of the scheme is shown in Figure 5-5. The new steel sheet pile wall (three pairs of 7m long AZ20-700 pile between one pair of 11m long AZ26-700 piles) will continue along the current alignment of the Esplanade as it turns northwards at the point where it meets Rochester Bridge. It will terminate at the intended access point to the Phase 1 site from High Street (A2).

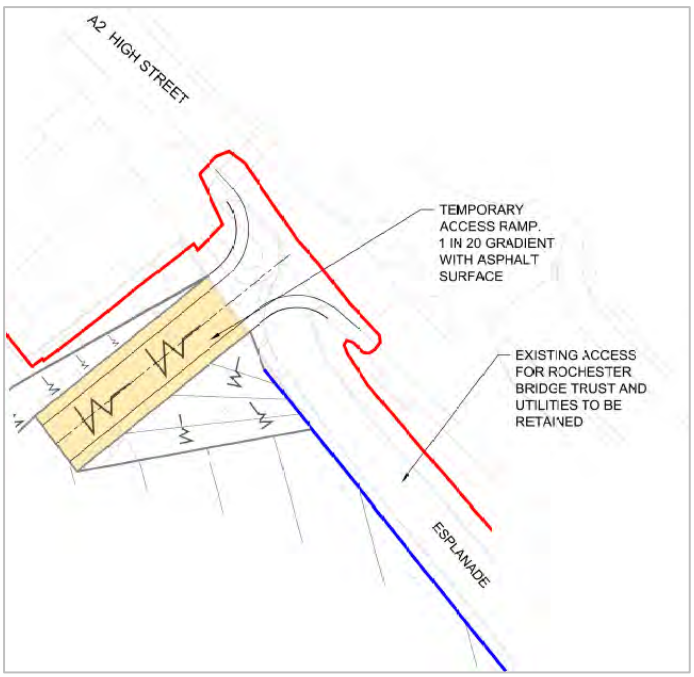

Figure 5-5: Clip of general arrangement between Rochester Bridge and High Street (A2) on the Phase 1 site

5.1.5 High Street (A2) to Jane's Creek and central portion of site

The relevant general arrangement for this part of the scheme is shown in Figure 5-6. The landward boundary of raised ground will consist of a geotextile wrapped battered slope, with a maximum gradient of 1 in 3. The boundary will extend westwards through the area currently occupied by the Medway Archives building before connecting into the steel sheet pile wall adjacent to Jane's Creek. The CCTV building and associated access will remain. The ambulance driver rest centre will be removed, but relocated following agreement with Medway council.

The ground within the Phase 1 site will be raised by approximately 1.8m to 6.0mAOD. Fill material will be Class 1A General Fill. Prior to this, the existing base slab will be punctured to permit drainage through the fill and into the subsurface.

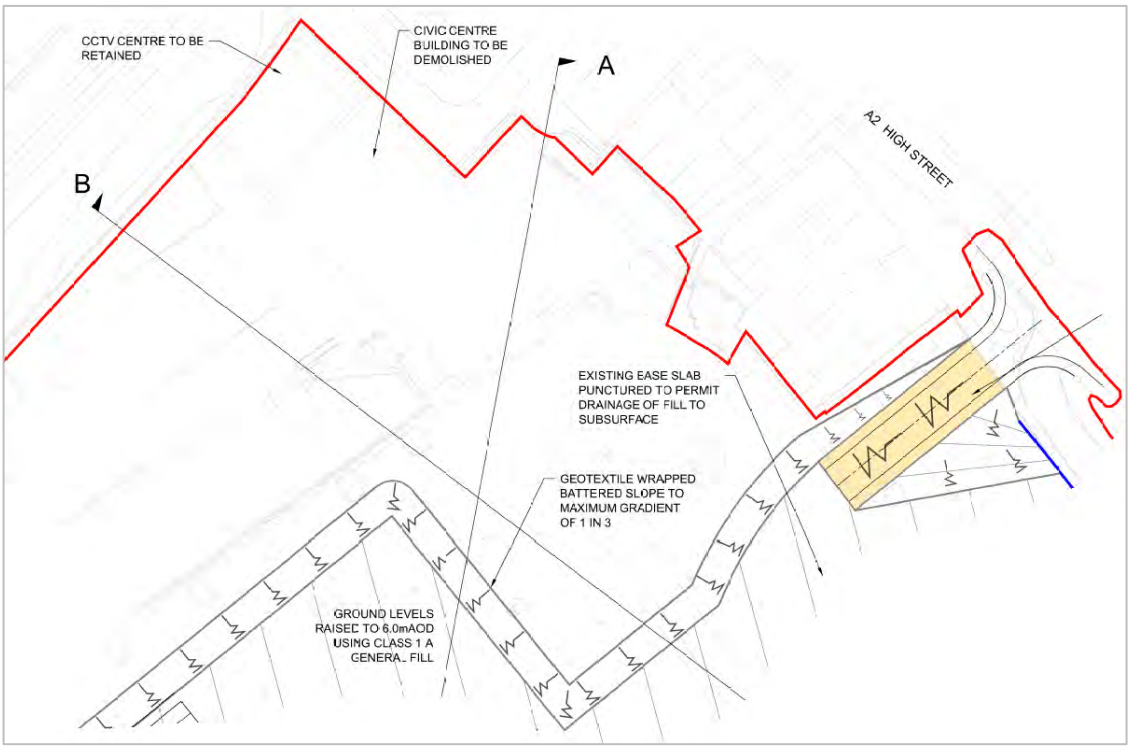

Figure 5-6: Clip of general arrangement between High Street (A2) and Jane's Creek on the Phase 1 site

5.2 Phase 2 (Strood Riverside) site

5.2.1 Strood Pier to Riverside Tavern

The relevant general arrangement for this part of the scheme is shown in Figure 5-7. A steel sheet pile wall will be constructed with in a kingpost arrangement, consisting of three pairs of 7m long AZ20-700 pile between one pair of 11m long AZ26-700 piles, with reinforced concrete capping beam. This will be along the alignment of a buried former concrete wall, approximately 4m back from the current flood wall, through Block C. The crest level of the wall will be 6.0mAOD and the toe level will be -5.0mAOD, with an overall height of 6.1mAOD including the concrete capping beam. The existing flood wall will be patch repaired where necessary, following a condition survey. This may involve excavating small patches of damaged wall, and refilling with mass concrete, finished in keeping with the existing wall.

The line of piles will terminate west of the Riverside Tavern. A graded slope leading up to raised ground will border behind Riverside Tavern, and access will be provided to it, from Block F. The slope will then tie in to another line of steel sheet piles on the east side of Riverside Tavern.

5.2.2 Riverside Tavern to Medway Metals Ltd

The relevant general arrangement for this part of the scheme is shown in Figure 5-8. A steel sheet pile wall will be constructed through Block D, from the eastern boundary of the Riverside Tavern to the Thames and Medway Canal lock gates. The wall will restart on the east side of the Thames and Medway Canal lock gates and continue towards Medway Metals Ltd, through Block E. Steel sheet piles will be set back from the river frontage in these sections to allow space for approximately 2925m^2 intertidal habitat. For the majority of this stretch of riverside, the arrangement will consist of three pairs of 7m long AZ20-700 pile between one pair of 11m long AZ26-700 piles. A reinforced concrete capping will also top the steel sheet piles, with a finished height of 6.1mAOD. They will tie in to either side of the Thames and Medway Canal lock gates. At the end of the steel sheet pile wall, close to Medway Metals Ltd, 3.5m long AZ26-700 steel sheet piles will provide a cut-off.

To ensure the long-term maintenance of the flood defence over its 100-year design life, anti-corrosive black paint will be applied to the piles, before piling. This will be in accordance with EN ISO 12944 (international standard on corrosion protection of steel structures using protective paint).

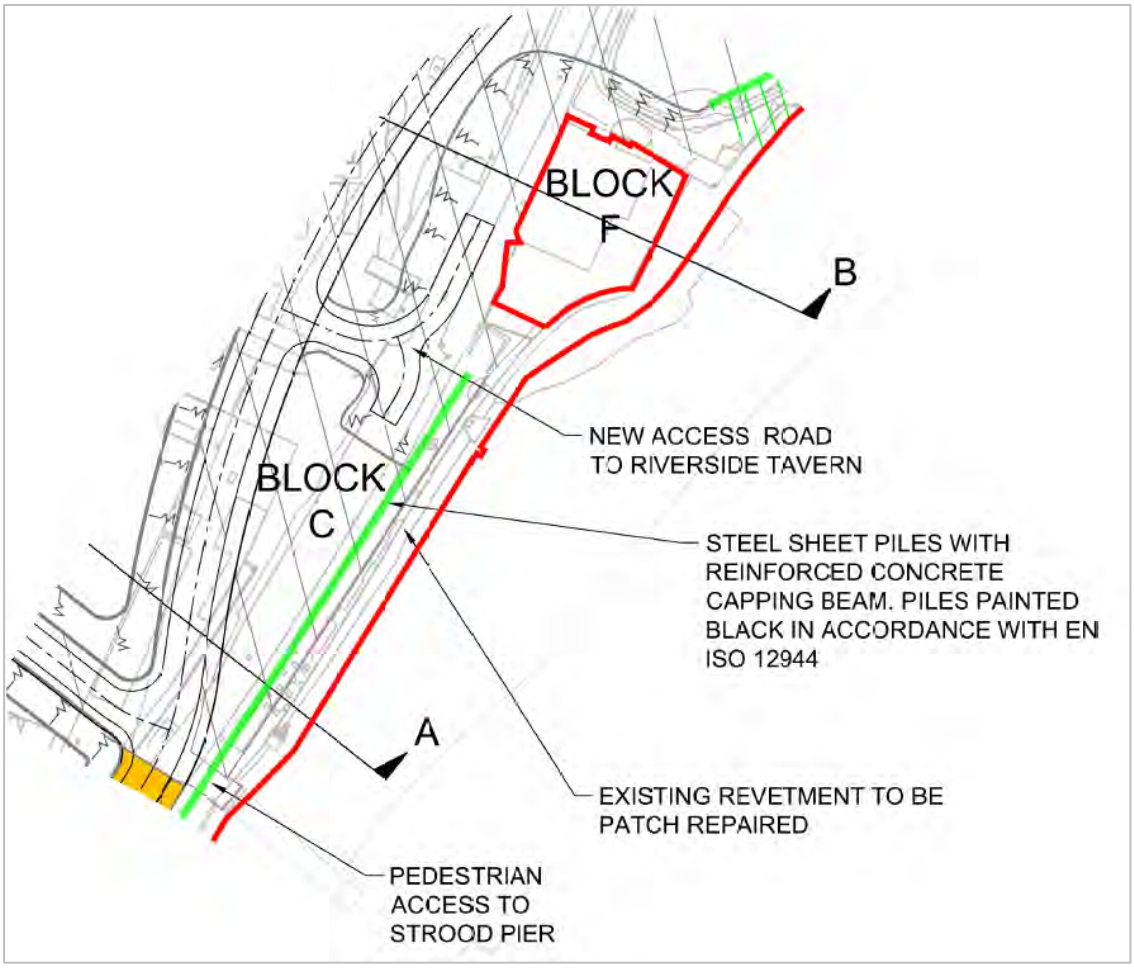

Figure 5-7: Clip of general arrangement between Strood Pier and Riverside Tavern on the Phase 2 site

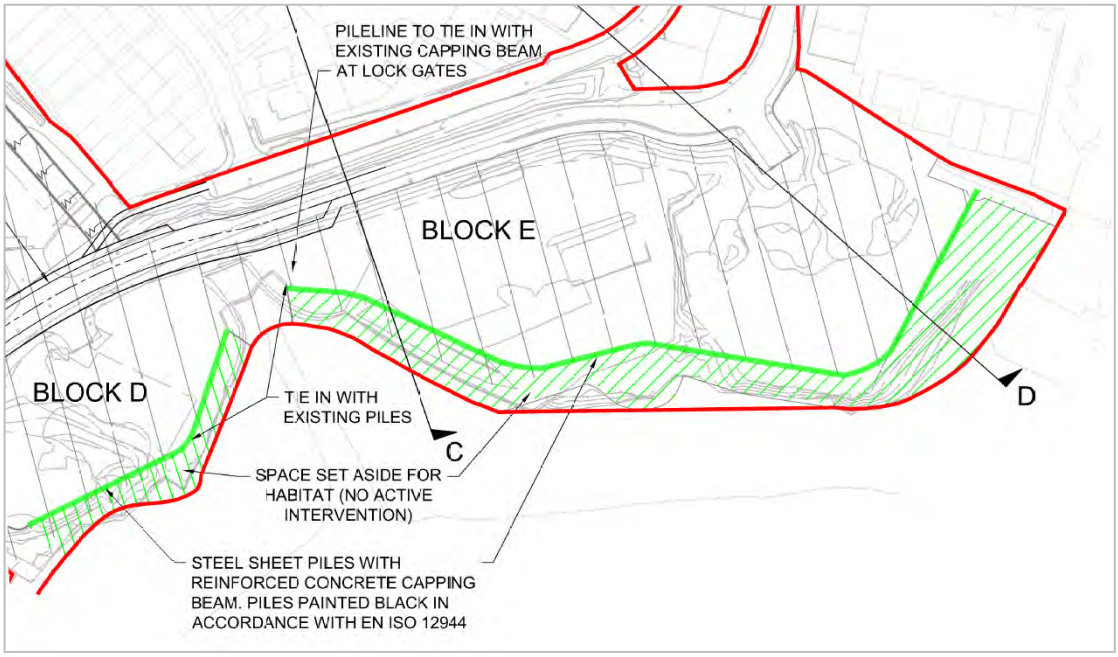

Figure 5-8: Clip of general arrangement between Riverside Tavern and Medway Metals Ltd on the Phase 2 site

5.2.3 Rear boundary and central portion of site

The relevant general arrangement for this part of the scheme is shown in Figure 5-9. Block A, C, D, E, and F will be raised to a height of 6.0mAOD. The existing base slab will be punctured to allow drainage into the subsurface below the raised ground. Block B will be left un raised for under croft parking in a future development, but the concrete slab will also be punctured to improve drainage. The rear boundaries of Block C, D, and F will abut against Canal Road, which will be raised and realigned landward, early on in the construction programme. The rear boundary of Block E will abut against the already higher ground along Riverside. The rear boundary of Block A is to be in coordination with Network Rail, but is likely to be either a graded slope of reinforced earth or a concrete retaining wall. These will offset approximately 5m from the property and railway boundaries, to allow space between residential properties and the root protection zones of coniferous trees. The road linking Canal Road and Strood Railway Station car park will be realigned north-east, and raised, and abut against Block B. This road will therefore ramp down to the car park from a height of 5.0mAOD. Canal Road will be ramped up on the west side of the site to meet this junction to a height of 4.5mAOD. The road embankment will comprise fill material on a geogrid raft supported on a grid of precast concrete pile at 2.5 C/C.

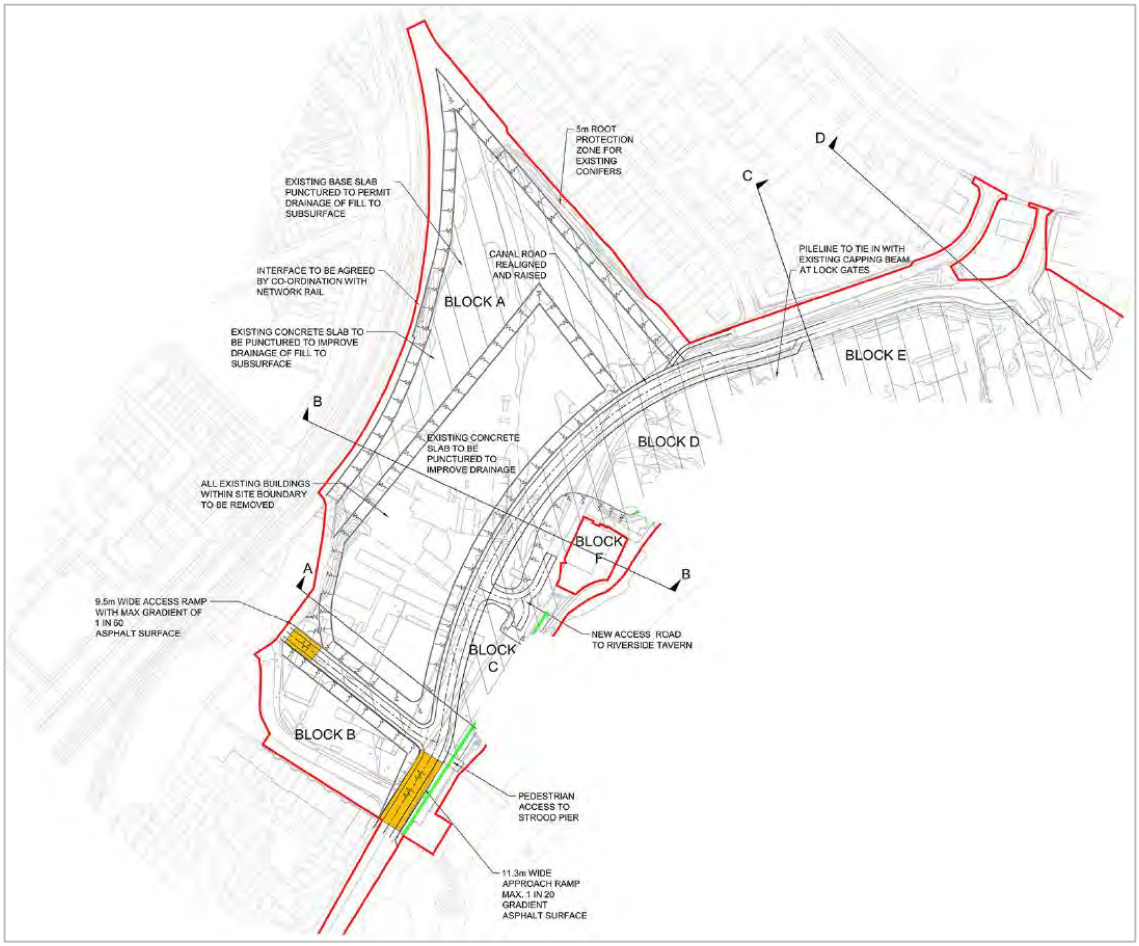

Figure 5-9: Clip of general arrangement of rear boundary and central portion of the Phase 2 site

6 Access and movement

The proposed scheme interacts with a variety of existing access routes, both highway and pedestrian, and the design has sought to maintain this connectivity across the sites.

The scheme will guarantee equal and safe access to all users to public areas that will be affected by the scheme. It will facilitate the ease of movement of authorised vehicular users, pedestrians, cyclists, disabled people, the elderly and people with young children. Minimum standards for disabled access for such items as steps and ramps will be adhered to. Safe access for personnel carrying out maintenance and inspections of the defences has also been incorporated within the design proposals.

A brief explanation of how the needs of different users has been considered is provided below.

6.1 Vehicular access

6.1.1 Phase 1

Three access points will be created to the Phase 1 site, accommodating access to the site and publicly accessible green space. Currently, access into the site area is via the Esplanade. This will be closed off by raising land as part of this scheme. However, the stretch of road bordering the site area to the east will be retained, to allow access for the Rochester Bridge Trust and utilities. The primary vehicular access into the Phase 1 site will be via a 1 in 20 gradient ramp, with asphalt surface, from the A2 (High Street). It will slope up to the raised ground to the east of the site. A secondary point of access will be provided to the west of the site via a 1 in 20 gradient slope, with asphalt surface, which will lead to the raised platform with a 5.5m carriageway. This will join from the A228 or Knight Road, past Strood Retail Park and under the railway bridge. This will lead into a temporary access route to the Pump House along the frontage of Jane's Creek.

Vehicular access to the Pump House will be via a ramp with a 1 in 20 gradient and asphalt surface, comprising a 5.5m wide carriageway with separate footways. The existing vehicle turning head will be retained.

6.1.2 Phase 2

Both Canal Road and the access road to Strood Railway Station will be raised and will be accessed via a single ramp on Canal Road to the west of the site. This will be 11.3m wide, with a maximum gradient of 1 in 20 and with an asphalt surface. The road will then branch north-west to the Strood Railway Station car park, and Canal Road will continue north-east and tie into Riverside at its exiting level, exempting the need to construct ramps.

Canal Road will be realigned landward of its current position. This is to allow space for future riverside development. The new alignment will be constructed before the original road is altered, to allow continued access through the site. It will therefore be completed at an early stage of construction, and the new offline road will sit on an embankment, until the land is raised in Block C, D, and F.

Traffic will be controlled by traffic lights as construction progresses, and offline sections of road are tied in to Riverside and western sections of Canal Road. Access to the Riverside Tavern will be provided by an access route from Canal Road. The station car park access road will also be realigned to the east.

Again, the newly aligned road will be constructed prior to works to remove the redundant road, to allow continued access to Strood railway station car park. The ramp down to the car park will be 9.5m wide, with a maximum gradient of 1 in 60 and asphalt surface.

6.2 Pedestrian and cycling access

6.2.1 Phase 1

A pedestrian footpath and cycle path will be created along the alignment of the former Esplanade, through the publicly accessible green space. This will be via a 3m wide graded slope ramp, facilitating disabled access into and out of the publicly accessible green space. Access will continue along the river frontage, past the Pump House, and out of the west side of the site, via a 3m wide cycle way and the 1 in 20 gradient ramp. This will adjoin the National Cycle Route 178, which is currently not complete/connected along this section.

6.2.2 Phase 2

Pavements on Canal Road and the access road to the railway station car park will be constructed to allow continued pedestrian use. Temporary fencing will be used during construction to segregate pedestrian access and construction activities. Canal Road pavements will tie into PRoW RR8 to the north-east of the site.

National Cycle Route 1 will also be maintained along Canal Road. The local cycle route along the road between Canal Road and the train station will remain and then be diverted onto the new access road once completed. Another local cycle route along the path, which follows the riverside edge of the pier, will be temporarily removed until it is reinstated after construction. However, National Cycle Route 1 will still allow access through the site at all times.

6.3 Parking

No parking provision is to be provided as a result of the scheme. Any subsequent parking provision will be subject to a separate application.

6.4 Access provision

To summarise, the scheme includes the following access provisions:

- Ramped vehicular access from the A2 (High Street) to the Phase 1 site.
- Ramped vehicular, pedestrian, and cycle access from the A228 (Knight Road) to the Pump House in the Phase 1 site.

- Ramped pedestrian and cycle access to the publicly accessible green space in the Phase 1 site, from the east and west, adjoining National Cycle Route 178 past the Pump House adjacent to Jane's Creek.
- Ramped vehicular, pedestrian, and cycle access along Canal Road to the west of the Phase 2 site, forming part of National Cycle Route 1.
- Ramped vehicular, pedestrian, and cycle access to Strood rail station from Canal Road via ramp, to the west of the Phase 2 site.
- Canal road will tie in to the already raised ground of Riverside, to the east of the Phase 2 site.

7 Sustainability and climate change

Sustainable development has been an important factor influencing the design of the scheme, which has sought to minimise its environmental impact. As a result, important wildlife habitats have been protected and ecological enhancements have been incorporated into the final scheme design. Key to this has been the desire to deliver a scheme that minimises the potential effects on riverine habitats and species, which has been achieved by setting back the flood defences away from the river frontage. Furthermore, direct impacts on the estuarine habitats have largely been avoided by eliminating the need for construction within the River Medway.

In addition, a range of controls will be placed on the construction phase of the scheme to effectively manage the potential risks associated with issues such as noise disturbance and water contamination. These aspects will be carefully managed throughout the construction phase through implementation of construction good practice and a wide range of controls specified in the project Construction Environmental Management Plan (CEMP).

The amenity and recreation value of the area has also been an important consideration, and the scheme has managed to limit impacts on public footpaths and cycle paths. Two national cycle routes pass through the scheme sites and the scheme will deliver enhancements to the cycle network, including completing a currently broken a section of cycle path through the Phase 1 site, and improve public footpaths and green space through resurfacing improvements and landscaping.

Although the scale of the works is relatively large, every opportunity has been taken to propose materials with a low environmental impact (embodied energy) and materials that can be sourced locally (to reduce transport emissions and encourage the local economic growth). This process has been guided by EA's sustainable procurement policy. We have also specified a range of material finishes, favouring styles in-keeping with the local character and nearby developments and offers a tangible landscape enhancement.

The project also delivers a scheme that will make an important contribution to managing the future risks associated with climate change. In the future, flood risk is predicted to increase due to the effects of climate change and sea level rise. This would have a range of negative impacts on local people and property, causing greater damage and increasing community stress and anxiety. The proposed scheme combats this issue by incorporating an allowance for climate change into the defence design level, helping to safeguard the Strood area into the future.

8 Conclusion

This document has been prepared to accompany Full Planning Applications for the proposed Strood Riverside Flood Defence Scheme. It presents information on the design concepts and principles of the proposed scheme and explains the reasoning behind how the design has been developed.

The general scale of the flood scheme has been dictated by the existing tidal flood risk and the requirement to provide a specific standard of flood defence (protection against a 1 in 200-year flood event). However, through a detailed appraisal and understanding of the site and context, a sustainable and comprehensive scheme has been prepared.

Care has been taken to use appropriate materials and design techniques that contribute to developing a 'sense of place' for the Strood area. This includes the use of a consistent palette of

material finishes that reinforce existing characteristics of the area and allow the scheme to blend into its surroundings. For example, hand rail finishes will be matched to nearby recent development in Rochester, across the River Medway.

A key consideration has also been to ensure that the scheme does not adversely affect the landscape character of the river corridors or impact upon the high biodiversity value of these environments.

Maintaining and improving public amenity has also been an important influence on the design process. Existing access routes have been carefully incorporated into the scheme where necessary, whilst ensuring they remain accessible to all users. This includes authorised vehicular users, pedestrians, cyclists, disabled people, the elderly and people with young children. Safe access for personnel carrying out maintenance and inspections of the defences has also been incorporated within the design proposals.

This scheme allows any future development on the sites the flexibility to create an efficient and suitable area, with a reduced risk of flooding, in line with local and national development policies and aspirations. Overall, it is clear that the site offers the opportunity to deliver a well-designed, high quality flood defence for the Strood area. The proposed flood alleviation scheme has clear socio-economic benefits and delivers high levels of accessibility and environmental sustainability.

Offices at

Coleshill
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Newport
Saltaire
Skipton
Tadcaster
Thirsk
Wallingford
Warrington

Registered Office
South Barn
Broughton Hall
SKIPTON
North Yorkshire
BD23 3AE

t: +44(0)1756 799919
e: info@jbaconsulting.com

Jeremy Benn Associates Ltd
Registered in England
3246693

Visit our website
www.jbaconsulting.com