CARDIGAN TIDAL FLOOD RISK MANAGEMENT SCHEME

Volume 4: Non-Technical Summary

Client's project no. CE0587

BUKL project no. 4021883

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Cyfoeth Naturiol Cymru
Natural Resources Wales

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Non-Technical Summary

1 Introduction and background

This Non-Technical Summary (NTS) presents the findings of the Environmental Impact Assessment (EIA) that has been undertaken for the Cardigan Tidal Flood Risk Management Scheme, hereafter referred to as 'the Scheme'. This NTS has been prepared by Binnies UK Ltd (BUKL) on behalf of Natural Resources Wales (NRW).

This NTS provides a summary of the Environmental Statement (ES) and includes an overview of the existing environment, the Scheme, the project development and the potential significant effects of the Scheme upon the environment and local community.

Cardigan is located on the River Teifi (Afon Teifi) in Ceredigion, west Wales (Plate 1). The Strand area of Cardigan on the north bank of the Afon Teifi, which includes residential and commercial properties, is vulnerable to flooding. Flood events occurred in 2007, 2008, 2012 and 2014. In 2007 the lower quayside, including Strand and Cattle Market flooded with flood depths exceeding 0.5m. A tidal flood on 3 January 2014 inundated 29 properties on St Mary's Street. This area will become increasingly vulnerable with predicted future sea levels rise.

The overall aim of the Scheme is to reduce tidal flood risk to approximately 90 properties on the north bank of the Afon Teifi in the Strand area, east of Cardigan bridge, providing protection from floods of up to a 1 in 200 (0.5%) annual chance of occurrence including an allowance for 100 years of climate change.

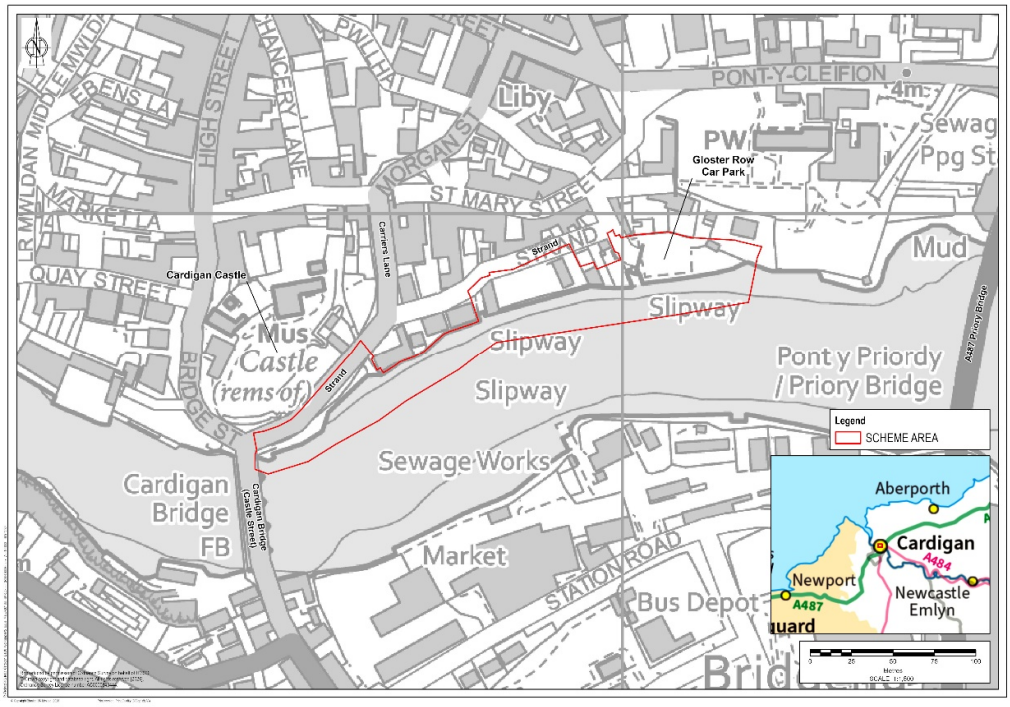


Plate 1 – Scheme Area Location

2 Project description

The Scheme would comprise a continuous flood defence structure designed to fit within the various constraints along the Afon Teifi frontage between Cardigan Bridge (Castle Street) and Gloster Row car park. The defences are designed to protect the area from a major flood event with a one in 200 likelihood of occurrence, taking future climate change into account. To achieve this level of protection, the new structures would generally range between approximately 1.1 to 2 metres above the existing ground level. The Scheme is designed to remain effective for the next 100 years.

The Scheme has been split into Areas 1, 2, 3 and 4 (Plate 2) and the Scheme design elements are described below.

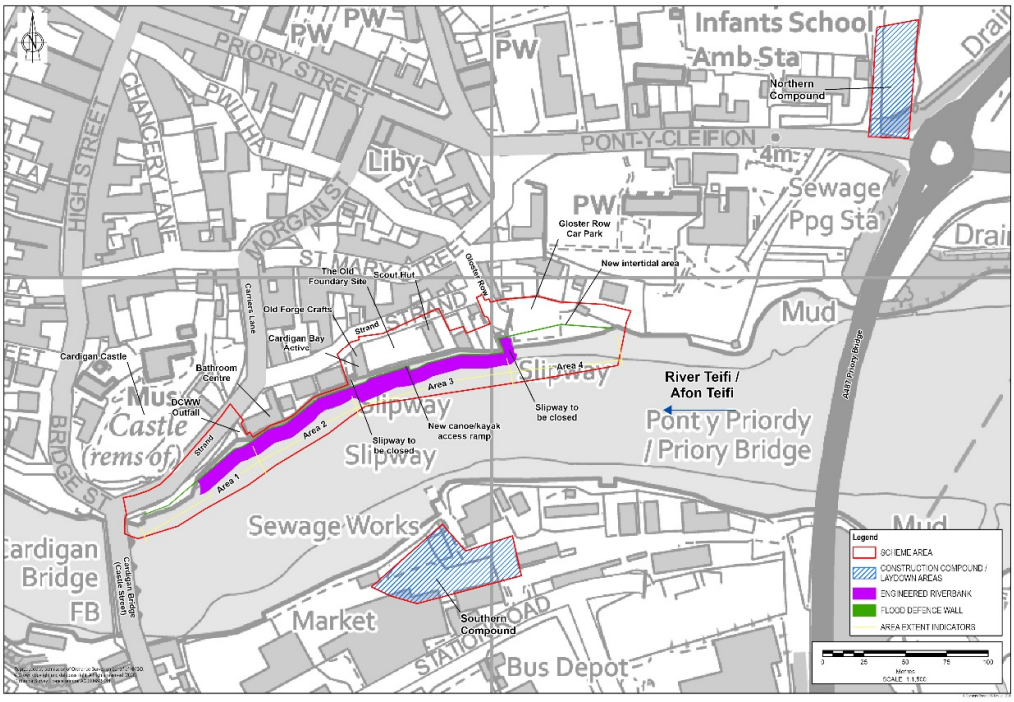


Plate 2 – Scheme Layout

Flood defence wall

The flood defence wall would be approximately 327 metres long. The majority of the wall would be formed from steel sheet piles driven into the riverbed. In Area 1, the first 34 metres of flood defence wall at the western end of the Scheme, would comprise a reinforced concrete wall and foundation. The entirety of the flood defence wall would be clad in stone and capped with a pre-cast concrete coping.

The height of the flood defence wall would vary in height, starting at approximately 1.1 metres at the western end of Area 1 and rising up to 2 metres high. On average the wall would be 1.6-1.7 metres high.

Where the flood defence wall is constructed on the riverward side of the existing wall, the existing wall would be broken down to ground level and the space between the existing wall and the flood defence wall would be backfilled.

There are two slipways currently providing access to the river, these are the Sea Scout's slipway in Area 3 and the Gloster Row slipway in Area 4. Both slipways would be permanently closed. The Sea Scout's slipway would be replaced with a new "up and over" canoe and kayak access ramp in Area 3 (see Plate 2).

Engineered riverbank

On the riverside of the flood defence wall, a new engineered riverbank would be created, extending approximately 10m into the river, to support the steel sheet pile wall. The new riverbank would be constructed using granular fill, a permeable membrane, and protective stone at the base. Rock rolls would be fitted over the entirety of the new riverbank to provide scour protection to the wall and allow for sediment to accrete and intertidal habitats to establish. To promote vegetation growth of the upper third of the new riverbank, which would be covered by tides very infrequently, imported soil would be placed and seeded with a salt tolerant mix of grass and flowering plants.

The new "up and over" canoe and kayak access ramp in Area 3 would be incorporated into the new riverbank meaning that the riverbank would extend approximately 13m into the river in this location.

The design of the new riverbank would lead to an adaptation of the existing habitats which would vary based on how regularly they are covered by the tide. The slope of new riverbank would allow for habitats to migrate upwards as sea level rises increasing the longevity of these habitats being present than if the new riverbank was not there.

Landscape design (Area 1)

Within Area 1 the alignment of the flood defence wall allows for a widening of the pavement along Strand, by removing the existing roadside wall. The widened pavement would be at least 3 metres wide and finished in riven slate to reduce slip risk and visually link Strand with Prince Charles Quay and the Cardigan Castle entrance.

A linear planting bed would be created alongside the road to separate pedestrians from traffic, this would be planted with small shrub and herbaceous species and street trees. A raised planting bed would also be created near the Bathroom Centre planted with taller species. The retaining wall containing the raised planting bed is parallel to Cardigan Castle walls and incorporates integrated seating facing the castle.

A small plateau would remain on the riverward side of the flood defence wall. This would be inaccessible to the public but visible from Strand. This would be seeded with the same salt tolerant seed mix as used on the upper section of the engineered river bank.

Estuarine/riverine habitat creation (Area 4)

Because the new flood defence wall extends into the river a total of 489 square metres of existing intertidal habitat would be permanently lost from the footprint of the wall and the space between it and the existing wall. To mitigate this the flood defence wall in Area 4 would be set back from the river to create new intertidal habitat.

To facilitate the establishment of intertidal habitat the existing upper gabion wall would be removed and the ground levels lowered to levels suitable for regular tidal inundation. This lowered area would include scour protection to ensure that it continues to provide support to

the sheet pile wall. The lower section of gabion wall would be retained with existing habitat that has formed on it. See Plate 3 for locations of upper and lower gabion walls in Area 4.

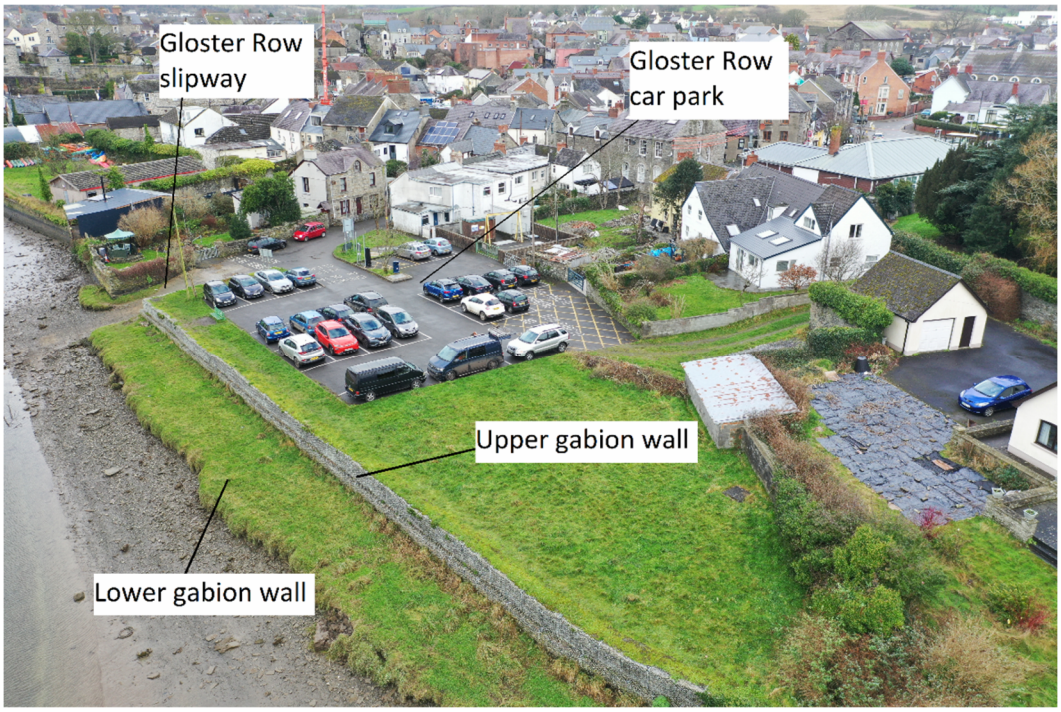


Plate 3 – Location of upper and lower gabion walls in Area 4

A portion of the Gloster Row car park would be lost through the setting back of defences. The remaining car park area has been redesigned to minimise the reduction of car parking spaces. The car park currently consists of 23 spaces including one disabled space, this would reduce to 17 spaces including one disabled space, a loss of 6 car parking spaces.

3 Design development and consideration of alternatives

This section summarises the design decision-making process and demonstrates how environmental considerations have influenced the evolution of the Scheme design and illustrates how the Scheme has been shaped to align with the principles of sustainable development and regulatory compliance.

An options appraisal process was undertaken in two stages (long-list and short-list) prior to the preferred solution being selected. The long-list process narrowed down potentially suitable flood risk management options though a process of appraisal. Following the selection of the preferred long-list option to create new defences, the short-list process utilised multi-criteria analysis and took consideration of public consultation to further develop the Scheme design.

Since the identification of the shortlisted option further design development has continued to refine the design:

- **Alignment of the flood defence**: In Area 3, to reduce construction risks to adjoining building and cost the alignment of the sheet piles was offset slightly towards the river. To mitigate, the alignment in Area 4 was set back further to provide additional habitat mitigation. This resulted in the flood defence wall being located partially within the Gloster Row car park, reducing parking space. Overall, these alignment changes ensure

that the intertidal habitat lost in Areas 1–3, where the new flood defence wall encroaches into the river channel, would be fully mitigated.

- **Engineered riverbank finish**: Several bioengineering options were explored, including the use of rip rap or rock rolls alone, with a seeded growing medium, or with planted coir matting. The preferred approach is to use rock rolls and place imported soil with a salt tolerant seed mix on the upper third and crest of the new riverbank to create a more natural appearance and encourage quicker vegetation growth. Rock rolls were selected because they provide small crevices where sediment can settle, supporting the development of intertidal habitats.

- **Landscape design**: Public-realm improvements are proposed along Strand between Cardigan Bridge and the Bathroom Centre. Two design options were developed: one providing a wider pavement, tree planting and an inaccessible area for biodiversity beside the river; and another offering a larger inaccessible biodiversity area but reduced pavement space and fewer trees. Public consultation carried out by NRW in June 2025 indicated support for the first option, which has been taken forward.

Carbon reduction during design process

To minimise embedded carbon and construction-phase emissions, the Scheme has been developed with a focus on low-carbon design choices and efficient construction methods. A carbon calculator was used to assess material impacts. The highest carbon cost in terms of materials is expected from the sheet piles, concrete infill and rock rolls used to form the flood defence and new engineered riverbank, with smaller carbon costs from granular fill and aggregates, stone facing and copings.

Design decisions that lower the Scheme's carbon footprint include aligning the flood wall close to the existing river wall to reduce fill requirements, shortening sheet piles through use of an engineered riverbank, and re-using engineered granular fill from the temporary haul route within the new permanent riverbank. Designing the defences for a 1 in 200-year standard with climate change allowance and a 100-year design life also reduces the need for future upgrades, while proposed tree planting would contribute to carbon absorption. During construction, emissions would be further minimised by using Euro VI-compliant vehicles and Stage V-compliant plant where feasible.

4 Embedded mitigation and environmental enhancements

As the design of the Scheme has been developed the mitigation measures and enhancements have been incorporated. Embedded mitigation and enhancements incorporated into the Scheme design are:

- Enhanced public realm within Area 1, including widening of pavements and provision of tree planting.

- Use of stone filled bags to increase the rate of sediment deposition and habitat establishment on the engineered riverbank. Additionally, the upper third of the engineered riverbank, where inundation would be less frequent, would include a seeded growing medium to further aid the rate of establishment on this part of the new riverbank.

- Setting back the flood defence wall in Area 4 and lowering existing ground levels to create an area for the establishment of estuarine/riverine habitats.
- Use of suitable stone cladding for the finish of the flood defence wall.
- Inclusion of a new boat ramp within Area 3 to maintain canoe/kayak access to the water for the Sea Scouts and other permitted users.

These mitigation measures and enhancements are illustrated on the Environmental Masterplan provided at the end of this NTS.

5 Consultation summary

NRW has carried out consultation throughout the development of the Scheme. Consultations have provided an opportunity for key organisations and stakeholders, including landowners, members of the public and other interested parties to inform the design of the Scheme, and to consider what they regard as key issues and priorities. In turn, consultation has allowed NRW to gain a clearer understanding of the main issues to be considered at an early stage.

The following consultation has been carried out:

- Public consultation in November 2022 focussed on the short-list options appraisal. Respondents generally preferred the option which would lead to improvements in public realm features.
- Public consultation in June 2025 focussed on the options for public realm improvements in Area 1. Preference was voiced for the option with wider pavements and greater tree planting.
- Consultation with technical specialists from NRW and Ceredigion County Council on the design of the Scheme and proposed environmental mitigation.
- Formal pre-application consultation (7 April to 18 May 2026).

6 Construction compounds and access

Two proposed temporary compound areas would be used for plant/material storage and housing welfare units during construction works.

The proposed Northern Compound would be located on the northern side of the Afon Teifi, off Pont-y-Cleifion Road. This compound area would be used as the main compound and laydown area for the works. This area has been proposed as it is an existing area of hardstanding which is close to the A487 turn off, which would allow access for large vehicles.

The proposed Southern Compound would be located on the southern side of the Afon Teifi off Station Road.

Construction traffic routes are shown on Plate 4. Access would primarily follow Pont-y-Cleifion, Morgan Street and Carrier's Lane to reach Strand and a laydown area in Area1. Vehicles would exit via Cardigan Bridge (Castle Street) on to the B4546 before either turning onto Station Road for the Southern Compound or rejoining the A487. This would ensure construction vehicles avoid the town centre. Traffic travelling to the Southern Compound may alternatively remain on the A487 and turn onto the B4546, providing flexibility while minimising disruption.

Temporary traffic management measures would be in place throughout the works to ensure safe access. These measures would include temporary lane closures (Strand) during key activities, suspension of on street parking, use of banksmen and traffic marshals, timed deliveries and a construction delivery management system.

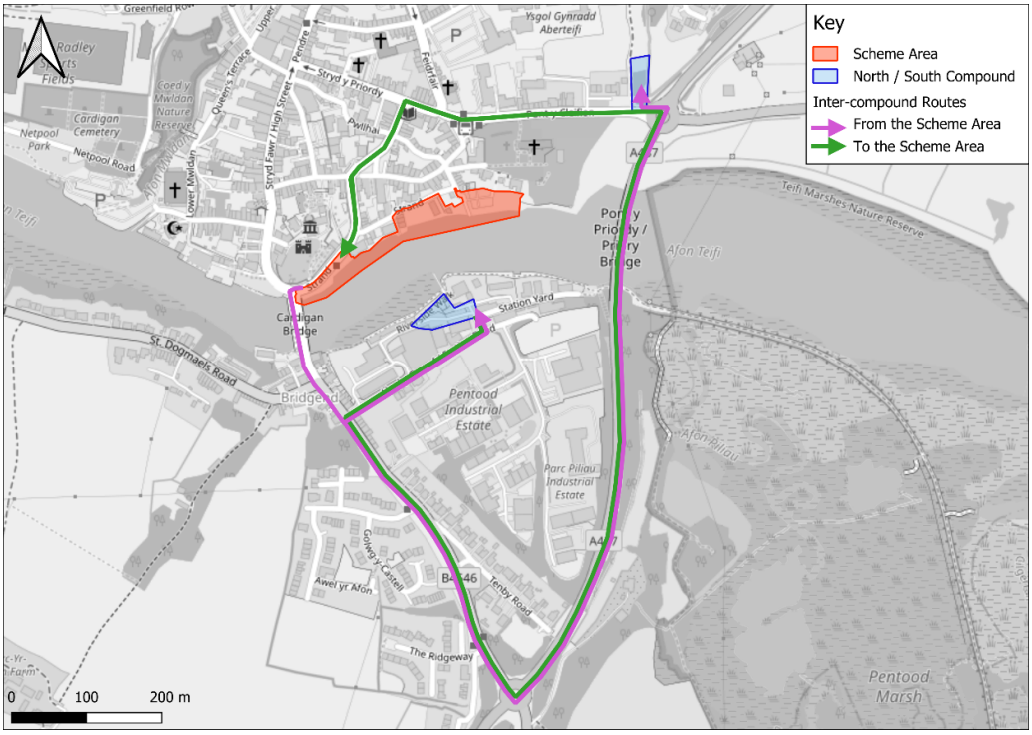


Plate 4 – Proposed construction traffic routes

7 Programme

It is expected that construction works would start in early 2027, once all approvals have been attained, and take approximately 18 months to complete. Construction durations are estimates and are dependent on the appointed contractor and their detailed construction approach.

The proposed construction working hours would be governed by Ceredigion County Council and are typically expected to be limited to daytime on weekdays between 0730 and 1800 during the summer and 0800 and 1630 during winter months due to decreased daylight hours. If weekend working is permitted, this would likely take place on Saturdays between 0730 and 1300. Activities within the site compounds may continue outside of the main construction activity hours. Riverside works would have to take place during suitable tide conditions for the specific task and so may need to be programmed for outside of normal working hours. No piling would take place outside of normal working hours. Out of hours works, if required, would be agreed in advance with the Local Authority Environmental Health Officer.

8 Assessment of effects for population and human health

Existing environment

The town of Cardigan is located on the southwestern edge of Ceredigion County, with Pembrokeshire being located to the south of the town. Existing infrastructure in the Scheme Area includes the current flood defences, residential and commercial buildings along the

northern riverbank, Gloster Row car park and the existing slipway/river access point at Gloster Row car park. Strand and Castle Street are roads located within the Scheme Area which provide access for local traffic to the town centre. Strand is a one-way road constrained by Cardigan Castle Scheduled Monument and the Afon Teifi. Perpendicular to Strand is Castle Street / Cardigan Bridge which is a narrow two-way road crossing the Afon Teifi.

The Strand area on the north bank of the Afon Teifi is highly vulnerable to tidal flooding, with notable events recorded in 2007, 2008, 2012 and 2014, affecting homes and businesses with flood depths exceeding 0.5 m. Many properties have low thresholds and are exposed to annual flooding, with risk expected to increase due to future sea level rise. The Scheme Area lies within the Cardigan Teifi Lower Super Output Area (LSOA), which has experienced relatively stable population levels but is among the 10% most deprived areas in Wales according to the Welsh Index of Multiple Deprivation (WIMD), with high levels of income and housing deprivation.

Cardigan benefits from the Afon Teifi, which supports a wide range of recreational uses including boating, canoeing, angling, and walking. Several footpaths, cycle routes and active-travel corridors run close to the river, though none fall within the Scheme Area. Slipways within the Scheme Area at Gloster Row car park and near to the Sea Scouts building provide access to the water, and the river is busiest in summer, supporting leisure craft and tourist boat trips. The town also hosts annual river-based events, including the Cardigan River and Food Festival and the Mermaid Race. These recreational and community assets contribute positively to local wellbeing and the town's identity, and maintaining access to river views and heritage features such as Cardigan Castle and Cardigan Bridge is an important consideration.

Plate 5 – View of Cardigan Castle and Strand from Cardigan Bridge

Potentially significant effects

Construction works have potential to cause negative effects for around 18 months on residents, businesses, community groups and amenity users from:

- Nosie and vibration, particularly when installing sheet piles
- Traffic noise and disruption (see also Traffic and Transport)
- Closure and diversions of footways along Strand

- Permanent closure of the two slipways in the Scheme Area and reduction in size of Gloster Row car park
- Disruption to river navigation.

Construction works can also provide a temporary positive effect on the local economy due to increased trade.

Once completed, the Scheme would provide the permanent, positive effects of a reduction to flood risk and an enhanced public amenity area on the south side of Strand opposite Cardigan Castle.

Mitigation and monitoring

As part of the works, a Construction Environmental Management Plan (CEMP) would be developed and followed. The main approach for managing noise and vibration would be the application of Best Practicable Means (BPM). Where significant negative effects are still predicted after the application of standard BPM, or at particularly sensitive receptors, additional mitigation measures would be implemented as appropriate. The specific details of these measures would be finalised by the construction contractor and approved via the CEMP, or a specific Noise and Vibration Management Plan, prior to works commencing.

A community liaison strategy would be developed and followed during construction, which would include liaison with users of the existing slipways in the Scheme Area.

Engagement with Afon Teifi Fairways Ltd (ATFL), who operate the river, would continue throughout construction to ensure that mitigation measures are implemented.

Residual effects

Due to construction noise, significant temporary noise effects are predicted at approximately 21 dwellings during the most intensive works, even with the application of Best Practicable Means (BPM).

Due to vibration caused by construction, significant temporary vibration effects are predicted at approximately 22 dwellings. However, these predictions assume standard impact/vibratory piling. The adoption of modern "resonance-free" piling rigs and pre-augering is expected to significantly reduce these levels in practice.

Two groups of commercial buildings (Cardigan Bathroom Centre, Old Forge Crafts / Cardigan Bay Active) may experience vibration levels exceeding the guideline values for assessing risk of cosmetic building damage. A vibration risk assessment should be undertaken for these specific buildings prior to piling works commencing.

There would be permanent negative effects on amenity access due to the closure of the two slipways in the Scheme Area and reduction in size of Gloster Road car park. However, the new “up and over” canoe and kayak access ramp would retain access to the river for the Sea Scouts and other permitted users.

The local economy is expected to experience a temporary positive effect due to increased trade during the construction phase.

Once operational the Scheme would provide a significant positive outcome for residents and businesses due to the reduction in flood risk and through the public realm enhancements along Strand.

9 Assessment of effects for biodiversity and nature conservation

Existing environment

A range of habitats are present within the Scheme Area including broadleaved scattered trees, shrub, amenity grassland and poor semi-improved grassland with wildflowers on the landward side of the existing river wall, and running water (Afon Teifi), intertidal mudflats and saltmarsh on the riverward side (

Plate 6). The intertidal mudflats and saltmarsh have been impacted by human activity, presence of slipways and the deposition of ballast stone from vessels.

Otters are known to use the Afon Teifi in the Scheme Area, and fish species including Atlantic salmon, sea trout, European eels, river lampreys and sea lampreys use and migrate along the river between Cardigan Bay and the freshwater reaches of the Afon Teifi. Marine mammals may also move up the Afon Teifi as far as Cardigan. The intertidal mudflats and saltmarsh support waterbirds and invertebrate species. There are bat roosts in Cardigan Castle and bats forage in the Scheme Area including along the Afon Teifi, but bats are likely to be affected by light spill from the current street lighting along Strand (Plate 7).

Plate 6 – View looking west from Gloster Row car park slipway showing the existing river wall, shrub and fronting mudflat

Plate 7 – Light spill onto Afon Teifi from Strand, view towards Cardigan Bridge from east

The Scheme Area is partially within two statutory designated sites:

- Afon Teifi SSSI: habitats and species of special interest that are relevant to the Scheme Area are the range of river types, associated riverside habitats and protected species including flowering plants, otter, Cetti's warbler, bottlenose dolphin, fish, dragonflies and a variety of other invertebrates as well as both breeding and wintering bird communities.

- Afon Teifi Special Area of Conservation (SAC): designated habitats and species relevant to the Scheme Area are otter and the fish species Atlantic salmon, bullhead, river lamprey and sea lamprey.

In addition, the Cardigan Bay SAC and West Wales Marine SAC are located immediately adjacent to the Scheme, downstream of Cardigan Bridge (Castle Street). Designated species relevant to the Scheme Area are bottlenose dolphin, Atlantic grey seal, sea lamprey, river lamprey and harbour porpoise.

Potentially significant effects

The Scheme requires a new flood defence to be built on the riverwards side of the existing river wall, resulting in the loss and adaptation of existing intertidal habitats. The Scheme design includes a section of set-back flood defence to provide replacement intertidal habitat. The engineered riverbank in front of the new sheet pile wall has been designed to enable intertidal habitats to develop on it, including with future sea level rise, with salt-tolerant estuarine vegetation provided on sections of bank above current tide levels.

The Scheme would result in localised changes to terrestrial habitats with an existing area of grassland with wildflowers adjacent to Gloster Row car park lost to the new intertidal habitat,

and removal of some broadleaved trees and shrub. Replacement native tree planting and ornamental planting in a new amenity area on Strand opposite Cardigan Castle is proposed as part of the Scheme design. The Scheme design also includes altering the street lighting on Strand to reduce light spill and effects to nocturnal species.

Construction works, especially noise and vibration from installing sheet piles into the river bed, could cause harm and disturbance to species using the Afon Teifi, including migrating fish and otter. Without mitigation there is predicted to be temporary negative effect from aquatic noise and vibration on diadromous migratory fish species (Atlantic salmon, sea trout, European eels, river lampreys and sea lampreys), some of which are designated features of Afon Teifi SSSI, Afon Teifi SAC and Cardigan Bay SAC and West Wales Marine SAC.

Mitigation and monitoring

In water, augering and piling should not be undertaken between March and December inclusive, to avoid the season when migratory fish are moving along the river. Augering and piling are permitted between March and December only during periods when the tidal level is below the level of the piling works area.

In addition to the seasonal in water restrictions, it is recommended that soft starts are used for piling activities.

Residual effects

With seasonal and tidal working restrictions being followed, there would be no significant residual effects on Biodiversity and Nature Conservation. The Scheme incorporates measures to maintain the extent and quality of intertidal habitats and terrestrial habitats as an integral part of the design.

10 Assessment of effects for historic environment

Existing environment

Cardigan contains a rich concentration of heritage assets, reflecting Cardigan's long and complex history. Although no Scheduled Monuments or listed buildings lie directly within the Scheme Area itself, the surrounding area includes three Scheduled Monuments (Cardigan Bridge, Cardigan Castle and Cardigan Town Walls), 36 listed buildings and the Grade II registered historic park and garden at Cardigan Castle.

Almost all of the Scheme lies within the Cardigan Conservation Area, a highly valued historic townscape recognised for its medieval origins, Georgian and Victorian architecture, riverside setting and strong cultural associations. The Scheme Area is also part of the Lower Teifi Valley Landscape of Special Historic Interest.

Although many archaeological sites are recorded in the wider Teifi catchment area, the archaeological potential for the EIA study area was considered to be low for the prehistoric, Roman and early medieval periods. Cardigan was definitively established as a castle and settlement during the medieval period, and therefore there is considered to be heightened potential for medieval and post-medieval archaeological sites. Within the Scheme Area there is an increased potential for medieval activity around the northern bridgehead, below the castle walls, although no specific features are recorded in this area.

Plate 8 – Existing view of Cardigan Bridge from Strand

Potentially significant effects

Construction activity in the vicinity of Cardigan Bridge has the potential for unintentional direct impacts to this heritage asset. Direct impacts would also occur to elements of Cardigan Conservation Area although these are not anticipated to alter the value of the Conservation Area. Additionally, there would also be visual setting impacts to these designations.

Once constructed the presence of the Scheme in close proximity to Cardigan Bridge and Cardigan Castle would have visual setting impacts to these designations.

Mitigation and monitoring

A Project Design for archaeological mitigation has been developed which includes archaeological monitoring and recording of any ground disturbing works that may reveal archaeological deposits. This Project Design would be updated prior to construction starting.

The design of the Scheme has incorporated measures to avoid and reduce impacts on historic designations, of note is the landscape design in Area 1 which would reduce effects on the visual setting of Cardigan Bridge and Cardigan Castle.

Residual effects

With mitigation, the proposed Cardigan Tidal Flood Risk Management Scheme would not have any significant negative effects on the historic environment.

11 Assessment of effects for landscape and visual

Existing environment

The Scheme is located on the periphery of the non-statutory designated Special Landscape Area (SLA) 7: Teifi Valley, which follows the course of the Afon Teifi through Cardigan, and is

defined for its distinctive and coherent sinuous river valley. The Scheme is located partly within Cardigan Conservation Area which lies on the north bank of the Afon Teifi, key features of which are the prevalence of historic buildings, medieval street layout, prominent Cardigan Castle and historic importance of the Afon Teifi.

The landscape around the Scheme reflects the mix of historic townscape and natural river scenery that characterises Cardigan, along with some more modern commercial buildings particularly on the south bank of the river. Landscape Character Area (LCA) 1 (Cardigan urban area) covers the town centre, where traditional buildings, narrow streets and views toward landmarks such as Cardigan Castle give the area a strong local identity, though some modern buildings weaken its historic character. Along the river itself, LCA2 (River and intertidal habitat) is defined by open mudflats, saltmarsh and a quiet, natural feel at low tide, creating a strong contrast with the surrounding town and forming an important part of the estuary's protected habitats. South of the river, LCA4 (Southern enclosed slopes) represents the steep, rural hillside around St Dogmaels, where winding lanes, wooded slopes and small fields create a more enclosed and tranquil landscape with occasional elevated views back towards Cardigan. Together, these areas form the local landscape baseline, which is expected to gradually change in future as rising sea levels reduce how often the mudflats in LCA2 are exposed.

Since the Scheme is centrally located in Cardigan along the river, a wide range of people currently experience views of the riverbanks, including residents, walkers, cyclists, drivers, local workers, visitors to Cardigan Castle and people using the river itself. Visibility is largely contained within the river corridor due to the Scheme's location in a built up area, where buildings provide screening. This includes views from bridges crossing the river, and from footpaths, homes and workplaces along the riverbanks. Whilst there are some elevated views towards the Scheme from surrounding high ground to the south and east, they are localised and individual built structures are not easily discernible at this distance. Overall, the baseline visual environment combines attractive historic townscape with natural river scenery, though existing modern structures, walls and mixed materials mean parts of the river edge already have a fragmented appearance.

Potentially significant effects

Significant effects are considered to be likely for a limited number of landscape and visual amenity receptors during both the construction and operation phases of the Scheme. Significant effects are considered likely to one landscape character area receptor, LCA2 River and intertidal habitat, during construction and operation. Effects during construction arise from disturbance and disruption to landscape character from construction plant and materials but would be short-term. Effects during operation arise from the adaptation of mudflats, which are a key characteristic of this area, to an engineered riverbank designed to allow for intertidal habitats to develop. This would result in the loss of the characteristic flat and open nature of the current mudflats, and this effect would be permanent.

Significant effects are considered likely to three visual amenity receptor groups during construction, and two during operation. The visual amenity receptor groups likely to experience significant effects during construction are residents of homes on the north bank of the Afon Teifi, pedestrians on Strand, Cardigan footbridge, Bridge Street and Prince Charles Quay, and individuals and groups using the river. Effects during construction arise from views of construction plant and materials but would be short-term. Receptor groups likely to experience significant effects during operation are users of recreational open spaces on the north bank of the Afon Teifi and pedestrians on Strand, Cardigan footbridge, Bridge Street and Prince Charles

Quay. Effects during operation largely arise from the loss of views which would be blocked by the flood defence, and these effects would be permanent. All these receptor groups are in immediate or close proximity to the Scheme.

All except one significant effect are considered to be negative. The exception is the impact to visual amenity of pedestrians along Strand, Cardigan footbridge, Bridge Street and Prince Charles Quay, during operation of the Scheme, who would experience both the positive impact of the public realm enhancements along Strand, and the negative impact of the loss of river views. The overall effect on this receptor is considered to be neutral, i.e. a combination of both positive and negative impacts.

Mitigation and Monitoring

Embedded mitigation has reduced the impacts of the Scheme on landscape and visual amenity receptors, notably the cladding of the flood defence wall in a material similar to that of Cardigan Castle, use of an engineered concrete wall coping to reduce the wall height compared to use of natural stone coping, seeding of the upper section of the engineered riverbank and the public realm enhancements along Strand.

No mitigation in addition to that embedded into the design of the Scheme is proposed. The identified effects cannot be prevented, as construction of the flood defence is a matter of public safety. The engineered riverbank is required to structurally stabilise the flood defence wall, and the flood defence wall must be built to a height sufficient to reduce flood risk. Construction impacts cannot be prevented, though would only be temporary.

Residual effects

Since no mitigation is proposed the effects as described above do not change.

12 Assessment of effects for traffic and transport

Existing environment

The roads around Cardigan comprises mainly of residential/town centre roads with low speed limits and carry light to moderate traffic. Good pedestrian facilities such as footpaths and crossings are present, and public transport is available through local bus stops. Accident records show very few incidents in recent years, with no particular safety concerns.

Potentially significant effects

The assessment considered the effect of increased HGV movements along construction routes, notably along Morgan Street, Carrier's Lane and Strand which is subject to low numbers of HGV movements currently. While construction would result in higher HGV flow along these roads the increase is considered to be imperceptible.

During construction there would be a partial road closure of Strand, a suspension of on-street parking and a closure of the bus stop (see Plate 9). This would allow cars to continue to be able to travel along Strand connecting to Bridge Street and Cardigan Bridge (Castle Street), rather than prohibiting traffic flow entirely.

Plate 9 – Extent of temporary road closure, parking restrictions and bus stop closure on Strand

Mitigation and monitoring

An outline Construction Traffic Management Plan (oCTMP) is submitted in support of the planning application. This provides a framework of the construction traffic routing, site access, delivery of materials, construction working hours and management and monitoring measures.

The oCTMP would be developed into a final CTMP by the appointed construction contractor. It would set out measures to avoid, minimise or against traffic and transport related impacts and includes procedures to manage movement of workers and HGVs. It would also outline the routing strategy for the Scheme construction traffic, conditions survey requirements and onsite construction activities (e.g. wheel washing).

Residual effects

With mitigation, the proposed Cardigan Tidal Flood Risk Management Scheme would not have any significant negative effects from traffic and transport.

13 Assessment of effects for water environment

Existing environment

Originating from Llyn Teifi in the Cambrian Mountains, the Afon Teifi flows southwest through predominantly rural uplands before passing through Cardigan and discharging into Cardigan Bay. The catchment is largely rural, with land use comprising agriculture, forestry, and upland moorland.

Within Cardigan itself, the Afon Teifi is transitional, both tidally and fluvially influenced, connecting both the marine and freshwater systems. Existing bank protection comprising of stone walls and gabions restricts natural processes and the ability of the channel to migrate.

The riverbed is mostly made up of fine sediments forming mudflats, with patches of saltmarsh along the northern bank.

Two key tributaries, the Afon Piliau and the Afon Mwldan, enter the Afon Teifi upstream and downstream of the Scheme Area respectively. Several other minor drains and watercourses discharge into the Teifi upstream and downstream of the Scheme.

The underlying geology comprises low-permeability mudstones with limited groundwater movement, while more permeable superficial alluvial and tidal deposits potentially support shallow groundwater close to the river.

Potentially significant effects

The assessment of effects is informed by a Water Framework Directive (WFD) Compliance Assessment.

Construction would temporarily impact the riverbed and intertidal areas where the haul road and new defences are built. The haul road would be converted to form the new engineered riverbank resulting in a loss of intertidal habitat. However, the design of the new engineered riverbank would allow a form of intertidal habitat to develop and support biodiversity in the long-term.

Overall, the changes are expected to be small and localised, with no deterioration of the wider waterbody's condition.

During operation, the Scheme would cause only very small changes to water movement, with modelling showing no meaningful effects on how fine sediments are moved or on the overall tidal behaviour of the estuary. The small reduction in tidal volume caused by the new flood wall and engineered riverbank would be balanced by the creation of new intertidal habitat where the defence alignment is set back in Area 4, meaning no noticeable change to the overall tidal behaviour of the estuary.

Mitigation and monitoring

During construction standard good practice for working in or near water would be applied and would include measures to avoid sediments entering the water and measures to minimise the area of river bed impacted by the works. Measures would be included in the CEMP.

Automated water quality monitoring both upstream and downstream of the works area would trigger limit alerts to determine whether construction activities are negatively impacting the Afon Teifi. If limits are exceeded, then works in the river would stop until conditions recover.

Residual effects

The WFD Compliance Assessment found that the Scheme would not result in a deterioration in water quality during construction or operation.

The loss of intertidal habitat is unavoidable, therefore in the short-term the negative impact of this would remain. However, in the long-term the design of the engineered riverbank and creation of new intertidal habitat would have a positive effect.

14 Assessment of effects for land use and soils

Existing environment

The Strand area of Cardigan has been built up over time using reclaimed material. This made ground comprises a mix of gravel sized fragments of concrete and brick, clay with mudstone gravel and other materials of human origin (e.g. slate and ceramic fragments). Historically, industrial land uses within the Scheme Area include a smithy, known as "The Old Foundry", along with a sawmill and timber yard on the southern bank of the river. River sediments are understood to have been affected by this historic industrial activity.

Potentially significant effects

Construction works within the river and in made ground have the potential to lead to contaminants entering the river. During works within the river there is the potential to disturb riverbed sediments which could lead to metals or hydrocarbons (encountered in very low concentrations in river sediments) to enter the river. Excavations within made ground, for example at Gloster Row car park, have the potential to lead to contact with the river. Should excavations be left open in the intertidal zone due to an unforeseen event contaminated sediments could enter the river during high tide.

During construction there is also the potential for construction workers to come into contact with made ground and localised contamination.

Mitigation and monitoring

Various mitigation measures are proposed to reduce the likelihood of contamination effects from occurring. Measures include the use of silt curtains, careful excavation practices, and strict pollution-prevention controls. Risk assessments would be completed and followed for the appropriate handling, testing, and disposal of any contaminated or asbestos-bearing soils. All construction workers would wear appropriate Personal Protective Equipment (PPE) and have access to welfare facilities.

Groundwater and surface water quality monitoring would be undertaken to demonstrate that the water environment is not negatively impacted by the Scheme.

New habitat works and clean material placed along the foreshore would also help break potential contamination pathways and protect future users.

Residual effects

With mitigation, the proposed Cardigan Tidal Flood Risk Management Scheme would not have any significant negative effects related to soil and land contamination.

15 Assessment of effects for cumulative effects

An assessment of cumulative effects with other existing, planned, or future developments was completed. One other development, the re-development of the former Cardigan Hospital site on Pont-Y-Cleifion, was identified as potentially having cumulative effects with the Scheme, whereby construction for both projects could overlap. The construction programme for the former Cardigan Hospital site is unknown. In the event that the two developments do take place simultaneously, it is considered unlikely that there would be any significant cumulative

construction traffic effects, as no significant effects have been identified within this ES. However, construction traffic planning for the Scheme would need to take account of any works that are also happening at the former hospital site.

In the event that the two developments do take place simultaneously, it is recommended that the proposed construction noise mitigation should be reviewed to determine the need for further mitigation measures for properties located between the two developments.

The assessment of cumulative effects also considered potential interactions between topic assessments. This is where effects assessed within one topic have the potential to interact with another topic (e.g. noise effects assessed under Population and Human Health interacting with Biodiversity). Each topic assessment was reviewed for potential interactions. No further interactions between effects were identified that had not already been assessed within their respective topic assessments.

16 Summary

The Cardigan Tidal Flood Risk Management Scheme would have a major positive and permanent effect of reducing flood risk for approximately 90 properties on the north bank of the Afon Teifi. The Scheme will also provide the following benefits:

- Enhancement of the public amenity area along Strand
- Long-term support to biodiversity due to the engineered riverbank enabling intertidal habitats to migrate upwards in response to sea level rise
- Reduced human disturbance to intertidal habitats
- Reduction in flood risk to heritage assets
- Reduced potential for environmental pollution during and following a flood event
- Employment of local contractors and increase in trade for local shops and businesses during construction.

The EIA identified a number of potential negative effects on the environment and, where possible, measures to avoid or minimise these effects have been included in the project design. Measures to minimise the scale of effects that cannot be avoided have been developed and recorded in an Environmental Action Plan, which is included within the ES.

Despite the application of mitigation, a small number of significant negative environmental effects would remain, most of which are temporary and related to the disturbance effects of construction. The construction of the flood defence is considered to have a significant negative effect on the landscape character and visual amenity for a limited number of receptors which cannot be avoided as construction of the flood defence is a matter of public safety. However, public realm enhancements along Strand will improve this area for pedestrians and those waiting for the bus.

17 Environmental Action Plan

An Environmental Action Plan (EAP) has been prepared which sets out the activities needed to protect the environment during each stage of carrying out the Scheme. All the mitigation and monitoring measures identified in the EIA are included in the EAP.

The EAP would be updated as planning permission, marine licence and other consents and permits are attained to include any conditions set out in those permissions. The updated EAP would then be used as a live document which would be updated regularly to record actions that have been completed or to add new actions that may become required.

An Environmental Clerk of Work would be appointed to ensure the EAP is followed, and environmental and ecological compliance audits are carried out.

18 Next steps

Upon receipt of the planning application and marine licence application, including this Environmental Statement, Ceredigion County Council and NRW Marine Licencing Team will ensure that the publicity requirements for the respective applications are met. Statutory and non-statutory consultees, including members of the public, would have the opportunity to comment on the proposal.

The ES and all supporting information will be available for review during the planning and marine licencing determination periods. This will be available on the Ceredigion County Council planning website (https://www.ceredigion.gov.uk/resident/planning-building-control-and-sustainable-drainage-body-sab/planning-applications/) and NRW Marine Licence public register (https://naturalresources.wales/permits-and-permissions/public-register-environmental-permitting/?lang=en). Physical copies will be provided at Cardigan Library, Council Offices, Morgan St, Cardigan SA43 1DG.

Any objections to, or other comments about, the proposals should be sent to Ceredigion County Council and/or NRW Marine Licensing Team to help inform their decision. In line with the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017, Ceredigion County Council must determine the planning application within 16 weeks of its submission (unless agreed otherwise). There are no statutory timescales for determining marine licence applications, however it is expected that this will be at least four months.

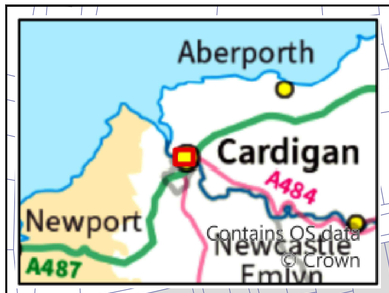
If you would like any further information about the Cardigan Tidal Flood Risk Management Scheme, please email:

cynllunllanwaberteifi@cyfoethnaturiolcymru.gov.uk

or write to:

Natural Resources Wales
Plas Gwendraeth
Heol Parc Mawr
Crosshands Business Park
Cross Hands
Llanelli
Carmarthenshire
SA14 6RE

19 Environmental Masterplan



Key to mitigation and enhancement types

B Biodiversity
H Health and wellbeing of the local community
A Amenity and sense of place
P Pollution, air quality & noise
C Climate change resilience

-M Mitigation
-E Enhancement
-M/E Mitigation and enhancement

Shade-tolerant wildflower meadow mitigates for semi-improved grassland lost. **B-M**

Up-and-over boat ramp with flood gate providing access to the river mitigates for slipways closed. **H-M, A-M**

Lighting changes along Strand improves connectivity between habitats for foraging and commuting bats and other species. **B-E**

New seating along Strand improves accessibility for pedestrians and bus stop users. **H-E, A-E**

Use of slate paving and slate walls along Strand integrates the space with its surroundings and improves public perception. **A-E**

Roadside planting improves diversity between habitats; improves wellbeing; and enhances sense of place. **B-E, H-E, A-E**

GLOSTER ROW CAR PARK

OLD FOUNDRY SITE

BATHROOM CENTRE

CARDIGAN CASTLE AND GARDENS

Bridge Street and High Street facilities 50m

STRAND

BUS STOP

Prince Charles Quay 40m

CARDIGAN BRIDGE

Constructed riverbank enhances diversity within a habitat and mitigates effects of climate change on intertidal habitats. **B-M/E, C-M**

Creation of intertidal habitat avoids net intertidal habitat loss. **B-M**

Creation of littoral mud and rock habitat avoids net intertidal habitat loss; and improves connectivity with mud and rock habitat downstream. **B-M/E**

AFON TEIFI / RIVER TEIFI

Flood defence wall clad with slate enhances the historic environment and its setting; and mitigates landscape and visual impacts. **A-M/E**

Wall height minimised through coping design mitigates separation from the river. **A-M**

Planting within raised bed mitigates visual impacts. **A-M**

Widened pavement along Strand improves accessibility and promotes walking; and maximises visibility of heritage assets. **H-E, A-E**

Street tree planting mitigates for trees lost; provides shade for foraging and commuting bats; improves wellbeing; enhances sense of place; and absorbs pollutants and carbon. **B-M/E, H-E, A-E, P-E, C-E**

Continuity of planting palette across planting beds enhances sense of place. **A-E**

Maintaining views of Cardigan Castle mitigates historic environment and visual impacts. **A-M**

St Dogmaels 1.2 km

Teifi Marshes 500m

PENTOOD INDUSTRIAL ESTATE

STATION ROAD

10m 0m 10m 20m 30m
Scale: 1:500

Central grid reference: SN 17932 45940

Note: The limits, including the height and depths of the Works, shown in this drawing are not to be taken as limiting the obligations of the contractor under Contract.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
IN ADDITION TO THE HAZARDS OR RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, THE FOLLOWING SIGNIFICANT RESIDUAL RISKS SHOULD BE NOTED. FURTHER DETAILS ARE INCLUDED IN THE CDM DESIGN RISK MANAGEMENT REGISTER
CONSTRUCTION :
NOT FOR CONSTRUCTION
MAINTENANCE, CLEANING AND OPERATION :
NOT FOR CONSTRUCTION
DECOMMISSIONING OR DEMOLITION :
NOT FOR CONSTRUCTION

Legend

- Scheme Area
- Flood defence wall
- Important views from Cardigan Castle Registered Park and Garden
- Littoral mud and rock habitat
- Afon Teifi / River Teifi
- Habitats of Principal Importance: Saltmarsh and Mudflats
- Area of new intertidal habitat
- Salt-tolerant estuarine vegetation
- Wildflower meadow
- Ornamental planting
- New trees
- Existing tree cover
- Existing Public Right of Way
- Wales Coast Path
- Ceredigion County Council Active Travel Network Route
- Access route connection to Scheme and distance from Scheme Area
- State paving along Strand
- Slate walls along Strand
- New seating location

Rev	Drawn	Chkd	Rvwd	Apprvd	Date	Description
P01	HR	TD	AB	AH	16/01/26	For review and comment
P02	HR	HJR	AB	AH	26/03/26	For client acceptance
P03	HR	HJR	AB	LJM	27/03/26	For client acceptance

Designed by: Date:

Status
S2 Suitable for Information

Client
Cyfoeth Naturiol Cymru Natural Resources Wales

Client Project No. | Revision

Binnies UK Limited
Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR, UK.
Tel: +44(0)1737 774155

Project
CARDIGAN TIDAL FRMS DETAILED DESIGN

Drawing title
ENVIRONMENTAL MASTERPLAN

Drawing scale: 1:500 Sheet size: A1

Drawing no. 4021883-BUK-ZZ-00-DR-L-00004 | Revision P03

IN PROJECTWISE