



Kidwelly Viaduct Repairs Water Framework Directive Assessment

Centregreat Rail Ltd

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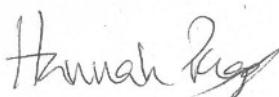
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1. Introduction

1.1 Background

- 1.1.1 Ecus Limited (Ecus) has been commissioned by Centregreat Rail Limited to prepare a Screening and Scoping Water Directive Framework (WFD) Assessment in relation to abutment and wingwall refurbishment works (the proposed works) at Kidwelly Viaduct (hereafter “the Site”).
- 1.1.2 A Screening and Scoping WFD Assessment is required under European Council Directive 2000/60/EC, establishing a framework for the Community action in the field of water policy (known as the Water Framework Directive, or “WFD”). The WFD remains applicable to the UK following the departure of the UK from the European Union (EU) because the WFD is fully transposed into UK law (The Water Environment (WFD) (England & Wales) Regulations as amended 2017; The Environmental Permitting (England & Wales) Regulations 2010).
- 1.1.3 Kidwelly Viaduct carries the South Wales Main Line (SWM2 234m 40.25ch/886yds) over the tidal estuary of Gwendraeth Fach, approximately 1 km west of Kidwelly / Cydweli Carmarthenshire, south west Wales. The Site is centred at approximately National Grid Reference SN 39863 06625, and sits over and around the transitional waterbody Tywi and Taf and Gwendraeth - Three Rivers Estuary (waterbody ID GB531006013400).

1.1.4

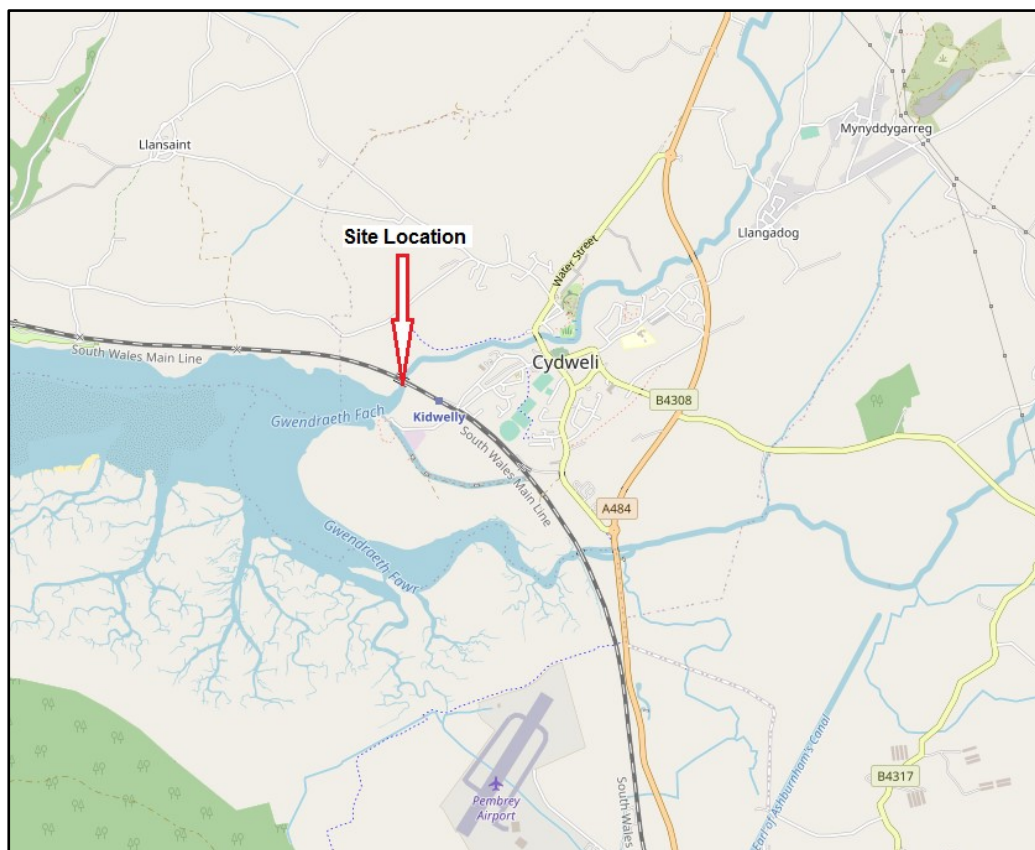


Figure 1: Site location (Copyright Open StreetMap contributors)

1.2 The Water Framework Directive

- 1.2.1 The WFD aims to protect and enhance the quality of the water environment across all EU member states and continues to be applicable to the UK as it is transposed into UK law. It targets sustainable management of water, through considering the interactions between surface water (including transitional and coastal waters, rivers, streams and lakes), groundwater and water-dependent ecosystems.
- 1.2.2 Under WFD, it is a requirement to classify the 'Status' or 'Potential' of surface and groundwater bodies, and to establish objectives for maintaining or improving conditions to reach 'Good' Status or Potential. Natural Resources Wales (NRW) is the competent authority for implementing the WFD in Wales.
- 1.2.3 As part of its role, the NRW must consider whether proposals for new developments or works have the potential to:
- Cause deterioration of a waterbody from its current status or potential; and/ or
 - Prevent future attainment of good status or potential where not already achieved.
- 1.2.4 For any works which have the potential to impact on current or predicted WFD status, it is required to assess the project's compliance with the WFD objectives of the potentially affected waterbodies.

1.3 Existing Viaduct Structure

- 1.3.1 The original timber structure of 1852 was replaced with a wrought iron structure in 1894. The superstructure was then replaced in 1939, bearing onto the existing substructure. Evidence of the original timber piles remains.
- 1.3.2 The current Kidwelly Viaduct structure is a simply supported four span structure with each span being approximately 20.72 m long and totalling 82.9 m. Each span comprises a steel deck with three main longitudinal plate girders, with interconnecting cross beams, and rail bearers, with the ballast fill supported on steel deck plates which are riveted to the rail bearers. The spans are supported on stone abutments and, concrete filled cylindrical wrought iron piers, (each 1.83 m diameter), braced transversely at the top with wrought iron girders.

1.4 Proposed Works

- 1.4.1 A site map of the proposed works is provided in Appendix 1. Sectional drawings of the proposed works are provided in Appendix 2.
- 1.4.2 Preparatory works to install scaffolding and minor repairs to the viaduct have already been considered as part of a NRW Band 1 Marine Licence (CML2050 / CML2038), and have therefore been excluded from this WFD Assessment.
- 1.4.3 There are visual signs of instability to the viaduct abutments. It is proposed that stainless steel soil anchors will be installed to stabilise the abutments. The soil anchors are drilled at 15 to 20 degrees passing through the existing abutments, made ground, soft tidal flat deposits and founded within the Glacial Till Clay. Proposed activities will

include:

- Materials delivered to two laydown areas adjacent to the railway (one existing laydown area south-east of viaduct covered by the previous Band 1 Marine Licence, and one additional laydown area south-west of viaduct for the period of works covered by the Band 2 Marine Licence that this WFD will support, see Appendix 1);
- Local levelling of ground adjacent to the abutments, requiring scraping to a maximum depth of 20 cm using hand tools – material will be redistributed locally;
- A temporary bund (plywood and visqueen layer) will be used to protect the ground and capture any spoil;
- Installation of a steel running rail to each abutment using hand tools, which will be carried from the laydown area by hand. The drill will be fixed to the rail to ensure that the anchors are installed at the correct level and angle.
- One test anchor will be installed to each abutment, which will then be tested using handheld specialist equipment. Once testing has been completed, a further seven anchors will be installed to the east abutment and a six to the west abutment (see Appendix 2) using the following method:
 - Drilling and grouting will take place simultaneously using direct drilling; rotary percussive drilling in conjunction with grout suspension improves the soil in the same way as a displacement pile and eliminates the requirement for Dynamic Pressure Grouting;
 - During the drilling procedure, water will be filtered off from the grout suspension to leave behind a filter cake that will stabilise the hole. This water will be captured within a smaller bund locally, and removed from the works area, and disposed of off-site;
 - The drilling rate will be approximately 1m/minute, this will improve the quality of the grout body by keeping the drilling rate low; cleaning out the hole regularly will also improve the quality. Cleaning will be undertaken by extracting and re-inserting the drilling rod while continue to rotate it and also continuing to flush out the hole; and
 - Upon completion of the drilling and grouting procedure, a 450 mm x 450 mm x 25 mm Stainless Steel Pattress Plate with 10 mm max. grout bed will be installed and top termination of anchor installed to required torque.
- Repointing of masonry to the existing abutments and retaining walls, by hand. A hopper scaffold (600 mm x 600 mm, 1.8 m height) will be carried to the works area by hand and used as needed to access areas out of reach; and
- Demobilise from site including reinstatement of landscaped area and pedestrian footpath access to upline side platform.

1.4.4 The proposed works are programmed to take place from 21 June 2021 until 20 July 2021, which includes time to work around the tide timetable. All works will be carried

out at low tide, all equipment and materials will be removed after each shift. Only the running rail will remain in place until the works are completed.

1.4.5 Pollution prevention control measures will be incorporated as standard for all Network Rail works adjacent to a watercourse. These include:

- Use of marine safe grout and concrete;
- All refuelling to be undertaken away from any watercourse (more than 10 m);
- Oil and fuel to be stored in accordance with the oil storage regulations (Control of Pollution (Oil Storage) (England) Regulations 2001), with containers to be in good condition with proper fitted lids and secured against vandalism. Storage areas for any fuel, oil or other chemicals to be at least 10 m away from any watercourse;
- No herbicides will be used within 5 m of a watercourse and herbicide treatment, where required, will be limited to treating stumps and using glyphosate by suitably qualified staff;
- Care to be taken to ensure that material arisings from vegetation clearance and chemicals are not discharged into waterbodies;
- Biodegradable fuels will be used in all handheld machinery;
- Construction plant 'nappy'/spill containment pads to be used for all handheld machinery when idle, and drip trays used when refuelling; and
- Spill kits will be provided to allow any chemical or fuel spillages to be remediated quickly.

1.4.6 These measures are standard and not considered to be added specifically to achieve the purpose of avoiding or reducing harmful effects of the works on the designated site. They therefore are not considered to constitute specific mitigation measures and are included as part of the Screening stage of this WFD Assessment.

1.5 Approach and methodology

1.5.1 This WFD Screening and Scoping Assessment aims to identify the potential effects of the Proposed Works on ecological, hydromorphological and chemical quality and identify any potential impacts that need to be considered further as part of a WFD impact assessment for the scheme.

1.5.2 Guidance on how to undertake WFD assessments can be found in a range of sources. The following guidance has informed the approach taken in this assessment:

- Water Framework Directive assessment: estuarine and coastal waters' (Environment Agency, 2016a);
- 'Water Framework Directive Risk Assessment - How to assess the risk of your activity' (Environment Agency, 2016b); and
- 'The Water Framework Directive - Advice note 18: The Water Framework Directive' (The Planning Inspectorate (PINS), 2017).

1.5.3 The approach taken for this assessment, comprises two key stages:

- Screening – to exclude activities from scoping; and
- Scoping – identify risks to receptors.

1.5.4 This report documents each of these stages and assesses the risk of impact to WFD water bodies, having regard to its specific elements and objectives, and aims to identify:

- Whether the scheme could cause deterioration in ecological status/potential of the affected waterbodies;
- Whether the scheme could prevent the waterbodies from meeting their objective of good ecological status/potential;
- Whether the scheme could prevent or compromise WFD objectives being met in other waterbodies;
- Whether the scheme could cause failure to meet good groundwater status, or result in a deterioration of groundwater status; and
- Whether the scheme could prevent the implementation of mitigation measures which define the hydromorphological designation of heavily modified waterbodies.

1.5.5 In accordance with the 2015 ruling in the EU Court of Justice, ‘deterioration of status’ is established as soon as the status of at least one of the quality elements falls by one class, even if the change does not result in a fall in classification of the water body as a whole.

1.5.6 Supporting evidence drawn upon to inform this assessment comprises data reported through the Water Watch Wales web application, Western Wales River Basin Management Plan (RBMP) (NRW, 2015), and the Preliminary Ecological Appraisal undertaken for the Site (Ecus, 2020).

2. Screening

2.1 Activity screening

2.1.1 In accordance with Environment Agency guidance, there are particular activities on or near waterbodies that are considered to be low risk from a WFD perspective and are therefore excluded from scoping. Low risk activities are summarised as follows:

- A self-service marine licence activity or an accelerated marine licence activity that meets specific conditions;
- maintaining pumps at pumping stations – if you do it regularly, avoid low dissolved oxygen levels during maintenance and minimise silt movement when restarting the pumps;
- removing blockages or obstacles like litter or debris within 10m of an existing structure to maintain flow;

- replacing or removing existing pipes, cables or services crossing over a water body – but not including any new structure or supports, or new bed or bank reinforcement; and
- ‘over water’ replacement or repairs to, for example bridge, pier and jetty surfaces – if you minimise bank or bed disturbance.

Scheme elements screened in

- 2.1.2 The proposed works, as described in Section 1.4, involve installation of anchors into the estuary bed and therefore the activities are not excluded from scoping under the description above, as the anchors are considered to be new supports.

Zone of Influence

- 2.1.3 The Screening stage identifies a Zone of Influence of the proposed works, which considers the type of activity and the potential pressures this may exert on sensitive receptors. This has taken into account the ‘Low Risk’ activities discussed above, and potentially significant impact pathways to waterbodies, in accordance with the RBMP.
- 2.1.4 The waterbodies which could potentially be affected (i.e. that are assessed as within the Zone of Influence), with their baseline RBMP data, are summarised below. Connecting waterbodies that are assessed to be outside the Zone of Influence are screened out of further assessment.

2.2 Waterbody Screening

- 2.2.1 The following waterbodies were considered in this Screening Assessment:

- Surface waterbodies within the Site;
- Ground waterbodies underneath the Site;
- Waterbodies upstream of the Site (adjacent to the waterbody in which the Site falls); and
- Waterbodies downstream of the Site (adjacent to the waterbody in which the Site falls).

- 2.2.2 Screening has identified four surface waterbodies and two groundwater bodies of relevance, located in the area around the Site.

Waterbody Status

- 2.2.3 Current waterbody classification, status and objectives, (as per NRW Water Watch Wales), are set out in Table 1.

Table 1 Current WFD Status of Identified Waterbodies

Name of Waterbody (location)	Waterbody ID	Hydromorphological Designation	Current Overall Status / Potential	Overall Status Objective
Tywi and Taf and Gwendraeth - Three Rivers Estuary (within the Site)	GB531006013400	Not designated A/HMWB	Moderate (2018)	Good (2027)
Burry Inlet Outer (coastal waterbody approx. 4.1 km downstream of the Site)	GB641008180000	Not designated A/HMWB	Moderate (2018)	Good (2027)
Carmarthen Bay (coastal waterbody approx. 5.7 km downstream of the Site)	GB611008590002	Not designated A/HMWB	Moderate (2018)	Good (2027)
Gwendraeth Fach - headwaters to tidal limit (approximately 1.1 km upstream of the Site)	GB110060029400	Not designated A/HMWB	Good (2018)	Good (2027)
Carmarthen Carboniferous Coal Measures (underlying the eastern abutment and bank, within the Site)	GB41002G200600	N/A	Poor (2015)	Good (2027)
Tywi, Taf and Gwendraeths (underlying the western abutment and bank, within the Site)	GB41002G200500	N/A	Poor (2015)	Good (2027)

Waterbody Screening Outcome

- 2.2.4 Table 2 sets out which waterbodies have been screened in or out of the assessment, and the reason for that decision.

Table 2 Waterbody Screening Decisions

Name of Waterbody (Waterbody ID)	Reasoning	Waterbody Screening Outcome
Tywi and Taf and Gwendraeth - Three Rivers Estuary (GB531006013400)	Proposed Works within this waterbody. Potential for direct impacts.	Screened in

Name of Waterbody (Waterbody ID)	Reasoning	Waterbody Screening Outcome
Burry Inlet Outer (GB641008180000)	Located approx. 4.1 km downstream of the Site, this coastal water covers an area of approx. 77 km ² . Due to the distance from the Site and the temporary nature of the proposed works it is considered highly unlikely the proposed works would impact Burry Inlet Outer.	Screened out
Carmarthen Bay (GB611008590002)	Located approx. 5.7 km downstream of the Site, this coastal water covers an area of approx. 524 km ² . Due to the distance from the Site and the temporary nature of the proposed works it is considered highly unlikely the proposed works would impact Carmarthen Bay.	Screened out
Gwendraeth Fach - headwaters to tidal limit (GB110060029400)	Located approximately 1.1 km upstream. Due to the distance from the Site and the temporary nature of the proposed works it is considered highly unlikely the proposed works would impact Carmarthen Bay.	Screened out
Carmarthen Carboniferous Coal Measures (GB41002G200600)	The ground anchors will be nominally 14 m in length, drilled at a 15 degree downwards inclination through the existing abutments (see Appendix 2). Initial drilling will be through embankment fill and tidal flat deposits, with the anchors toed into the underlying Glacial Till. The Tidal Flat Deposits are likely to have a high groundwater level but this is likely to be saline in nature based on the proximity to the adjacent tidal estuary. Saline groundwater is typically lower risk since it is not used as a potable water resource and the impact on this groundwater should be low as a result. The underlying Glacial Till is not typically considered to be a valuable groundwater horizon due to the relatively impermeable nature of the material and should not be impacted by the anchor installation. Finally, the anchor system proposed uses a hollow bar that allows for the drill hole to be efficiently flushed of drill arisings. This means that even if contaminants were present, they would be flushed out on completion of the drilling further limiting any groundwater impact. The low permeability grout used to secure the anchors would seal the migration pathway for contaminants further protecting the groundwater. Therefore it is considered highly unlikely the proposed works will impact groundwater.	Screened out

Name of Waterbody (Waterbody ID)	Reasoning	Waterbody Screening Outcome
Tywi, Taf and Gwendraeths (GB41002G200500)	The ground anchors will be nominally 14 m in length, drilled at a 15 degree downwards inclination through the existing abutments (see Appendix 2). Initial drilling will be through embankment fill and tidal flat deposits, with the anchors toed into the underlying Glacial Till. The Tidal Flat Deposits are likely to have a high groundwater level but this is likely to be saline in nature based on the proximity to the adjacent tidal estuary. Saline groundwater is typically lower risk since it is not used as a potable water resource and the impact on this groundwater should be low as a result. The underlying Glacial Till is not typically considered to be a valuable groundwater horizon due to the relatively impermeable nature of the material and should not be impacted by the anchor installation. Finally, the anchor system proposed uses a hollow bar that allows for the drill hole to be efficiently flushed of drill arisings. This means that even if contaminants were present, they would be flushed out on completion of the drilling further limiting any groundwater impact. The low permeability grout used to secure the anchors would seal the migration pathway for contaminants further protecting the groundwater. Therefore it is considered highly unlikely the proposed works will impact groundwater.	Screened out

2.3 Baseline Status of Waterbodies Screened In

- 2.3.1 Tables 3 sets out the current status of the Ecological Quality Elements for the surface water bodies screened in.
- 2.3.2 Some WFD Quality Elements have not been formally assessed as part of the classification for the waterbodies. However any identified impacts on the receptors (Environment Agency, 2016a) will be considered in relation to the ecological status of the waterbody and the status objectives.

**Table 3 Tywi and Taf and Gwendraeth - Three Rivers Estuary (GB531006013400)
Ecological Quality Elements**

Quality Element	Current Status	Objective
Biological Quality Elements		
Angiosperms	High	Good (2021)
Macroalgae	High	Good (2021)
Phytoplankton	Moderate	Good (2021)
Invertebrates	Moderate	Good (2021)
Hydromorphological Quality Elements		
Hydrological Regime	Not High	Good (2021)
Morphology	Not High	Good (2021)
Physico-Chemical Quality Elements		
Dissolved Inorganic Nitrogen	Moderate	Good (2015)
Disolved Oxygen	High	Good (2015)

2.4 Protected Areas

2.4.1 Under WFD areas requiring special protection under other EU Directives and drinking water abstraction areas waters are identified as Protected Areas.

Natura 2000 Sites

2.4.2 Protected Areas identified within 2 km comprise:

- Carmarthen Bay and Estuaries Special Area of Conservation (SAC).

2.4.3 There are no Drinking Water Protection Areas in the catchments of the waterbodies.

2.4.4 The waterbodies are not connected to any Nitrate Vulnerable Zones.

2.5 Screening Summary

2.5.1 The following waterbodies and quality elements are screened into the Scoping Assessment:

- Tywi and Taf and Gwendraeth - Three Rivers Estuary (GB531006013400)
 - Biological - Habitats;
 - Hydromorphology;
 - Water Quality; and
 - Protected Areas.

3. Scoping

3.1 Background

- 3.1.1 In accordance with Environment Agency WFD guidance, this scoping assessment identifies whether the receptors for the waterbodies screened in are at risk from the proposed works.
- 3.1.2 The Environment Agencies scoping template, accompanying Guidance Water Framework Directive assessment: estuarine and coastal waters, has been completed to inform this process for each waterbody.

3.2 Biology – habitats

Saltmarsh

- 3.2.1 Saltmarsh habitat is located immediately adjacent to the Site, which has been listed under the WFD as higher sensitivity habitat which has a low resistance to, and recovery rate from, human pressures. The Preliminary Ecological Appraisal (PEA) carried out for the site (Ecus, 2020) and the WFD Higher Sensitivity Habitats layer on the Multi-Agency Geographical Information for the Countryside (MAGIC) website (<http://magic.defra.gov.uk>), both record saltmarsh around and underneath the bridge.
- 3.2.2 Saltmarsh habitat is designated as a priority habitat by the Joint Nature Conservation Committee (JNCC) and is recognised to be an important resource for wading birds and wildfowl. Saltmarsh habitats are areas with high structural and plant diversity, particularly where freshwater seepages provide a transition from fresh to brackish conditions, and are particularly important for invertebrates. Saltmarshes also provide sheltered nursery sites for several species of fish.
- 3.2.3 The Environment Agency WFD guidance (2016) states that where any high sensitivity habitats such as saltmarsh are within 500 m of the Site then they should be scoped in to the impact assessment stage.
- 3.2.4 Saltmarsh habitat is at risk from physical disturbance from the installation of the anchors.

Mudflat / Intertidal Soft Sediment

- 3.2.5 A review of MAGIC shows an area of intertidal mud directly adjacent to the bridge and upstream and downstream of it. The Environment Agency WFD guidance (2016) states that Biological Habitats should be scoped in for impact assessment if the footprint is 1% or more lower sensitivity habitat (such as intertidal soft sediments like sand and mud). There is potential for direct impacts on this habitat through temporary disturbance as a result of the installation of the anchors.

3.3 Hydromorphology

- 3.3.1 Hydromorphology considers the physical characteristics of a water body, including structure of the water body itself and the flow and quantity of water and sediment.

There is a potential impact arising from the temporary alteration of water flow and changes in turbidity that can affect the quantity of sediment as a result of the installation of the ground anchors.

3.4 Water quality

Construction

- 3.4.1 There is a potential impact to water quality as a result of disturbance of the banks and seabed from installation of the ground anchors.

3.5 Protected Areas

- 3.5.1 There are two statutory designated sites within the boundaries of the Site, these are the Carmarthen Bay and Estuaries Special Area of Conservation (SAC) and Pembrey Coast Site of Special Scientific Interest (SSSI). The works have the potential to impact these designated sites.
- 3.5.2 The impacts On the SAC have been assessed through a Habitats Regulations Assessment (Ecus, 2021), the conclusions of which are included in the mitigation measures

4. Preliminary Assessment

- 4.1.1 For the proposed works which are not exempt from WFD Assessment (as per Sections 2 and 3), a Preliminary Assessment is used to rationalise the need for more detailed “Impact Assessments”.
- 4.1.2 A Preliminary Assessment defines the scope of further assessments that may be required subject to agreement with the Environment Agency and Local Authority. This includes identifying potential WFD constraints, threats and opportunities associated with a development scheme and any residual risk after mitigation has been applied.

4.2 WFD constraints, risks and mitigation measures

- 4.2.1 Table 4 provides details of the Preliminary Assessment undertaken for the proposed works, including the constraints, threats and any potential residual impacts after mitigation has been considered.

Table 4 Preliminary Assessment

WFD risk category	WFD potential impact	Proposed mitigation measures
Installation of ground anchors to the existing abutments	Potential direct impacts to the SAC, SSSI including saltmarsh, mudflat and intertidal soft sediment habitats through temporary disturbance. Potential changes to water quality, flow and sediment including changes in turbidity. It is not anticipated that this will be significant, due to the short duration of the works (1 month); which will be of minimal footprint and foot access only.	Site-wide: The production of a Precautionary Method of Working ("PMW") is recommended to ensure the proposed works minimise disturbance to the Priority Habitats. A temporary bund (plywood and visqueen layer) will be put in place to protect the ground and capture any arisings during the works. Handheld machinery will be used for works including installation of a steel running rail, installation of test anchors and repointing of masonry to the existing abutments and retaining walls. Pollution prevention control measures will be incorporated as standard for all Network Rail works adjacent to a watercourse. These include: • Use of marine safe grout and concrete; • All refuelling to be undertaken away from any watercourse (more than 10 m); • Oil and fuel to be stored in accordance with the oil storage regulations (Control of Pollution (Oil Storage) (England) Regulations 2001), with containers to be in good condition with proper fitted lids and secured against vandalism. Storage areas for any fuel, oil or other chemicals to be at least 10 m away from any watercourse; • No herbicides will be used within 5 m of a watercourse and herbicide treatment, where required, will be limited to treating stumps and using glyphosate by suitably qualified staff; • Care to be taken to ensure that material arisings from vegetation clearance and chemicals are not discharged into waterbodies; • Biodegradable fuels will be used in all handheld machinery; • Construction plant 'nappy'/spill containment pads to be used for all handheld machinery when idle, and drip trays used when refuelling; and • Spill kits will be provided to allow any chemical or fuel spillages to be remediated quickly.

WFD risk category	WFD potential impact	Proposed mitigation measures
		Within saltmarsh: The location of the new laydown area is within saltmarsh habitat. The location has been discussed at length but the proposed area to the south west of the viaduct is the only available option due to access restrictions and the proximity of the proposed location to the ground anchor works. No vehicles will be used within the saltmarsh. All materials and equipment required for the works will be transported via Road Rail Vehicle (RRV) to the laydown area that is within the saltmarsh. All materials and equipment will be moved by hand between the laydown area and work site. To minimise any damage to the habitat within the laydown area, the layer of stone required to level the area will be placed on a membrane to protect the ground below. All material will be removed after the one month period. Refuelling of equipment will occur in designated refuelling areas outside of the saltmarsh habitat with drips trays, spill kits and training of staff. With these measures fully implemented, impact to the saltmarsh will be reduced as far as possible, however it remains likely there will be a residual ground pressure impact from these works. Therefore we propose a pre-works survey of the area of saltmarsh within the footprint of the works, a post-works survey and the implementation of reinstatement measures following completion of the works, and the implementation of restoration measures as necessary following a second post-works survey one year after completion. This is in order to reduce any long term impact to the habitat and promote recovery of the saltmarsh vegetation.

5. Conclusions

- 5.1.1 This report has been prepared to support a Band 2 Marine Licence application in relation to abutment and wingwall refurbishment works at Kidwelly Viaduct, SWM2 234m 40.25ch/886yds.
- 5.1.2 In accordance with WFD objectives, the WFD risk assessment has focused on whether there is a risk of deterioration of any WFD element as a result of the proposed works as detailed in Table 5

Table 5 Assessment against WFD objectives

WFD objective question	Preliminary Assessment
Do the Proposed Works have the potential to cause deterioration in the ecological status/potential of waterbodies?	The proposed work does have the potential to cause deterioration in the ecological status / potential of the Tywi and Taf and Gwendraeth - Three Rivers Estuary waterbody. The Zone of Influence of the proposed works has the potential for temporary impact pathways to the Tywi and Taf and Gwendraeth - Three Rivers Estuary, in terms of changes to water quality, flow and sediment including changes in turbidity, and impacts to the designated saltmarsh, mudflat and intertidal soft sediment habitats through temporary disturbance. Where the mitigation measures detailed in Table 5 are applied the risk of deterioration is considered to be negligible.
Do the Proposed Works have potential to prevent the waterbodies from meeting their future objective of good ecological status/potential?	The localised and temporary nature of the proposed works are unlikely to prevent the waterbody from meeting its WFD objectives.
Do the Proposed Works have potential to prevent or compromise WFD objectives being met in other waterbodies?	Any waterbody impacts will be local to the Site and will not prevent any WFD objectives from being met in any of the connecting waterbodies listed.
Do the Proposed Works have potential to prevent the implementation of mitigation measures which define the hydromorphological designation of heavily modified waterbodies?	The proposed works are not located within a heavily modified waterbody, as such there are no mitigation measures that the proposed works would impact.

- 5.1.3 Overall it is considered that the proposed works will not result in impacts to the WFD status of the Tywi and Taf and Gwendraeth – Three Rivers Estuary waterbody and therefore there is no requirement for further assessment.

6. References

Ecus Ltd (2020). Kidwelly Viaduct: Preliminary Ecological Appraisal, SWM2 234 miles 886 yards. August 2020.

Ecus Ltd (2021). Kidwelly Viaduct: Habitat Regulations Assessment, SWM2 234 miles 886 yards. January 2021.

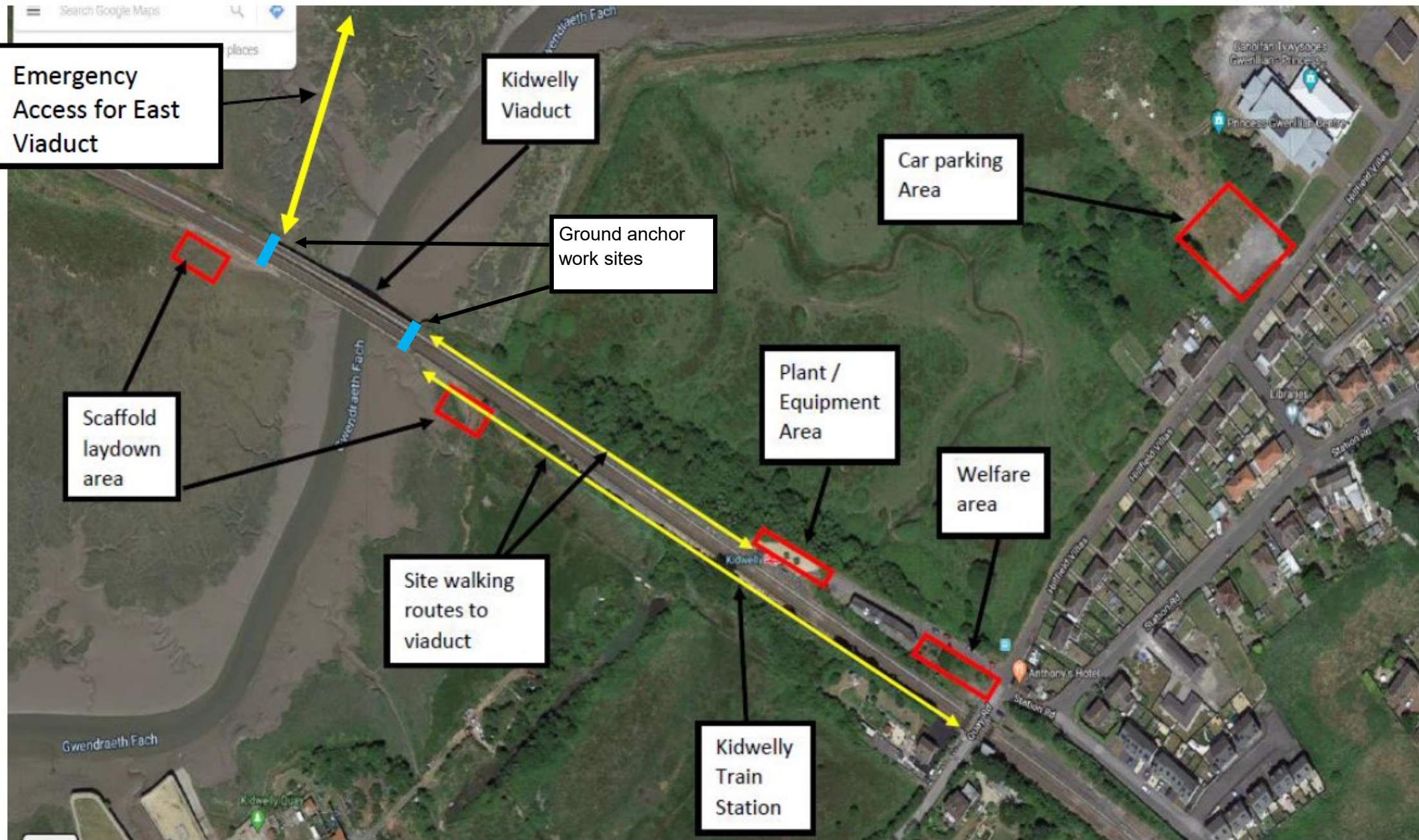
Environment Agency (2016a). *Water Framework Directive assessment: Estuarine and Coastal Waters* <https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters> [Accessed January 2021].

Environment Agency (2016b). • *Water Framework Directive Risk Assessment - How to Assess the Risk of your Activity* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/522426/LIT_10445.pdf [Accessed January 2021].

Natural Resources Wales (2015). *Western Wales River Basin Management Plan 2015 – 2021*. Available at: <https://naturalresources.wales/evidence-and-data/research-and-reports/water-reports/river-basin-management-plans/river-basin-management-plans-published/?lang=en> [Accessed January 2021].

The Planning Inspectorate (2017). *Advice note 18: The Water Framework Directive* https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2017/06/advice_note_18.pdf [Accessed January 2021].

Appendix 1. Site map of proposed works



Emergency
Access for East
Viaduct

Kidwelly
Viaduct

Car parking
Area

Ground anchor
work sites

Scaffold
laydown
area

Plant /
Equipment
Area

Welfare
area

Site walking
routes to
viaduct

Kidwelly
Train
Station

Appendix 2. Sectional drawings of proposed works



SCALE 1:50

IDEALISED POSITION AND SPACING OF ANCHORS SHOWN ABOVE BUT THESE CAN BE MOVED UP TO 500mm LEFT OR RIGHT TO AVOID CLASHES BETWEEN RIG AND BEAMS DURING INSTALLATION.

MAXIMUM SPACING BETWEEN ANCHORS TO BE 1500mm

6No. GROUND ANCHORS
ON WESTERN ABUTMENT

SCALE 1:50

NOTE:
VERTICAL TOLERANCE FOR THE INSTALLATION
OF ANCHORS TO BE PLUS/MINUS 150mm

NOTE:
MINIMUM POSITION OF ANCHORS FROM
THE EDGE OF ABUTMENT TO BE 750mm
ALTHOUGH IT MAY BE INCREASE TO 950mm



FOR DRA REFER TO DOC. REF. 152092-CGE-RSA-ECV-000002
SEE ALSO CONSTRUCTION IN DRAWING
152092-CGE-RSA-ECV-000121.

1. ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS ARE IN METRES
AND UNLESS NOTED OTHERWISE.
2. DO NOT SCALE OFF THIS DRAWING, USE FIGURED DIMENSIONS
ONLY.
3. THIS DRAWING HAS BEEN PREPARED BASED ON TOPOGRAPHICAL
SURVEY UNDERTAKEN BY JOHN VINCENT SURVEYS LTD. ON 1st
AND 13th NOVEMBER 2018 ON BEHALF OF ARCADIS CONSULTING
(UK) LTD.
4. FOR AS-BUILT INFORMATION REFER TO NETWORK RAIL ARCHIVE
DRAWINGS: 19380719 001 TO 005 AND 19610000 001.
5. WATER LEVEL SHOWN IS REPRESENTATIVE OF THE PREDICTED
MEAN HIGH WATER SPRINGS TIDE BETWEEN 2006 AND 2026, AT
9.54m CHART DATUM (4.54m OS) BASED ON THE DATA AT MUMBLES,
SWANSEA.
6. TRACK MONITORING AND CRT MANAGEMENT RECOMMENDED FOR
THE WORKS.
7. ALL ANCHORS TO BE CONSTRUCTED IN ACCORDANCE WITH BS EN
527.
8. CHARACTERISTIC ULTIMATE GROUND / GROUT INTERFACE
RESISTANCE OF ANCHOR SHALL BE PROVEN BY A SUITABILITY TEST
IN ACCORDANCE WITH BS8081:2015 OR BS EN ISO22477-5.
9. ALL ANCHORS SHALL ALSO BE SUBJECT TO AN ACCEPTANCE TEST.
ALL TESTING TO BE IN ACCORDANCE WITH BS EN 1537 USING
TESTING METHOD 1.
10. ALL ANCHOR ASSEMBLY ITEMS TO BE IN ACCORDANCE WITH THE
RELEVANT MANUFACTURERS SPECIFICATIONS /
RECOMMENDATIONS.

Safety, Health and Environmental Information

Notes below are additional to hazards risks normally associated with this type of work

Construction

- Ci. Lifting steel plates during demolition and construction works
- Cii. Uncontrolled bridge collapse during strengthening works
- Ciii. Bridge fail due to poor condition of the structure
- Civ. Significant corrosion/degradation arising from mechanical cleaning/grit blasting
- Cv. Bridge collapse due to overloading to underslung scaffold
- Cvi. Abutment instability due to refurbishment works on the abutment/wing walls
- Cvii. Abutment instability due to ground anchor installation
- Cviii. Ground anchor under designed capacity
- Operations
- Oi. Disturbing the track during works
- Oii. Working at height, risk of personnel falling
- Oiii. Personal injury to workers due to contact with trains
- Oiv. Slip/trip/falls due to uneven or steep ground
- Ov. Disturbance to local area and environment
- Ovi. Contamination to environment and species
- Ovii. Injury or infection due to contact to hazardous material
- Oviii. Injury due to drilling into steel plates
- Oix. Damage to service cables laid along the ballast
- Ox. Personal injury due to mechanical cleaning / Grit blasting
- Oxi. Personal injury by drowning due to working near/above water
- Oxii. Bridge/scaffold impacted by large object during flooding events
- Oxiii. Limited signal sighting on the bridge approaches
- Oxiv. Abutment instability during anchor installation
- Maintenance
- Mi. Vegetation to be cleared
- Dismantling/Demolition (Future)
- Abutment stability during future works

B01	19/01/21	FOR APPROVAL				KL	TV			
P01	04/12/20	FIT FOR INFORMATION				MM	TV			
Rev	Date	Description of Revisions				Drawn	Chkd		Appr	
Status								Suitability		
FIT FOR CO-ORDINATION								S1		



Authorised		Signed	Date
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Contractor(s)

Centregreat Rail

Location	SOUTH WALES MAIN LINE (GLOUCESTER YD JN - NEYLAND)		
Type	CAD Drawing	Sub-type	Plan
Role	Civil Engineer	Sub-Role	Structures and Buildings
Zone	Wales Region		
Phasing	Grip Stage	5	

Region

Western and Wales

Contract No.

152092

Contract Title

Kidwelly Viaduct

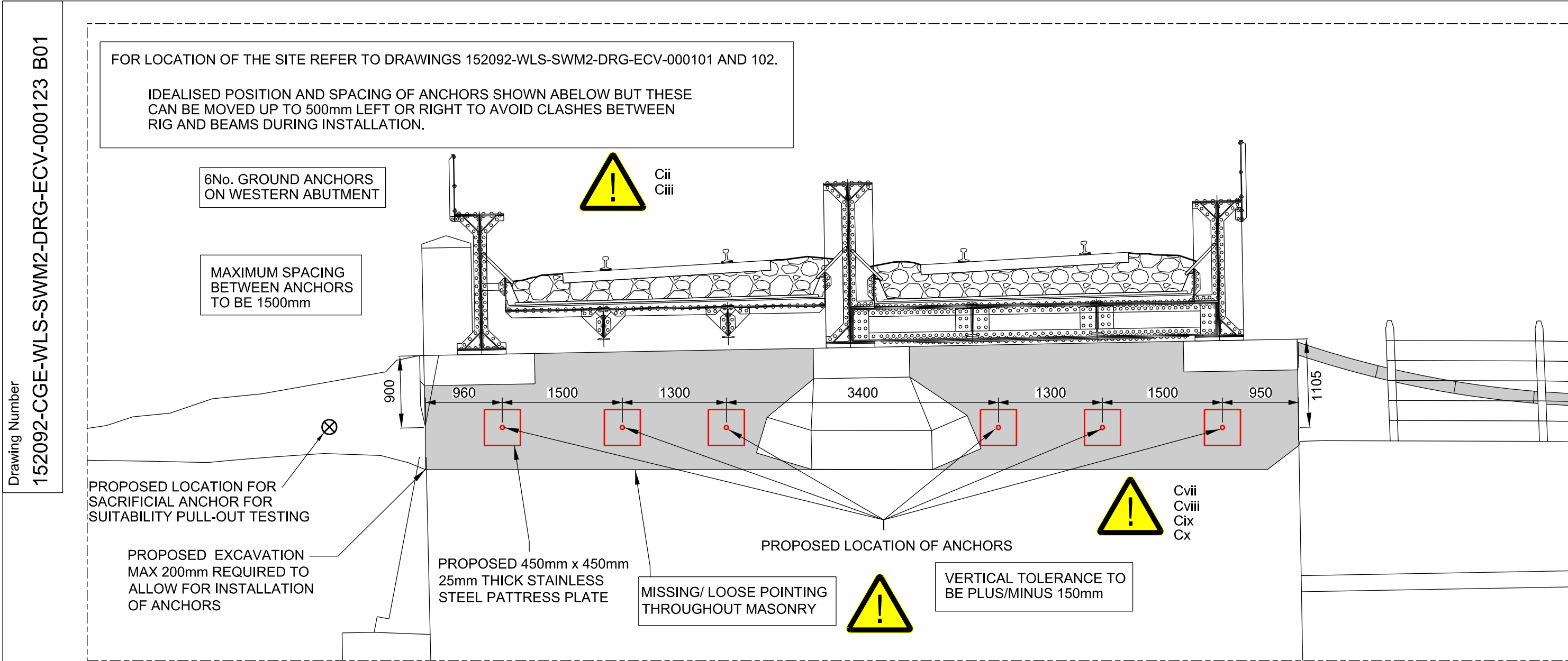
Proposed Abutment Repairs

Ground Anchors

(Sheet 2 of 3)

Designed	P. LLANES	Signed Electronically Signed	Date 04/12/20
Drawn	M. MITCHELL	Signed Electronically Signed	Date 04/12/20
Checked	T. VINCENT	Signed Electronically Signed	Date 04/12/20
Approved		Signed	Date

Scale(s)	ELR & Mileage	
As Shown	113.0164	to 285.0572
Alternative Reference		Sheet
152092-CGE-DRG-ECV-000122		2 of 3
Drawing Number		Revision
152092-CGE-WLS-SWM2-DRG-ECV-000122		B01

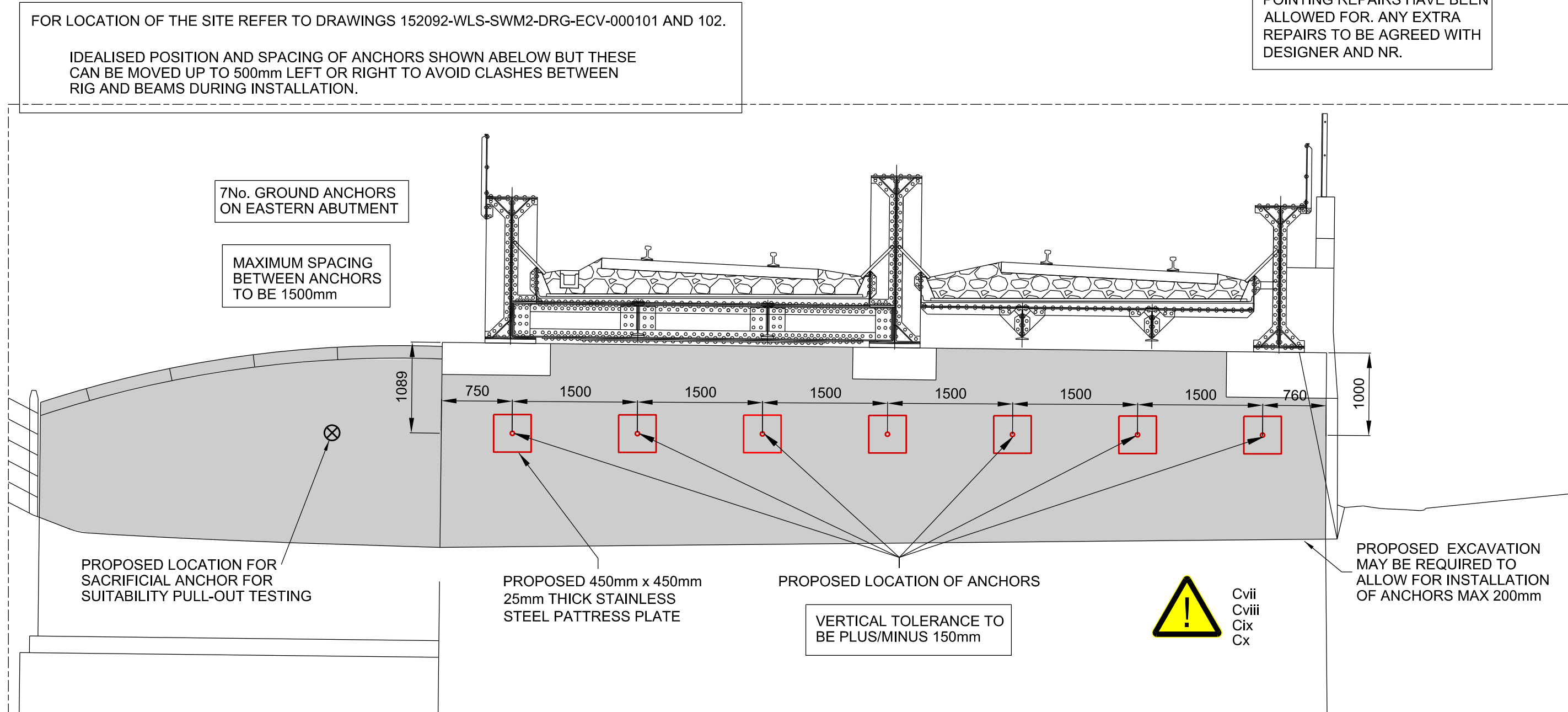


B REPAIR M - CROSS SECTION OF WESTERN ABUTMENT

000015 SCALE: 1:50

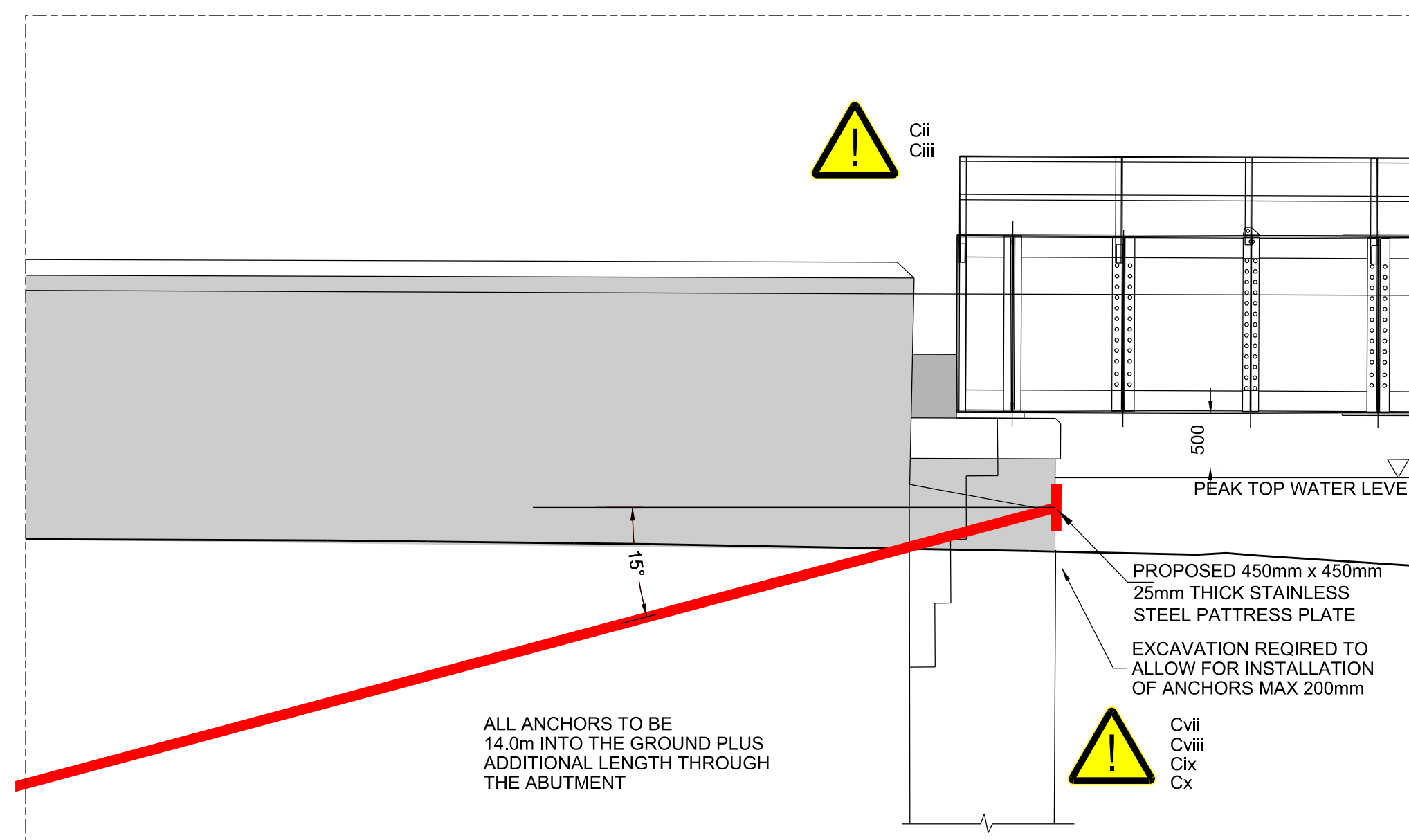
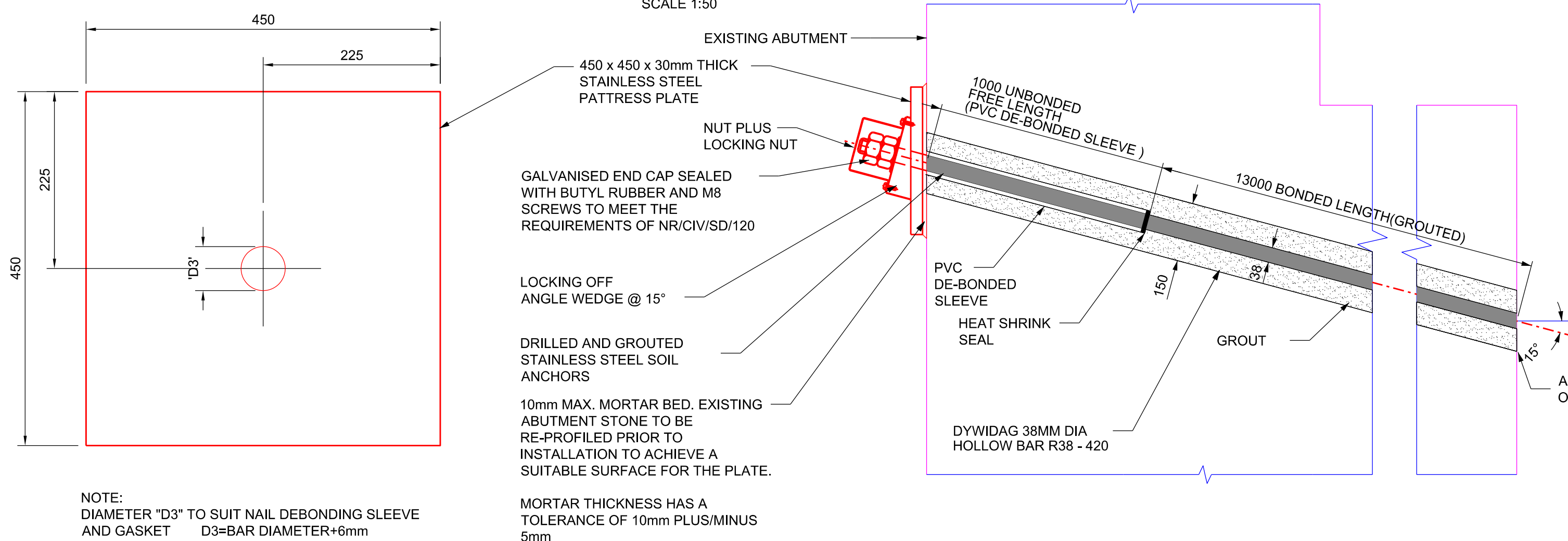


A MAXIMUM OF 60 M² OF POINTING REPAIRS HAVE BEEN ALLOWED FOR. ANY EXTRA REPAIRS TO BE AGREED WITH DESIGNER AND NR.



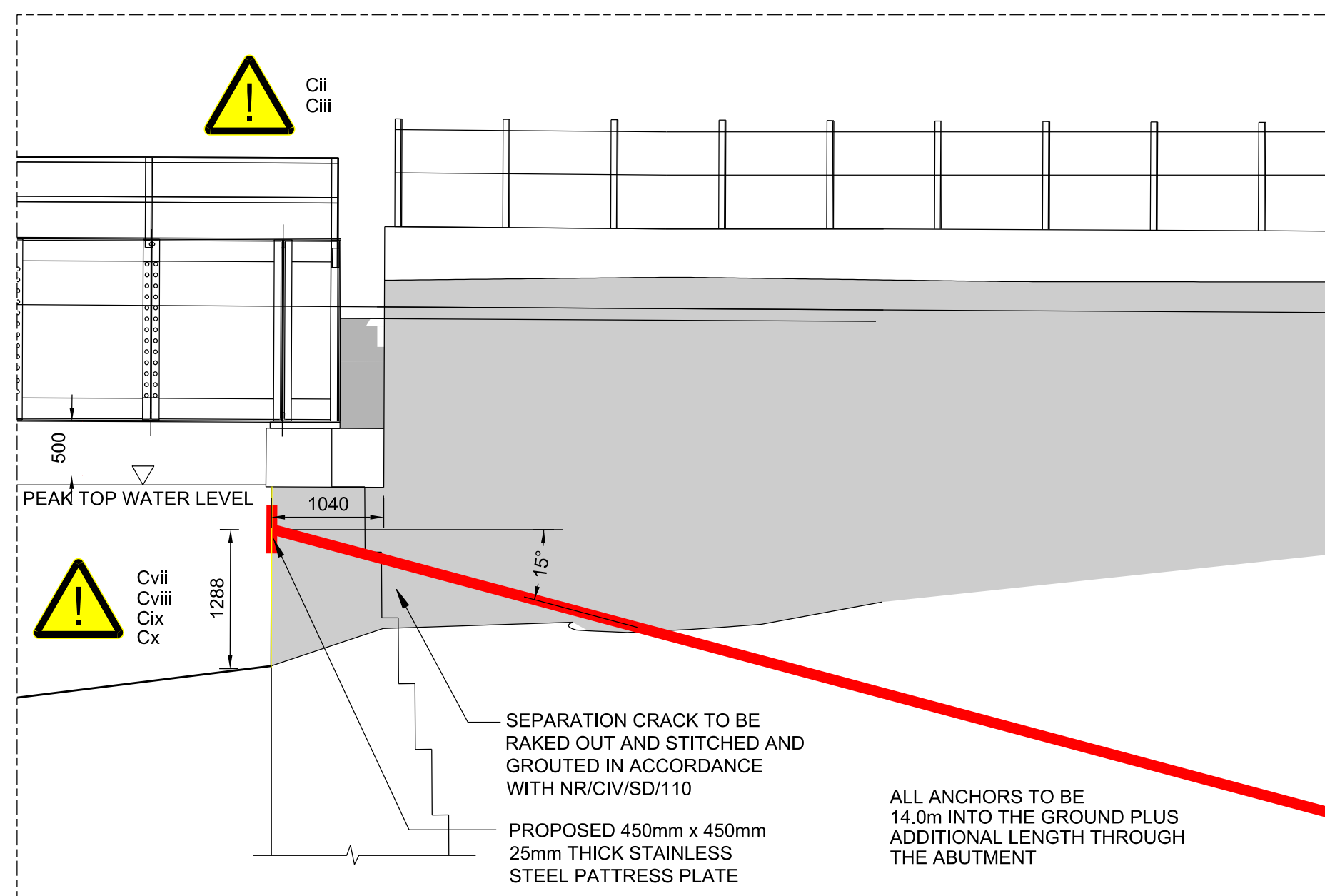
C REPAIR M - CROSS SECTION OF EASTERN ABUTMENT

000015 SCALE: 1:50



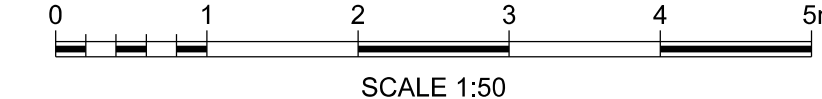
3 REPAIR M - SOUTH ELEVATION OF WESTERN ABUTMENT

000015 SCALE: 1:50



4 REPAIR M - SOUTH ELEVATION OF EASTERN ABUTMENT

000015 SCALE: 1:50



- Legend/Notes
1. ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS ARE IN METRES AOD UNLESS NOTED OTHERWISE.
 2. DO NOT SCALE OFF THIS DRAWING. USE FIGURED DIMENSIONS ONLY.
 3. THIS DRAWING HAS BEEN PREPARED BASED ON TOPOGRAPHICAL SURVEY UNDERTAKEN BY JOHN VINCENT SURVEYS LTD. ON 11TH AND 13TH NOVEMBER 2018 ON BEHALF OF ARCADIS CONSULTING (UK) LTD.
 4. FOR AS-BUILT INFORMATION REFER TO NETWORK RAIL ARCHIVE DRAWINGS: 19380719 001 TO 005 AND 19610000 001.
 5. WATER LEVEL SHOWN IS REPRESENTATIVE OF THE PREDICTED MEAN HIGH WATER SPRINGS TIDE BETWEEN 2006 AND 2026, AT 9.54m CHART DATUM (4.54m OS) BASED ON THE DATA AT MUMBLES, SWANSEA.

KEY:

ALL MASONRY TO BE RAKED OUT TO A DEPTH OF 80mm AND REPOINTED IN ACCORDANCE WITH NR/SD/CIV/101.

Safety, Health and Environmental Information

Notes below are additional to hazards risks normally associated with this type of work

Construction

Ci. Lifting steel plates during demolition and construction works

Cii. Uncontrolled bridge collapse during strengthening works

Ciii. Bridge fail due to poor condition of the structure

Civ. Significant corrosion/degradation arising from mechanical cleaning/grit blasting

Cv. Bridge collapse due to overloading to understung scaffold

Cvi. Abutment instability due to refurbishment works on the abutment/wing walls

Cvii. Abutment instability due to ground anchor installation

Cviii. Ground anchor under designed capacity

Cix. Ground anchors and underground services

Cx. Ground anchors and rail clearance

Operations

Oi. Disturbing the track during works

Oii. Working at height, risk of personnel falling

Oiii. Personal injury to workers due to contact with trains

Oiv. Slip/trip/falls due to uneven or steep ground

Ov. Disturbance to local area and environment

Ovi. Contamination to environment and species

Ovii. Injury or infection due to contact to hazardous material

Oviii. Injury due to drilling into steel plates

Oix. Damage to service cables laid along the ballast

Ox. Personal injury due to mechanical cleaning / Grit blasting

Oxi. Personal injury by drowning due to working near/above water

Oxii. Bridge/scaffold impacted by large object during flooding events

Oxiii. Limited signal sighting on the bridge approaches

Oxiv. Abutment instability during anchor installation

Maintenance

Mi. Vegetation to be cleared

Mii. Ground anchors inspection works and re-tensioning

Miii. Potential additional ground anchor and services

Miv. Potential additional ground anchor and rail clearances

Mv. Potential additional ground anchor design capacity

Dismantling/Demolition (Future)

Abutment stability during future works

B01	19/01/21	FOR APPROVAL		KL	TV	
P01	02/12/20	FIT FOR INFORMATION		MM	TV	
Rev	Date	Description of Revisions		Drawn	Chkd	Appr
Status					Suitability	
FIT FOR CO-ORDINATION					S1	



Authorised		Signed		Date	
Contractor(s)					
Centregreat Rail					
Location SOUTH WALES MAIN LINE (GLOUCESTER YD JN - NEYLAND)					
Type	CAD Drawing	Sub-type Detail			
Role	Civil Engineer	Sub-Role Structures and Buildings			
Zone	Wales Region				
Phasing	Grip Stage	5			
Region					
Western and Wales					
Contract No. 152092					
Contract Title Kidwelly Viaduct					
Drawing Title Kidwelly Viaduct Proposed Abutment Repairs Ground Anchors (Sheet 3 of 3)					
Designed	P. LLANES	Signed Electronically Signed	Date	04/12/20	
Drawn	M. MITCHELL	Signed Electronically Signed	Date	04/12/20	
Checked	T. VINCENT	Signed Electronically Signed	Date	04/12/20	
Approved		Signed	Date		
Scale(s)		ELR & Mileage			
As Shown		113.0164		to 285.0572	
Alternative Reference 152092-CGE-DRG-ECV-000123				Sheet	3 of 3
Drawing Number 152092-CGE-WLS-SWM2-DRG-ECV-000123				Revision	B01