

CARDIGAN TIDAL FRMS

Marine Licence Method Statement

Client's project no. CE0587

BUKL project no. 4021883

Prepared for:

Natural Resources Wales

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Revision P03



Cyfoeth Naturiol Cymru
Natural Resources Wales



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1. Scheme Overview

1.1 Introduction

Natural Resources Wales (NRW) has commissioned Binnies UK Ltd to act as the agent responsible for the preparation of the Marine Licence application, including the method statement and other supporting documents listed within section 1.4.

The Cardigan Tidal Flood Risk Management Scheme (TFRMS), hereafter referred to as the 'Scheme', is located towards the centre of Cardigan town, Ceredigion, in west Wales. The nearest postcode is SA43 1EX. The Scheme is positioned along the right bank (northern bank) of the River Teifi (Afon Teifi), which flows east to west. The Scheme covers an approximate distance of 327m length of the right bank on the Afon Teifi, upstream of Cardigan Bridge, and is located to the southeast of Cardigan Castle. The Scheme is divided into four areas (1-4). The location of the Scheme is shown on the Location Plan provided in Appendix A.

The permanent works are bound to the west by Castle Street (SN 177 458) and to the east by Gloster Row car park (SN 180 459) as shown in Figure 1.



Figure 1 – Western extent of the Scheme adjacent to Cardigan Bridge (left) and Eastern extent of the Scheme adjacent to Gloster Row car park (right)

Existing infrastructure in the 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.

1.2 Project description

Scheme overview

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 flood defences need to achieve a consistent level of 4.95mAOD to provide the scheme design standard of 1 in 200 annual exceedance probability (AEP) with allowance for climate change, which would make the structures up to approximately 2m tall

above general ground level (though lower in some sections). The Scheme would have a design life of 100 years.

The proposed flood defence would be composed of sheet piles, with a reinforced concrete wall for a section in Area 1. The sheet piles would be supported on the riverside by an engineered riverbank. Within the central area there is a proposed boat ramp to enable canoe/kayak access to the water for the Sea Scouts and other permitted organisations. The existing slipway/river access points at (SN179459) and Gloster Row car park would be removed. Towards Cardigan Bridge (Castle Street) there would be further improvements to the street scene.

The construction of the flood defence wall in Areas 1-3 would lead to the permanent loss of approximately 489m² of intertidal habitat as the wall must encroach into the river channel to avoid existing buildings. This would be mitigated through the setting back of flood defences in Area 4 to create an equal area for the establishment of intertidal habitats. The construction of the new riverbank would lead to an adaptation of approximately 1,946m² of existing habitats.

The majority of the proposed Scheme elements would be located below the Mean High-Water Springs so would be partially submerged for the majority of the time.

Area 1

Area 1 is located on the north bank of the Afon Teifi and is immediately upstream of Cardigan Bridge, and adjacent to Strand. This is a walled-off roadside area extending between the bridge and an existing bathroom centre showroom (see Figure 2).



Figure 2 – Aerial images of Area 1

Existing structures within Area 1 include a Welsh Water (DCWW) (The Mart SPS) discharge chamber at the east end, adjacent the bathroom centre, masonry walls and access steps, roadside and plateau area.

The Scheme elements within Area 1 would include a new flood defence wall section which would be on average approximately 1.4m in height relative to the existing ground level on the dry side of the wall and 76m in length. The alignment of this would start from approximately 10m east of the bridge parapet where the wall would be approximately 1.1m high, continuing between the existing roadside wall and the river side wall. Where the existing river side wall curves inland the proposed flood wall would cross to the river side and continue through to the river side of the existing bathroom centre retaining wall where the wall will have risen to approximately 2m high. A flood gate through the flood defence wall would be provided to facilitate access for DCWW at the Mart SPS discharge chamber for periodic inspections of the

headwall on the riverward side of the defence. This flood gate would remain closed under normal conditions and would only be opened by DCWW to access their asset.

The first 34m of flood defence wall east of the bridge parapet, between the existing roadside wall and the river side wall, would comprise a reinforced concrete wall and foundation. The flood defence wall would be clad with stone (approximately 150mm on each side).

The remaining 42m of flood defence wall in Area 1 would be formed out of steel sheet piles (approximately 5.5m long) sunk into the riverbed by approximately 0.55m. The flood defence wall would be capped and clad with stone (approximately 150mm on each side) and would be in keeping with the materials used within the nearby Cardigan Bridge Scheduled Monument.

To support the 42m long sheet pile wall an engineered riverbank would be constructed on the riverside of the proposed flood defence wall within Area 1.

The engineered riverbank has been designed to achieve a consistent profile, helping to reduce sheet pile requirements along the Scheme. The engineered riverbank also provides the opportunity for a range of intertidal habitats to establish on the banks. Further detail of the design development and reasoning is described in Environmental Statement (ES) Chapter 2: Project Development. As illustrated in Figure 3, the riverbank across the majority of the Scheme is a uniform profile with a 1m wide crest at a height of approximately 2.95mAOD and a gradient of 1V in 2H down to the riverbed with a rip rap toe, in total extending approximately 10m into the estuary.

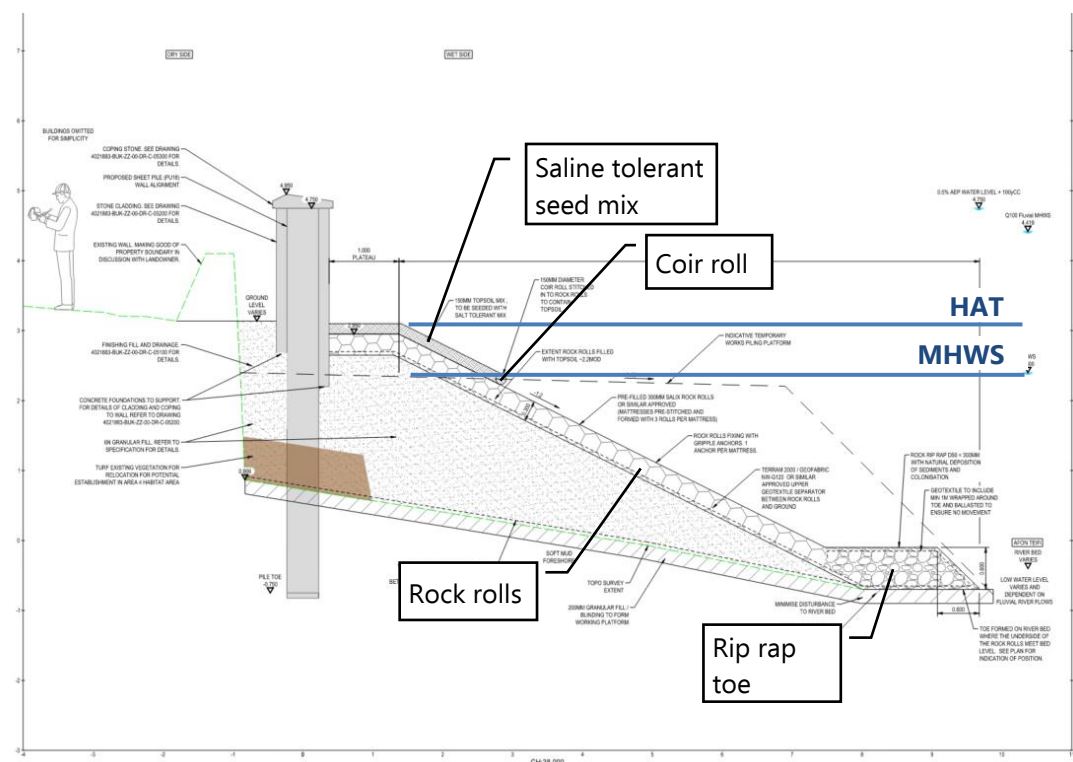


Figure 3 – Typical engineered riverbank section

The existing riverbank wall would be removed or buried to enable the construction of the new flood defence. The new engineered riverbank would involve the use of granular fill, a permeable

geo-textile membrane and rip rap (large durable stones to prevent erosion and scouring) at the bottom of the engineered riverbank slope. Rock rolls (to prevent erosion and scouring) would be placed on the lower slope to approximately two thirds of the height, this section of the new riverbank would be regularly inundated by the tide and accrete with sediment with intertidal habitats establishing over time. The remaining upper third of the slope and crest of the engineered riverbank would incorporate a seed mix and imported soil to promote a more natural finish as this section of the new riverbank would be inundated by the tide infrequently. This seeded soil would be placed over the rock rolls which would extend up the upper third of the slope and crest providing the required engineered scour protection to protect the new riverbank. As vegetation develops on the rock rolls this would further enhance the scour protection. To hold soil in a place while the seeded vegetation establishes on the upper slope a single line of coir rolls would be installed, these coir rolls would not be planted.

Within Area 1, the space landside of the flood defence wall would be backfilled and would provide a new public amenity area. The pavement along Strand would be widened by removing the existing roadside wall and from setting the flood defence wall away from the road. The new footway would be at least 3m wide and finished in riven slate to reduce slip risk and visually link Strand with Prince Charles Quay and the Cardigan Castle entrance. The slate surface would continue to the Strand–Cardigan Bridge junction.

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. Three seats are proposed with a combination of backrests, armrests and at different seat heights to facilitate use by users with differing accessibility needs.

A small plateau would remain on the riverward side of the proposed 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 riverbank. A gate and steps to allow maintenance access to the plateau would be installed between the western end of the flood defence wall and the existing wall to the west of the Scheme.

Area 2

Area 2 extends east along the riverside from the bathroom centre showroom to the east end of the Bathroom Centre warehouse. A number of commercial units are located directly north of Area 2 which are directly adjacent to Strand.

Within Area 2, existing structures include masonry river walls retaining the raised ground in which the bathroom centre showroom, offices and warehouse are located (see Figure 4).

The Scheme elements within Area 2 would include a new section of flood defence wall which continues from Area 1. This would be approximately 1.6m in height relative to the existing ground level on the dry side of the wall and approximately 70m in length. This would be offset from the riverside of the existing wall. The proposed flood defence wall would be capped, and the exposed faces would be stone clad (approximately 150mm on each side). The space behind the flood defence wall would be backfilled, burying the existing wall, and would provide an access corridor (approximately 0.5-1.66m wide) to enable future access to the neighbouring commercial properties.



Figure 4 – Aerial images of Area 2

The flood defence wall would be formed out of steel sheet piles (approximately 5.5m long) sunk into the riverbed by approximately 0.55m. The lower 3m of the sheet pile above the riverbed would be supported and buried by a new engineered riverbank section (extending approximately 10m into the estuary at a gradient of 1V in 2H) and the rip rap toe extending a further 2-3m, however these figures are subject to vary depending on riverbed levels, which would replace the existing riverbed profile. The new riverbank would involve the use of granular fill, a permeable geo-textile membrane and rip rap at the toe of the engineered riverbank slope. Rock rolls would be placed on the lower slope to approximately two thirds of the height. The remaining upper third of the slope and crest of the engineered riverbank would incorporate a seed mix and growing medium to promote a more natural finish, and an engineered scour protection to protect the engineered riverbank.

Area 3

Area 3 is located between the slipway adjacent to the Sea Scouts boat house and the slipway at Gloster Row car park. This area spans the Old Forge Crafts, Cardigan Bay Active, Scout field/ the old foundry site, the Scout hut, Teifi House, garage/office building, and the Gloster Row slipway, which are all located along Strand (see Figure 5).



Figure 5 – Aerial images of Area 3

Similar to Area 2, there is a masonry river wall retaining the ground which includes the properties above. The Scheme elements within Area 3 would include a new section of flood defence wall which continues from Area 2, approximately 106m long and varying between approximately 1.7-1.9m high relative to the existing ground level on the dry side of the wall. The flood defence wall would be formed out of steel sheet piles (approximately 5.5-12.5m long)

sunk into the riverbed by approximately 0.55-7.5m. The lower 3m of the sheet pile above the riverbed would be supported and buried by a new engineered riverbank section (extending approximately 10-13m into the estuary at a gradient of 1V in 2H) which would replace the existing riverbed profile. The new riverbank would involve the use of granular fill, a permeable geo-textile membrane and rip rap at the toe of the engineered riverbank slope. Rock rolls would be placed on the lower slope to approximately two thirds of the height. The remaining upper third of the slope and crest of the engineered riverbank would incorporate a seed mix and growing medium to promote a more natural finish, and an engineered scour protection to protect the engineered riverbank. The engineered riverbank would tie into the regraded ground at the existing Gloster Row car park where the defence is set back inland from the water's edge.

The alignment of the wall would be offset towards the riverside of the existing walls to minimise damage to existing structures in the area. Works may still temporarily affect the existing Scout hut and further to the east a structure which overhangs the existing river wall. The potential demolition and associated dust management mitigation measures for the partial demolition of this structure (if required) are outlined within ES Chapter 5: Population and Human Health. Towards the Gloster Row slipway Teifi house is further set back from the defence works.

Due to the alignment of the proposed flood defence wall, the existing slipway used by the Sea Scouts and other permitted organisations would need to be closed. To ensure that access to the Afon Teifi would be retained for these groups, the Scheme would provide a new up and over canoe/kayak access ramp to the south of the Old Foundry site.

Area 4

Area 4 extends between the Gloster Row slipway and the property boundary wall at the eastern end of the Gloster Row car park. Area 4 includes the car park and a small area of grassland to the east of the car park (see Figure 6).



Figure 6 – Aerial images of Area 4

Existing structures within Area 4 include a two-level gabion wall retaining ground at Gloster Row car park, the Gloster Row slipway and the existing DCWW pumping station (Cardigan No. 2) infrastructure.

The Scheme elements within Area 4 would include a new set back flood defence wall section (approximately 1.3m high and 75m in length). The wall would be formed out of steel sheet piles (between approximately 5.5m and 13m long) sunk into the riverbed by between 0.55m and 7.95m. Exposed faces of the flood defence wall would be clad with stone (approximately 150mm on each side). The existing public slipway at Gloster Row car park would also be permanently closed, however it is understood that this is not regularly used and is not required for emergency services to access the river.

1 DRAWING: 05000 FOR DETAILS

PILE (PU) ALIGNMENT

1 DRAWING: 05000 FOR DETAILS

3.949 (VARIES)

1.000 BERM WIDTH

2.800

2.300

1.800

0.800 APPROX. GABION WIDTH

1.836

0.5% AEP WATER LEVEL + 100ycc

4.750

G100 Fluvial MHWS

4.413

MHWS

2.620

SOFT MUD ON FORESHORE

HABITAT AREA WIDTH VARIES

PROTECT EXISTING HABITAT

HABITAT AREA TO COLONISE NATURALLY

EXISTING GROUND REMOVED

500MM TOPSOIL (AVERAGE)

EXISTING GABION BASKET/MATRIX RETAINING WALL TO BE REMOVED

FOUNDATION OF GABIONS UNKNOWN

RETAIN EXISTING GABIONS/MATRIX

PRE-FILLED 300MM SALIX ROCK ROLLS OR SIMILAR APPROVED

SCRAPE

SWALE

HUMP

TERRAM 2000 / GEOTEXTILE OR SIMILAR APPROVED UPPER GEOTEXTILE SEPARATOR BETWEEN ROCK ROLLS AND GROUND

PILE TOE 0.750

1 SUPPORT CLADDING REFER TO JR-C-05100 AND 05300

DRAINAGE: 05100 FOR DETAILS

CH 38.000

Gloucester Row slipway

Gloucester Row car park

Upper gabion wall

Lower gabion wall

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 in car parking spaces. The car park currently consists of 23 spaces including one disabled space, this would reduce to 16 spaces including one disabled space, a loss of 7 car parking spaces.

It is anticipated that setting back the proposed flood defence wall would allow for the creation of approximately 489m² of new intertidal habitat within Area 4, mitigating for the losses within Areas 1-3 where the wall alignment encroaches out into the estuary.

1.3 Marine policy

Applicable marine policy has been reviewed and documented within the Welsh National Marine Plan Signposting Document which has been submitted to support this marine licence application.

1.4 Supporting documents

- Cardigan TFRMS Environmental Statement (Binnies UK Ltd, 2026a)
- Cardigan TFRMS Screening for Potential Coastal Squeeze (NRW, 2026)
- Draft Marine Invasive Non-native Species Biosecurity Risk Assessment and Management Plan (Binnies UK Ltd, 2026b)
- Cardigan TFRMS Welsh National Marine Policy Signposting Plan (Binnies UK Ltd, 2026c)
- Cardigan TFRMS Water Framework Directive Compliance Assessment (Binnies UK Ltd, 2026d)
- Cardigan TFRMS Habitat Regulations Assessment (APEM, 2026)
- Cardigan TFRMS Navigational Risk Assessment (Binnies UK Ltd, 2026e)
- Design and Access Statement - 4021883-BUK-ZZ-00-RP-EN-00030 (Binnies UK Ltd, 2026f)

Supporting drawings

- Cardigan TFRMS Location Plan – 4021883-BUK-ZZ-00-DR-EN-00005
- General Arrangement Plan – 4021883-BUK-ZZ-00-DR-EN-00008)
- Environmental Masterplan - 4021883-BUK-ZZ-00-DR-L-00004
- Environmental Constraints and Opportunities Plan (ECOP) – 4021883-BUK-ZZ-00-DR-EN-00020
- Design Drawings:
 - Design and Access Statement - 4021883-BUK-ZZ-00-RP-EN-00030
 - Wall coping stones - 4021883-BUK-ZZ-00-DR-C-05300
 - Cladding detail - 4021883-BUK-ZZ-00-DR-C-05200
 - Embankment standard cross section - 4021883-BUK-ZZ-00-DR-C-05000
 - Area 1 proposed plan and long section - 4021883-BUK-ZZ-00-DR-C-01001

- Area 1 setting out - 4021883-BUK-ZZ-00-DR-C-01003
- Area 1 wall tie-in west and plateau steps - 4021883-BUK-ZZ-00-DR-C-01100
- Area 1 RC wall cross section - 4021883-BUK-ZZ-00-DR-C-01105
- Area 1 pile wall cross section - 4021883-BUK-ZZ-00-DR-C-01250
- Area 1 DCWW outfall - 4021883-BUK-ZZ-00-DR-C-01300
- Area 2 proposed plan and long section - 4021883-BUK-ZZ-00-DR-C-02001
- Area 3 proposed plan and long section - 4021883-BUK-ZZ-00-DR-C-03001
- Area 3 boat ramp plan and long section - 4021883-BUK-ZZ-00-DR-C-03200
- Area 3 boat ramp flood gate details - 4021883-BUK-ZZ-00-DR-C-03300
- Area 4 proposed plan and long section - 4021883-BUK-ZZ-00-DR-C-04001
- Area 4 car park layout - 4021883-BUK-ZZ-00-DR-C-04400

2. Methodology

2.1 Estimated timings and durations of works

It is expected that the proposed construction works would commence in spring/summer 2027, once all approvals have been attained, and would take approximately 18 months to complete. Construction durations are estimates and are dependent on the appointed contractor and their chosen construction methodology.

The proposed construction working hours would be governed by Ceredigion County Council (CCC) and are typically expected to be limited to daytime on weekdays between 0730 and 1800. If weekend working is permitted, this would likely take place on Saturdays between 0730 and 1300. Activities within the 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.

A summary of the main works components in consecutive order and their approximate durations is detailed within

Table 2-1. Construction activities would overlap, for example completion of sheet pile installation in one area would be followed by concrete pours and stonework cladding while sheet pile installation continues in subsequent areas. It is anticipated that the flood defence/new riverbank works would begin within Area 4, working back towards Area 1 to allow for access along the haul route throughout the works.

Table 2-1 – Works components and their approximate durations

Element	Duration
Mobilisation / demobilisation	2 weeks
Installation of haul roads / temporary piling platform	6 months
Sheet pile installation	2 months
Concrete pours	2 months
Stonework cladding	4 months
Copings	1 month
Remove/regrade piling platform	3 months
Rip rap	1 month
Landscaping	1 month
Various reinstatements	2 weeks

2.2 Sequence of works

The construction methodology for each component of the proposed works is outlined below in the proposed order of construction. All works components below would be constructed once the site compounds have been established.

(a) Installation of temporary haul roads / temporary piling platform

A haul road and temporary piling platform would be constructed on the river side of the existing walls in Areas 1–4 to provide access to the construction area for the proposed flood defences. The haul road would allow for access to the narrow working area without the need to transport materials and plant across the Afon Teifi, which would reduce the potential risk of disturbance and pollution to the river. Materials and plant would be transported directly to the installation locations using this methodology which would simplify the construction logistics.

The haul road and piling platform would be constructed from engineered granular fill, comprising Class 6I and 6G inert material, in accordance with Specification for Highways works. A geotextile separator would first be laid over the foreshore to protect underlying soft materials and reduce migration of fine sediment. The granular material would be placed in compacted layers by a 13–20 t tracked excavator, beginning in Area 1 and progressing upstream to Area 4. Compaction would be subject to vibration monitoring. The working width of the platform would generally be 7m wide to accommodate piling rigs and material transport vehicles and the full width of the platform at around 9-10m, shown in red on Figure 9. The working platform would act as the primary haul route for plant and materials during construction and would later be incorporated into the engineered riverbank.

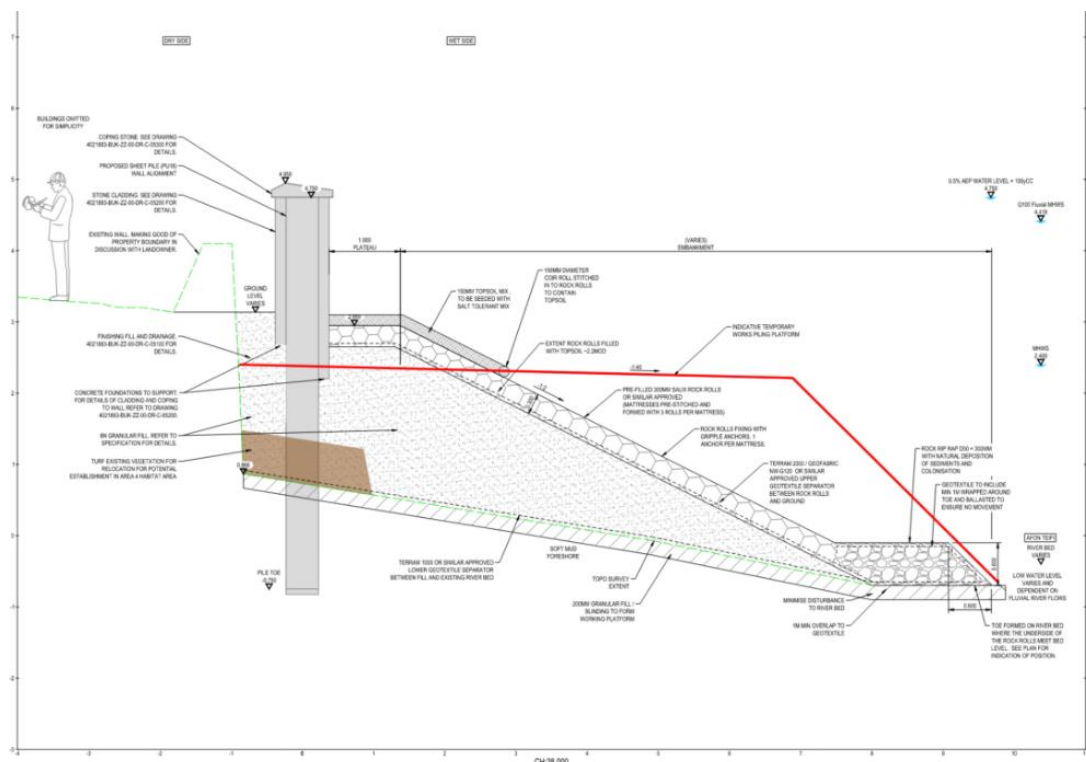


Figure 9 – Typical cross section of the engineered riverbank with red line showing the indicative extent of the proposed temporary piling platform

Key considerations for implementing granular fill on the foreshore and haul routes include:

- Detailed temporary works design, confirming platform stability under tidal inundation, bearing capacity for haulage vehicles, and integration with obstruction removal and piling operations.
- Flood risk management planning, maintaining existing masonry walls as flood protection during haul route construction and sequencing wall removal with immediate pile installation supported by temporary barriers or cofferdams.
- Environmental approvals and marine licensing, demonstrating no negative impacts on river hydraulics, sediment dynamics, water quality, or ecology.

These works are expected to be tide-dependent and would need to be scheduled around low-tide windows for safe placement.

(b) Sheet pile installation

To facilitate the construction of the Scheme elements, the existing river walls in Areas 1-2 would need to be removed where they conflict with the new pile line. The removal of existing stone filled gabions would also be required. The existing wall would be removed using excavators with hydraulic breakers from the granular fill platform. These proposed works would occur immediately ahead of piling in small sections to maintain stability. Fill and retained ground behind the walls would be trimmed back or battered locally to enable access to the pile face and subsequent cladding. Removed materials would be either stockpiled for reuse (if suitable) or loaded directly into wagons for off-site disposal.

Ground investigation data for the Scheme indicates that the made ground along the north bank of the Afon Teifi is highly variable and contains sandy/silty gravels, frequent cobbles and boulders and occasional buried construction debris / fill materials.

This variability poses a high risk of pile refusal, misalignment, or damage during installation if obstructions are not adequately identified and managed. Effective obstruction management is therefore a critical enabler for successful piling installation.

To undertake piling within the Scheme area, proof digging and pre-augering may need to take place in accordance with the contractors' Obstruction Management Strategy. Proof digging would involve excavation along the proposed pile line to expose and remove obstructions before piling works can commence. Pre-augering would involve drilling along the pile line to loosen dense soil strata, penetrate cobbles, and reduce pile driving resistance. This Obstruction Management Strategy would:

- Reduce refusal risk for hydraulic driving.
- Maintain pile alignment and clutch integrity, critical for seepage cut-off performance.
- Improve construction safety and programme certainty by minimising unforeseen refusal delays.

This Obstruction Management Strategy was provided as advisory guidance to support detailed construction planning, risk assessments, and contractor method development during the next design stage. Final approaches should be confirmed through contractor input, temporary works design, and environmental approvals.

Piling would be undertaken starting within Area 4, working back towards Area 1 to retain access.

A combination of a Movax side-grip rig and leader rig would be utilised depending on the ground conditions encountered on site. For example, if a side grip rig proves to not have sufficient power or counterweight to push piles into the ground, a leader rig would be required.

Movax Vibro-driving (Side-grip Rig)

A Movax side grip piling rig uses a hydraulic hammer mounted on an excavator to drive sheet piles into the ground. Vibro-driving using Movax side-grip piling rigs mounted on excavators could be feasible in the following areas due to access restrictions and limited working space:

- The castle slipway and public car park, where open working platforms and haul routes are available.
- Locations where vibration impacts are acceptable and structural receptors are less sensitive.

Movax Vibro-driving (Leader Rig)

Vibro-driving uses a vibratory hammer to install sheet piles by reducing friction along the pile shaft, allowing penetration under self-weight and vibration-induced settlement. Movax side-grip rigs mount the vibro hammer on an excavator arm, providing a compact, flexible setup suitable for constrained sites.

A Movax vibro piling rig is considered to be the most practical installation method for the Scheme Area due to the following reasons:

- Flexibility to install piles individually, without needing reaction piles, enabling installation along complex alignments with bends or split lines.
- Suitability for operation in restricted working widths typical of Strand frontage, supporting efficient installation in narrow riverbank areas.
- Faster installation rates, improving programme certainty and reducing the duration of works in sensitive public and heritage environments.

(c) Concrete pours

Following installation of the sheet piles and prior to cladding works, a reinforced concrete toe would be cast at the base of the new wall to provide structural support and protection against scour. The toe would also form the foundation for the stone cladding and would improve durability at the tidal interface.

The concrete toe would be pumped in sequential sections, typically 6–8 m in length, to suit tidal working windows and formwork logistics. Localised excavation would be required at the toe of the pile wall, particularly where the toe would be recessed into the foreshore or behind the removed river wall (e.g. in Areas 1 and 3).

(d) Stonework

The stone cladding would be installed following completion of the concrete toe. Each cladding panel or unit would be fixed to the pile face using brackets, ties, or adhesive systems.

(e) Copings

Coping stones would form the uppermost element of the wall, capping the new sheet piles and providing a durable and visually appropriate edge finish. These would be pre-cast concrete, installed with mechanical dowels or fixings and bedded on mortar or high-strength adhesive. The installation would be carried out from the temporary foreshore haul route rather than the landside, due to access constraints.

As the wall spans approximately 323m, coping works would progress in sections following cladding completion and full cure of the concrete toe. Interface with hard landscaping or fencing would be completed afterward from the landside, where access permits.

(f) Remove / regrade piling platform

The piling platform and haul road would be re-profiled to form the base of the engineered riverbank. Excess granular fill would be removed and recycled or re-used elsewhere within the Scheme.

(g) Engineered riverbank finish

A permeable geotextile membrane would be placed onto the graded granular fill. Rip rap would be placed at the toe of the new riverbank slope. Rock rolls would be placed on the slope and crest of the new riverbank. Imported soil would be placed on the upper third of the slope and

crest of the new riverbank and the seed mix for an estuarine/salt-tolerant environment would be sown to aid vegetation growth on these upper areas which are inundated less frequently by the tides. To hold the soil in a place on the upper slope a single line of coir rolls would be installed, this coir roll would not be planted.

The seed mix will be tailored for an estuarine/salt-tolerant environment. The specification for this seed mix is to be confirmed by the client. These works are expected to be tide-dependent and would need to be scheduled around low-tide windows for safe placement.

(h) Various reinstatements and landscaping

Upon completion of construction reinstatement, landscaping works for Area 1 and the redesign of Gloster Row car park would take place. Reinstatement of temporary works areas would return the site to the same or better condition than before construction and would be completed in accordance with landowner agreement. The landscaping works at Area 1 would be an improvement on existing conditions.

(i) Riverbank regrading (Area 4)

At Area 4, the upper gabion wall would be removed and the ground, including a portion of the car park, reprofiled to create an area for tidal inundation, allowing for intertidal habitats to establish. The lower gabion wall would be retained as the gabion baskets contain saltmarsh species. Stripping of topsoil would occur first, followed by excavation to formation level using an excavator working from the land side. Rock rolls would be placed to form a mattress across the area which would then be covered by approximately 0.5m of imported soil. Localised changes in topography across the area would be created to facilitate the establishment of intertidal habitat. Selected materials may be reused as fill in other areas or spread on site subject to environmental approval.

2.3 Plant and machinery

The size of plant as described in the sections above, may vary slightly depending on the Contractor chosen methodology. If considered significantly different following the tendering and appointment of the Contractor, this will be communicated to the relevant consenting authorities.

2.4 Access, compounds and working areas

As shown on the Location Plan (Appendix A), there are two proposed temporary compound areas which would be used for plant/material storage and housing welfare units during construction works. The exact boundaries of the construction compounds will be determined by the contractor once appointed and therefore may be smaller than those shown on the Location Plan (Appendix A).

The proposed northern compound would be located on the northern side of the Afon Teifi, just to the north of the Pont-y-Cleifion Road (SN 18239 46106). This compound area would be used as the main compound and laydown area for the works on the northern bank of the Afon Teifi. This area has been proposed as it is close to the A487 turn off, which would allow access for large vehicles. This site has previously been used as a construction compound for other infrastructure projects in Cardigan and therefore comprises an existing hard standing area.

The proposed southern compound would be located on the southern side of the Afon Teifi (SN 17973 45829), adjacent to an existing slipway which could be used to access the river.

The proposed access route to the northern side of the Afon Teifi would follow Pont-y-Cleifion and down Morgan Street and Carrier's Lane to reach Strand. This route has been selected as it passes the northern compound area and allows for transit towards a laydown area located in Area 1. Construction traffic bound for the southern compound area would continue across Cardigan Bridge (Castle Street) onto the B4546 before turning onto Station Road. Alternatively, instead of entering the town centre via Pont-y-Cleifion, construction traffic bound for the southern compound area can continue along the A487 before turning off on the B4546.

2.5 Estimated material quantities and vehicle movements

Approximate material volumes and vehicle movements for the construction phase of the Scheme are detailed within Table 2-2.

Table 2-2 – Approximate material volumes and vehicle movements

Works element	Quantity	Vehicle Movements	Comments/assumptions
Sheet piling	1,806m ²	8 articulated wagons (40t)	Could depend on size loads to site and potential for efficiencies such as double handling etc.
Granular fill / piling platform	1,1763t	655 tipper wagons (20t)	Based on piling platform for full length. Single access.
Granular fill (removal)	8,853t	492 tipper wagons (20t)	Overburden for piling matt and over dig for granular base. Could reduce but no allowance made for other disposal.
Rip rap	2,450t	137 tipper waggons (20t)	-
Stone facing	1,062t	59 tipper wagons (20t)	Based on 300mm thickness as per drawings (150mm per side).
Copings	163t	5 artic wagons (40t)	Based on thickness as per drawings.
Concrete	793m ³	133 concrete wagons	Assumes concrete fill to piles down to foundation level.
Other disposal	Unknown	Potential need for 20 tipper waggons (20t)	May be some disposal but it is assumed based on the current design this would be fairly minimal.
Other vehicles	N/A	12-18 light vehicles	Peak numbers likely to increase towards 18 when works overlap.

2.6 Waste generation

Following the tendering and appointment of the Contractor. The Contractor will be responsible for producing a Site Waste Management Plan.

3. Environmental Mitigation

3.1 Environmental mitigation

Construction Environmental Management Plan

Prior to the works, a Construction Environmental Management Plan (CEMP) would be developed, embedding mitigation recorded within the ES and the EAP to ensure that environmental impacts are avoided and minimised during construction. The CEMP would detail mitigation measures specific to the construction phase and help to demonstrate the Scheme's commitment to environmental protection and sustainability.

The CEMP would include various management plans which contain best practice guidance and mitigation measures for certain environmental topics including:

- Noise and Vibration Management Plan (NVMP);
- Dust Management Plan (DMP) including all agreed IAQM Dust Management mitigation measures;
- Construction Traffic Management Plan (CTMP) based on the outline CTMP (oCTMP). To include requirement for access to be maintained to properties adjoining Gloster Row car park;
- Pollution Prevention Plan (PPP) including mitigation listed within the WFD Compliance Assessment and ES Chapter 11;
- Lighting Plan (LP);
- Biosecurity Management Plan (BMP);
- Fish Rescue Plan (FRP);
- Invasive Species Management Plan, to include measures to manage Japanese knotweed observed at entrance to Northern Compound;
- Arboricultural Method Statement incl. Tree Protection Plan;
- Materials Management Plan; and
- Soil Management Plan.

The CEMP would also include measures requiring the monitoring of weather and potential flood events, and contingency measures to be put in practice in the event of flooding.

Aquatic Noise and Vibration

- No in-water augering or piling activities would be undertaken between 1 March and 31 December (inclusive), except where such activities are undertaken from a dry working platform in dry conditions, such that no augering or piling plant or equipment operates within the water column. For the avoidance of doubt, incidental contact between installed piles and groundwater or tidal water within the substrate shall not constitute

in-water working. Between 1 January and 28 February (inclusive), when these seasonal restrictions would not apply, any in-water activities augering or piling activities would be limited to daylight hours (defined as the period between sunrise and sunset minus any specific working time restrictions as specified within the project Environmental Action Plan).

- In addition to the seasonal in water restrictions above, soft starts are to be used for piling activities. This involves the gradual and incremental increase in piling power until full operational power is reached and provides fish the opportunity to move away from the noise source before the onset of full power.

River navigation mitigation

Due to the proximity of the Scheme to the River Teifi, specific mitigation measures have been developed to promote the safety of river users during the construction phase, as informed by the Navigational Risk Assessment (NRA). Mitigation measures include:

- Establishing an exclusion zone within the River Teifi which includes the northernmost arch of Cardigan Bridge to prevent canoes and kayaks from entering the exclusion zone.
- Developing a community liaison strategy which includes liaison with Afon Teifi Fairways Limited (ATFL) and users of the existing slipways in the Scheme Area, including Sea Scouts.

Biodiversity

Mitigation measures to avoid or minimise the disturbance or harm to protected species which have been developed within Chapter 6 of the ES and the Appropriate Assessment include:

- Implement best practice biosecurity measures such as check, clean, dry to minimise the risk of accidental spread of Invasive Non Native Species (INNS), as detailed within the Biosecurity Risk Assessment and Management Plan.
- Erection of fencing to prevent unauthorised access to ecologically sensitive areas, e.g. terrestrial and intertidal habitats within the SSSI and SAC adjacent to the works area and access routes (as specified by a Suitably Qualified Ecologist (SQE));
- Development of a Precautionary Working Method Statement (PWMS) which will detail appropriate working methods and mitigation designed to minimise the risk of disturbance to protected habitats and species;
- Pre-works checks to be undertaken by an SQE for the following species:
 - Amphibians and reptiles – hand searches of any areas of tall vegetation or refugia (logs or stone) which will be disturbed by the works.
 - Invasive Non-Native Species (to be undertaken within March - October)
 - European otter – to be undertaken immediately prior to the start of works.

- Potential Roosting Feature for Bats: trees (T3 and T4) to be checked by a SQE prior to the start of works. If evidence of bats is found, further mitigation shall be advised by the SQE.
- A pre-works survey of the two construction compounds is also required to confirm any additional actions.
- Undertake vegetation clearance and the blocking/removal of crevices outside of the breeding bird season (March to September, inclusive). If clearance is required during this period, nesting bird checks should be undertaken by a SQE 24-48 hours prior to clearance. Should an active nest be identified, suitable mitigation must be established as directed by the SQE and works in the vicinity to be delayed until the young have fledged.
- Any excavations due to be left open overnight shall be covered or left with a means of egress for wildlife to prevent entrapment. Any open piping should be capped to prevent entry. Construction materials must be stored well away from the riverbank to ensure that otters do not use voids etc.
- All planting stock must be free of pests and pathogens. All plants and seed mixes to be UK sourced and grown, and peat free. Use NRW assurance pro forma as part of procurement process. Retain all Plant Passport information for client inspection. Regularly inspect plants for signs or symptoms of pests and disease. Report to NRW Plant Health Team and APHA (Animal and Plant Health Agency) immediately if suspicious.

Landscape and visual

- Photographic record to be taken before and after work to document the condition of the working area and inform reinstatement requirements.

Historic environment

- Archaeological Written Scheme of Investigation (WSI) to be produced prior to the start of works and approval to be obtained from Cadw.
- All ground disturbing works where there is a potential for archaeological remains to be exposed, damaged or destroyed are to be supervised by a Suitably Qualified Archaeologist (SQA), accredited by the Chartered Institute for Archaeologists (CIfA), who will be responsible for the monitoring and recording of ground works.
- Construction works to maintain a minimum of 1m distance from Cardigan Bridge and historic foundry wall at all times.

Land use and soils

- Undertake an asbestos in soils construction risk assessment in accordance with relevant guidance (including the Control of Asbestos Regulations 2012) to ensure risks from asbestos exposure are adequately assessed and control measures are implemented as necessary during the works.

- Formal monitoring of Made Ground and natural soils, and groundwater for potential contamination to be undertaken during works. Monitoring will include the use of Rapid Screening Methods using field test kits or portable instruments (e.g. Photo-Ionisation Detector (PID) for volatile organic compounds and X-Ray Fluorescence (XRF) for heavy metals), and formal sampling of soils and groundwater for laboratory testing, should indications of contamination be observed or detected.
- Undertake a remediation options appraisal to inform the final remediation strategy for landscaped areas which includes measures to reduce or remediate impacts of compaction on existing soft landscape areas.
- Any visual or olfactory evidence of contamination encountered during construction works will be investigated to determine spatial extents and concentrations. Sampling and laboratory testing will be utilised where necessary. Work will need to stop during any investigation into unexpected contamination to prevent further spread of contamination.

Water environment

- Establish baseline groundwater and surface water quality on and around the Scheme Area, and upstream and downstream of the Scheme in the Afon Teifi by controlled water sampling and laboratory testing. The baseline is to be used for comparison post construction.
- Adhere to Pollution Prevention Plan (PPP), which will outline best practice guidance and specific pollution prevention measures which are to be put in place during the works. This will include silt management measures to protect the Teifi estuary and a contingency plan for excavations in the intertidal zone to be covered/protected if they cannot be backfilled within a single low tide event (before the next high tide inundation).
- If water quality limits are exceeded, then works in the river will be suspended until conditions recover. Acceptable limits are to be outlined within the Pollution Prevention Plan (PPP).

Traffic management

Temporary traffic management measures would be in place during the works to ensure safe access. Measures would include:

- Temporary lane closures on Strand during key delivery or mobilisation activities.
- Suspension of on-street parking to allow the safe passage and turning of delivery vehicles.
- Use of banksmen and traffic marshals to manage vehicle movements and pedestrian safety.
- Time-restricted deliveries to avoid peak pedestrian and traffic periods.
- Advance notification to local residents and businesses to inform of potential disruption.

- A construction delivery management system would be necessary to coordinate vehicle movements and ensure that access conflicts are avoided in the town centre. This may involve the use of a remote holding area outside of Cardigan to manage arrival timings and reduce queuing on approach roads.

4. Additional Information

4.1 Applicant contact details

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5. References

APEM, 2026. *Cardigan Tidal FRMS Habitat Regulations Assessment*, s.l.: s.n.

Binnies UK Ltd, 2026a. *Cardigan Tidal FRMS Environmental Statement*, s.l.: s.n.

Binnies UK Ltd, 2026b. *Draft Marine Invasive Non-native Species Biosecurity Risk Assessment and Management Plan*, s.l.: s.n.

Binnies UK Ltd, 2026c. *Cardigan Tidal FRMS Welsh National Marine Policy Signposting Plan*, s.l.: s.n.

Binnies UK Ltd, 2026d. *Cardigan Tidal FRMS Water Framework Directive Compliance Assessment*, s.l.: s.n.

Binnies UK Ltd, 2026e. *Navigational Risk Assessment*, s.l.: s.n.

Binnies UK Ltd, 2026f. *Design and Access Statement*, s.l.: s.n.

NRW, 2026. *Cardigan Tidal FRMS Screening for Potential Coastal Squeeze*, s.l.: s.n.

APPENDICES

Appendix A Supporting Documents

- Cardigan Tidal FRMS Location Plan – 4021883-BUK-ZZ-00-DR-EN-00005
- General Arrangement Plan – 4021883-BUK-ZZ-00-DR-EN-00008
- Environmental Masterplan - 4021883-BUK-ZZ-00-DR-L-00004
- Environmental Constraints and Opportunities Plan (ECOP) – 4021883-BUK-ZZ-00-DR-EN-00020
- Design Drawings:
 - Design and Access Statement - 4021883-BUK-ZZ-00-RP-EN-00030
 - Wall coping stones - 4021883-BUK-ZZ-00-DR-C-05300
 - Cladding detail - 4021883-BUK-ZZ-00-DR-C-05200
 - Embankment standard cross section - 4021883-BUK-ZZ-00-DR-C-05000
 - Area 1 proposed plan and long section - 4021883-BUK-ZZ-00-DR-C-01001
 - Area 1 setting out - 4021883-BUK-ZZ-00-DR-C-01003
 - Area 1 wall tie-in west and plateau steps - 4021883-BUK-ZZ-00-DR-C-01100
 - Area 1 RC wall cross section - 4021883-BUK-ZZ-00-DR-C-01105
 - Area 1 pile wall cross section - 4021883-BUK-ZZ-00-DR-C-01250
 - Area 1 DCWW outfall - 4021883-BUK-ZZ-00-DR-C-01300
 - Area 2 proposed plan and long section - 4021883-BUK-ZZ-00-DR-C-02001
 - Area 3 proposed plan and long section - 4021883-BUK-ZZ-00-DR-C-03001
 - Area 3 boat ramp plan and long section - 4021883-BUK-ZZ-00-DR-C-03200
 - Area 3 boat ramp flood gate details - 4021883-BUK-ZZ-00-DR-C-03300
 - Area 4 proposed plan and long section - 4021883-BUK-ZZ-00-DR-C-04001
 - Area 4 car park layout - 4021883-BUK-ZZ-00-DR-C-04400