

Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour, Porthcawl, Bridgend

Heritage impact assessment

June 2019

A report for Ove Arup & Partners Ltd
and Bridgend County Borough Council
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**Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour,
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Summary

On behalf of Ove Arup and Partners Ltd (Arup), the Glamorgan-Gwent Archaeological Trust, Projects Division (GGAT Projects) has undertaken a heritage impact assessment and produced a heritage impact assessment and statement to accompany an application for Listed Building Consent (LBC) for proposed repair and modification works at the Grade II Listed Western Breakwater (LB19362) and Eastern Promenade (located within the curtilage of the adjacent Grade II Listed Walls of the Outer Basin (LB19363) and therefore covered by the listing), at Porthcawl Harbour, Bridgend. The application is submitted to Bridgend County Borough Council (BCBC), as Local Planning Authority, on behalf of BCBC Communities Directorate.

The report sets out the historic background, context, development and descriptions of the heritage assets affected by the proposed works. Details of listed assets indirectly affected by the works are also included (i.e. the Light House (LB11370), the Pilot's Look-out Tower (LB19359) and the Custom's House (LB19358), all located on the Breakwater, as well as the adjacent Jennings's Warehouse (LB11369)), all Grade II Listed buildings closely associated with, and integral to the development of the historic industrial Harbour at Porthcawl.

The report examines the significance and capacity for change of the assets affected. The Western Breakwater is significant as an early 19th century maritime structure from the earliest days of the port of Porthcawl, and for its exceptional importance in the history of the development of the town. Its significance is enhanced by group value, documentation, preservation, retention of rare industrial transport remains, and high levels of evidential, historical, aesthetic and communal value. The monumental scale of the structure and previous repair interventions (including being partially clad in concrete during the 20th century) indicate that the structure has a high capacity for change; sensitive repair and maintenance of the structure is viewed as necessary to ensure its structural integrity, as well as medium and long-term preservation and survival. The report notes similar high levels of significance and capacity for change relating to the walls of the Outer Basin (not directly affected), and Eastern Promenade which is particularly significant for retaining seawalls, considered to be those constructed during the 1860s for the now infilled Inner Basin, and now protected by the curtilage of the listed Outer Basin.

The report sets out the need for the proposed works, investigations undertaken, and options considered and preferred options, whilst heritage impacts have been identified. Given the need for maintenance to ensure the continued structural integrity and survival of the heritage assets, it is considered that the proposed repair and modification works, with suitable heritage conservation construction methodologies in place, would likely have a negligible to low direct heritage impact. Overall, however, these heritage impacts could be considered as moderate to potentially highly beneficial, as the works would help ensure the long term survival of the assets, whilst also safeguarding potential buried archaeological remains relating to the infilled Inner Basin. Any indirect visual impacts, in relation to key views are considered to minimal and limited in nature.

Mitigation has been recommended in the form the design of, and adherence to, suitable conservation construction methodologies and the provision of a WSI to set out

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necessary recording of the assets affected; and provide for a watching brief on any works which disturb their fabric (including the sea wall at Eastern Promenade) and on ground disturbance work. Archaeological works should be carried out to the professional standards laid down by the Chartered Institute for Archaeologists.

Crynodeb

Ar ran Ove Arup and Partners Ltd (Arup), mae Is-adran Prosiectau (Prosiectau GGAT), Ymddiriedolaeth Archaeolegol Morgannwg-Gwent wedi cynnal asesiad o'r effaith ar dreftadaeth ac wedi llunio asesiad o'r effaith ar dreftadaeth a datganiad i gyd-fynd â chais am Ganiatâd Adeilad Rhestredig ar gyfer gwaith atgyweirio ac addasu arfaethedig ar y Morglawdd Gorllewinol Rhestredig Gradd II (LB19362) a Phromenâd y Dwyrain (sydd wedi'i leoli o fewn cwrtil Waliau Rhestredig Gradd II cyfagos y Basn Allanol (LB19363) ac felly a gwmpesir gan y rhestr), yn Harbwr Porthcawl, Pen-y-bont ar Ogwr. Cyflwynir y cais i Gyngor Bwrdeistref Sirol Pen-y-bont ar Ogwr, fel yr Awdurdod Cynllunio Lleol, ar ran Cyfarwyddiaeth Cymunedau Cyngor Bwrdeistref Sirol Pen-y-bont ar Ogwr.

Mae'r adroddiad yn nodi cefndir hanesyddol, cyd-destun, datblygiad a disgrifiadau o ran yr asedau treftadaeth y mae'r gwaith arfaethedig yn effeithio arnynt. Mae manylion yr asedau rhestredig yr effeithir arnynt yn anuniongyrchol gan y gwaith hefyd wedi'u cynnwys (h.y. y Goleudy (LB11370), Tŵr Gwyllo'r Peilot (LB19359) a'r Tollty (LB19358), sydd oll wedi'u lleoli ar y Morglawdd, yn ogystal â Warws Jennings cyfagos (LB11369)), ac sydd oll yn adeiladau Rhestredig Gradd II sydd â chysylltiad agos â'r Harbwr diwydiannol hanesyddol ym Mhorthcawl, ac sy'n rhan annatod o'i ddatblygiad. Mae'r adroddiad yn archwilio arwyddocâd yr asedau yr effeithir arnynt, a'u capasiti i newid. Mae'r Morglawdd Gorllewinol yn arwyddocaol fel strwythur morwrol o ddechrau'r 19eg ganrif o ddyddiau cynharaf porthladd Porthcawl, ac am ei bwysigrwydd eithriadol yn hanes datblygiad y dref. Caiff ei arwyddocâd ei ategu gan werth grŵp, dogfennaeth, cadwraeth, gweddillion trafndiaeth diwydiannol prin, a lefelau uchel o werth tystiolaethol, hanesyddol, esthetig a chymunol. Mae graddfa anferth y strwythur ac ymyriadau atgyweirio blaenorol (gan gynnwys cael ei orchuddio'n rhannol â choncrid yn ystod yr 20fed ganrif) yn dangos bod gan y strwythur gapasiti uchel ar gyfer newid; ystyrir bod gwaith atgyweirio a chynnal a chadw sensitif yn angenrheidiol i'r strwythur i sicrhau ei gyfanrwydd strwythurol, yn ogystal â'i gadwraeth a'i oroesiad tymor canolig a hirdymor. Mae'r adroddiad yn nodi lefelau uchel tebyg o arwyddocâd a chapasiti ar gyfer newid o ran waliau'r Basn Allanol (nas effeithir arnynt yn uniongyrchol), a Phromenâd y Dwyrain sy'n arbennig o arwyddocaol oherwydd morgloddiau cynnal, a ystyrir yn rhai a adeiladwyd yn ystod y 1860au ar gyfer y Basin Mewnol sydd bellach wedi'i fewnlenwi, ac a ddiogelir erbyn hyn gan gwrtil y Basn Allanol rhestredig.

Mae'r adroddiad yn nodi'r angen am y gwaith arfaethedig, yr ymchwiliadau a gynhaliwyd, a'r opsiynau a ystyriwyd, yn ogystal â'r opsiynau a ffefrir, a nodwyd hefyd yr effeithiau ar dreftadaeth. O ystyried yr angen am waith cynnal a chadw i sicrhau cyfanrwydd strwythurol parhaus a goroesiad yr asedau treftadaeth, ystyrir y byddai'r

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gwaith atgyweirio ac addasu arfaethedig, ynghyd â methodolegau adeiladu cadwraeth treftadaeth addas, yn debygol o gael effaith uniongyrchol ddibwys i isel ar dreftadaeth. Ar y cyfan, fodd bynnag, gellid ystyried bod yr effeithiau hyn ar dreftadaeth yn gymedrol neu o fudd mawr o bosibl, gan y byddai'r gwaith yn helpu i sicrhau goroesiad hirdymor yr asedau, a hefyd yn diogelu gweddillion archeolegol a allai fod wedi'u claddu ac sy'n ymwneud â'r Basn Mewnol sydd wedi'i fewnlenwi. Ystyrir bod unrhyw effeithiau gweledol anuniongyrchol, mewn perthynas â golygfeydd allweddol, yn fach iawn ac yn gyfyngedig o ran eu natur.

Argymhellwyd lliniaru ar ffurf cynllunio methodolegau adeiladu cadwraeth addas, a glynu wrthynt, yn ogystal â darparu Cynllun Ymchwilio Ysgrifenedig er mwyn nodi'r gwaith cofnodi angenrheidiol o ran yr asedau yr effeithir arnynt; a darparu briff gwyllo o ran unrhyw waith sy'n amharu ar eu ffabrig (gan gynnwys y morglawdd ar Bromenâd y Dwyrain) ac o ran gwaith sy'n aflonyddu ar y ddaear. Dylid cwblhau'r gwaith archaeolegol i'r safonau proffesiynol a osodwyd gan Sefydliad Siartredig yr Archaeolegwyr.

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Acknowledgements

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Abbreviations

GGAT:	Glamorgan Gwent Archaeological Trust
Gm:	A Scheduled Monument (SM) in Glamorgan
HER:	Historic Environment Record (curated by GGAT Curatorial)
LB:	Listed Building
NGR:	National Grid Reference
NMR:	National Monuments Record (curated by RCAHMW)
NMGW:	A find held by the National Museum and Galleries of Wales
NPRN:	National Primary Record Number (in NMR)
OS Map:	Ordnance Survey Map
PRN:	Primary Record Number (in HER - indicated by a letter suffix, in this case 'm')
RCAHMW:	Royal Commission on the Ancient and Historical Monuments of Wales

1. *Introduction and Purpose*

1.1 Background

This Heritage Impact Assessment (HIA) has been prepared by the Glamorgan-Gwent Archaeological Trust Ltd (GGAT) for Ove Arup and Partners Ltd (Arup) and accompanies an application for Listed Building Consent (LBC) for proposed works at the Grade II Listed Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour, Porthcawl, Bridgend. The HIA has been carried out in support of the Detailed Design of Coastal Risk Management proposals at Sandy Bay, Porthcawl and Planning Application. The application is submitted to Bridgend County Borough Council (BCBC), as Local Planning Authority, on behalf of BCBC Communities Directorate. The proposed development is described below:

‘works within a Conservation Area, works to a Grade II Listed Building (Western Breakwater), works to a curtilage listed structure (Eastern Promenade) and setting impacts on the wider Listed features.

Indicative proposals include:

- Repairs (repointing, patch and strengthening) to Western Breakwater revetment and parapets.
- Construction of a cut off wall to around roundhead and along revetment to prevent further loss of material and scour .
- Repairs and strengthening of the Eastern Promenade parapet and revetment.
- Modifications to Eastern Promenade parapet – raising and potential addition of wave return. • Modifications to Eastern Promenade – raising promenade. Installation of landscaping features, furniture, lighting and/or ancillary structures and provision for ducts for future installation of utilities.

Arup on behalf of BCBC Communities Directorate has formally consulted with the Local Planning Authority to agree the consents required for the proposed works. Email correspondence between Arup and the Conservation and Design Department established the need for a LBC for the proposed works. As a Grade II listed structure any changes to the Porthcawl Breakwater and/or its setting require Listed Building Consent (LBC). Written confirmation provided by the Heritage Officer, in consultation with Cadw, previously confirmed that the proposed works at eastern promenade would require LBC given the site’s reference in the listing of the outer basin and west pier/quay and the promenade’s physical attachment to the walls of the listed outer basin.

The current report draws on previous studies undertaken for the project in particular the extensive number of reports undertaken by Arup on behalf of Bridgend County Borough Council for the various elements of the proposed scheme. These include ‘Porthcawl Eastern Promenade and Walls of Outer Basin Listed Building Consent Heritage Impact Assessment’ (8 June 2018); ‘Q203 - Coastal Defence Breakwater, Porthcawl Structural Assessment - Residual Life of Structure PART 1 - Visual Inspection and Desk Study to identify Further Survey Work’ (27 March 2017);

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Technical Note on 'Existing Coastal Defence Structural Review' (08 February 2017); 'Sandy Bay Porthcawl Coastal Defences Preliminary Environmental Information Report (PEIR)' (16 June 2017); 'Porthcawl Sandy Bay Coastal Risk Management Programme Outline Business Case' (June 2017); File Note: 'Porthcawl Western Breakwater Structural Assessment' (22 May 2017); 'Porthcawl Sandy bay PAR Geotechnical desk study' (15 December 2016); and 'Q203 - Coastal Defences Breakwater, Porthcawl Condition Assessment - Part 2' (Draft 19 October 2018), Western Breakwater drawings 264874-ARP-XX-WB-DR-CS-2801 to 2815 (Figures 17-22), Eastern Promenade drawings 264874-ARP-XX-EP-DR-CS-1101, 1102, 1111 and 1112 (Figures 33 -36), DRAFT- Porthcawl Sandy Bay Coastal Scheme - Western Breakwater, Basis of Design, 2019-05-24_Western Breakwater Basis of Design_P01, P01 | 24 May 2019 and DRAFT- Porthcawl Sandy Bay Coastal Scheme - Eastern Promenade, Basis of Design, 2019-05-24_Eastern Promenade Basis of Design_P02, P02 | 24 May 2019 Porthcawl Sandy Bay Coastal Scheme - Eastern Promenade, Option Selection Report: Parapet Crest Raising and Strengthening, 2019-03-12_Option Selection Report_P01,P2|24 May 2019 amongst others.

This Heritage Impact Assessment (HIA) sets out the heritage significance of the Western Breakwater and the Walls of the Outer Basin (as relates to Eastern Promenade), briefly presents their history and provides a description of the listed structures. It considers the current proposals, establishes the need for the proposed works and evaluates the heritage impact that these would have and where appropriate identifies potential mitigation.

The works were completed in accordance with The Chartered Institute for Archaeologists (CIfA) Code of Conduct (2014), relevant CIfA standard (e.g. 2017 Standard and Guidance for Historic Environment Desk-Based Assessment), Cadw (2017) Heritage Impact Assessment in Wales, Cadw (2017) Setting of Historic Assets in Wales, Cadw (2011) Conservation Principles for the sustainable management of the historic environment in Wales and Cadw Managing Change to Listed Buildings in Wales or Managing Listed Buildings at Risk in Wales and other relevant guidance.

1.2 Location

The heritage assets subject to the Listed Building Consent application, the Western Breakwater, the Outer Basin Walls, part of Porthcawl Harbour, and Eastern Promenade, are located at the south-eastern edge of the town of Porthcawl and form the western flank of Sandy Bay, Porthcawl. Both the Western Breakwater and the Outer Basin Walls form part of the Porthcawl Conservation Area, whereas the promenade is located immediately northeast of and beyond the boundary of the Conservation Area. The centre of the breakwater is located approximately at National Grid Reference (NGR) SS8198476318, and extends NW-SE from NGR SS8189176384 to SS8205376267. The centre of the promenade is approximately located at NGR SS8207776747 and extends NNE-SSW over c. 400m, whilst the centre of the outer basin walls is located at approximate NGR SS8198276495. The extent of the study area (indicated in red outline) and the location of the main listed assets (orange triangles) are illustrated in Figure 1, below. The western part of the study area, taking in the breakwater and eastern Promenade, is bordered by Porthcawl Point to the west, and along its northwest facing

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edge by the listed Jennings Warehouse and the Outer Basin itself, and the site of the former inner basin of Porthcawl Harbour, now infilled and a carpark. Sandy Bay and Coney Beach separate the eastern part of the study area, which includes the promontory of Rhych Point. The breakwater significantly influences coastal risk in Sandy Bay and shelters much of the west side of the bay from the most extreme wave activity and acts to ensure beach levels in Sandy Bay are maintained. The breakwater is also necessary to ensure that the harbour is a safe haven, as required under the Harbour Act. The outer basin is now used as a marina and the promenade historically formed the eastern wall of the inner basin. These structures now form important parts of the coastal defence infrastructure of Porthcawl. Access to the breakwater is from near the Inshore Rescue Boat Station at its northwest end, whilst access to the outer basin walls and promenade are gained via Eastern Promenade Road which provides direct vehicular and pedestrian access. However, the latter can also be reached on foot via Sandy Bay.

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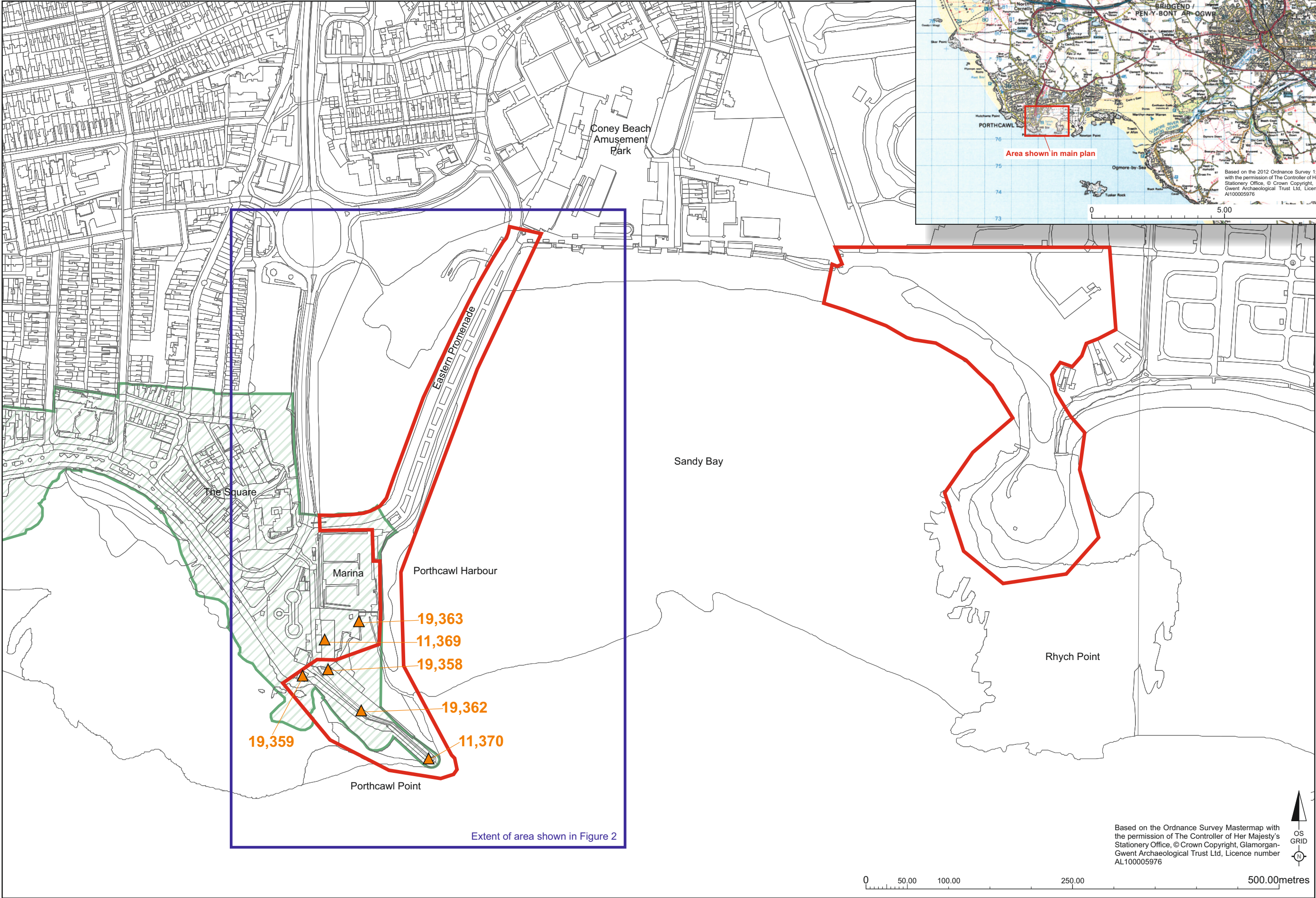


Figure 1. Location and extent of study area (red outline) showing relevant listed assets (orange triangles) and Conservation Area (green hatched).

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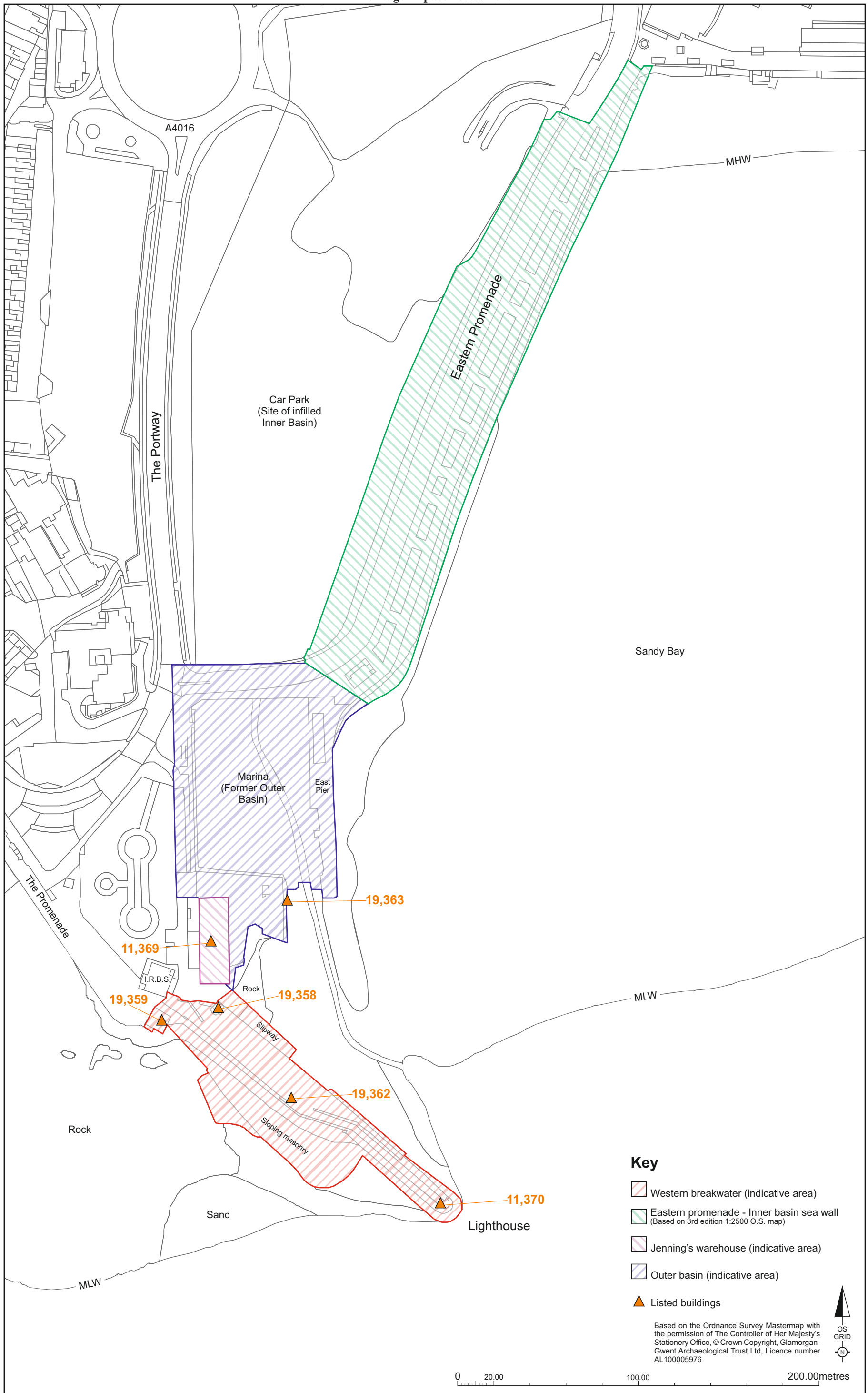


Figure 2. Indicative extents of main assets as shown in Figure 1.

1.3 Methodology

The purpose of this Heritage Impact Assessment is to fully understand the heritage asset and to assess the likely impact on the heritage of the proposed works, taking in to account significance and vulnerability.

The process for writing a heritage report is broadly in line with the philosophy first set out in the *Australia ICOMOS Burra Charter* of 1979 (last updated in 2013), which set out a methodology adopted by ICOMOS and used throughout the world.¹ The established objective is to identify the place and its associations, then assess its significance, identify obligations arising from this significance, gather information about other factors affecting the future of the place and develop a policy for its future. The assessment also follows the approach set out in Cadw's Conservation Principles document (*Conservation Principles for the sustainable management of the historic environment in Wales*, March 2011) as well as that set out in the more recent best-practice guidance documents associated with the Historic Environment (Wales) Act 2016. In particular *Heritage Impact Assessment in Wales* (May 2017) sets out the general principles to consider when planning changes to historic assets and applying for listed building, conservation area and scheduled monument consent.

The heritage impact assessment and statement followed the guidance set out in the best-practice guidance published by Cadw *Heritage Impact Assessment in Wales*. The latter sets out the general principles to consider when planning changes to historic assets and applying for listed building, conservation area and scheduled monument consent.

The results of the heritage impact assessment are set out in a heritage impact statement submitted with the application for consent. The heritage impact statement accompanying the application for listed building and/or conservation area consent includes:

- summary description of the proposed work (which explains what the works intend to achieve and why the works are desirable or necessary).
- summary of significance (brief description of the special architectural or historic interest of the listed building affected and an assessment of its significance, with particular emphasis on those aspects that will be affected by the proposals)
- summary of proposed works
- access statement
- general summary

On site survey and assessment is supplemented by research in the County Archives and the Historic Environment Record (HER). Information recorded on the regional Historic Environment Record (HER) and National Monuments Record (NMR) has been assessed. Cartographic and documentary sources have been consulted, along with relevant published information from the West Glamorgan Archives, Swansea, the Glamorgan Archives, Cardiff and the National Library of Wales, Aberystwyth. Current Listed Building data and information on Scheduled Monuments has been obtained from

¹ *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*, 2013.

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Cadw. Where considered necessary, readily available aerial photographic material (such as that held by the Central Register of Air Photography for Wales) was accessed.

The following bodies have been consulted, as necessary:

- Cadw: Scheduled Ancient Monuments, Listed Buildings and Registered Landscapes, Parks and Gardens
- RCAHMS: NMR, aerial photos, archive and upland survey
- Regional HER: HER information and further information files
- Local museums and societies
- Local and National Archive Service: Historic maps, plans and records

1.4 The site visit

A site visit was undertaken on Tuesday 8th of January 2019 to the area of Porthcawl Breakwater, the Harbour Basin, Eastern Promenade and Rhych Point and to nearby identified interests to photograph the area of the proposed works, the listed assets and also to record extant lines of site, i.e. views from and to the heritage asset(s), to identify potential significant or key lines of site, and help assess direct and any potential indirect visual impact(s). The visit informed potential design mitigation. The weather was fine, light conditions were good for the time of year, which aided photography, especially of more distant views.

Key views noted included those between the inter-visible listed assets identified for the purpose of the project. These views were those between the Western Breakwater (LB 19362) and Eastern Promenade and the following inter-visible listed assets: Walls of the Outer Basin and West Pier/Quay (LB 19363); Lighthouse on Breakwater Porthcawl Harbour (LB 11370); The Old Customs House (LB 19358); The Look-Out Tower (LB 19359) and the Jennings Warehouse (LB 11369).

Additional key views included those of the breakwater identified in historic photographs and on early postcards (see Appendix IV), of particular significance the 19th century photographs showing the breakwater under construction, and those of the early 20th century taken before the alterations of the 1970s. Other historic views of note include those taken during the late 19th century of the Outer and Inner Basins of Porthcawl Harbour, before the infilling of the Inner Basin, and those illustrating the later changes associated with the 20th century development of the area as a leisure/tourist resort.

2. Initial Baseline Study

2.1 The HIA Study Area

An initial baseline study was undertaken to identify relevant historic assets in the area of the proposed works. A wider HIA study area (see Figure 2, Appendix I), some 4.293 sq km in extent and centred on SS82521 76742, was purposefully designed to be more extensive than the redline study area provided by Arup to ensure the main views west, east and north of the proposed development area were covered and allow any potential relevant interests inter-visible with the area of the proposed works to be identified.

2.2 Heritage assets within the wider HIA Study Area

A search of site data held at the HER, NMR and Cadw was undertaken to inform the study. This data, encompassing some 96 heritage interests was mapped (see Figure 2, Appendix I) and further refined, and cross-referenced extracting those interests relevant to the study, i.e. designated interests likely to be affected, directly or indirectly, by the proposed works. In so doing, site data relating to sites not extant above ground or not having a visual relationship (i.e. not inter-visible) with the area of the proposed works was scoped out and excluded from the following stage of the process; non-designated sites, wrecks, find spots, and non-extant sites known through documentary reference were among those removed. A list of all known heritage assets within the study area is provided in Table 3 (see Appendix II) with the results of the initial filtering process shown.

2.3 Porthcawl Conservation Area

The wider study area takes in the Porthcawl Conservation Area (see Figure 2, Appendix I, for extent), encompassing the surviving maritime/harbour elements and the historic core of the industrial town of Porthcawl.² The area subject to the Listed Building Consent application falls within the extreme south-western corner of the conservation area, which includes the main listed elements of the Western Breakwater and the Outer Basin, together with other listed assets identified below in section 2.4. The area of Eastern Promenade itself falls outside the bounds of the conservation area.

2.4 Selected heritage assets with a visual relationship to the proposed works

As a result of initial filtering, some 14 assets were identified as relating to above ground sites with visual relationships to the area of the proposed works and therefore relevant to the Heritage Impact Assessment (HIA) process; these included 6 listed buildings to which the other interests were all cross-referenced (see Table 1, below). Effectively, 6 listed buildings (see Figure 1, above for their locations) have been identified as being potentially directly or indirectly affected by the proposed works. Those interests identified for further analysis as part of the current HIA are presented in Table 1, below:

² The study area also takes in the southern part of the Newton Conservation Area, which is not impacted by the current works.

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Table 1: Interests identified as relevant to the HIA study

ID ³	NAME	Aboveground Site	Inter-visible	Listed Building
LB 11369 (NPRN 34263; PRN 02346m)	JENNINGS WAREHOUSE	Yes	Yes	Yes
LB 11370 (NPRN 34274; PRN 01481m)	LIGHTHOUSE ON BREAKWATER Porthcawl HARBOUR	Yes	Yes	Yes
LB 19358	THE OLD CUSTOMS HOUSE	Yes	Yes	Yes
LB 19359	THE LOOK-OUT TOWER	Yes	Yes	Yes
LB 19362	THE BREAKWATER	Yes	Yes	Yes
LB 19363 (NPRN 34275; PRN 02537m; PRN 07418w; PRN 08396m)	WALLS OF THE OUTER BASIN AND WEST PIER/QUAY	Yes	Yes	Yes

2.5 Heritage Context

The Porthcawl Breakwater and the walls of the outer basin of Porthcawl Harbour are Grade II listed structures, whilst the Grade II listing of the latter covers the area of eastern promenade through means of its curtilage. The relevant listing for the structures is included in Section 2.6 of the Assessment, however in summary the structures are listed because they represent early 19th century structures from the earliest days of the port of Porthcawl and for their exceptional importance in the history of the development of Porthcawl.

The breakwater and walls of the outer basin are also recognised for their group historic value with each other and other adjacent structures, which amount to a cluster of four historic buildings or structures, which form part of the historic Porthcawl Harbour, and fall within the eastern extent of the Porthcawl Conservation Area.⁴ The listed buildings and structures surrounding the promenade include:

- Jennings Warehouse (Grade II Listed);
- The Old Customs House (Grade II Listed);
- The Look-out Tower (Grade II Listed);
- The Lighthouse on the Breakwater (Grade II Listed).

³ LB = Listed Building (Cadw designated site); NPRN = National Primary Record Number (NMR, RCAHMS site); PRN = Primary Record Number (GGAT HER site).

⁴ Note eastern promenade is not located within the Porthcawl Conservation Area, unlike the listed structures noted.

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2.6 Heritage Designations

The main heritage designations are the Western Breakwater at Porthcawl and the Outer Basin (including part of the Eastern Promenade within its curtilage),⁵ both are Grade II listed structures associated with the wider Porthcawl Harbour. All the Listed buildings fall within and contribute to the designation of the Porthcawl Conservation area. A summary of the heritage designations (listed buildings) is provided below; for full listing data see Appendix V.

The Western Breakwater (LB ref: 19362; Grade II Listed) consists of a long arm stretching roughly east-west. Originally constructed of giant dressed stone blocks on a wooden frame, with smaller stone and other material such as brick and concrete used for later repairs, patching and alterations. On the landward side it is three tiered. The main quay is of stone blocks with plenty of later patching; concrete surface covers the original stone quay surface. The slipway in front has been widened and reinforced with later concrete. The second tier is ramped and battered, also with giant blocks, and incorporates a small surviving section of the Dyffryn Llynfi Porthcawl Railway imbedded in the stone surface, the rest covered in concrete. The top tier is the sea-wall mostly of smaller stone though some larger in centre, stepped up in centre; flights of stone steps join levels. The seaward end section is battered and faced in concrete though the lighthouse has a stone surround with stone ledges; a flight of steps descends at its end to the water. On seaward side the defences rise at roughly 45% angle comprising a slope of giant roughly hewn and mortared boulders surmounted by two vertical courses of giant dressed blocks. Other features included an added concrete walkway with blue brick on top, and steps rise to the single width wall, here consisting of large stone blocks at base, small at top.

The breakwater is listed as it represents a substantially surviving structure from the main period of activity of Porthcawl Dock in the second half of the 19th century and for its crucial importance in the development of the town, as well as having group value with the Outer Basin, Jennings Warehouse, the Look-out Tower, the Old Customs House and the Lighthouse, the latter two actually stand on the Breakwater.

The Outer Basin (LB ref: 19363; Grade II Listed) is rectangular, originally built of giant regularly coursed dressed limestone blocks, at the south and west directly onto outcropping rock; with later rock-faced stone and later small stone patching and repairs. The south and west walls are mainly of giant coursed blocks. The later north wall is of rock-faced stone, with clear infill where lockgates were removed when the Inner Basin was decommissioned. Further alterations can be traced in masonry of the east wall. Stone quaysides, in places covered with concrete or asphalt, have iron and stone bollards and mooring rings; original steps at the northwest corner, two steps created out of each stone block; an apparently original buttress adjacent; culverts and a blocked arched opening in west wall. The seawall to the east has blocks on its inner face decoratively snecked; the seaward side is rock-faced, mostly large coursed blocks battered to base; raised parapet. The West Pier or Quay in front of Jennings Warehouse

⁵ Consultations with both BCBC Heritage Officers and Cadw have identified that the eastern promenade forms part of the listing as it lies within the curtilage of the Grade II listed walls of the outer basin; the walls of the eastern promenade which extend from those of the outer basin historically formed part of a large dock to the north of the outer basin.

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is built of coursed dressed blocks with section south of rock-faced stone; grooves for gates, which are apparently submerged and visible in silt at low water.

The Walls of the Outer Basin and West Pier/Quay are listed because they represent an early 19th century maritime structure from the earliest days of the port of Porthcawl, for its exceptional importance in the history of the development of Porthcawl, and for group value with Jennings Warehouse, the Breakwater, the Old Customs House, the Look-out Tower, and the Lighthouse.

Four other listed structures are noted above as having a close group value association with both the breakwater and the walls of the outer basin and West Pier/Quay; these are the Look-out Tower, the Old Customs House, the Lighthouse and the Jennings Warehouse.

The Look-out Tower (LB ref: 19359; Grade II Listed) comprises a circular tower, slightly tapered, rendered and white painted; a small gap in the rendering shows stone rubble originally lime washed. It has a flat roof, now of concrete supported internally by cast iron piers on the seaward side where there are four replaced large glazed viewing panels. Two protruding ledges at eye level on each side of unknown purpose. At upper floor right is a small recessed light apparently unaltered facing town. To the rear are doors on each level with iron lintels, and keystone to ground floor which also has large stone step. Timber flight of steps to first floor. Sea guidance lights and flag poles on roof.

The Look-out tower is listed for its local interest as a building representing the maritime guidance and rescue service provided by the dock in the mid-19th century, and has group value with the Outer Basin, the Breakwater, Jennings Warehouse, the Old Customs House, and the Lighthouse.

The Old Customs House (LB ref: 19358; Grade II Listed), located on the breakwater, is a small rectangular building with a semi-circular end built of snecked rockfaced sandstone now heavily weathered with a hipped timber shingle roof. Gabled porch now roofless with a sandstone block lintel. Second opening in main wall adjacent. On the curved wall to the left the two blocked window openings have deep curved sandstone lintels and sills. The right end facing Jennings warehouse has two small rectangular windows. The wall to the rear is of rubble and the quoins at each end of straight section suggest some alteration.

The Customs House is listed as a structure dating from the second major period of development of Porthcawl dock and for its group value with Jennings Warehouse, the Outer Basin, the Breakwater, the Look-out Tower, and the Lighthouse.

The Lighthouse (LB ref: 11370; Grade II Listed), also located on the breakwater, is made of cast-iron painted black and white on a hexagonal painted stone base set on a rectangular stone plinth just behind outer sea wall. It comprises a tapered hexagonal tower, with battered plinth, with small vents bolted midway up each side and a hinged metal door with handle and catches (the metal ladder to door no longer extant). The structure has a moulded band at its top on which is set a replaced bolted circular domed cap with small round finial; curved bolted frames to glazed panels.

The Lighthouse is listed for its interest as an early cast iron lighthouse and for its importance in the second major stage of development of Porthcawl Harbour. Group

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value with Jennings Warehouse, the Outer Basin, the Breakwater, the Look-out Tower, and the Old Customs House is also a factor.

The Jennings Warehouse (LB ref: 11369; Grade II Listed), located just off the outer basin, is a large two storeyed building, 15 bays long, 5 bays wide, built of limestone rubble with stone and brick dressings, some replaced with concrete, rendered to rear west, and south; hipped slate roof, terracotta ridge tiles, and inserted skylights. The building is listed as a rare example of a very early railway company warehouse, for its important connections with the South Wales Iron industry, and for its importance as one of the founding buildings of Porthcawl which originated with the harbour. The significance of the building is enhanced by its group value with the Lighthouse, the Outer Basin, the Breakwater, the Old Customs House, and the Look-out Tower.

3. History of the study area and its wider context⁶

3.1 The Initial Period

It is known that some form of harbour existed at Porthcawl, probably a small tidal inlet protected by the rocky headland of Porth-y-cawl or Porthcawl, from at least the 18th century; George Yates map of the County of Glamorgan of 1799 notes 'Porthcawl Harb' or Harbour. It was not until the 19th century, however, that the dock associated with industrial and commercial development that led to the establishment of the town of Porthcawl was constructed.

3.2 The Harbour - Initial Industrial Phases c. 1825 - c.1860

Development of the current harbour at Porthcawl began during the early 19th century; the initial phase, which included a dock (later the Outer Basin) and planned breakwater began following an Act of Parliament of 1825; this authorised the construction of both the Dyffryn Llynfi Porthcawl Railway, a horse-drawn tramroad, and the dock at Pwll Cawl Point, to provide an outlet for coal and iron from the Llynfi Valley.

In 1828 the dock comprised a rectangular basin with breakwater, the latter planned but not completed immediately because of financial difficulties, is shown extant on the Tithe plan of 1846.⁷ A section of rails of Dyffryn Llynfi Porthcawl Railway Company is still *in situ* on Breakwater, the only such surviving. The original dock (later known as the outer basin) consisted of a rectangular tidal basin protected by a short breakwater with an entrance in its east side and open to north. The map of 1846 shows the short breakwater and the west, south sides and part of the east walls of the harbour on a similar alignment to those shown on later maps.

A large warehouse, Jennings Warehouse,⁸ is shown located at the southwest of West Quay. The Jennings Warehouse, now a Grade II Listed building, was built in 1832 by James Allen, the proprietor of a spelter works at Dyffryn, as the south terminus of the Dyffryn Llynfi Porthcawl horsedrawn tramroad. The Tithe apportionment notes a 'warehouse of the Llynfi Iron Company' leased from the Dyffryn Llynfi and Porthcawl Railway Company. It was used as a store for iron and iron goods awaiting shipment and is much larger than the few other surviving examples, perhaps as a result of trade expectations, or as extended storage provision during periods of bad weather.

The dock was further developed following an Act of 1840 which provided new facilities for loading coal, extending the dock by rebuilding the north wall 50 yds (45.7 metres) to the north, and excavating to deeper depths (see e.g. Morgan 1987).

The closely associated circular look-out tower,⁹ now a Grade II Listed building, previously thought to have been constructed after the later harbour extension of c. 1865-

⁶ See Appendix III for historic map regression and Appendix IV for historic images.

⁷ Newton Nottage Parish Tithe map of 1846.

⁸ The name dates from 1911 when it was used by Jennings and Co, timber importers. More recently used as a roller skating rink during the Second World War the warehouse became a base for RAF Air Sea Rescue Launch.

⁹ Part of a complex formerly comprising, a signal station now demolished, a lifeboat station (1860 and now rebuilt) and the lighthouse on the Breakwater (1866).

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1867,¹⁰ is now considered to be earlier in origin; a circular structure appears on a plan of 1846 at its location.¹¹ The look-out likely dates to the harbour improvements of the 1840s, or earlier; the first coastguard service at Porthcawl is known to date to the 1830s.

3.3 The Harbour - Main Industrial Phase c. 1860 - c. 1898

In 1864 John Brogden and Son, who had purchased Tondy Ironworks in the Llynfi Valley and were developing coal mining in the Ogmore Valley, were instrumental in obtaining an Act of Parliament for the improvement of Porthcawl Harbour which also involved extending the breakwater by 100 yds (91.4 metres). This was needed to provide additional protection for shipping as strong tides and winds had always made access difficult and in early stages dock could only be used intermittently and predominantly in summer. The improvements of 1860s involved construction of an additional large dock to north, 'the inner dock' or 'Floating Basin' with entrance gates at the north end of existing tidal outer basin, re-siting the entrance from the east side of the basin to the south, erection of an inner pier along the east side and the extension of the breakwater by 100 yds (91.4 metres), as shown in a plan of 1863, indicating the proposed improvements to the harbour.¹² A photograph of c. 1866 shows the breakwater extension nearing completion with wooden structure (wood from Forest of Dean) part faced in stone. This extension work included the erection of the lighthouse, now a Grade II Listed building, at the southeast end of the extended western breakwater, built in 1866 by Messrs Stephen of Bristol.¹³ The Old Customs House, also a Grade II Listed building, located at the northwest end of the breakwater is believed to have been built after the inner dock was constructed in 1867 for levying duties on main imports of iron ore and timber for pit props.

Following enlargement of the docks trade increased greatly; in 1871 some 165,000 tons (168,300 tonnes) were shipped and in 1874 over 700 vessels docked. Over a half of the outgoing cargoes were from Brogden undertakings, whilst many incoming vessels came in empty or in ballast which was tipped on nearby dunes.

3.4 The Harbour - Late Industrial & Recreational Phase c. 1898 - the Present

The opening of the Port Talbot and Barry Docks in 1898, provided better and larger facilities with safer access, and had the immediate effect of reducing trade at Porthcawl and Porthcawl docks closed in 1906. Subsequently the harbour was predominantly used for pleasure trips notably by paddle steamers in the Bristol Channel as Porthcawl became an increasingly popular resort, with a landing stage added to the breakwater.

The filling of the north inner basin commenced in 1914 but was abandoned owing to outbreak of World War I. It became the Salt Lake Bathing Pool in 1920s when the area developed as Cosy Corner after the name of a cinema adjacent to the Jennings Warehouse and Eastern Promenade was constructed. The inner basin was finally infilled during Second World War. More recent development includes repair to the

¹⁰ After listed building description, which also notes 'on 1st edition OS Map 1885 (surveyed 1876)' and 'on a photograph of c1900 much as now but with small-paned lookout windows, also one on seaward side at ground floor, and possibly a chimney'.

¹¹ Newton Nottage Tithe map of 1846.

¹² Llynfi Valley Railway Sheet 1 (GRO Q/D/P/243).

¹³ Its lantern replaced after storm damage in 1911.

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breakwater carried out during the 1970s and 1980s and the conversion of the Outer Basin dock into a marina in 2013.

4. The Development of the Western Breakwater, the Outer Basin and Eastern Promenade¹⁴

4.1 The Western Breakwater

The 182m (200yds) long breakwater was constructed in two phases. It was originally built in 1820s and extended by 91m in 1860s. The 1860s structure comprises 0.5m thick mass masonry external walls with a secondary rock rubble core. The 1860s extension also raised the 1820s parapet from its original height. An extensive timber trestle lattice frame and infill boards on timber piles is buried within the structure; construction formwork for the permanent structure.¹⁵

Although it is possible that an earlier structure may have existed on the site, it is thought that the construction of the Western Breakwater (also known as the Outer Breakwater) was planned as part of the harbour following an Act of Parliament of 1825, which authorised construction of both Dyffryn Llynfi Porthcawl Railway, a horse-drawn tramroad, and the dock, to provide an outlet for coal and iron from the Llynfi Valley. The work authorised by the Act to construct the breakwater appears not to have been immediately undertaken due to financial difficulties; the structure is first shown extant on plan of 1846.¹⁶ Further detail of the breakwater shown on the plan of 1846 (i.e. the structure extant during the 1830s and 1840s) are provided on a plan of 1863 showing the harbour arrangement of the time and initial proposals for extension.¹⁷ This plan shows the rails of Dyffryn Llynfi Porthcawl Railway Company in place leading to a point half way along the length of the breakwater (the rails, which still survive *in situ* on the breakwater today are considered a very rare survivor); at this date the breakwater is a straight NW-SE aligned linear breakwater of stone construction set on a splayed revetment base or toe which becomes wider as it extends towards its SE end.¹⁸ The 1863 plan relates to a series of accompanying cross sections, one of which provides is a profile/section of the SE end of the existing breakwater (with its junction with the proposed extension), showing the raised parapet towards its SE terminus.¹⁹

Extension works were undertaken on the Western Breakwater between 1864 and 1867 as part of wider improvements to Porthcawl Harbour. The Act of Parliament of 1864 for the improvement of Porthcawl Harbour included extending the breakwater by 100 yds (91.4 metres). A series of detailed plans from 1864 show the layout of the extension to the breakwater and provide constructional details (including a General Plan of Porthcawl Harbour, Plans, elevations and various sections of Outer Breakwater, sections of parapets, plans and various elevations of the end of the outer Breakwater

¹⁴ See Appendix III for historic map regression and Appendix IV for historic images.

¹⁵ Q203 - Coastal Defences Breakwater, Porthcawl Condition Assessment - Part 2 (19 October 2018).

¹⁶ Newton Nottage Tithe map of 1846.

¹⁷ Llynvi Valley (1) Railway and Ogmore Valley (2) Railway improvement of harbour and other works at Porthcawl. Date 1863. Sheet 1 (GRO Q/D/P/243).

¹⁸ The plan also shows a proposed extension on the same alignment, differing to that actually constructed (which ran slightly to the east before continuing on a NW-SE alignment).

¹⁹ Section from S to T on Plan. Llynvi Valley (1) Railway and Ogmore Valley (2) Railway improvement of harbour and other works at Porthcawl. Date 1863. Sheet 2 (GRO Q/D/P/243).

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and Light House Foundation, among others).²⁰ Photographs of c. 1866 show the extension nearing completion with wooden structure (wood from Forest of Dean) of the eastern elevation part faced in stone.²¹ The plans and the photographs indicate that the end of the original breakwater was partially dismantled and cleared away (including the curved splayed revetment base on SW side of the old breakwater terminus) to allow the construction of the extension, and demolition work can be seen to an extent in the photographs of c. 1866. The first edition 1:2500 OS map of 1877 shows the layout of the Western Breakwater complete as it is today with the extension with its lighthouse, known to have been constructed in 1866, in place. Also shown is a footbridge from the breakwater leading the end of the west pier to the entrance of the Outer Basin, the lines of the Llynfi Valley Railway extending along the original breakwater, the circular pilot look-out and the nearby customs house.

The opening of Port Talbot and Barry Docks in 1898 caused a decline in the trade using Porthcawl Dock and finally to its closure in 1906 as a coal port. Subsequently, as Porthcawl became an increasingly popular resort, Porthcawl harbour, specifically the breakwater was used as a berth for paddle steamers which plied the Bristol Channel. Postcards of the 1920s illustrate paddle steamers such as the *Glen Avon* docking at the pier, and show six wooden piers of the steamer berthing point.²²

The 2nd edition 1:2500 OS map of 1899 shows minimal change to the breakwater; three mooring posts are depicted on the lowest level in the area of the steamer berth on the E side of the original part of the breakwater, whilst a slipway (not indicated on the previous edition) has been constructed on the inner side of the breakwater. It is notable that the lines of the Llynvi Valley Railway are no longer shown on the mapping. No change is noted on the 3rd edition 1:2500 OS map of 1919. By the 4th edition OS map of 1943, minor changes include the widening of the slipway, and the provision of an additional mooring post. A number of early 20th century photographs and postcards exist illustrating the appearance of the breakwater (known as the pier) at Porthcawl following its extension with the light house and pilot's look-out, and prior to alterations made during the latter half of the 20th century.²³

Later changes to the breakwater have been extensively covered by structural and condition assessments undertaken by Arup. In 1960, the steamer berth was re-constructed from kerbstones and mass concrete. It was 1.8m wide and 2m deep with concrete foundations with stone plumbs which were laid in anticipation of an extension of the berth to the end of the Breakwater. The breakwater was used to tie up the MV Balmoral (passenger ship) several times a year.²⁴

²⁰ Llynvi Valley Railway and Ogmore Valley Railway Porthcawl Harbour (dated from around May 30th 1864) contained on 3 CDs at the Glamorgan Archives (Lib/CD/63i-iii).

²¹ Courtesy of Porthcawl Museum.

²² Postcards held at the Glamorgan Archives (D57/8 & 10).

²³ See glass plate negatives at the Glamorgan Archives: D261/M697; D261/M698; D261/M699 and Postcards at the GA: DX135/3/2 and DX145/4. Also two glass plate negatives at the National Library of Wales of c. 1905: Ridley 1930 and Ridley 1935.

²⁴ Arup 2017b and 2018b.

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In 1974 significant remedial works were necessary in particular to the 90 feet section leading to the head. Spray concrete or Gunnite was used to the face of the 90 feet timber section and 3:1 sand/cement grout was injected horizontally to contain the rubble filling and fill the voids, estimated to be 40% voided. “The seaward face was in comparatively good condition, having concrete blockwork facing, with stone pitching below. Much of the leeward timbers were rotted and missing causing the voiding of fill material.” The deck was similarly treated with Gunnite to repair damage caused by overtopping. In addition to pressure grouting, areas of masonry were rebuilt and re-pointed at the time.

The inner old wall near the slipway was repaired following storm damage in January 1974, which had ‘washed out’ and collapsed a large section of the inner face of the masonry wall. The permanent repair was mass concrete poured in lifts of 4 feet with 25mm diameter bars placed in lifts to act as dowels.²⁵

The appearance of the breakwater extension was further altered during the 1980s; in 1981 the seaward face of the timber frame cladding, which had been clad in pre-cast concrete blocks during the 1970s, were further overlain with reinforced concrete protection panels, which continued around the roundhead of the original Breakwater.²⁶

During recent years the parapet of the breakwater has been repaired regularly and in places re-built following damage from wave impacts, including the important section at and around the highest part in the transition area of the 1820s and 1866 work, which has proved particularly susceptible to storm damage.²⁷ The structure is currently protected as a listed building (LB 19362).

4.2 The Outer Basin

The first harbour, which later became the outer Basin, was completed in 1828 following Act of Parliament 1825 authorising construction of both Dyffryn Llynfi Porthcawl Railway, a horse-drawn tramroad, and the dock. The original dock was a rectangular tidal basin protected by a short breakwater with an entrance in the east side and open to north. A large warehouse, Jennings warehouse, erected to the southwest on West Quay. Plan of 1846 shows the west, south and possibly part of the east walls largely as at present. Dock was further developed following Act of 1840 which provided new facilities for loading coal, extending dock by rebuilding the north wall 50 yds (45.7 metres) to the north, and excavating depths. Extensive further development authorised by Act of Parliament of 1864 involved construction of additional large new dock to the north with entrance gates at the north end of the existing dock, now the tidal outer basin, re-siting the entrance from the east to the south side of the basin, the erection of inner pier on the east side of the basin entrance and extension of breakwater by 100 yds (91.4 metres), as shown in Plans of 1863 and 1864.²⁸ The plans show the west, south and east walls of the Outer Basin together with a proposed new entrance to the south protected

²⁵ Ibid.

²⁶ Ibid.

²⁷ Ibid.

²⁸ See footnotes 13 & 16.

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by an Inner Breakwater at its east,²⁹ the former ‘Present Entrance’ to the east is shown blocked, and to the north is a new centrally placed entrance to the new ‘Inner or Floating Basin’.³⁰ The 1860s expansion took place under John Brogden and Sons who became owners of Tondy Ironworks in 1853 and began developing coal mining in the Ogmore Valley and accounted for over a half of outgoing cargoes at Porthcawl.³¹ Numerous photographs taken during the latter part of the 19th century illustrate the Outer Basin at the height of its use, including the dock gate between the Outer and Inner Basins, and provide additional evidence of the original dockside features and fittings.³²

The rectangular Outer Basin is shown in detail on the 1st edition 1:2500 OS map of 1877, with the new entrance to the sea at the south with the west and east³³ piers flanking (the former entrance to the east is shown blocked), the Jennings Warehouse to the southwest, and with the dock gates centrally placed at the north leading to the new dock or Inner Basin of 1866 in place. The map also shows railway lines/sidings of the GWR Llynfi & Ogmore Section, Porthcawl Branch extending down the west and east sides of the basin and crossing the southern side and the dock entrance. Other characteristic features include what appear to be turntable junctions, docks-side structures and mooring posts, and steps in west side near the northwest angle of the dock. The 2nd and 3rd edition OS maps chart the general decline of Docks, specifically reduction in and simplification of the siding provision at the Outer Basin, first with the loss of the track to the south of the dock by 1899 and later the removal of those on the eastern side of the dock, as well as the loss of the dock gates between the Outer and Inner Basins, by 1919. The 4th edition OS map of 1943 shows that all rail sidings have been removed from the dockside and a new road, linking the southwest extent of Eastern Promenade, has been constructed across the northern edge of the Outer Basin, whilst the Inner Basin beyond has also been infilled. Aerial photographs indicate the new road likely dates to the 1920s.³⁴ A single storey linear building was constructed adjacent to the east side of the Outer Basin during the latter part of the 20th century.³⁵ Further losses that occurred during the latter part of the 20th century included the removal of the west and east piers at the basin entrance, aerial photographs of 2003-2016 indicate the remains of these structures as linear footings, and stone banks visible at low water. A replacement east pier structure was erected in around 2013, part of works undertaken when the dock was converted to a marina.³⁶ The Outer Basin is currently protected as a listed building (LB 19363).

4.3 Eastern Promenade (walls of the Inner Basin)

Eastern Promenade is linked to the development of the new dock or Inner Basin at Porthcawl, the walls of which form the seaward side of the Promenade. Extensive

²⁹ This is given as east pier on the 1st-4th edition 1:2500 OS maps of 1877-1943.

³⁰ Ibid.

³¹ Cadw Listed Building Description (LB 19363), amended.

³² Photographic evidence provided by BCBC.

³³ The east pier is ‘Inner Breakwater’ given on the 1864 plan, also illustrated on the 1863 plan.

³⁴ The road is shown on an aerial photograph of 1929, courtesy of Porthcawl Museum.

³⁵ Not shown on the aerial photograph of 1929, or the 4th edition OS map of 1943.

³⁶ Google Earth Historic Imagery.

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development to the harbour at Porthcawl authorised by Act of Parliament of 1864 involved construction of additional large new dock to the north of the original dock (the Outer Basin). This expansion took place under John Brogden and Sons owners of Tondy Ironworks, and the enlargement of docks was followed by substantially increased levels of trade.³⁷ Plans of 1863 and 1864, which illustrate the layout of development proposals of the time, show the 'Inner or Floating Basin' with new entrance gates at north end of existing tidal outer basin, staggered wharves on the west side, a generous (slightly curving) wide sea embankment to its eastern side and a pitched slope at its north northeast end.³⁸

The extensive Inner Basin is shown in detail on the 1st edition 1:2500 OS map of 1877, its entrance to Outer Basin at the south, two staggered wharves to the west each with coal staithes (or coal tips) served by rail links to an area of sidings to the north. Railway lines/sidings of the GWR Llynfi & Ogmre Section, Porthcawl Branch extend along the west (passing under the lines to the wharves) and east sides of the dock to reversing spurs in the area beyond the northeast of the dock. A group of three buildings, including a smithy, part of a shipbuilding yard is shown at the northwest side of the northern end of the dock. The northern extent of the dock is flanked by sloping masonry revetments, part of the shipbuilding yard. Other features indicated include mooring posts. The eastern side of Inner Basin (currently taken by Eastern Promenade) is protected by an embankment and sea wall with a sloping revetment or toe. The area between the Inner Basin and the sea wall contains a line of mooring posts, three rail lines and a small rectangular structure adjacent to the coastal wall. A number of alterations to the dock taken place by 2nd edition OS map of 1899, notably the construction an additional coal tip served by rail, located to the north of the previous two and the removal of shipbuilding yard and its buildings, a travelling crane is indicated on the west side of the dock, whilst the eastern dockside shows a new rail line parallel to the dockside and existing mooring posts. The structure by the seawall now removed and a group of three small structures/huts has been erected further north adjacent to the seawall. The provision of superior facilities with safer access at Port Talbot and Barry Docks in 1898, led to the closure of the Porthcawl Docks in 1906. The filling in of the north part of the Inner Basin commenced in 1914 but was abandoned owing to outbreak of World War I. The 3rd edition OS map of 1919 shows the dock following closure; mooring posts and the dockside crane remain in place, though the rail lines to the wharves on the west side of the dock have been partly dismantled and no longer extending to the wharves, whilst the rail lines on the east side of the dock have been removed, the area adjacent to the sea wall were devoid of features by this date.

The dock became the Salt Lake Bathing Pool in 1920s when the area was developed as 'Cosy Corner' after the name of a cinema adjacent to the Jennings Warehouse. The Inner Basin was finally infilled during Second World War.³⁹ An aerial photograph of 1929, among others, shows the dock as yet not infilled, but with Eastern Promenade, the new road across the north end of the Outer Basin and two shelters in place just east of the Promenade in the southern part of the open area adjacent to the coastal wall (the

³⁷ From Cadw Listed Building Description (LB 19363), amended.

³⁸ See footnotes 13 & 16.

³⁹ Ibid.

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southern of the two being the larger).⁴⁰ The road and bridge at Eastern Promenade having been constructed between 1925 and 1926 by Porthcawl Urban District Council in conjunction with the Ministry of Transport.⁴¹ By the 4th edition OS map of 1943 the Inner Basin is shown infilled and Eastern Promenade has been constructed with a new road crossing the area of the former gate to the Outer Basin. At this date the former western dockside rail appears to survive heading northeast beyond the site of the former docks to terminate at the Porthcawl Gas works, whilst a Miniature Railway has been constructed along the eastern side of the infilled dock, partly bordering the western edge of Eastern Promenade. The map also shows the two previously mentioned shelters east of the Promenade, whilst a telephone call box is indicated at the northern end, near the Coney Beach Amusement Park. An aerial photograph of 1947 essentially shows little change to the area of Eastern Promenade, more recent aerial photographs indicate the area of the infilled dock as an area of rough ground utilised in recent years as a carpark, whilst the two shelters were both demolished between 2015 and 2016.

The coastal wall of the Inner Basin and its revetment shown on the 1st edition OS map appears to have remained unchanged in plan over all four editions of the OS maps, i.e. from 1877 and 1943, and with aerial photographs indicating little subsequent change, it is likely that the wall with its parapet, as existing today, is largely that constructed in 1866. The wall appears to have been the subject to maintenance and repair, such as work carried out between 2009 and 2011.⁴² The seawall at Eastern Promenade is presently protected through the listing of the adjacent Outer Basin through its curtilage.

⁴⁰ Aerial photographs provided by Porthcawl Museum.

⁴¹ Construction dates recorded on plaque attached to bridge pier.

⁴² Arup 2017b.

5. Description of the Western Breakwater, the Outer Basin (walls of) and Eastern Promenade

5.1 The Western Breakwater

5.1.1 Western Breakwater – general description

The Breakwater consists of a long arm stretching roughly east-west. Originally constructed of giant dressed stone blocks on a wooden frame, with smaller stone and other material such as brick and concrete used for later repairs, patching and alterations.



Plate 1. The Western Breakwater: view from near the Look-out tower towards the light house

On the landward side it is three tiered. Main quay is of stone blocks with plenty of later patching; concrete surface covers original stone quay surface. Slipway in front widened and reinforced with later concrete.

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Plate 2. The Western Breakwater: view from the Look-out tower towards the light house and the Customs House (left)



**Plate 3. The Western Breakwater: tiered layout on the landward side and adjacent slipway.
Taken from West Quay and Jennings Warehouse.**

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Plate 4. The Western Breakwater: the quay (steamer berth) on the landward side.

Second ramped and battered tier, also with giant blocks, incorporates a small surviving section of the Dyffryn Llynfi Porthcawl Railway imbedded in the stone surface, the rest covered in concrete. Top tier is the sea-wall mostly of smaller stone though some larger in centre, stepped up in centre; flights of stone steps join levels.



Plate 5. The Western Breakwater: the quay (steamer berth) and the section of railway from above. Taken from near the Customs House.

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Plate 6. Western Breakwater: section of Dyffryn Llynfi Porthcawl Railway and upper wall.



Plate 7. The Western Breakwater: steps and upper wall, inner side of junction with the extended section of the 1860s.

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Plate 8. The Western Breakwater: the junction between the extended section of the 1860s (foreground) and the original part of the breakwater.

Seaward end section is battered and faced in concrete though the lighthouse has a stone surround with stone ledges; flight of steps descends at end to water.



Plate 9. The Western Breakwater: the lighthouse and steps at the round end.

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On seaward side the defences rise at roughly 45% angle comprising a slope of giant roughly hewn and mortared boulders surmounted by two vertical courses of giant dressed blocks. There is an added concrete walkway with blue brick on top. Steps rise to the single width wall, here consisting of large stone blocks at base, small at top.



Plate 10. The Western Breakwater: wall and walkway on seaward side with sloping revetment below to the right. Taken from south of the Lookout Tower.

5.2 The Outer Basin, walls of (no direct impact)

5.2.1 The Outer Basin – general description

The Outer Basin is rectangular, originally built of giant regularly coursed dressed limestone blocks, at the south and west directly onto outcropping rock; later rock faced stone and later small stone patching and repairs. The south and west walls are mainly of giant coursed blocks. The later north wall is of rock-faced stone, with clear infill where lock gates were removed when Inner Basin was decommissioned. Further alterations can be traced in masonry of the east wall. Stone quaysides, in places covered with concrete or asphalt, have iron and stone bollards and mooring rings; original steps at the northwest corner, two steps created out of each stone block; an apparently original buttress adjacent; culverts and a blocked arched opening in the west wall. The seawall to the east has blocks on inner face decoratively snecked; the seaward side is rock faced, mostly of large coursed blocks battered to base; surmounted by a raised parapet. The West Pier or Quay in front of Jennings Warehouse is built of coursed dressed blocks with a section to the south of rock-faced stone; it retains grooves for gates, which are apparently submerged and visible in silt at low water.

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Plate 11. The Outer Basin: entrance to the Basin with West Quay, Jennings Warehouse and Customs House to the left, view from Western Breakwater



Plate 12. The Outer Basin: north and west (left) walls

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Plate 13. The Outer Basin: the east wall



Plate 14. The Outer Basin: entrance gates to the marina

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Plate 15. The Outer Basin: view of the north wall and the blocked entrance to the former Inner Basin. Stone mooring post in foreground right

5.3 Eastern Promenade (walls of the Inner Basin)

5.3.1 Eastern Promenade – general description

The Eastern Promenade runs along the Western edge of the bay, from the north of the marina along to edge of the Coney Beach Fairground at the Northern end of Sandy Bay.



Plate 16. Eastern Promenade: view of Outer Basin (left) with Inner Basin Wall extending to Coney Beach (right)

It consists of a vertical sea wall of roughly faced rusticated stone masonry, with a sloping basal revetment or toe of similar style and a crest level of between 8.6 and 9.0 m AOD. The wall has a parapet which varies in height from the pedestrian side,

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becoming very low at the approach to Coney Beach Fairground (after Arup Technical Note & Vol2 Halcrow 2005).



Plate 17. Eastern Promenade: distant view of the Inner Basin Wall of the Promenade (right) with the Western Breakwater (left)



Plate 18. Eastern Promenade: typical section of Inner Basin/promenade wall with sloping revetment toe

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Plate 19. Eastern Promenade: Inner Basin/promenade wall and revetment towards the Coney Beach end



Plate 20. Eastern Promenade: Inner Basin/promenade wall and revetment at the lower Coney Beach end

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Plate 21. Eastern Promenade: the promenade showing variations/blocked openings in the wall parapet



Plate 22. Eastern Promenade: the promenade at Coney Beach end with lower wall parapet (right)

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Plate 23. Eastern Promenade: the view over Sandy Bay/Coney Beach towards Rhych Point from the promenade

It has been noted that historic drawings indicated that the eastern promenade wall is faced with sea pitching in mortar 2ft thick. The Halcrow report of 2005 noted that the wall appeared to be in good condition, whilst highlighting that a small accumulation of rockfill along the toe of the wall was unlikely to provide a viable scour protection. Intrusive investigations to establish the toe level along the line of wall were recommended. The report estimated that the wall reached required crest levels (8.65m OD) in order to reduce overtopping within acceptable limits for a 1 in 200 year return period storm event (after Halcrow 2005 from Arup Technical Note).

6. Significance and Capacity for Change

6.1 Summary of Significance and Capacity for Change

6.1.1 The Western Breakwater

Despite alterations and repairs, the Western Breakwater, a Grade II listed building, is a well-preserved and large-scale industrial maritime monument located at the harbour entrance and given its scale and location is a key landmark structure within the dock area of Porthcawl. It represents a substantially surviving structure from the main period of activity of Porthcawl Dock in the second half of the 19th century and is noted for its crucial importance in the development of Porthcawl town, and as part of the dock area of Porthcawl it has strong links with the wider industrial development of Glamorgan, in particular the area's coal industry and industrial transport networks. The breakwater is also notable for retaining an early section of rails of the Dyffryn Llynvi Porthcawl Railway Company; still *in situ* on the Breakwater these are the only surviving example of this type in such a location, and as such represent a rare survivor.

The breakwater's significance is enhanced by its strong group association with other listed structures and buildings within the Porthcawl Conservation Area, including the Outer Basin, Jennings Warehouse, the Look-out Tower, the Old Customs House and the Lighthouse, the latter two actually stand on the Breakwater.

The breakwater is also interesting as a reasonably well-documented example of 19th century maritime construction; the 1860s extension, in particular, is well supported by documentary source material illustrating the construction detail/design of the period. It also provides an example of 20th century engineering repair solutions carried out on maritime structures.

The fabric of the structure, which appears to be largely intact despite periodic repairs to the parapet and stone toe revetment, reflects both the early 19th century and mid-19th century maritime construction techniques. Later 20th century repairs including concrete cladding set over the 1860s extension, have to an extent altered the close-up visual appearance of the structure. These now obscure much of the original stone and timber elements that would have been visible after construction in the 1860s; the original elements appear to be largely preserved beneath the cladding. More traditional and small-scale repairs have also been carried out, particularly to the parapet. It should also be noted that the overall form, function and scale of the structure remain unaltered and that the medium and distant visual appearance of the structure remains largely true to that which would have been experienced by visitors to the port at the end of the 19th century. Although more recent 20th century repair using concrete, concrete cladding, and 'Gunnite', has considerably altered the close-up appearance of the structure, these alterations, have not effectively diminished its evidential, historical or communal value, with perhaps a minor, but largely negligible effect to its aesthetic value. The monumentality of the structure taken together with the previous repair interventions indicate that the structure has a high capacity for change; sensitive repair and maintenance of the structure is necessary to ensure the structural integrity of the structure, as well as its medium and long-term preservation and survival in an increasingly harsh maritime environment.

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6.1.2 The Outer Basin and West Pier/Quay (no direct impact)

The main significance of the Outer Basin (including the West Pier/Quay), a Grade II listed building, is as an early 19th century maritime structure from the earliest days of the port of Porthcawl, and for its exceptional importance in the history of the development of Porthcawl.

Further significance is based on its strong group value with other listed buildings within the Porthcawl Conservation Area, notably the associated Breakwater, the Jennings Warehouse, the Old Customs House, the Look-out Tower, and the Lighthouse.

The Outer Basin is also interesting as a reasonably well-documented example of 19th century maritime construction and is reasonably well-supported by documentary source material illustrating its earlier layout and changes proposed and made as part of the 1860s harbour improvements.

The walls of the Outer Basin are monumentally constructed and remain intact, although there have been losses to associated elements, such as the removal of the original dock gates, the collapse/removal of the west and east piers, the latter now replaced, and the construction of a road to link to the south end of Easter Promenade over and now blocking the entrance to the former Inner Basin, as well as the removal of some dockside features (e.g. rails and crane). The recent construction undertaken to convert the dock to a marina also has had some impact on the monument. However, taking the above and the solid and robust nature of Outer Basin wall construction into account, it is considered the structure has a reasonably high capacity for change; it should be stressed that the proposed works will have no direct impact on this asset.

6.1.3 Eastern Promenade (Walls of the Inner Basin)

The area of Eastern Promenade, set just outside the current Porthcawl Conservation area boundary, lies within the curtilage of the Grade II listed Outer Basin is significant for retaining seawalls, considered to be essentially those constructed during the 1860s for the now infilled Inner Basin. Cadw have confirmed that these walls are covered by the curtilage listing of the listed Outer Basin; the Inner Basin is referenced in the listing description of the Outer Basin and west pier/quay, whilst the walls of the Inner Basin/Eastern Promenade are also physically attached to those of the listed asset.

The area is also significant for its aesthetic and communal values, essentially based on key views over the popular tourist area of Sandy Bay and Coney Beach. The area also provided leisure facilities (e.g. the Salt Lake swimming baths, and later Miniature Railway) within living memory, part of the area's more recent history. The location of former shelters adjacent to the Promenade emphasize this element

The area of the Inner Basin has been subject to considerable change during the first half of the 20th century, with the decline and closure of the docks, the redevelopment of the area for recreational leisure with the construction of Eastern Promenade during the 1920s and the eventual infilling of the dock leaving the outer dock wall as the main surviving element. The outer dock walls of the Inner Basin appear to be intact and in relatively good condition, having been subject to general maintenance and repair undertaken by BCBC within the last 10 years. As a result, the area has high capacity

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for change on its western side as long as works to the eastern side, i.e. the sea wall, remains essentially intact and of high significance.

6.2 Assessment of Heritage Values

Cadw, following Historic England, published Conservation Principles⁴³ setting out how historic assets should be managed to sustain their values.

The preceding part of this report has described the heritage asset and explained its significance. The next stage is to test this understanding against the conservation principles adopted by Cadw on behalf of Welsh Government.

These principles start from the point of view that changes within the historic environment are inevitable and that conservation is often more about the careful management of that change rather than the prevention of it. The guidance set out by Cadw requires that:

“New work must respect the setting and significance of the historic assets affected. The quality of design and execution must add value to that site and its setting, both now and in the future.”

It sets out criteria for how significance can be evaluated, considering Evidential, Historical, Aesthetic and Communal values and says that:

“The significance of an historic asset embraces all of the cultural heritage values that people associate with it”.

6.2.1 Evidential Value

This derives from those elements of an historic asset that can provide evidence about past human activity.

The Western Breakwater and the Outer Basin, along with the other listed assets of the area (Jennings Warehouse, the Look-out Tower, the Old Customs House and the Lighthouse) have a high level of evidential value. The historic dynamic nature of the area is clearly demonstrated by the development and extension of breakwater and the development and alterations carried out to the Outer Basin, together with the creation and final disuse and infilling of the Inner Basin, and the following creation of Eastern Promenade. The evidential value of this industrial maritime area and its individual but highly associated elements is well supported by the documentary material referenced in the current report. The proposed works will preserve the evidential value of the site, preventing catastrophic structural loss and securing it for future generations. Constructional details might be revealed during the works, the recording of which would be beneficial to the site’s evidential value.

⁴³ Conservation Principles for the sustainable management of the historic environment in Wales, March 2011

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6.2.2 Historical Value

This derives from how the historic asset might illustrate a particular aspect of past life or be associated with a notable family, person, event or movement. This can be less tangible than the evidential value but are nonetheless important.

The instrumental association with the development of the town of Porthcawl as an industrial port and transit point for the coal industry from the early 19th century, and in particular the second half of the 19th century, when the dock and rail facilities were considerably enlarged ensures a high level of historical value for the Western Breakwater and the Outer Basin, along with the other listed assets of the area. This is enhanced by the continued development of the area as a resort destination from the late 19th century, increasingly popular during the first half of the 20th century in particular with working families from the coal mining hinterland. The development of Eastern Promenade following the infilling of the Inner Basin during the second quarter of the 20th century, reflects the complete transition from industrial port to coastal resort. The walls of the Inner Basin, which now form the eastern walls to Eastern Promenade were part of the 1860s harbour improvements; shown in place on the 1st edition 1:2500 OS map of 1877, and unchanged by the 4th edition 1:2500 OS map of 1943, have survived largely unchanged to the present. This historical value will be essentially unchanged by the proposed development.

6.2.3 Aesthetic Value

This derives from the way in which people draw sensory and intellectual stimulation from an historic asset. The Western Breakwater and the Outer Basin, along with the other listed assets of the area clearly retain a high level of aesthetic value as a near intact group of historic features and buildings illustrating the area's maritime past; this high level is shared with the Eastern Promenade, which follows the wall of the former, now infilled, Inner Basin. Eastern Promenade also fringes the Western side of Sandy Bay, a long established beach holiday destination featured in historic postcard views; the promenade and the former associated shelters dates from the 1920s, and was associated with the early development of Porthcawl as a resort. Extensive and panoramic views are afforded by the promenade across Sandy Bay and Coney Beach towards Rhych Point, views essentially unchanged since the early part of the 20th century.

6.2.4 Communal Value

This derives from the meanings that an historic asset has for people who relate to it or for whom it figures in their collective experience or memory.

The Western Breakwater has high communal value; it is a noted historic landmark feature within the harbour area of Porthcawl, and it has historically provided a clear public amenity value having been used as a terminus and embarkation point for steamers visiting Porthcawl and with its lighthouse acting as a navigational aid to shipping using the harbour or navigating the coastal waters. In the past this would have included trading vessels that used the dock facilities at Porthcawl and especially cargo vessels carrying coal from the surrounding hinterland. This traffic has been more recently replaced by pleasure craft using the marina, and the breakwater is a popular area with both tourists and residents for taking the air and experiencing the coastal

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vistas, especially during bracing winter storms. The proposed works will preserve its communal value.

The Outer Basin forms the other main surviving element of the historic harbour of Porthcawl, fundamental in the development of the town and although now acting as a marina retains evocative elements of its former industrial maritime origins. As an historic harbour, now used as a marina for pleasure craft, the Outer Basin has high communal value as it as public amenity and is a popular draw to both visitors and residents, continuing as a focus for a range of activities typical of maritime areas associated with coastal settlements. The Outer Basin is not directly affected by the proposed works.

Eastern Promenade (walls of the Inner Basin), which falls within the curtilage of the adjacent Outer Basin has high communal value as it as public amenity and it is clearly used by both residents and visitors to the town. The proposed development will ensure its preservation and likely enhance its communal value.

6.3 Significance of all selected historic assets

In addition all the assets previously selected (see section 2.4 above) as being relevant to the study, all grade II Listed Buildings, both those directly affected by the proposed works and those potentially indirectly affected through inter-visibility were subject to an assessment of significance carried out according to established assessment criteria (see Table 2, below).

A summary of the valuation results is presented in Table 2, below.

Table 2: Initial Appraisal of Significance of Selected Historic Assets

ID⁴⁴	NAME	Condition	Rarity	Group Association	Historic Association	Listed Building Grade	Value
LB 11369; NPRN 34263; PRN 02346m	JENNINGS WAREHOUSE	Near Intact/restored	Medium	High	High	II	B
LB 11370; NPRN 34274; PRN 01481m	LIGHTHOUSE ON BREAKWATER PORTHCAWL HARBOUR	Near Intact	Medium	High	Medium/High	II	B
LB 19358	THE OLD CUSTOMS HOUSE	Near Intact	Medium	High	Medium/High	II	B
LB 19359	THE LOOK-OUT TOWER	Near Intact	Medium	High	Medium/High	II	B
LB 19362	THE BREAKWATER	Near Intact	Medium	High	Medium/High	II	B

⁴⁴ LB = Listed Building (Cadw designated site); NPRN = National Primary Record Number (NMR, RCAHMW site); PRN = Primary Record Number (GGAT HER site)

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LB 19363; NPRN 34275; PRN 02537m; PRN 07418w; PRN 08396m	WALLS OF THE OUTER BASIN AND WEST PIER/QUAY	Near Intact	Medium	High	Medium/High	II	B
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Given the high level of group value, which is enhanced by inclusion within the Porthcawl Conservation Area (See Figure 1), the value of the resource, normally considered of Regional significance (Value B) on the basis of Grade II listing alone, might be seen as being of National significance (Value A).

7. Relevant Planning Policy and Guidance

7.1 Key Legislation

7.1.1 The Historic Environment (Wales) Act 2016

The statutory protection, under the terms of the Planning (Listed Buildings and Conservation Areas) Act 1990, as amended by the Historic Environment (Wales) Act 2016, means that any works that may affect the character of the listed building, or any of its ancillary buildings, as one of special architectural or historic interest need listed building consent. There is a presumption in the Act that Welsh Ministers will have “special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses.

In relation to Listed Buildings, S.7 of the 1990 Act states that:

“subject to the following provisions of this Act, no person shall cause to be executed any works for the demolition of a listed building or its alteration or extension in any manner which would affect its character as a building of special architectural or historic interest, unless the works are authorised.”

7.2 National Planning Guidance

7.2.1 Planning Policy Wales Edition 10

Planning Policy Wales (PPW), as revised in December 2018, sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. PPW, the TANs, MTANs and policy clarification letters comprise national planning policy.

The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales, as required by the Planning (Wales) Act 2015, the Well-being of Future Generations (Wales) Act 2015 and other key legislation. A well-functioning planning system is fundamental for sustainable development and achieving sustainable places.

Chapter 6 of PPW, ‘Distinctive and Natural Places’, outlines policies for the Historic Environment. Paragraph 6.1.10 of PPW states that for any development proposal affecting a listed building or its setting, the primary material consideration is the statutory requirement to have special regard to the desirability of preserving the building, its setting or any features of special architectural or historic interest which it possesses.

Paragraph 6.1.14 further states that there should be a general presumption in favour of the preservation or enhancement of the character or appearance of conservation areas or their settings.

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7.2.2 TAN 24: The Historic Environment

Technical Advice Note (TAN) 24 seeks the protection of the historic environment in Wales. With reference to listed buildings it states that when considering any applications for listed building consent, the local planning authority or the Welsh Ministers must have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses.

7.2.3 Wales Spatial Plan

The Wales Spatial Plan sets out the planning agenda for Wales at the spatial level. It states that conserving and celebrating the unique cultural heritage of each area is important.

7.3 Local Planning Policies (UDP and LDP)

7.3.1 BCBC Local Development Plan

The development plan for the area is the BCBC Local Development Plan (LDP) adopted on the 18 September 2013.

Whilst there is no statutory requirement to have regard to the provisions of the development plan, when considering applications for LBC a review has nonetheless been undertaken of LDP policies of relevance in light of the promenade's significant historic setting.

Strategic Policy SP5 deals with conservation of the built and historic environment and states that development should conserve, preserve or enhance the built and historic environment of the County Borough and its setting.

Policy ENV8 further states that development which respects and utilises heritage assets and which preserve, conserve or enhance the local distinctiveness of the County Borough and its setting.

7.4 Cadw Guidance

7.4.1 Heritage Impact Assessment and the Setting of Historic Assets

In May 2017 Cadw published two relevant guidance documents, one on Heritage Impact Assessment in Wales and the other on Setting of Historic Assets.⁴⁵ They explain how vital it is to understand the implications of any proposed change before development is consented. It describes heritage impact assessment as a “structured process” to be summarised in the Heritage Impact Report.

This report accordingly sets out the required understanding of the historic character and significance of the listed assets, reviews the current proposals for change and assesses the potential heritage impact, whilst providing mitigation advice to minimise any such impact.

⁴⁵ Cadw, Heritage Impact Assessment in Wales, May 2017 and Setting of Historic Assets, May 2017

8. The Need for the Proposed Works

8.1 Background on the Need for the Proposed Works

The Outline Business Case (OBC) issued in June 2017 presented the justification for coastal risk management for Sandy Bay to provide a 1 in 200 annual exceedance Standard of Protection (SoP) with an allowance for 100 years of sea level rise.

The 2017 OBC sought approval for the design development and consenting to manage flood and coastal erosion risk at Sandy Bay, Porthcawl. The preferred option will also deliver wider benefits to enhance the regionally important tourist destination, safeguard a strategic regeneration opportunity and enhance relict dune protected habitat. The OBC was prepared as part of the Welsh Government Coastal Risk Management Programme.

The Eastern Promenade masonry wall and parapet reduces erosion and flood risk to the land behind. Whilst in a good condition, the crest level varies and is not adequate in places. Predicted overtopping presents a flood risk to 108 residential and 67 non-residential properties to the north during the 100-year appraisal period.

If the Western Breakwater were to fail, this increases to 531 residential and 175 non-residential properties. Providing protection is estimated to deliver present value benefits to the UK of £21.3m by reducing flood risk to existing properties.

Sandy Bay supports the town's significant tourism economy. Some 1.1 million visitors to Porthcawl in 2015 are estimated to inject £95 million into the local economy. Tourism-facing sectors contribute more than half of Porthcawl's employment.

8.2 OBC objectives:

8.2.1 To reduce the threat of coastal flood and erosion risk to people and their property by holding the line at Sandy Bay and Eastern Promenade in accordance with SMP2 policy, whilst supporting tourism and providing greater opportunities for amenity and regeneration.

8.2.2 To maintain, and where possible enhance, natural, historic, visual and built environments through good design and mitigation. Promote sustainable management of the relict dunes, a priority habitat to be maintained and enhanced, whilst improving access via realignment of the Wales Coast Path to increase connectivity with coastal landscapes and improve social and recreational cohesion

8.2.3 To ensure navigation and marine activities can continue to grow.

8.2.4 To ensure an affordable and deliverable whole life option through a partnership approach and contributions.

8.2.5 Bridgend County Borough Council (BCBC) have since appointed Ove Arup and Partners (Arup) to deliver design development, detailed design and consenting of Phase 1 of coastal flood and erosion risk at Sandy Bay and Eastern Promenade, Porthcawl.

Phase 1 includes the following existing heritage assets, each with specific design, construction and maintenance considerations:

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Area/Structure	Description
Western Breakwater	Historic outer masonry/stone breakwater extending out into the sea from the rocky point at the western side of Sandy Bay. Significantly influences coastal risk in Sandy Bay and fully exposed to the Bristol Channel. Length: ~180m.
Eastern Promenade	Historic masonry/stone seawall and revetment retaining the promenade and highway to the west of Sandy Bay, formerly a wall containing the inner harbour. Length: ~350m.

9. Investigative Works Undertaken

The following investigative works/survey information is available.

9.1 Western Breakwater

9.1.1 Two-part desk study/structural assessment by Arup, 2018:

Part 1. Visual Inspection and Desk Study to identify Further Survey Work.

This report collates and assesses the available archive information, along with visual observations and provide recommendations regarding further survey works.

Part 2. Condition Assessment.

This report analyses all survey information obtained following part 1, assesses the existing failure mechanisms and provides initial recommendations for repair and strengthening.

9.1.2 Porthcawl Breakwater Ground Investigation Report (GIR)

This report collates existing and additional GI/SI works undertaken on the breakwater by Exploration Associates (1999) and WYG (June/July 2018) in support of the part 2 condition assessment. This report provides an overview of the ground conditions present below the Western Breakwater.

9.1.3 Ground Penetration Radar (GPR) survey by TerraDat to determine the extent of voiding beneath the revetment and the breakwater superstructure. Refer to Appendix D of the Western Breakwater Condition Assessment – Part 2.

9.1.4 Topographic survey of the existing breakwater dated April 1999 providing a high-level geometry of the breakwater.

9.1.5 LiDAR and drone survey, TerraDat, January 2018. Supplements the existing topographic survey providing greater geometric information on the revetment, breakwater and beach. Provides further information regarding failure mechanisms and the location of defects.

9.2 Eastern Promenade

9.2.1 Porthcawl Eastern Promenade Ground Investigation Report (GIR)

This report collates intrusive GI/SI undertaken by WYG (December 2018), Terra Firma (2018) and Quantum Geotechnical (2013)

This report provides an overview of the ground conditions present below the Eastern Promenade

9.2.2 Ground Penetration Radar (GPR) survey and survey report by Terradat, Jan 2019 to determine the extent of voiding beneath the Eastern Promenade

9.2.3 GPR validation survey, May 2019 to validate the findings of the GPR survey – refer to GPR validation report

9.2.4 Topographic survey of the Sandy Bay including the Eastern Promenade, Coney beach frontage and Rhych Point conducted by Azimuth Land Surveys Ltd in February

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2017. Additional topographical survey by Azimuth Land Surveys Ltd in January 2019 to obtain the geometry of the public realm adjacent to the Eastern Promenade sea wall

9.2.5 LiDAR and drone survey, TerraDat, January 2019. Supplements the existing topographic survey providing greater geometric information on the revetment and promenade public realm

10. Options Considered

10.1 Western Breakwater

Priority remedial works and works to ensure long term structural integrity are proposed.

Several options have been considered to address the failure mechanisms identified in the part 2 condition assessment. A summary of the key failure mechanisms/defects are given in the table below.

No.	Defect/Failure Mechanism	Location
1.	Washout of fines/material from beneath the revetment/within rubble core of breakwater due to water penetration resulting in voiding, long term damage and increasing the likelihood of localised collapse of the breakwater.	GPR highlights significant regions of potential voiding in Zone A, B & C beneath the revetment and the main concrete deck of the breakwater (Figures 11, 16, 15, 14). Zone D – not surveyed, unknown, voiding likely.
2.	Chloride penetration and impact damage resulting in surface degradation, spalling and corrosion of reinforcement on the concrete panels protecting zone D and zone C of the breakwater and roundhead. Risk of exposure of blockwork and timber trestles buried beneath panels.	Zone C, D (Figures 11, 14, 13, 12).
3.	Scour at base of revetment and on the leeward side of the breakwater.	Leeward side of breakwater in zone D (Figures 11, 12). Base of revetment
4.	Exposure of masonry upstand sections in zone A, B and C to high wave impact pressures/lateral loads resulting in tensile stresses in the masonry, crack propagation, loss of mortar and 'shunting' of blockwork due to the transfer of wave energy from front face to rear face. Insufficient flexural and shear capacity to resist the applied design loading (i.e. 1 in 1000-year wave loads) Long term risk of collapse of parapet upstands.	Zone A, B and C (Figures 11, 16, 15, 14). It is noted that zone B (55m chainage to 105m chainage) where the upstand is slender (H:V = 1:2.5)
5.	Water penetration and loss of mortar/fines on exposed masonry parapet upstands in zone A, B and C weakening bond between adjacent stones and leading to loss of individual blocks/voids within parapet.	Zone A, B and C (Figures 11, 16, 15, 14).

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No.	Defect/Failure Mechanism	Location
	Risk to stability of parapets compounding the issues presented above.	
6.	Run up and overtopping of the breakwater resulting in vertical impact/damage to the breakwater surface and damage to/washout of material on the leeward side of the structure.	Entire length (Figure 11).
7.	Zone C of the breakwater superstructure is particularly susceptible to damage and degradation due where the breakwater cranks in plan. The existing geometry results in a 'funnelling' effect, significant run up and extreme wave impact pressures on both the upstand and revetment in this location. This has resulted in significant damage (scour/washout/loss of facing stones) and a depression in the revetment between 90m and 110m chainage. This region has been repaired using mass concrete on several occasions. Risk that if unrepaired further, widespread damage will occur to the revetment	Zone C; 90m to 110m chainage (Figures 11, 14).

Proposed options have been subdivided into two groups.

Group 1 solutions:

10.1.1 Essential repair works required to ensure the present day structural integrity of the breakwater

Group 2 solutions:

10.1.2 Repair/modifications to the existing breakwater that will extend the longevity of the structure for another 100 years – focusing on addressing the issues arising in zone C (defect no.7)

The proposed options are described, assessed and evaluation in respective options matrices (See Appendix VI, Figures 23, 24).

10.2 Eastern Promenade

As outlined at the OBC stage the following works are required:

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10.2.1 Crest raising and strengthening of the existing parapet wall to reduce overtopping combined with land raising to minimise visual impact (Figures 25, 33-36).

10.2.2 A solution to manage inundation/residual overtopping volumes.

Several options have been considered regarding structural interventions as described in the option selection report.

The proposed options are described, assessed and evaluated in the options matrix (See Appendix VI, figure 37. Figures 25-32 depict existing general arrangements)

11. Preferred Options and Heritage Impact

11.1 The Preferred Options

The proposed Design development, consenting and detailed design of coastal risk management proposals at Sandy Bay, Porthcawl present the preferred options. The scope includes works within a Conservation Area, works to a Grade II Listed Building (Western Breakwater), works to a curtilage listed structure (Eastern Promenade) and setting impacts on the wider group of Listed features.

The preferred options are presented in detail below:

11.2 Western Breakwater

Based upon the options evaluation, the preferred scheme is described below. The preferred scheme is shown in drawings 264874-ARP-XX-WB-DR-CS-2801, 2811-2815 (Figures 17-22):

11.2.1 General masonry repairs/repointing/replacement of missing stonework to the limestone upstand in zones A, B and C (Figures 17, 22, 21, 20)

11.2.2 Concrete patch repairs to spalled regions in zone D by specialist contractor. Repairs using an SBR modified mortar following defect survey to capture all areas that require repair (Figures 17, 18, 19)

11.2.3 Pressure grouting to fill voids beneath the revetment and concrete deck slabs, and works reduce the risk of wash-out of fine material

11.2.4 Repair and strengthening of the masonry upstands in zone A, B and C using Cintec anchors (Figures 17, 22, 21, 20)

11.2.5 Construction of a concrete cut off wall and rock armour scour protection around roundhead and along revetment to prevent further loss of material and scour.

11.2.6 Works to the revetment in zone C (Figures 17, 20) to reduce the wave energy impact that arrives at the breakwater parapets and prevent further washout/damage to the revetment - mass concrete revetment embedded with large boulders/facing stone with scour/cut off protection detail as per item 5.

11.3 Eastern Promenade

Based upon the options evaluation (Figure 37), the preferred scheme is described below. The preferred scheme is shown in drawings 264874-ARP-XX-EP-DR-CS-1001, 1101, 1102, 1111 and 1113 (Figures 25, 33, 34, 35, 36):

11.3.1 Strengthening of the existing parapet where deemed necessary using Cintec anchors (Figures 25, 33, 34, 35, 36)

11.3.2 Crest raising to reduce overtopping volumes with like for like natural limestone blockwork: Zone B (Figures 25, 27) ; 0m to 55m chainage, raised to +9.0mAOD

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(tapering to existing level between 0m and 5m chainage), Zone E (Figures 25, 32); 368m to 445m chainage, raised to +9.3mAOD

11.3.3 Installation of integrated solution for managing wave overtopping volumes comprising landscaping/promenade drainage system

11.3.4 Landscaping works to promenade public realm space (Figure 38, refer to landscape architect drawing)

11.3.5 Provision of ducts for future installation of utilities

The client is considering the option of adding a beach access ramp however, this is subject to funding and landowner agreement.

11.3.6 Relict Dunes and Rhych Point

At the west of the bay, an option includes monitoring and management to conserve and enhance the relict dunes in their current stable and re-naturalised state, and provision of rock armour revetment to protect the Rhych Point headland's neck.

The preferred options for the relict Dunes and Rhych Point are considered not to impact, either directly or indirectly, on the listed assets, given the nature and scale of the proposed works and the distance between the assets and Rhych Point, and are not considered further.

11.4 Permitted Development

Although an application for LBC is required for the proposed works, BCBC has previously informally confirmed that proposed works by BCBC at the Porthcawl Harbour would not require planning permission and could be undertaken using BCBC Harbour Authority's permitted development rights. The Applicant considers the proposed works would constitute permitted development by virtue of the rights afforded to BCBC as a statutory undertaker for Harbour associated activities. Part 17, Class B of Schedule 2 of the Town and Country Planning (General Permitted Development) Order 1995 (as amended) states that permitted development includes:

“Development on operational land by statutory undertakers or their lessees in respect of dock, pier, harbour, water transport, or canal or inland navigation undertakings, required –

(a) for the purposes of shipping; or

(b) in connection with the embarking, disembarking, loading, discharging or transport of passengers, livestock or goods at a dock, pier or harbour, or with the movement of traffic by a canal or inland navigation or by any railway forming part of the undertaking.”

11.5 Assessment of heritage impact during construction works

The possible heritage impact of the proposed modification works at Eastern Promenade include works to 1. *Strengthening of the existing parapet where necessary using Cintec anchors*, 2. *Crest raising with like for like natural limestone blockwork*, 3. *Installation*

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of integrated solution for managing wave overtopping volumes comprising landscaping/promenade drainage system, 4. Landscaping works to promenade public realm space and 5. Provision of ducts for future installation of utilities (the client is also considering the option of adding a beach access ramp)

and at the Western Breakwater, 1. General masonry repairs/repointing/replacement of missing stonework to the limestone upstand in zones A, B and C, 2. Concrete patch repairs to spalled regions in zone D, 3. Pressure grouting to fill voids beneath the revetment and concrete deck slabs 4. Repair and strengthening of the masonry upstands in zone A, B and C using Cintec anchors, 5. Construction of a concrete cut off wall and rock armour scour protection around roundhead and along revetment to prevent further loss of material and scour and 6. Works to the revetment in zone C to reduce the wave energy impact that arrives at the breakwater parapets and prevent further washout/damage to the revetment - mass concrete revetment embedded with large boulders/facing stone with scour/cut off protection.

Construction methods employed should seek to minimise potential damage to the listed structures. The proposed repair works, assumed to take the form of minimal necessary intervention on the listed structures, should pose minimal or negligible heritage impacts during construction.

It is considered that the greatest impact on heritage assets could be the provision of Cintec anchors, to be embedded through the parapet into the made ground below. The anchors will be drilled to a sufficient depth to ensure adequate pull out resistance under tension arising from the design loading. It is recommended that monitoring should be undertaken to ensure integrity of the parapet during drilling works.

It is crucial that the method statement for the works ensures that the works do not put heritage assets at risk and that the method statement is rigorously adhered to with methods employed regularly monitored during the course of the works to ensure continued efficacy. The method statement for the works should include details of how the works would be carried out in a manner that safeguards all listed assets affected and in the vicinity of the works from unnecessary or accidental damage during construction; this should include details of suitable access routes designed to be used by construction traffic. Care should be taken however to avoid damage from construction vehicles and plant, including hoists/cranes, where these are employed.

11.6 Assessment of long-term heritage impact of the proposed works

The long-term heritage impacts have been divided into direct and indirect visual impacts to take into account not only the direct impacts to the Western Breakwater and Eastern Promenade, but also impacts on the other inter-visible listed assets that have a strong group value in conjunction with those assets directly impacted.

11.6.1 Direct impacts

It is considered that the repair work carried out to the revetment of Eastern Promenade and the revetment and parapets of the Western Breakwater, intended to be carried out in a sensitive manner, using like-for-like replacement materials would have a negligible direct impact given that both structures have been previously repaired and maintained

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on numerous occasions. Given the need for on-going maintenance to ensure structural integrity and continued survival of both the Western Breakwater and the Seawall at Eastern Promenade, the proposed repair works arguably would likely have a moderate to highly beneficial impact on these assets over the long-term.

The proposed modification works to Eastern Promenade will have a generally low direct impact, i.e. the raising of the parapet would have a limited impact given the piecemeal nature of repair works previously carried out on the site and the scale of the currently proposed works. Given the area's relatively high capacity for change – demonstrated by the construction of, the road and Eastern Promenade with its shelters in the 1920s and their subsequent demolition - and the nature and scale of the proposed works a similar negligible heritage impact is noted for raising of the level of the promenade and the construction of an inner floodwall. It is considered that the raising of the promenade surface with careful landscaping would have a negligible impact, whilst the provision of a set-back floodwall, especially if designed to complement the existing structures through the use of similar matching materials (i.e. masonry walling), would likely have a low impact.

There is some limited potential for uncovering buried archaeological remains associated with the former Inner Basin Dock in the area of the promenade and the proposed floodwall, from the historic OS mapping evidence the former rail and mooring features associated with the east side of the former dock were located outside the area of the proposed works (in the area of the adjacent road and to its far side). The only features noted in the area of the proposed works being small clusters of rectangular structures, likely temporary sheds/shelters located adjacent to the seawall, and later shelters associated with the development of Eastern Promenade and constructed during the mid-1920s. The limited archaeological potential presented could be sufficiently mitigated through archaeological monitoring of any ground disturbing activity associated with the proposed works in the area of Eastern Promenade, such as that undertaken for the construction of the proposed floodwall.

The works to Eastern Promenade in their entirety could arguably be said to have at least an overall moderately beneficial impact, potentially highly beneficial impact as they would ensure the long term survival of walls of the Inner Basin and the protection of any buried archaeological remains associated with the infilled harbour.

Given the level of previous alterations to the appearance of the southern part of the Western Breakwater undertaken during the 1970s and 1980s (see section 4.1, above and Arup 2017c and 2018b), and a demonstrable high capacity for change, the proposed modifications, which include potential rock armour to the revetment, the potential addition of a wave return to the parapet, and provision of access causeway around its roundhead would likely have a low direct heritage impact on the monument. To lessen the levels of heritage impact the designs for any proposed modifications taken forward, should seek to retain all surviving elements and fabric of the extant structure as far as practicable, whilst any replacement should seek to respect the original materials, and any new elements reflect the historic maritime nature of the structure.

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The high levels of evidential, historical, communal and aesthetic value of the Western Breakwater would essentially be retained and further evolved, with the proposed works helping to ensure the long-term efficacy, structural integrity and survival of the asset. The modification works would have an overall moderate to highly beneficial impact, especially as they would help ensure the long term survival of the asset.

11.6.2 Indirect impacts and key views

Indirect impacts include any alterations caused by the proposed works on the setting of listed assets and take into account key views between the Western Breakwater (LB 19362) and Eastern Promenade and the following inter-visible listed assets: Walls of the Outer Basin and West Pier/Quay (LB 19363); Lighthouse on Breakwater Porthcawl Harbour (LB 11370); The Old Customs House (LB 19358); The Look-Out Tower (LB 19359) and the Jennings Warehouse (LB 11369). These key views are illustrated in section 5, above.

Additional key views included those of the breakwater identified in historic photographs and on early postcards (see Appendix IV), of particular significance the 19th century photographs showing the breakwater under construction, and those of the early 20th century taken before the alterations of the 1970s. Other historic views of note include those taken during the late 19th century of the Outer and Inner Basins of Porthcawl Harbour, before the infilling of the Inner Basin, and those illustrating the later changes associated with the 20th century development of the area as a leisure/tourist resort.

The proposed repair works are unlikely to have any negative indirect heritage impacts or impacts on key views, given the nature and scale of the proposed intervention; indeed these are likely to be beneficial, given the works are carried out in a sensitive manner which respects the original form and materials used, combined with suitable low-key/soft touch engineering solutions,.

The proposed modifications to Eastern Promenade, i.e. the raising of the parapet and the raising of the promenade would have only a slight visual impact on the closely associated listed Outer Basin (walls of). The proposed modification work to locally raise and widen narrow/and or low sections/areas of parapet so that they are matched to and tied into the adjacent existing parapet using existing material and masonry will have a negligible indirect heritage impact on nearby listed structures in terms of visual change. This is especially so as the main views of the promenade seawall are fairly distant views from the Breakwater, whilst views of the structure from beach level will only be noticeably altered at close quarters, with negligible or no change otherwise visible. As regards the raising of the promenade this has been designed to include landscaping and alignment to the harbour, which will limit any perceptible changes where the promenade joins the listed harbour, so indirect heritage impacts will be negligible.

The proposed modifications to the Western Breakwater, i.e. the potential rock armour at the revetment, potential addition of wave return parapet, and provision of access causeway around roundhead are considered to have minimal indirect visual impact in terms of key views between the associated listed structures and also identified historic

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views. The potential rock armour and wave return to the parapet will only be visible from the Breakwater itself, and from the area to the west (i.e. no indirect visual impacts on the Outer Basin, the Customs House and the Jennings Warehouse). There may be a slight visual impact on the Look-out Tower, but given the industrial maritime nature of the design/works, which can be viewed as a continuation of interventions previously carried out this will likely be negligible, even more so if the works are limited to the section of the breakwater extended in the 1860s. The provision of an access causeway around the roundhead, if constructed to simple designs suitable for and reflective of an industrial maritime structure would also likely be limited to negligible indirect visual impact on the setting of other listed assets; there are distant views from the Jennings Warehouse and the Outer Basin area, whilst the views from both the Look-out Tower and the Customs House, whilst distant are also partly obscured. The area immediately between the Outer Basin and the Breakwater has been recently altered with the provision of new entrance gates to the new marina within the Outer Basin and the construction of a new west pier. The previous alterations to the historic setting need to be taken into account as they demonstrate that the industrial maritime setting of the listed assets at Porthcawl Harbour is sufficiently robust to absorb change as long as that change is sensitively designed and reflects existing character.

12. Potential Mitigation

Assessment of potential mitigation is an essential part of a Heritage Impact Assessment. In the case of the listed structures the following recommendations are made:

To preserve historic integrity, historic form and character appropriate conservation construction methodologies should be designed, establishing suitable practical construction techniques and set out for undertaking the repair and modification works proposed for the Western Breakwater and the sea wall of Eastern Promenade. These conservation construction methodologies should be adhered to during the works.

An archaeological written scheme of investigation should be produced for the proposed works for the Western Breakwater and the sea wall of Eastern Promenade to set out necessary programme of archaeological work for the recording/investigation of the heritage assets affected during the proposed works; this should include as a minimum the provision of a watching brief on any works which disturb their fabric (including the sea wall at Eastern Promenade) and on ground disturbance work at or within close proximity to the location of the identified assets. Some level of building recording, prior to and during the proposed works, might also be considered for the standing structures affected.

Any mitigation work should be carried out to the professional standards laid down by the Chartered Institute for Archaeologists, including their *Standard and guidance for an archaeological watching brief* (2014), *Standard and guidance for the archaeological investigation and recording of standing buildings or structures* (2014), among others. Building recording should be carried out to the guidance established in Historic England's *Understanding Historic Buildings, A guide to good recording practice* (2016).

13. Summary and Conclusion

An application for LBC has been submitted to BCBC for proposed repair and modification works to the Western breakwater, the walls of the outer basin and eastern promenade, Porthcawl. It is considered that the nature and scale of the proposed works would ensure that the special architectural and historic interest of the listed structures and their historic setting would be preserved, in accordance with the relevant legislation and guidance. The proposed works are in accordance with relevant Historic Environment Acts and TAN 24, which state that there should be a general presumption in favour of the preservation of listed buildings.

On behalf of Ove Arup and Partners Ltd (Arup), the Glamorgan-Gwent Archaeological Trust, Projects Division (GGAT Projects) has produced a heritage impact assessment and statement to accompany an application for Listed Building Consent (LBC) for proposed repair and modification works at the Grade II Listed Western Breakwater (LB19362) and Eastern Promenade (located within the curtilage of the adjacent Grade II Listed Walls of the Outer Basin (LB19363) and therefore covered by the listing), at Porthcawl Harbour, Bridgend. The application is submitted to Bridgend County Borough Council (BCBC), as Local Planning Authority, on behalf of BCBC Communities Directorate.

The report sets out the historic background, context, development and descriptions of the heritage assets affected by the proposed works. Details of listed assets indirectly affected by the works are also included (i.e. the Light House (LB11370), the Pilot's Look-out Tower (LB19359) and the Custom's House (LB19358), all located on the Breakwater, as well as the adjacent Jennings's Warehouse (LB11369)), all Grade II Listed buildings closely associated with, and integral to the development of the historic industrial Harbour at Porthcawl.

The significance and capacity for change of the assets affected has been examined. The Western Breakwater is significant as an early 19th century maritime structure from the earliest days of the port of Porthcawl, and for its exceptional importance in the history of the development of the town. Its significance is enhanced by group value, documentation, preservation, retention of rare industrial transport remains, and high levels of evidential, historical, aesthetic and communal value. The monumental scale of the structure and previous repair interventions (including being partially clad in concrete during the 20th century) indicate that the structure has a high capacity for change; sensitive repair and maintenance of the structure is viewed as necessary to ensure its structural integrity, as well as medium and long-term preservation and survival. The report notes similar high levels of significance and capacity for change relating to the walls of the Outer Basin (not directly affected), and Eastern Promenade which is particularly significant for retaining seawalls, considered to be those constructed during the 1860s for the now infilled Inner Basin, and now protected by the curtilage of the listed Outer Basin.

The report identifies the need for the proposed works, investigations undertaken, as well as providing details of the options considered and preferred options, it identifies and provides an analysis of heritage impacts. Given the need for maintenance to ensure the continued structural integrity and survival of the heritage assets, it is considered that

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the proposed repair and modification works, with suitable heritage conservation construction methodologies in place, would likely have a negligible to low direct heritage impact. Overall, however, these heritage impacts could be considered as moderate to potentially highly beneficial, as the works would help ensure the long term survival of the listed assets (i.e. the Western Breakwater with its lighthouse, and the Inner Basin, as well potentially safeguarding the closely associated and located customs house, pilot's lookout tower and Jennings's warehouse, which all form part of a tightly integrated historic ensemble), whilst also safeguarding potential buried archaeological remains relating to the infilled Inner Basin. Any indirect visual impacts of the proposed works, in relation to key views are considered to minimal and limited in nature.

Mitigation has been recommended in the form the design of, and adherence to, suitable conservation construction methodologies and the provision of a WSI to set out necessary recording of the assets affected; and provide for a watching brief on any works which disturb their fabric (including the sea wall at Eastern Promenade) and on ground disturbance work.

14. References

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- Arup, 2017a, *Technical Note on Existing Coastal Defence Structural Review* (08 February 2017)
- Arup, 2017b, *File Note: Porthcawl Western Breakwater Structural Assessment* (22 May 2017)
- Arup, 2017c, *Q203 - Coastal Defence Breakwater, Porthcawl Structural Assessment - Residual Life of Structure PART 1 - Visual Inspection and Desk Study to identify Further Survey Work* (27 March 2017)
- Arup 2017d, *Sandy Bay Porthcawl Coastal Defences Preliminary Environmental Information Report (PEIR)* (16 June 2017),
- Arup, 2017e, *Porthcawl Sandy Bay Coastal Risk Management Programme Outline Business Case* (June 2017)
- Arup, 2018a, *Porthcawl Eastern Promenade and Walls of Outer Basin Listed Building Consent Heritage Impact Assessment* (8 June 2018)
- Arup, 2018b, *Q203 - Coastal Defences Breakwater, Porthcawl Condition Assessment - Part 2* (Draft 19 October 2018).
- Arup, 2019a, *Porthcawl Eastern Promenade, Design Development Public Design for Consent Preferred Option. PO2. 23/05/2019 PO2*
- Arup 2019b, *Porthcawl Sandy Bay Coastal Scheme - Western Breakwater, Basis of Design, 2019-05-24_Western Breakwater Basis of Design_P01.P01* | 24 May 2019
- Arup 2019c, *Porthcawl Sandy Bay Coastal Scheme - Eastern Promenade, Basis of Design, 2019-05-24_Eastern Promenade Basis of Design_P02. P02* | 24 May 2019
- Arup 2019, *Western Breakwater drawings 264874-ARP-XX-WB-DR-CS-2801 to 2815. Issue PO2 24/5/19*
- Arup 2019, *Eastern Promenade drawings 264874-ARP-XX-EP-DR-CS-1101 to 1113. Issue PO2 24/5/19*
- Arup 2019, *Western Breakwater Options matrix. Type 1. 21 May 2019.*
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- Porthcawl Civic Trust Society, 2015, *Porthcawl: Much More Than Meets the Eye Stage 1: A Character Study of Porthcawl's Maritime and Industrial Area.*

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Welsh Government *Planning Policy Wales Edition 10* – December 2018 – Chapter 6
Distinctive and Natural Places.

15. Access Statement

Where listed building consent is applied for in connection with works to a non-residential building the guidance requires a consideration of Access to form part of the Heritage Impact Statement. Full details are not yet available.

It is expected however, that restrictions on public access will be appropriate to the works and in line with safety requirements. At the request of the client BCBC the parapet of the Eastern Promenade is not to provide vehicle restraint.

After the works have been completed no further access associated with the works would be required and the works would have no impact on the current arrangements for mobility impaired access to and on the promenade.

The Eastern Promenade (and parts of the western Breakwater) is very busy in the summer months so it is expected that works would be programmed accordingly to minimise public integration.

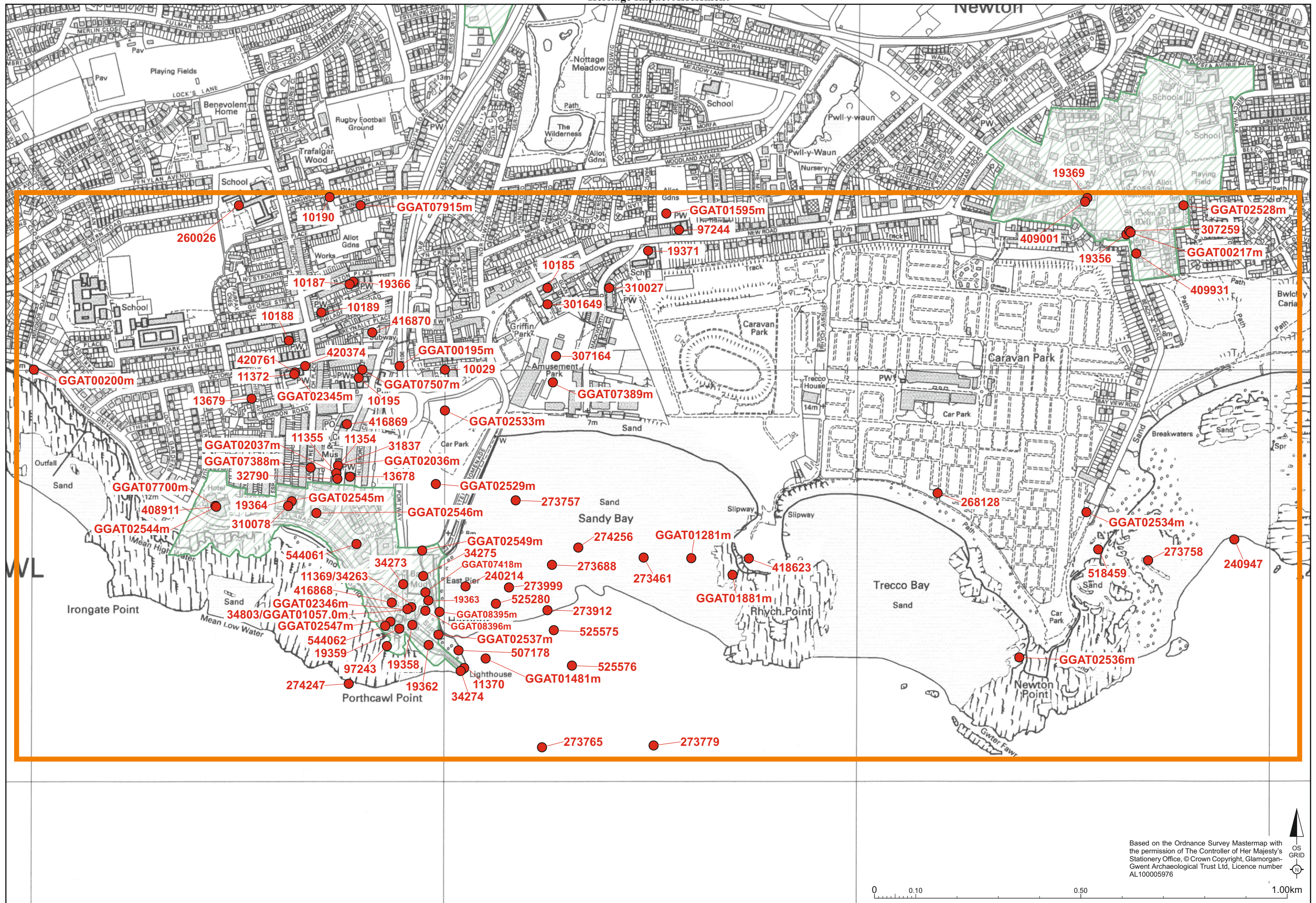


Figure 3. All heritage assets within the wider HIA study area (orange rectangle).

Appendix II: All Heritage Interests within the Wider HIA Study Area

Table 3. All heritage interests within the wider HIA study area: initial filtering

PRN	NAME	Aboveground Site	Non-Site	Wreck (below water)	Below ground	Destroyed	Inter-visible	Comment	Listed Building Yes/No	Taken forward to HIA
GGAT00195m	PORTHCAWL BARROW	No	No	No	Yes	Yes	No		No	No
GGAT00200m	ROMAN COIN FOUND IN PORTHCAWL	No	Yes	No	No	No	No		No	No
GGAT00217m	SANDFORD'S WELL	Yes	No	No	No	No	No		No	No
GGAT01057.0m	PORTHCAWL-DYFFRYN LLYNFI RAILWAY	No	No	No	Yes	Yes	No		No	No
GGAT01281m	SANDY BAY, NEWTON	No	Yes	No	No	No	No		No	No
GGAT01481m	PORTHCAWL LIGHTHOUSE	Yes	No	No	No	No	Yes	See LB 11370 (poor location)	Yes	Yes
GGAT01595m	CANON BALL, PORTHCAWL	No	Yes	No	No	No	No		No	No
GGAT01881m	RHYCH POINT, PORTHCAWL	No	No	No	Yes	Yes	No		No	No
GGAT02036m	THE OLD POLICE STATION, PORTHCAWL	Yes	No	No	No	No	No		No	No
GGAT02037m	JOHN STREET PUB CON	Yes	No	No	No	No	No		No	No
GGAT02345m	ALL SAINTS PARISH CHURCH, PORTHCAWL	Yes	No	No	No	No	No		No	No
GGAT02346m	JENNINGS WAREHOUSE, PORTHCAWL	Yes	No	No	No	No	Yes	See LB 11,369	Yes	Yes
GGAT02528m	HEAVY AA BATTERY; MODERN WW2	Yes	No	No	No	No	No		No	No
GGAT02529m	PORTHCAWL DOCK, PORTHCAWL	No	No	No	Yes	No	No		No	No
GGAT02533m	SHIP YARD, PORTHCAWL	No	No	No	Yes	Yes	No		No	No
GGAT02534m	TY COCH, TRECCO BAY	No	No	No	Yes	Yes	No		No	No
GGAT02536m	SITE NAME NOT KNOWN	No	No	No	Yes	No	No		No	No
GGAT02537m	HARBOUR, PORTHCAWL	Yes	No	No	No	No	Yes	See LB 19,363	Yes	Yes
GGAT02544m	SEABANK HOTEL	Yes	No	No	No	No	Yes	Inaccurate location - Not listed	No	No
GGAT02545m	GRAND PAVILION	Yes	No	No	No	No	No	See LB 19,364	Yes	No
GGAT02546m	ESPLANADE HOTEL	No	No	No	No	Yes	No	Original hotel re-built. Not Listed	No	No
GGAT02547m	COASTGUARD STATION	No	No	No	Yes	Yes	Yes		No	No
GGAT02549m	BRIDGE, PORTHCAWL	Yes	No	No	No	No	Yes	Not listed	No	No
GGAT07388m	MARY STREET, PORTHCAWL	Yes	No	No	No	No	No		No	No
GGAT07389m	CONEY BEECH FAIRGROUND	Yes	No	No	No	No	Yes	Not listed	No	No
GGAT07418w	PORTHCAWL DOCKS	Yes	No	No	No	No	Yes	See LB 19,363	Yes	Yes
GGAT07507m	DRILL HALL, PORTHCAWL	Yes	No	No	No	No	No		No	No
GGAT07700m	SEABANK HOTEL, PORTHCAWL	Yes	No	No	No	No	Yes	Not listed	No	No
GGAT07915m	BOULTON PAUL DEFIANT K8620 CRASH SITE	No	No	No	No	No	No		No	No
GGAT08395m	EAST PIER, OUTER BASIN, PORTHCAWL DOCK	Yes	No	No	No	No	Yes	Not listed	No	No
GGAT08396m	WEST PIER, OUTER BASIN, PORTHCAWL DOCK	Yes	No	No	No	No	Yes	See LB 19,363	Yes	Yes
19371	NEWTON PRIMARY SCHOOL (2 BLOCKS)	Yes	No	No	No	No	No		No	No

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PRN	NAME	Aboveground Site	Non-Site	Wreck (below water)	Below ground	Destroyed	Inter-visible	Comment	Listed Building Yes/No	Taken forward to HIA
19366	TABERNACL CAPEL YR ANNIBYNWYR AKA WELSH CONGREGATIONAL CHAPEL	Yes	No	No	No	No	No		No	No
19364	GRAND PAVILION	Yes	No	No	No	No	No		Yes	No
19363	WALLS OF THE OUTER BASIN AND WEST PIER/QUAY	Yes	No	No	No	No	Yes		Yes	Yes
19362	THE BREAKWATER	Yes	No	No	No	No	Yes		Yes	Yes
19359	THE LOOK-OUT TOWER	Yes	No	No	No	No	Yes		Yes	Yes
19358	THE OLD CUSTOMS HOUSE	Yes	No	No	No	No	Yes		Yes	Yes
11372	CHURCH OF ALL SAINTS	Yes	No	No	No	No	No		No	No
11370	LIGHTHOUSE ON BREAKWATER PORTHCAWL HARBOUR	Yes	No	No	No	No	Yes		Yes	Yes
11369	JENNINGS WAREHOUSE	Yes	No	No	No	No	Yes		Yes	Yes
11355	PUBLIC CONVENIENCES	Yes	No	No	No	No	No		No	No
11354	THE OLD POLICE STATION	Yes	No	No	No	No	No		No	No
19369	CROWN HOUSE	Yes	No	No	No	No	No		No	No
19356	ST JOHN'S WELL AKA SANDFORD'S OR DE SANFORD'S WELL	Yes	No	No	No	No	No		No	No
240947	MAGNET	No	No	Yes	No	No	No		No	No
525280	BROTHERS	No	No	Yes	No	No	No		No	No
416868	CASINO CINEMA, PORTHCAWL	Yes	No	No	Yes	Yes	No		No	No
544062	COASTGUARD STATION, PORTHCAWL	No	No	No	Yes	Yes	Yes		No	No
544061	LIFEBOAT STATION, PORTHCAWL	Yes	No	No	No	No	No		No	No
34275	PORTHCAWL HARBOUR, PORTHCAWL	Yes	No	No	No	No	Yes	See LB 19,363	Yes	Yes
240214	GORDON	No	No	Yes	No	No	No		No	No
507178	HENRY AND DORA	No	No	Yes	No	No	No		No	No
34273	PORTHCAWL HARBOUR WAREHOUSES, PORTHCAWL	No	No	No	Yes	Yes	No	Demolished	No	No
97243	GILGAL BAPTIST CHAPEL, SOUTH ROAD, PORTHCAWL,	Yes	No	No	No	No	No	See NPRN 10,188	No	No
274247	SAGE	No	No	Yes	No	No	No		No	No
34803	DYFFRYN LLYNFI AND PORTHCAWL RAILWAY	No	No	No	Yes	Yes	No		No	No
273999	EDMUND	No	No	Yes	No	No	No		No	No
34263	JENNINGS WAREHOUSE, PORTHCAWL HARBOUR, PORTHCAWL	Yes	No	No	No	No	Yes	See LB 11,369	Yes	Yes
34274	PORTHCAWL HARBOUR LIGHT, PORTHCAWL	Yes	No	No	No	No	Yes	See LB 11,370	Yes	Yes
518459	BATHING HOUSE, NEWTON NOTTAGE	No	No	No	Yes	Yes	No		No	No
409931	HOUSE ON BEACH ROAD, NEWTON	Yes	No	No	No	No	No		No	No
273758	ZENITH	No	No	Yes	No	No	No		No	No
307259	ST JOHN'S OR SANDFORD'S WELL	Yes	No	No	No	No	No		No	No
409001	CROWN HOUSE, 316 NEW ROAD, PORTHCAWL	Yes	No	No	No	No	No		No	No
525576	ALBION	No	No	Yes	No	No	No		No	No
525575	ALEXANDER	No	No	Yes	No	No	No		No	No
273461	SWAN	No	No	Yes	No	No	No		No	No
273688	WELCOME	No	No	Yes	No	No	No		No	No

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PRN	NAME	Aboveground Site	Non-Site	Wreck (below water)	Below ground	Destroyed	Inter-visible	Comment	Listed Building Yes/No	Taken forward to HIA
273757	ISABELLA	No	No	Yes	No	No	No		No	No
273765	BON LEON	No	No	Yes	No	No	No		No	No
301649	PORTHCAWL GAS WORKS, PORTHCAWL	No	No	No	Yes	Yes	No		No	No
274256	WILLIAM MILES	No	No	Yes	No	No	No		No	No
97244	OUR LADY STAR OF THE SEA CATHOLIC CHURCH, NEW ROAD, PORTHCAWL	Yes	No	No	No	No	No		No	No
273779	MAGNET	No	No	Yes	No	No	No		No	No
310027	NEWTON PRIMARY SCHOOL (2 BLOCKS), NEW ROAD, NEWTON, PORTHCAWL	Yes	No	No	No	No	No		No	No
10185	NEW ROAD ENGLISH INDEPENDENT CHAPEL, NEW ROAD, PORTHCAWL	No	No	No	Yes	Yes	No		No	No
273912	TELL TALE	No	No	Yes	No	No	No		No	No
418623	TOWER, RHYCH POINT, PORTHCAWL	Yes	No	No	No	No	Yes	Not listed	No	No
307164	CONEY BEACH AMUSEMENT PARK, SANDY BAY, PORTHCAWL	Yes	No	No	No	No	Yes	Not listed	No	No
416870	COSY THEATRE (CINEMA), PORTHCAWL	Yes	No	No	No	No	No		No	No
416869	COLISEUM CINEMA, PORTHCAWL	Yes	No	No	No	No	No		No	No
420761	ALL SAINTS CHURCH, PORTHCAWL	Yes	No	No	No	No	No		No	No
268128	TRECCO BAY CARAVAN PARK	Yes	No	No	No	No	Yes	N/A Not Listed	No	No
420374	PORTHCAWL WAR MEMORIAL	Yes	No	No	No	No	No		No	No
408911	SEA BANK HOTEL; SEABANK HOTEL, PORTHCAWL	Yes	No	No	No	No	Yes	Not listed	No	No
13678	PENIEL APOSTOLIC CHURCH, HILSBORO PLACE, PORTHCAWL	No	No	No	No	Yes	No	Redeveloped	No	No
13679	HIGHFIELDS INDEPENDENT CHAPEL (UNITED REFORMED CHURCH,)), HIGHFIELDS AVENUE, PORTHCAWL,	Yes	No	No	No	No	No		No	No
310078	GRAND PAVILION, PORTHCAWL	Yes	No	No	No	No	No	See LB 19,364	Yes	No
31837	OLD POLICE STATION AND SUPERINTENDENT'S HOUSE, JOHN STREET, PORTHCAWL	Yes	No	No	No	No	No		No	No
10029	CEFNCRIBWR, LLANDUDWG UCHAF, TYTHEGSTONE HIGHER	Yes	No	No	No	No	No	Inaccurate location	No	No
10187	TABERNACL WELSH INDEPENDENT CHAPEL, FENTON PLACE, PORTHCAWL	Yes	No	No	No	No	No		No	No
10188	GILGAL ENGLISH BAPTIST CHAPEL, PARK AVENUE, PORTHCAWL	Yes	No	No	No	No	No		No	No
10189	NODDFA WELSH BAPTIST CHAPEL PHILADELPHIA ROAD, PORTHCAWL	Yes	No	No	No	No	No		No	No
10190	ARLINGTON ROAD CALVINISTIC METHODIST CHAPEL, ARLINGTON ROAD, PORTHCAWL	Yes	No	No	No	No	No		No	No
260026	PORTHCAWL	Yes	No	No	No	No	No		No	No
10195	ENGLISH WESLEYAN METHODIST CHAPEL, JOHN STREET, PORTHCAWL	Yes	No	No	No	No	No		No	No
32790	PUBLIC CONVENIENCE, JOHN STREET	Yes	No	No	No	No	No		No	No

Appendix III: Historic Map Regression



Figure 4. 1846 Newton Nottage Tithe Map. Courtesy of the National Library of Wales.

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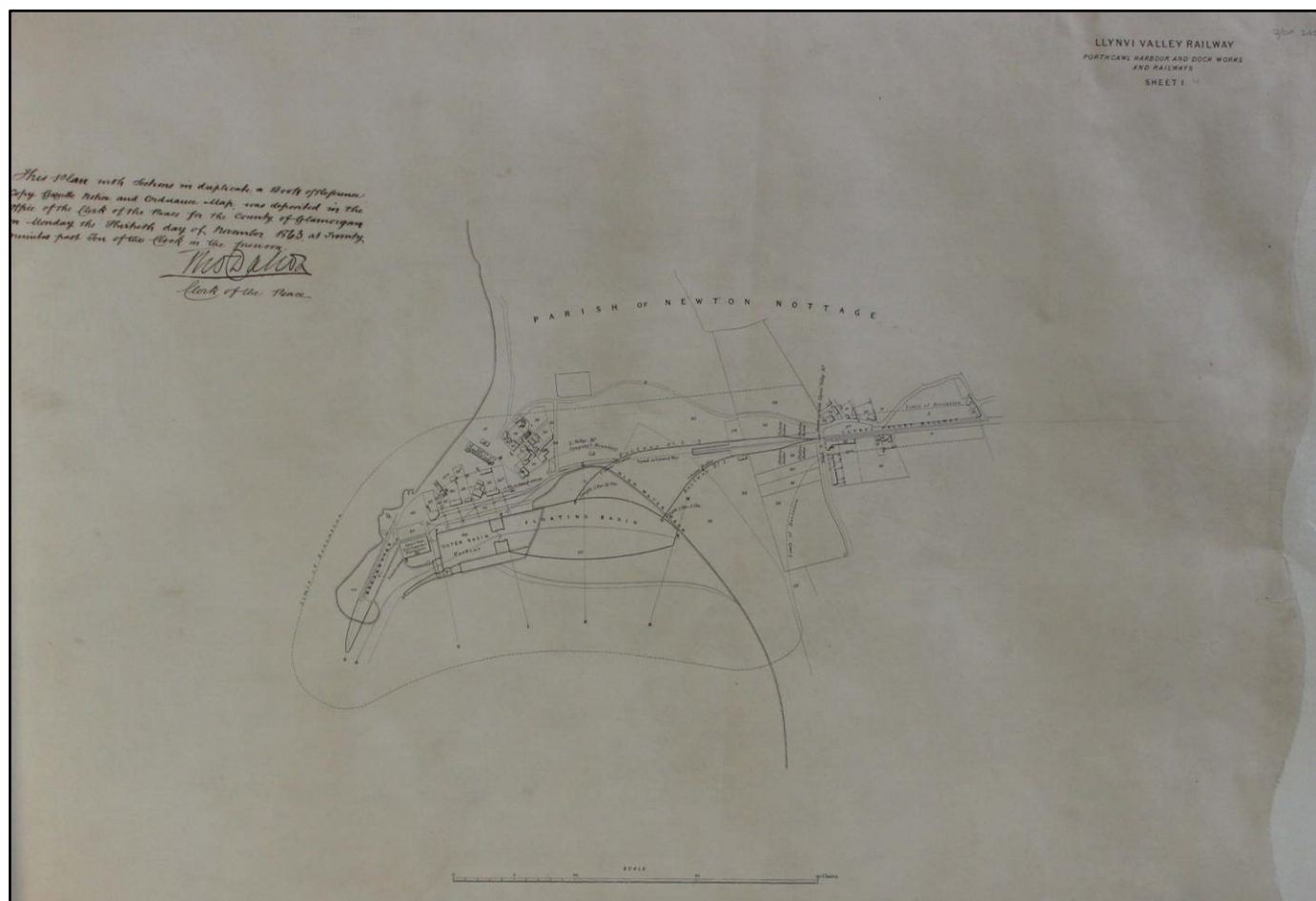


Figure 5. 1863 Llynvi Valley Railway: Porthcawl Harbour and Dock Works and Railways (Sheet 1).

Courtesy of the Glamorgan Archives (GRO Q/D/P/243).

**Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour, Porthcawl, Bridgend:
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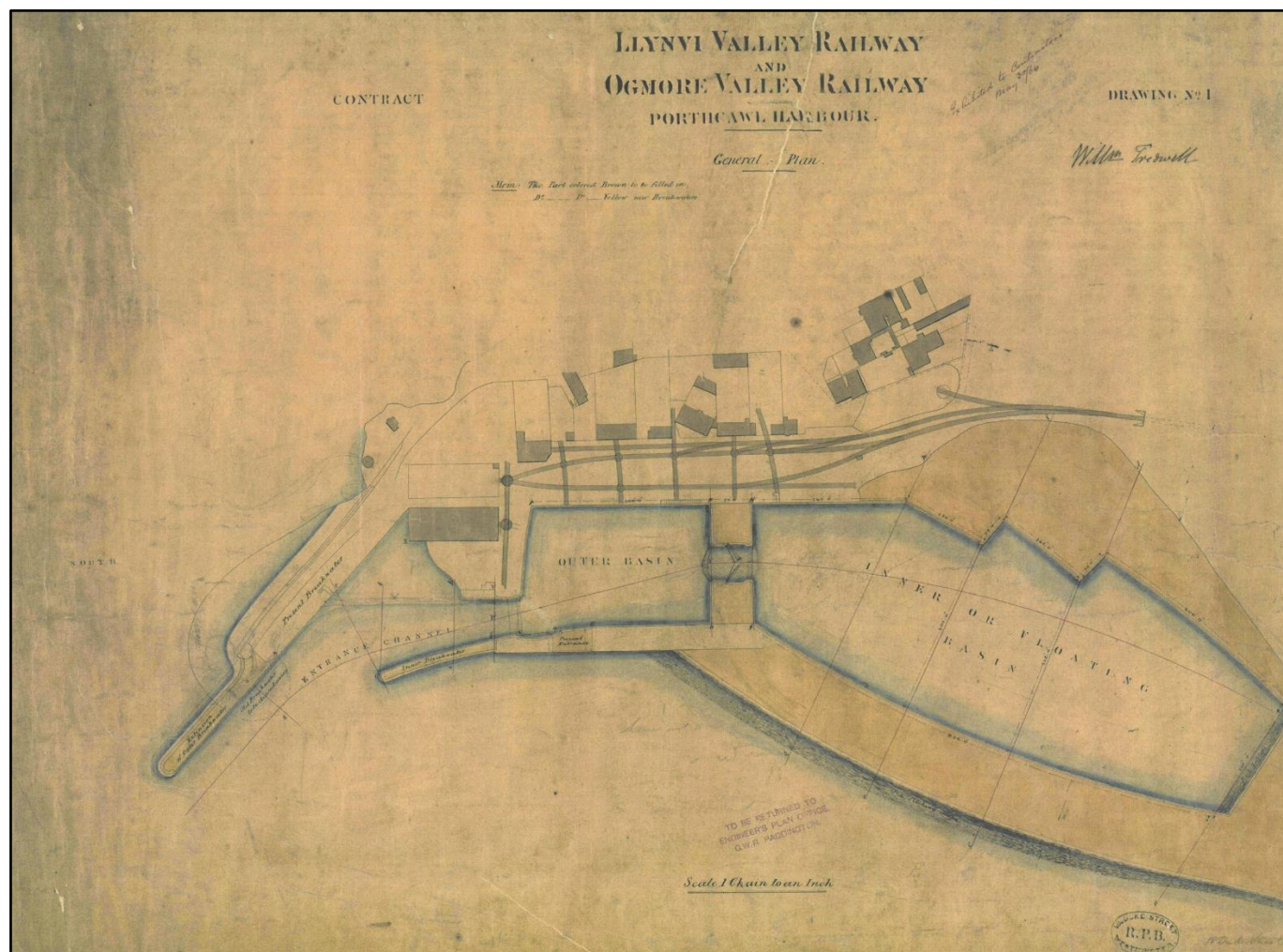


Figure 6. 1864 Llynvi Valley Railway and Ogmore Valley Railway: Porthcawl Harbour (General Plan).

Courtesy of BCBC (also GRO Lib/CD/63i-iii).

**Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour, Porthcawl, Bridgend:
Heritage Impact Assessment**

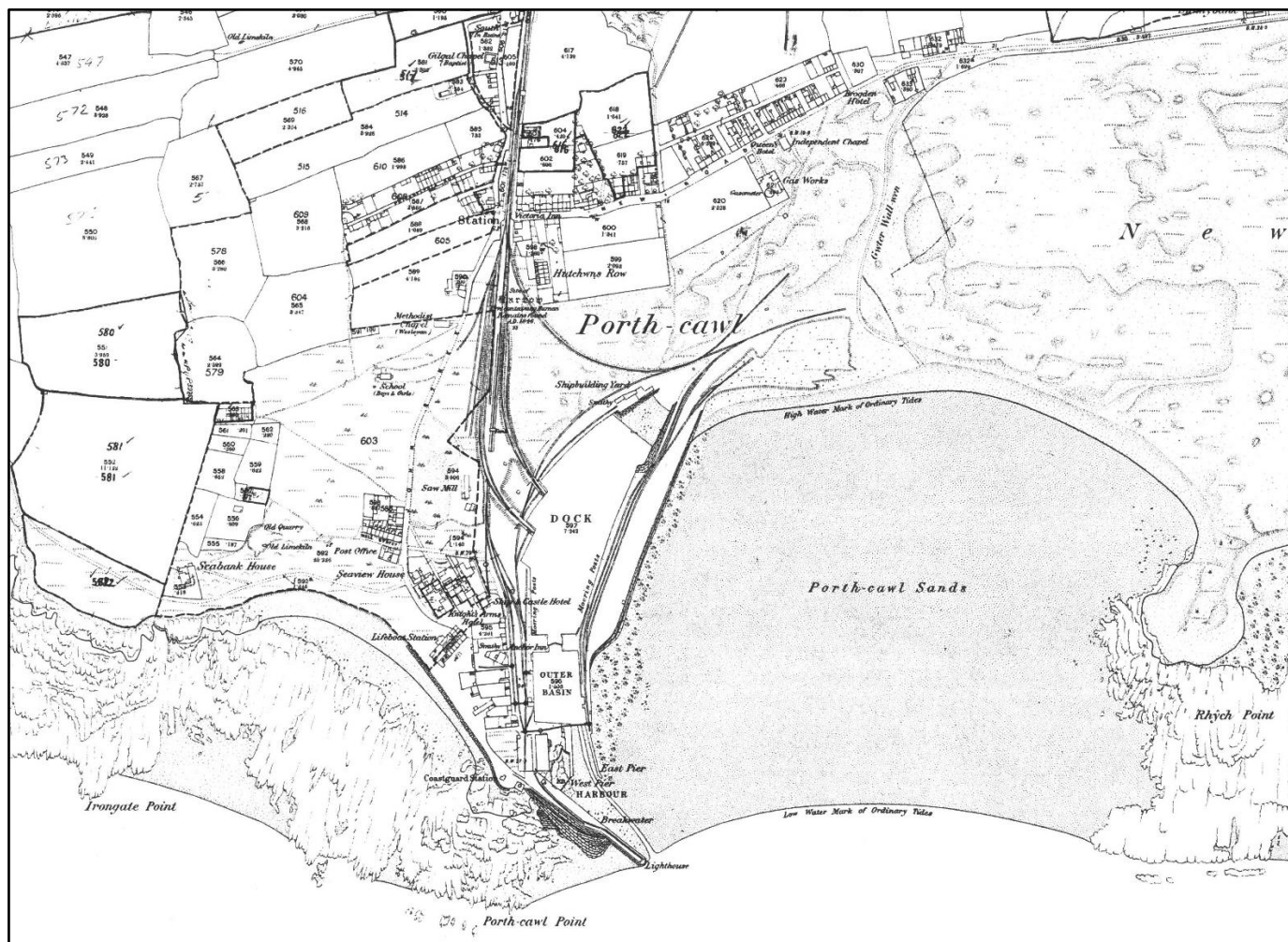


Figure 7. 1877 1st edition 1:2500 OS map (Not to scale)

Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour, Porthcawl, Bridgend:
Heritage Impact Assessment

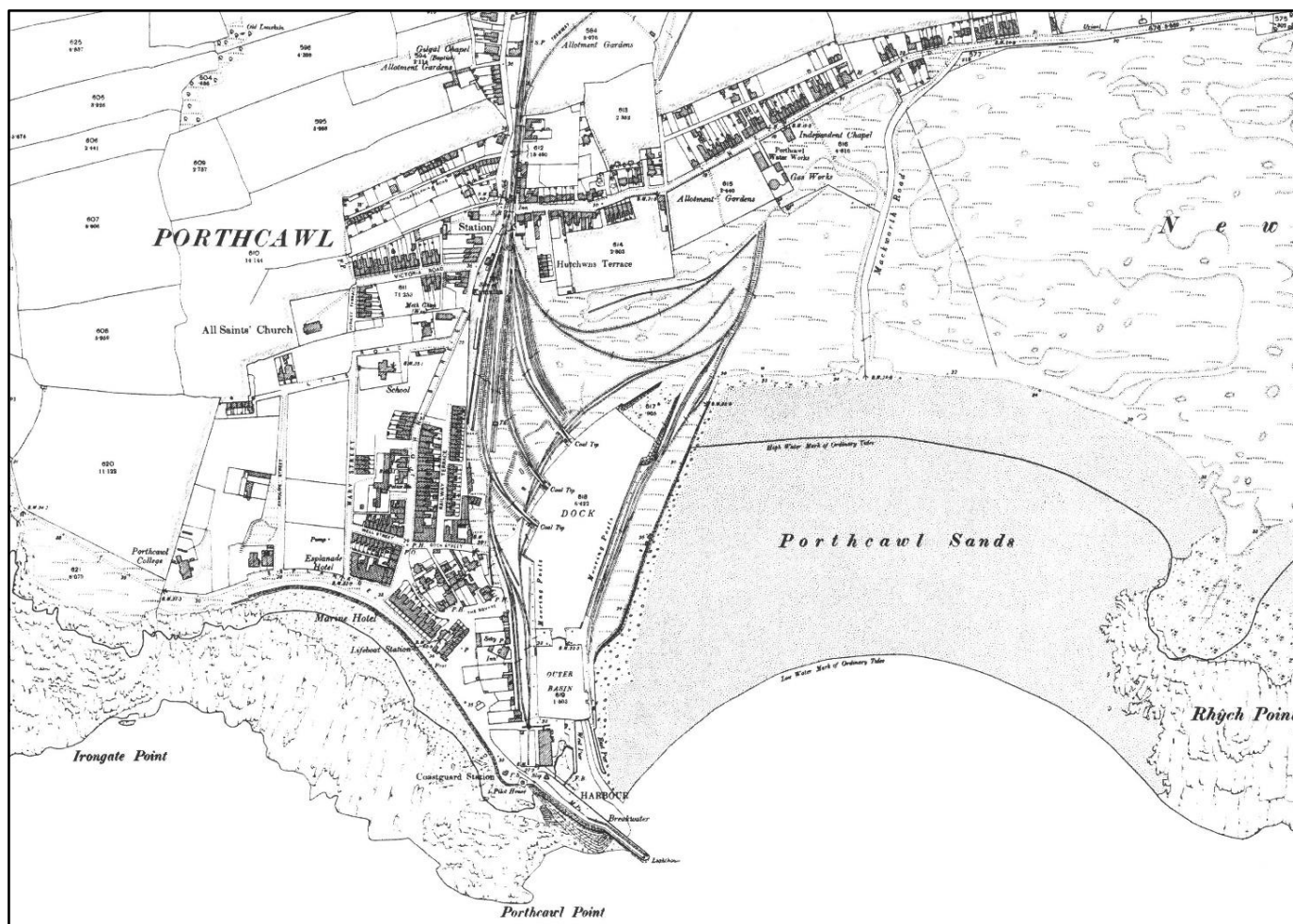


Figure 8. 1899 2nd edition 1:2500 OS map (Not to scale)

**Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour, Porthcawl, Bridgend:
Heritage Impact Assessment**

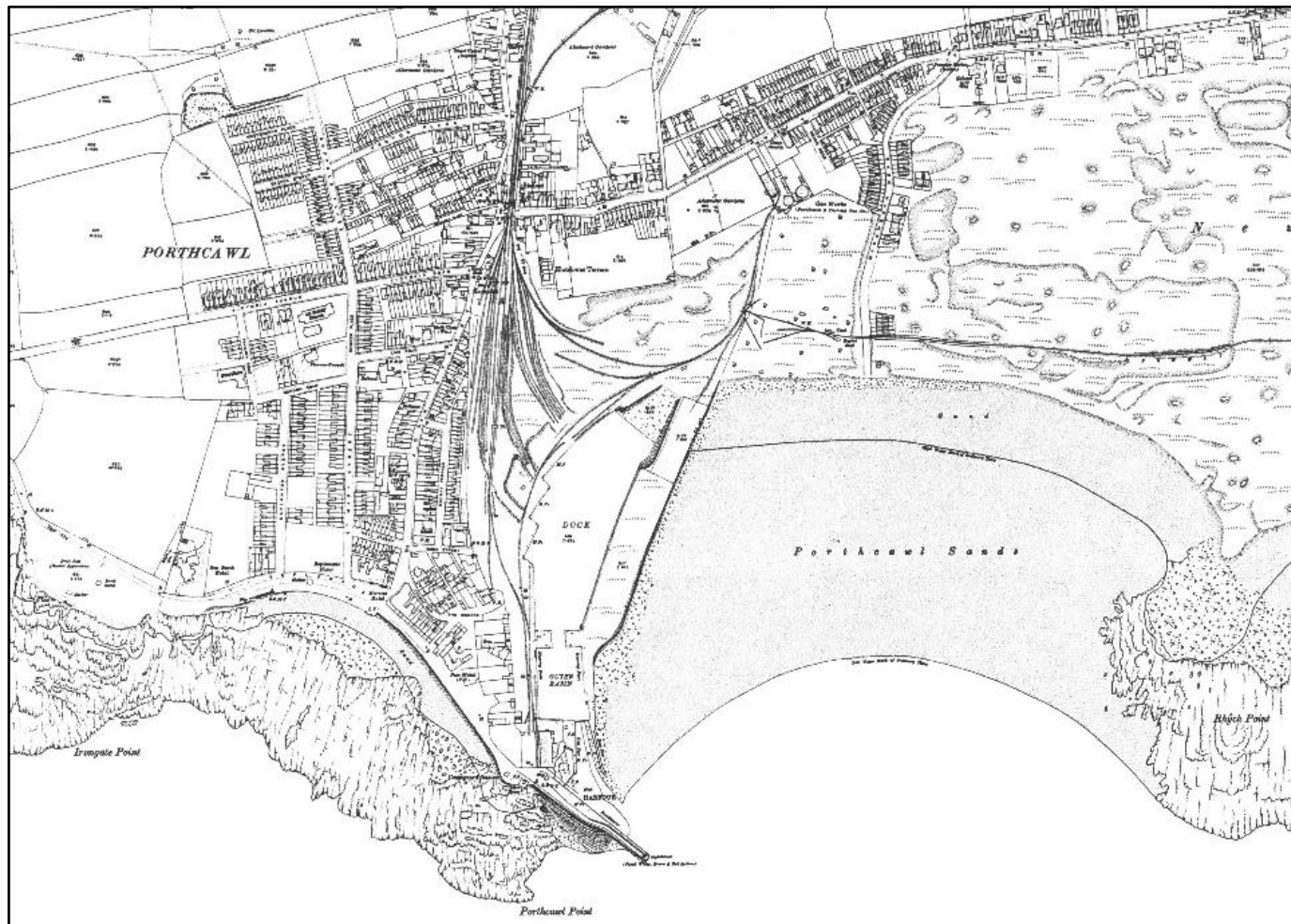


Figure 9. 1919 3rd edition 1:2500 OS map (Not to scale)

**Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour, Porthcawl, Bridgend:
Heritage Impact Assessment**



Figure 10. 1943 4th edition 1:2500 OS map (Not to scale)

Appendix IV: Porthcawl Historic Images

Historic images relating to the Breakwater (selection):



Plate 24. The Western Breakwater during later stages of construction: photograph of c. 1866.
Courtesy of Porthcawl Museum.

**Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour,
Porthcawl, Bridgend:
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**Plate 25. The Western Breakwater during later stages of construction: photograph of c. 1866.
Courtesy of Porthcawl Museum.**



**Plate 26. The Western Breakwater: glass plate negative of the Pier, Porthcawl, undated (c.
1905).⁴⁶ Courtesy of the Glamorgan Archives (GRO D261/M697).**

⁴⁶ Similar to two glass plate negatives at the National Library of Wales of c. 1905, not reproduced here: see Ridley 1930 and Ridley 1935.

**Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour,
Porthcawl, Bridgend:
Heritage Impact Assessment**



Plate 27. The Western Breakwater: glass plate negative of the Pier, Porthcawl, undated (c. 1905).⁴⁷ Courtesy of the Glamorgan Archives (GRO D261/M698).



Plate 28. The Western Breakwater: glass plate negative of the Pier, Porthcawl, undated (c. 1905).⁴⁸ Courtesy of the Glamorgan Archives (GRO D261/M699).

⁴⁷ Ibid.

⁴⁸ Ibid.

**Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour,
Porthcawl, Bridgend:
Heritage Impact Assessment**



Plate 29. The Western Breakwater: postcard view of lighthouse and rocks, Porthcawl, undated (c. 1914). Courtesy of the Glamorgan Archives (GRO DX135/3/2).

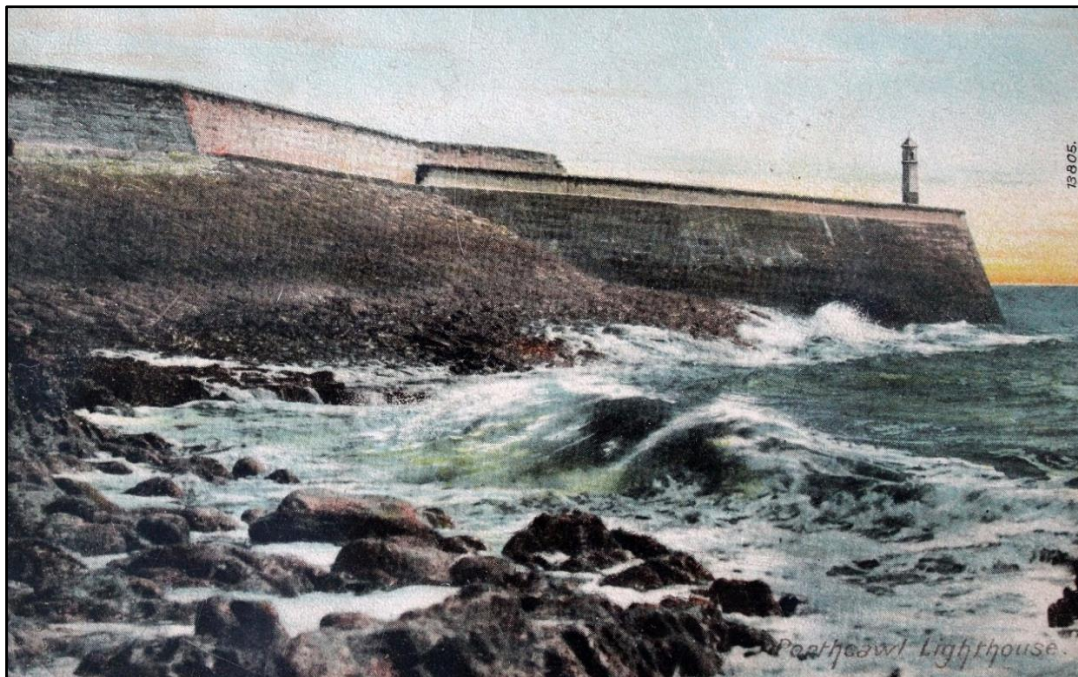


Plate 30. The Western Breakwater: postcard view Porthcawl Lighthouse, undated. Courtesy of the Glamorgan Archives (GRO DX145/4).

**Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour,
Porthcawl, Bridgend:
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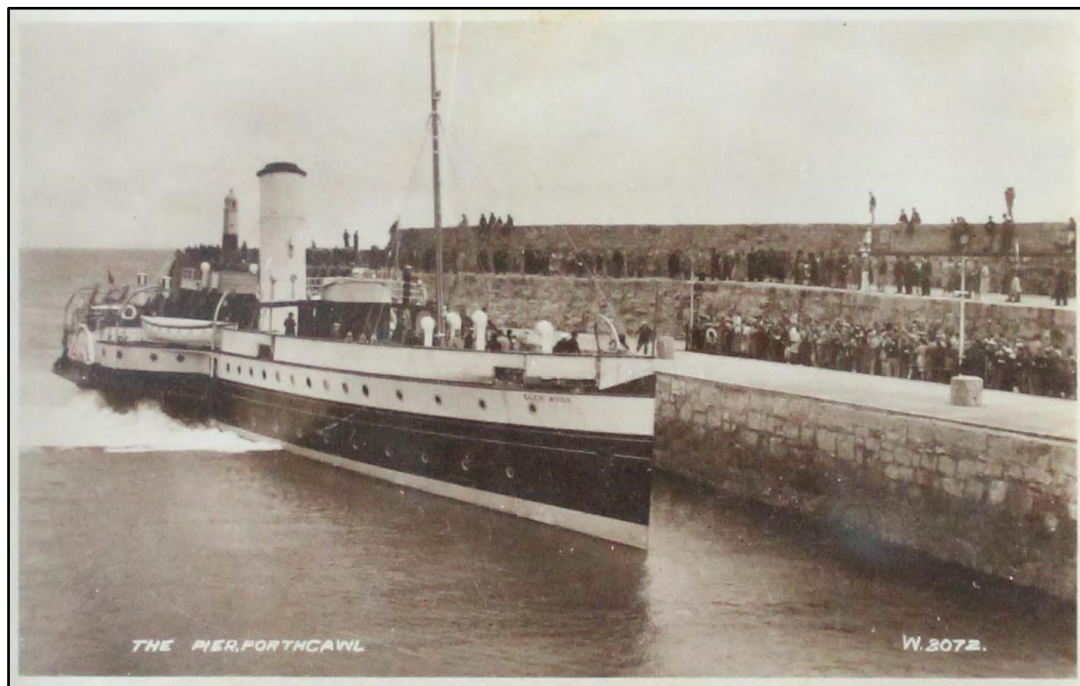


Plate 31. The Western Breakwater: postcard showing the 'Glen Avon' docking at the pier in Porthcawl, c. 1920s. Courtesy of the Glamorgan Archives (GRO D57/8).



Plate 32. The Western Breakwater: postcard showing a steamer leaving the pier, Porthcawl, c. 1920s, also shows the steamer berth on the breakwater. Courtesy of the Glamorgan Archives (GRO D57/10).

**Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour,
Porthcawl, Bridgend:
Heritage Impact Assessment**

Historic images relating to the Outer and Inner Basin, Porthcawl (selection):



Plate 33. Porthcawl Harbour in the late 19th century. Courtesy of Porthcawl Museum.

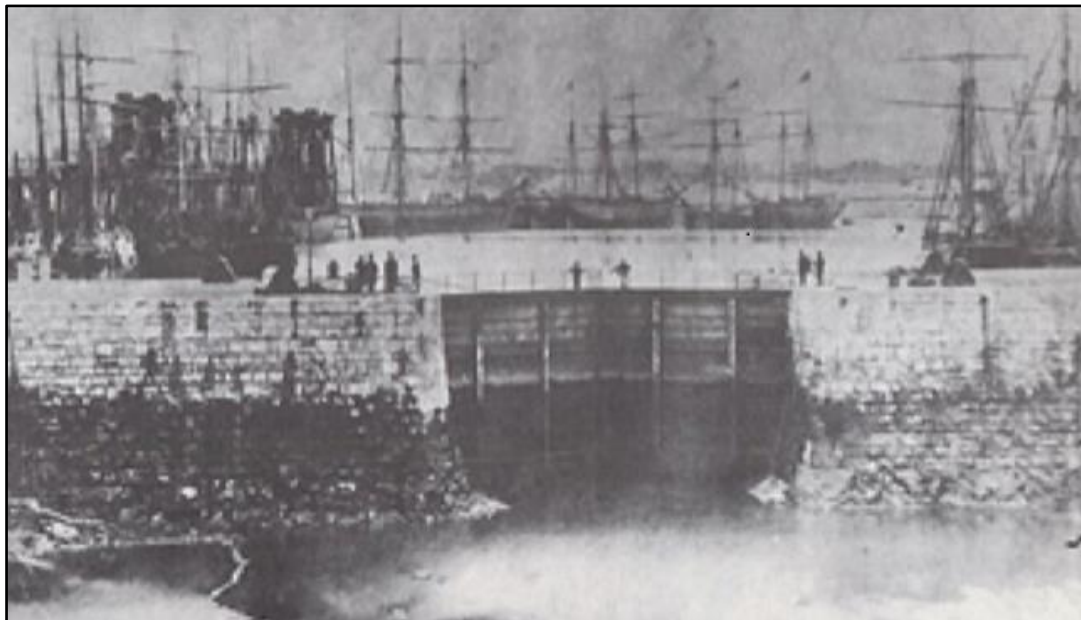


Plate 34. The entrance to the Inner Basin, Porthcawl from the Outer Basin (near Jennings Warehouse), showing the lock gates and beyond to the left coal shutes or tips, 19th century. Courtesy of BCBC.

**Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour,
Porthcawl, Bridgend:
Heritage Impact Assessment**



Plate 35. View of the Inner Basin from near the entrance from the Outer Basin, mooring posts in the foreground, coal tips in the middle distance to the left and sea embankment on the right, 19th century. Courtesy of BCBC.



Plate 36. Similar view of the Inner Basin from near the entrance from the Outer Basin, close-up of dock-side railing, 19th century. Courtesy of BCBC.

**Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour,
Porthcawl, Bridgend:
Heritage Impact Assessment**



Plate 37. View from the north end of the Inner Basin over rail sidings, coal tips to the right and sea embankment to the left, 19th century. Courtesy of BCBC.

Aerial Photographs (selection):



Plate 38. Porthcawl Docks: aerial Photograph, 1919-1926. Courtesy of Porthcawl Museum.

**Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour,
Porthcawl, Bridgend:
Heritage Impact Assessment**



Plate 39. Porthcawl: aerial photograph from the west, 1929. Courtesy of Porthcawl Museum.



Plate 40. Porthcawl and Harbour: aerial view from the south, c. 1929-39(?). Courtesy of Porthcawl Museum.

**Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour,
Porthcawl, Bridgend:
Heritage Impact Assessment**



Plate 41. Eastern Promenade, Porthcawl: aerial photograph, c. 1947-48? Courtesy Porthcawl Museum.

Full Report for Listed Buildings



Summary Description of a Listed Buildings

Reference Number	Building Number	Grade	Status	Date of Designation	Date of Amendment
11369		II	Designated	15/08/1991	17/02/1998
Name of Property		Address			
Jennings Warehouse					

Location

Unitary Authority	Community	Town	Locality	Easting	Northing
Bridgend	Porthcawl	Porthcawl	Porthcawl Harbour	281918	176418
Street Side		Location			
W		Situating on the west quay of the harbour just North of the Breakwater and S of the surviving harbour basin.			

Description

Broad Class	Period
Commercial	

History

Built 1832 by James Allen, the proprietor of a spelter works at Dyffryn, as the S terminus of the Dyffryn Llynfi Porthcawl horsedrawn tramroad which was built under an Act of 1825 to transport iron and coal from the Llynfi valley; the Act provided for a new harbour at Pwll Cawl, a rocky promontory amidst the surrounding sand dunes or warrens. Total cost £60,000. Shown on Tithe Map of 1846 and described in the apportionment as a 'warehouse of the Llynfi Iron Company' leased from the Dyffryn Llynfi and Porthcawl Railway Company. It was used as a store for iron and iron goods awaiting shipment and is much larger than the few other surviving examples, perhaps as a result of high early expectations of a trading future, or to provide for storage during bad weather, as at some periods the dock was only fully in use during the summer months. Name dates from 1911 when it was used by Jennings and Co, timber importers. In 1920s was part of Cosy Corner site, with Cosy Corner cinema, a converted aeroplane hanger, and Pierrot stage erected to W; to NW was an outdoor roller skating rink with the first floor of

Jennings building also being used as a roller skating rink; to N was the Salt Lake for Swimming and Boating created from the former inner dock and to S was the slipway and harbour where paddle steamers called for day trips. In Second World War warehouse became a base for RAF Air Sea Rescue Launch.

Exterior

A large 2 storeyed building, 15 bays long, 5 bays wide. Built of limestone rubble with stone and brick dressings, some replaced with concrete, rendered to rear W, and S; hipped slate roof, terracotta ridge tiles, inserted skylights. All openings currently boarded. Regularly spaced window openings to first floor mostly have cambered arched heads with brick voussoirs, dressed stone surrounds and sills. Ground floor harbour frontage (E) has 6 remodelled square headed windows and 3 large segmental arched openings of former loading bay. Frontage facing inner dock (N) has one segmental arched doorway at ground floor and formerly two between the two storeys, one remodelled; town frontage (W) has chimneys; breakwater frontage (S) has large double doors inserted.

Interior

No access to interior closed for repair and conversion (March 1997).

Reason for designation

Listed as a rare example of a very early railway company warehouse, for its important connections with the South Wales Iron industry, and for its importance as one of the founding buildings of Porthcawl which originated with the harbour; group value with the Lighthouse, the Outer Basin, the Breakwater, the Old Customs House, the Look-out Tower.

Full Report for Listed Buildings



Summary Description of a Listed Buildings

Reference Number	Building Number	Grade	Status	Date of Designation	Date of Amendment
11370		II	Designated	15/08/1991	17/02/1998
Name of Property		Address			
Lighthouse on Breakwater Porthcawl Harbour					

Location

Unitary Authority	Community	Town	Locality	Easting	Northing
Bridgend	Porthcawl	Porthcawl	Porthcawl Harbour	282044	176274
Street Side		Location			
		Prominently sited on the curved outer end of the main breakwater at entrance to Porthcawl harbour.			

Description

Broad Class	Period
Maritime	

History

Built 1866 by Messrs Stephen of Bristol. Lantern replaced following destruction in storm of 1911 (photograph of 1909 shows pyramidal roof with weathervane); powered by town gas from rebuilding until converted to North Sea gas in 1974. Small scale development of harbour began in 1825 at the end of the Dyffryn Llynfi Porthcawl Railway to provide an outlet for iron and coal from the Llynfi Valley; further developed in 1840 and main breakwater extended by 100 yards (91.4 metres) in 1866 when lighthouse was installed. Following storm damage, lantern replaced with replica and placed in museum 1996.

Exterior
Made of cast-iron painted black and white on a hexagonal painted stone base set on a rectangular stone plinth just behind outer sea wall. Tapered hexagonal tower, itself with battered plinth, with small vents bolted midway up each side and hinged metal door with handle and catches. Moulded band at top on which is set replaced bolted circular domed cap with small round finial; curved bolted frames to glazed panels; awaiting repairs following storm damage 1996. Metal ladder to door no longer extant.

Interior

Reason for designation
Included for its interest as an early cast iron lighthouse and for its importance in the second major stage of development of Porthcawl Harbour; group value with Jennings Warehouse, the Outer Basin, the Breakwater, the Look-out Tower, the Old Customs House.

Cadw : Full Report for Listed Buildings	[Records 1 of 1]
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Full Report for Listed Buildings



Summary Description of a Listed Buildings

Reference Number	Building Number	Grade	Status	Date of Designation	Date of Amendment
19358		II	Designated	17/02/1998	17/02/1998
Name of Property		Address			
The Old Customs House					

Location

Unitary Authority	Community	Town	Locality	Easting	Northing
Bridgend	Porthcawl	Porthcawl	Porthcawl Harbour	281922	176381
Street Side		Location			
W		At the W end of the Breakwater near the corner of the Harbour and between Jennings Warehouse and the sea wall.			

Description

Broad Class	Period
Commercial	

History

Believed to have been built after the inner dock was constructed in 1867 for levying duties on main imports of iron ore and timber for pit props. This was part of the development of the dock undertaken by the Brogden family who had purchased the Tondy Ironworks from Robert Price in 1853 and were developing coal mining in Ogmore Vale, the products being transported from the Valleys by the Dyffryn Llynfi and Porthcawl Railway for export from the small harbour built for that purpose at Porthcawl. Llynfi and Ogmore Valley Railway Companies jointly obtained an Act of Parliament in 1864 for the improvement of Porthcawl Harbour, authorising construction of a dock at N end of tidal basin, substitution of S entrance for existing E, extension of breakwater by 100 yds (91.4 metres) and erection of inner pier, following which trade grew rapidly. Shown on OS map surveyed 1876.

Exterior

A small rectangular building with a semicircular end built of snecked rockfaced sandstone now heavily weathered with a hipped timber shingle roof. Gabled porch now roofless with a sandstone block lintel. Second opening in main wall adjacent. On curved wall left the two blocked window openings have deep curved sandstone lintels and sills. End right facing Jennings warehouse has 2 small rectangular windows. Wall to rear is of rubble and the quoins at each end of straight section suggest some alteration here.

Interior

Interior vacant.

Reason for designation

Listed as a structure dating from the second major period of development of Porthcawl dock and for group value with Jennings Warehouse, the Outer Basin, the Breakwater, the Look-out Tower, and the Lighthouse.

Cadw : Full Report for Listed Buildings

[Records 1 of 1]

Full Report for Listed Buildings



Summary Description of a Listed Buildings

Reference Number	Building Number	Grade	Status	Date of Designation	Date of Amendment
19359		II	Designated	17/02/1998	17/02/1998
Name of Property		Address			
The Look-out Tower					

Location

Unitary Authority	Community	Town	Locality	Easting	Northing
Bridgend	Porthcawl	Porthcawl	Porthcawl Harbour	281891	176374
Street Side		Location			
E		At the extreme E end of the Promenade adjacent to the Breakwater on the very edge of the sea wall.			

Description

Broad Class	Period
Communications	

History

Part of a complex formerly comprising the lighthouse on the Breakwater 1866, signal station now demolished and lifeboat station inaugurated 1860 and now rebuilt, to provide guidance and a rescue service for sailors in the surrounding treacherous seaways, the site of many wrecks. First coastguard service in Porthcawl 1830s. This building of unknown date is thought to have been constructed after the harbour extension of 1867 and appears on 1st edition OS Map 1885 (surveyed 1876). Shown on a photograph of c1900 much as now but with small-paned lookout windows, also one on seaward side at ground floor, and possibly a chimney.

Exterior
A circular tower, slightly tapered, rendered and white painted, a small gap in the rendering shows stone rubble originally limewashed. Flat roof now of concrete supported internally by cast iron piers on the seaward side where there are 4 replaced large glazed viewing panels. 2 protruding ledges at eye level on each side of unknown purpose. At upper floor right is a small recessed light apparently unaltered facing town. To rear are doors on each level with iron lintels, and keystone to ground floor which also has large stone step. Timber flight of steps to first floor. Sea guidance lights and flag poles on roof.
Interior
Reason for designation
Listed for its local interest as a building representing the maritime guidance and rescue service provided by the dock in the mid C19; group value with the Outer Basin, the Breakwater, Jennings Warehouse, the Old Customs House, and the Lighthouse.

Cadw : Full Report for Listed Buildings	[Records 1 of 1]
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Full Report for Listed Buildings



Summary Description of a Listed Buildings

Reference Number	Building Number	Grade	Status	Date of Designation	Date of Amendment
19362		II	Designated	17/02/1998	17/02/1998
Name of Property		Address			
The Breakwater					

Location

Unitary Authority	Community	Town	Locality	Easting	Northing
Bridgend	Porthcawl	Porthcawl	Porthcawl Harbour	281962	176332
Street Side		Location			
		The outer arm of Porthcawl Harbour adjoining the E end of The Esplanade.			

Description

Broad Class	Period
Maritime	

History

Construction of the harbour was authorised by Act of Parliament in 1825 to provide outlet for iron and coal from the Llynfi Valley, the material being transported by the Dyffryn Llynfi Porthcawl horsedrawn tramroad opened 1828. At this time the dock consisted of a rectangular basin with breakwater planned but not completed immediately because of financial difficulties, though shown extant on plan of 1846. Jennings warehouse constructed 1832. Section of rails of Dyffryn Llynfi Porthcawl Railway Company still in situ on Breakwater, the only such surviving. In 1864 John Brogden and Son, who had purchased Tondy Ironworks in the Llynfi Valley and were developing coal mining in the Ogmore Valley, were instrumental in obtaining an Act of Parliament for the improvement of Porthcawl Harbour which also involved extending the breakwater by 100 yds (91.4 metres). This was needed to provide additional protection for shipping as strong tides and winds had always made access difficult and in early stages dock could only be used spasmodically and predominantly in summer. Lighthouse established 1866 as part of

these improvements. Photograph of 1865 shows Breakwater extension nearing completion with wooden structure (wood from Forest of Dean) part faced in stone. Following decades were the Dock's busiest, in 1874 shipping over 136,000 tons (138,720 tonnes) and docking over 700 vessels, trade mostly being within the British Isles. Over a half of the outgoing cargoes were from Brogden undertakings, many incoming vessels came in light or in ballast. Opening of Port Talbot and Barry Docks in 1898 led to almost total loss of trade at Porthcawl Dock which was closed in 1906. Subsequently harbour used for pleasure trips especially by paddle steamers in the Bristol Channel as Porthcawl became an increasingly popular resort. Narrow slipway shown in etching pre 1879, widened during 2nd World War to provide access for rescue service for ditched aircraft. Concrete reinforcement of seaward end dates from 1970s.

Exterior

The Breakwater consists of a long arm stretching roughly E/W. Originally constructed of giant dressed stone blocks on a wooden frame, with smaller stone and other material such as brick and concrete used for later repairs, patching and alterations. On the landward side it is 3 tiered. Main quay is of stone blocks with plenty of later patching ; concrete surface covers original stone quay surface. Slipway in front widened and reinforced with later concrete. Second ramped and battered tier, also with giant blocks, incorporates a small surviving section of the Dyffryn Llynfi Porthcawl Railway imbedded in the stone surface, the rest covered in concrete. Top tier is the sea-wall mostly of smaller stone though some larger in centre, stepped up in centre; flights of stone steps join levels. Seaward end section is battered and faced in concrete though the lighthouse has a stone surround with stone ledges; flight of steps descends at end to water. On seaward side the defences rise at roughly 45% angle comprising a slope of giant roughly hewn and mortared boulders surmounted by 2 vertical courses of giant dressed blocks. Added concrete walkway with blue brick on top. Steps rise to the single width wall, here consisting of large stone blocks at base, small at top.

Interior

Reason for designation

Included as a substantially surviving structure from the main period of activity of Porthcawl Dock in the second half of the C19 and for its crucial importance in the development of Porthcawl town ; group value with the Outer Basin, Jennings Warehouse, the Look-out Tower, the Old Customs House and the Lighthouse , the two latter actually standing on the Breakwater.

Full Report for Listed Buildings



Summary Description of a Listed Buildings

Reference Number	Building Number	Grade	Status	Date of Designation	Date of Amendment
19363		II	Designated	17/02/1998	17/02/1998
Name of Property	Address				
Walls of the Outer Basin and West Pier/Quay					

Location

Unitary Authority	Community	Town	Locality	Easting	Northing
Bridgend	Porthcawl	Porthcawl	Porthcawl Harbour	281960	176440
Street Side	Location				
	On the landward side of the Breakwater, to the E of Porthcawl town.				

Description

Broad Class	Period
Maritime	

History

The first harbour, which became the outer Basin, was completed in 1828 following Act of Parliament 1825 authorising construction of both Dyffryn Llynfi Porthcawl Railway, a horse-drawn tramroad, and the dock, to provide an outlet for coal and iron from the Llynfi Valley. Original dock was a rectangular tidal basin protected by a short breakwater with entrance in E side and open to N. Large warehouse, Jennings warehouse, erected SW on West Quay. Plan of 1846 shows W, S and possibly part of E walls largely as at present. Dock was further developed following Act of 1840 which provided new facilities for loading coal, extending dock by rebuilding N wall 50 yds (45.7 metres) N, and excavating depths. Extensive further development authorised by Act of Parliament of 1864 involved construction of additional large new dock to N with entrance gates at N end of existing tidal outer basin, resiting the entrance from E to S, erection of inner pier along E side and extension of breakwater by 100 yds (91.4 metres), as shown in Plan of 1866. This expansion took place under John Brogden and Sons who became

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owners of Tondu Ironworks in 1853 and began developing coal mining in the Ogmore Valley and accounted for over a half of outgoing cargoes. Following enlargement of docks trade increased greatly; in 1871 165,000 tons (168,300 tonnes) were shipped and in 1874 over 700 vessels docked. Most trade was within the British Isles and most vessels came in empty or in ballast which was tipped on nearby dunes. Opening of Port Talbot and Barry Docks in 1898, providing better and larger facilities and safer access, created immediate reduction in trade and docks closed in 1906. Filling in N Inner Basin commenced in 1914 but was abandoned owing to outbreak of World War I. It became Salt Lake Bathing Pool in 1920s when the area developed as Cosy Corner after the name of a cinema adjacent to the Jennings Warehouse. Finally filled in during Second World War. The West Pier or Quay abuts the S wall of the original Outer Basin, the E side remodelled in 1866 when the Dock entrance was moved to S and thus forming the E quay of the Dock entrance. OS survey 1876 shows railway along W side of outer basin.

Exterior

The Outer Basin is rectangular, originally built of giant regularly coursed dressed limestone blocks, at S and W directly onto outcropping rock; later rockfaced stone and later small stone patching and repairs. S and W walls are mainly of giant coursed blocks. Later N wall is of rock-faced stone, with clear infill where lockgates were removed when Inner Basin was decommissioned. Further alterations can be traced in masonry of E wall. Stone quaysides, in places covered with concrete or asphalt, have iron and stone bollards and mooring rings; original steps at NW corner, 2 steps created out of each stone block; an apparently original buttress adjacent; culverts and a blocked arched opening in W wall. Seawall to E has blocks on inner face decoratively snecked; seaward side is rockfaced, mostly large coursed blocks battered to base; raised parapet. The West Pier or Quay in front of Jennings Warehouse is built of coursed dressed blocks with section S of rock-faced stone; grooves for gates, which are apparently submerged and visible in silt at low water.

Interior

Reason for designation

Included as an early C19 maritime structure from the earliest days of the port of Porthcawl, for its exceptional importance in the history of the development of Porthcawl, and for group value with Jennings Warehouse, the Breakwater, the Old Customs House, the Look-out Tower, the Lighthouse.

Full Report for Listed Buildings



Summary Description of a Listed Buildings

Reference Number	Building Number	Grade	Status	Date of Designation	Date of Amendment
19364		II	Designated	17/02/1998	17/02/1998

Name of Property	Address
Grand Pavilion	

Location

Unitary Authority	Community	Town	Locality	Easting	Northing
Bridgend	Porthcawl	Porthcawl	Porthcawl	281628	176677

Street Side	Location
N	On the seafront a little W of the town centre.

Description

Broad Class	Period
Recreational	

History

Built 1931-2 by E J E Moore with L G Mouchel as consultant engineers for the concrete dome, an important example of ferrous-concrete (Ferrocete) work. Sponsored by Russell Mabley, elected Porthcawl's chief citizen 1931. Original plans held by Porthcawl Museum. Cost c £25,000. Formerly surrounded by Winter Gardens. Became centre for live entertainment and also conferences of South Wales miners. Lower promenade opposite, an addition to Brogden's Esplanade of 1877, opened 1935. Front open until 1995.

Exterior

Rendered, the dome of ferrous concrete. Plan of an octagonal central dome with entrance bays flanked by two loggia wings. Silver coloured dome tiered at base and divided into sections by flat ribs is surmounted by a weathervane; octagonal walls have wide segmental arched Diocletian windows on upper floor, double to sides; attached rear service wing with blind panels and a triglyph-derived motif. Added wings at sides and some alterations to windows. Attached at front is clock tower with two angled clock faces rising from a square plinth with relief lettering in moulded panels and date and an orb finial. Symmetrical main frontage is one storey high, the central section topped by a balustraded parapet ending in chunky moulded end piers on a moulded cornice; central below is a curved entrance bay flanked by pairs of tapered Tuscan columns on a plinth; matching curved concrete steps with terrazzo floor incorporating Porthcawl anchor motif lead to recessed replaced doorway with 30's style lettering in overhead. On either side of entrance are bays with deeply channelled render and heavy keystone over full length window with replaced glazing flanked by a second pair of columns. On either side are slightly recessed wide round headed arches, again deeply channelled with keystone and impost, leading to side entrances and stairs to lower level. Breaking forward on each side are the loggia wings comprising 5 pairs of columns, steps to replaced full length windows surmounted by entablature with triglyph derived frieze and plain parapet. The end bays on each side form an elaborate archway leading to former Winter Gardens comprising pairs of columns on a plinth supporting an entablature on each side of a central recessed archway of 2 orders with a deep stepped flat topped pediment, all with heavy channelling of voussoirs and masonry joints.

Interior

Interior although substantially refurbished retains much of its original plan. Central hall has a tent-like roof, balcony with moulded front, stage with some decorative plaster mouldings to surround and wall, sprung floor.

Reason for designation

Included as an important seafront building retaining much of its original character and reflecting Porthcawl's development as a major South Wales sea-side resort after the closure of the docks in 1906; also for its importance in its use of ferrous concrete.

Western Breakwater, Walls of the Outer Basin and Eastern Promenade, Porthcawl Harbour,
Porthcawl, Bridgend:
Heritage Impact Assessment

Option Selection: Western Breakwater

Group 1 options:

- Essential repair works required to ensure the present day structural integrity of the breakwater

Failure mechanism		1. Voiding in revetment and breakwater		2. Chloride ingress and spalling	3. Impact damage/overturning failure of raised parapet section on seaward	4. Overtopping and washout at leaward side of structure
		GPR survey in December 2017 identified voids in both the sloped revetment and the main breakwater structure. Continued washout will eventually result in significant damage and potential collapse of the breakwater superstructure.		Chloride penetration and impact damage resulting in surface degradation, spalling and corrosion of concrete panels protecting zone D and zone C of the breakwater and roundhead.	High impact pressures acting on breakwater upstand/parapet resulting in tensile stresses in masonry, cracking and gradual 'shunting' stress propagation and potentially collapse of parapet sections. Wave pressures are high all the way along the breakwater, but it is noted that the shape of revetment in zone C results in a 'funneling' effect, significant run up and high wave impact pressures locally in this area. Vulnerability of the upstand within this zone (55m chainage to 105m chainage) is compounded by the geometry of the upstand (H:V = 1:2.5) and its susceptibility to overturning	Run up and overtopping of the breakwater resulting in vertical impact/damage to the breakwater surface and damage to/washout of material on the leeward side of the structure.
Repair method		Method 1a. Void filling	Method 1b. Cut off wall	Method 2. Concrete repairs	Method 3. Parapet/superstructure strengthening	Method 4. Capping beam with/without recurve
		This repair method comprises the injection of one or more of the following: - Mass concrete - Pressure grouting/flowable grout - Hydro-insensitive polymer system Typically these are injected under controlled pressure through holes in outer walls of breakwater in the locations where voiding is identified. *To be carried out in conjunction with cut off wall works	This repair method comprises the installation of a cut off wall/extending the existing cut off trench in zone D along the revetment around the entire structure. This will prevent piping of fines/washout from the base of the structure. Options include: a. Trench backfilled with concrete or cement bags b. Continuous sheet piled wall with capping beam at beach level tied into revetment c. Precast concrete blockwork wall with mass concrete backing and rock armour scour protection *To be carried out in conjunction with void filling works	This repair method comprises specialist concrete repairs using the following outline construction methodology: - Survey of existing panels to identify all areas requiring immediate repair or most likely to be at risk in the future - Repair, replace and protect all exposed reinforcement - Prepare surface of spalled concrete and patch repair with SBR modified mortar - Apply hydrophobic/waterproofing coating to protect exposed face of concrete	This repair method comprises the installation of vertical Cintec anchors along the length of the breakwater: - To strengthen the existing masonry parapet and upstand wall on top of the breakwater - Anchors to provide tensile resistance to lateral and uplift forces generated by wave impact on the existing masonry parapet/ upstand wall on the top of the breakwater. Construction method comprises boreholes drilled into existing structure to receive stainless steel dowel inserted inside fabric sleeve filled with grout. Anchors to a sufficient depth to provide adequate pull out resistance.	This repair method comprises raising the crest/installing a capping element along the length of the breakwater structure. The capping element would be shaped to improve the cross sectional profile in zone B and zone A widening the up stand and enhancing its robustness. Reinforced concrete capping beam recommended over large limestone blocks to account for variability in the existing geometry. Limestone will be expensive; requiring significant plant to lift.
Evaluation	Advantages	- Non invasive procedure - Visually discrete upon completion - Increases the strength of the substrate binding particles as well as filling the void - Admixtures can be used to accelerate or retard the curing process if required - Reduces the permeability of the internal fill reducing washout of fines - Relatively inexpensive and work can be carried out in a relatively short timescale	General - Effective method for preventing the transportation of fine material and 'sealing' off the breakwater - Robust - Visually discrete upon completion	- Extends the service life of the precast concrete panels covering the breakwater and roundhead in zone D and zone C avoiding the need for complete replacement - Design to prevent need for costly emergency repair work - Minimum of 15 years to first maintenance	- Visually discrete upon completion, finished with like for like capping/cover element - Increases the strength of the parapet/upstand wall on top of breakwater minimising tensile stresses developing in the masonry - Installation will take place from the top of the existing breakwater avoiding the need to operate in the tidal zone and avoiding need for marine plant	- Capping element can be combined with strengthening as per repair method 3 to create a more robust solution - Recurve/raising crest can minimise overtopping reducing damage to the structure on the leeward side - Concrete: cast in-situ construction is efficient, durable and cost effective - Stone: desirable visual appearance
	Disadvantages	- Requires access to all faces of the breakwater and revetment/working within the tidal zone - Penetration relies upon the viscosity and the size of the particles suspended in the grout in relation to the particle size of the fill. If the mix is not correctly specified there is a risk that pores will be blocked preventing grout from seeping into larger voids deeper within the structure - sealing voids rather than filling. - Where pore size is highly variable multiple injections of fluids with different viscosities may be required - Determining required volume of grouting and preventing loss of fluid during construction (environmental and cost implications) - Validation of effectiveness requires new GPR survey and comparison with existing GPR, potentially requiring more than one round of works	General: - Hazardous. Both options involve construction and operation of plant in areas that are only accessible during low tide around the bulkhead Concrete backfilled trench: - Challenging to support trench/cast cut off wall in loose sand at required depth. Risk of collapse - use of bentonite slurry or diaphragm wall to support trench is likely to increase the cost - Spillage of concrete or cementitious material poses risk to the environment Sheet piling: - Expensive, mainly due to need of marine plant and expected long timescale for works due to tidal cycle - Risk of pile refusal on rocky ground below cut off wall location - Requires maintenance of concrete capping beam element	- Requires specialist subcontractors to carry out detailed inspection and examination to identify all areas that require repair - Requires specialist subcontractors with knowledge and experience of the materials and methods required to carry out the works in a marine environment - Requires working at height and within the tidal zone for both inspection and repair works. Construction method and temporary works design will need to include emergency procedures in the event of sudden weather changes - Selection of suitable pigment to minimise unsightly visual appearance of patch repair on the heritage structure	- Depending on quantitative assessment to be carried out, large number of anchors may be required to significant depth to obtain required pull out resistance and anchor into competent material with high cost associated - In-situ testing required to demonstrate pull out resistance	- Concrete: Visual aesthetic from seaward side not in keeping with existing (this can be improved through use of reconstituted/cast stone) - Stone: expensive, significant plant requirement to lift large, heavy stones into position. Requires plant/crane to operate at height on top of the breakwater

Figure 23. Western Breakwater (LB19362). Group 1 options matrix: Essential repair works required to ensure the present day structural integrity of the breakwater.

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Option Selection: Western Breakwater

Group 2 options:

- Repair/modifications to the existing breakwater that will extend the longevity of the structure for another 100 years
- A solution from group 2 options will be selected in conjunction with group 1 repairs

Rationale

- Options are compared in terms of their ability to achieve the objectives listed in the table below
- Each objective has been assigned a weighting from 1 to 5 in terms of priority/importance. 1 = low priority, 5 = high priority (comparatively).
- Each option has been assigned a score from 0 to 5 based upon how well it satisfies each objective. A score of 5 indicates the solution is very effective at meeting the given objective.
- The total score = Σ(Wi x Si)

		Failure mechanism											
		Zone C of the breakwater superstructure is particularly susceptible to damage and degradation due to the plan shape of the revetment/breakwater in this location whic results in a 'funnelling' effect, significant run up and extreme wave impact pressures on both the upstand and revetment. This has resulted in significant damage (scour/washout/loss of facing stones) to the revetment between 90m and 110m chainage. This has since been repaired using mass concrete on a number of occasions however it is noted that if left further erosion of the revetment and exposure of the upstands to high pressures will occur. A solution is required to repair the revetment, reduce wave energy and prevent further scour.											
		Options for repair, scour protection and reduction of wave energy											
		A. Terraced mass concrete infill apron			B. Precast concrete armour revetment			C. Natural rock armour revetment			D. Mass concrete revetment/apron embedded with stone/boulders		
Description		Option A comprises reinforced concrete terraces formed with recure (~750mm to 1000mm in height) to dissipate incident wave energy. The terrace would be inclined to match the slope of the revetment. Each terrace would be keyed into the terrace below and dowelled to the existing breakwater/revetment. A stepped access route would be provided down to the toe of the revetment to allow inspection only. A similar form of construction can be seen at Town Beach.			Option B comprises precast concrete armour laid on the revetment in front of the breakwater in zone C to dissipate incident wave energy. There are various sub options available - dolos, accropods, tetrapods, seabee etc. Stability of the units provided by self weight, interlocking and friction.			Option C comprises natural rock laid on the existing revetment in front of the breakwater in zone C to absorb incident wave energy. Stability of the rock armour provided by self weight and friction. This solution would require additional toe protection to prevent scour at the toe of the berm.			Option D comprises smoothing out the 'crank' at zone C with a mass concrete revetment embedded with large natural stones/boulders, cast into place in a similar manner to surrounding existing revetment. Combined rock armour and concrete cut off wall will be installed at the toe of the structure to prevent scour at the toe of the berm.		
Objective	Weight (1-5)	Evaluation		Score (0-5)	Evaluation		Score (0-5)	Evaluation		Score (0-5)	Evaluation		Score (0-5)
		Advantages	Disadvantages		Advantages	Disadvantages		Advantages	Disadvantages		Advantages	Disadvantages	
Minimise wave energy	5	- Minimises incident wave energy impacting on the breakwater	- Not as effective at minimising incident wave energy in comparison with option B or option C - Robust detail required for toe of terraced structure and at joint interfaces with existing revetment to prevent scour and localised damage under wave impact - Careful consideration of interface between highest terrace and face of breakwater required to prevent localised degradation and undesirable hydrodynamic effects in this region - Dowelling into existing revetment may be required to provide adequate lateral resistance to high impact pressures/load effects on the recurved steps	2	- Very effective at minimising incident wave energy	- Modelling required to assess effectiveness of solution - Hydraulic modelling required to assess effectiveness - Toe protection required - Laid on top of existing damaged revetment; additional repairs to existing damage/stabilisation of existing fabric recommended prior to construction of berm	4	- Very effective at minimising incident wave energy	- Reliant on self weight and friction for stability - Calculations indicate large boulders are required (10-15t, median dia. 1.7m for a slope of 1:3, >20t for steeper slopes of 1:2) which require placement on existing slope - Hydraulic modelling required to assess effectiveness - Toe protection required - Laid on top of existing damaged revetment; additional repairs to existing damage/stabilisation of existing fabric recommended prior to construction of berm	4	- Revetment shaped to minimise wave concentration effect - Depression in zone C to be removed and repaired at ~100m chainage, preventing further loss of existing revetment - Robust repair to existing revetment preventing further scour propagation - Rough surface to provide wave energy dissipation	- Not as effective at minimising incident wave energy in comparison with option B or option C - Toe protection required	3
Minimise environmental impact	3		- High levels of embodied carbon associated with large volumes of concrete and reinforcement - In situ construction presents small risk of spillages and localized contamination of the bay.	2	- In situ concrete is not required eliminating risk of spillage and contamination in the bay - Interlocking units creat new habitat for marine life	- High levels of embodied carbon associated with large volumes of concrete, reinforcement and transportation of units to site	3	- In situ concrete is not required eliminating risk of spillage and contamination of the bay - Creates new habitat for marine life	- Carbon intensive through transportation and quarrying processes however likely to be less carbon intensive than equivalent concrete solution (option B)	4	- Rock/stone will reduce volume of mass concrete required (plumbs)	- High levels of embodied carbon associated with large volume of mass concrete - In situ construction presents risk of spillage and contamination of the bay	3
Minimise heritage impact	5		- Notably different aesthetic and form to adjacent faced stone revetment - Large areas of exposed concrete visible from sea and from the Western end of the breakwater particularly at low tide. - Significant visual impact on existing structure	0		- Large volumes of manmade units, poor visual appearance, negative heritage	0	- Greater sensitivity to visual appearance to existing structure - Natural stone boulders compliment surrounding features; stone revetment, oswich limestone outcrops		4	- Very visually sensitive solution; embedded stone will provide a similar appearance to existing stone faced revetment - In keeping with heritage appearance and nature		5
Minimise maintenance requirement and cost	5	- Durable. Marine grade concrete/suitable cover and finishes to be specified	- Interface between individual terraces, terraces and existing revetment, terraces and existing breakwater critical to longevity and preventing adverse hydrodynamic effects. Challenge justifying a 100 year design life. - Maintenance of construction joints and surfaces will be required. - Concrete surfaces will be subject to severe abrasion; large volumes of high strength, highly durable concrete required. Prominent features/risers will remain vulnerable to debris impact and damage - Reinforcement is vulnerable to chloride ingress (future concrete repairs may be required)	3	- Highly durable. Marine grade concrete/suitable cover and finishes to be specified. - High quality finish due to offline construction - Very robust, interlocking units reduce deformation/movement	- Reinforcement is vulnerable to chloride ingress (future concrete repairs may be required)	5	- Requires intermittent maintenance due to damage in severe weather - Repositioning of rock armour requires plant and temporary access or use of marine plant - 5 year maintenance strategy	- Reinforcement is not required eliminating problems associated with chloride ingress	2	- Routine repointing/repair required, - Risk of damage to stone facing/loss of stone due to impact of debris. Replacement of stones - Rock armour at toe requires repositioning however is to be laid at beach level therefore will not be exposed to as high loading		3
Minimise design and construction complexity	4	- Readily available construction materials - Concrete can be pumped from top of breakwater	- Significant temporary works required (formwork, coffer dam etc.). Ramp required for access onto the revetment - In situ concrete pours within the tidal zone - Slow construction procedure, weather dependent - Precast steps preferable, however considerable design and construction challenges due to the spatial complexity of existing revetment. Likely that significant excavation and modification of the existing revetment will be required to accommodate design solution	1	- Precast construction eliminates the need for formwork and associated temporary works (coffer dams etc.) - Relatively quick construction procedure - Selected when sourcing natural rock of the required weight is not feasible - Steeper slope achievable, reducing volume of material - Easy to procure units e.g. Bam Nuttall supply in house X Blox	- Large units requiring significant plant/crane size - jacking barge will be required to transport units to site and to place units in a controlled manner - Armour will need to be placed and locked together by plant operating on the revetment. Temporary ramp likely to be required for access onto the revetment.	3	- Relatively quick construction procedure	- Large units requiring significant plant/crane size - jacking barge will be required to transport units to site and to place units in a controlled manner	3	- Readily available construction materials - In situ concrete can be pumped from top of breakwater - Simple construction procedure building up the revetment in layers	- Temporary works required (formwork etc.) - Ramp required for access onto the revetment - In situ concrete pours required within the tidal zone. Coffor dam may be required.	2
Minimise H&S risks ⁽¹⁾	5	- Level platform for maintenance and inspection of works to the breakwater masonry upstand - Easy to access, easy to inspect by maintenance teams	- Refer to note (1). This solution presents a high risk of unintentional usage. Due to the nature of a terraced geometry it is likely that the general public will see this solution as an extension of the breakwater public realm i.e an area for sitting and playing in and will not perceive the risks present. This behaviour has occurred at town beach where a similar structure has been used by skateboarders. This solution presents significant risk to the general public in terms of slips, trips and falls if unauthorised access is gained. Signage/access control will be required upon construction completion.	0	- Not identifiable as public realm	- Gaps between units pose risk to the general public if access is gained; slips, trips and falls due to climbing - Difficult to inspect and maintain safely	3	- Not identifiable as public realm	- Gaps between units pose risk to the general public if access is gained; slips, trips and falls due to climbing - Difficult to inspect and maintain safely	3	- Not identifiable as public realm, similar to existing revetment - Easier to inspect and maintain in comparison to option B and C, rough surface but minimal gaps between units		5
Minimise capital cost	4	Very high		2	- High		1	- High		2	- Medium		3
Total (max score 145)		43			85			97			109		

(1) It is assumed that access to the pedestrian access to the seaward revetment of the breakwater is not allowed, however it is noted that several routes exists that can be used by pedestrians who are willing to risk gaining access. Staircase at 95m chainage for example.

Figure 24. Western Breakwater (LB19362). Group 2 options matrix: Repair/modifications to the existing breakwater that will extend the longevity of the structure for another 100 years. A solution from group 2 options will be selected in conjunction with group 1 repairs.

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Option Selection: Eastern Promenade

Parapet raising and strengthening

Eastern Promenade parapet is to be raised by installing a capping beam/element in one of the following forms
All proposed solutions will be dowelling into the existing parapet using Cintec anchors

Scoring Rationale

Options are compared in terms of their ability to achieve the objectives listed in the table below
Each objective has been assigned a weighting from 1 to 5 in terms of priority/importance. A weighting of 1 indicates that the objective is low priority comparatively.
Each option has been assigned a score based upon how well it satisfies each objective.
The total score = $\sum(W_i \times S_i)$

		Options for crest raising											
		A. Reinforced concrete capping beam - normal finish		B. Reinforced reconstituted 'cast stone' capping beam		C. Reinforced concrete capping beam - clad with natural stone		D. Natural limestone blocks					
Description		Reinforced concrete capping beam on top of the existing parapet with expansion joints at regular intervals to allow for thermal expansion (~10m) Construction process: 1. Upper course of existing masonry broken out. Existing masonry surface prepared. 2. Cintec anchors pre-installed into existing masonry 3. Installation of capping beam i. Cast insitu - formwork erected, spacers installed, reinforcement cage positioned and joints. Concrete cast. Formwork struck at 28 days ii. Precast - units cast with predetermined holes. Holes grouted/resined upon completion.		Reinforced reconstituted 'cast stone' capping beam on top of the existing parapet with expansion joints at regular intervals to allow for thermal expansion (~10m) Aggregate selected to match existing structure, textured finish to match existing. Construction process as per option A.		Reinforced concrete capping beam on top of the existing parapet with expansion joints at regular intervals to allow for thermal expansion (~10m) Construction process as per option A.		Parapet rebuilt with new course of natural limestone blocks on top of existing Construction process: 1. Upper course of existing masonry broken out. Existing masonry surface prepared. 2. New course of masonry installed 3. Cintec anchors installed through new construction to tie into the existing					
Objective	Weight	Evaluation - A		Score	Evaluation - B		Score	Evaluation - C		Score	Evaluation - D		Score
Minimise environmental impact	3	- Cementitious, high embodied carbon - Insitu construction presents risk of spillage and localized contamination of the bay		1	- Cementitious, high embodied carbon - Insitu construction presents risk of spillage and localized contamination of the bay		1	- Cementitious, high embodied carbon - Insitu construction presents risk of spillage and localized contamination of the bay - Reduced volume of concrete due to stone cladding		2	- Likely to be less carbon intensive than concrete counterpart however, transportation and quarrying of large boulders (to match existing) will be a carbon intensive		4
Minimise heritage impact (1)	5	- Significant visual change to existing structure		0	- Visual change to the existing structure is more sensitive due to tailored finish, selection of suitable aggregate and textured surface will be key for desired finish - Samples required prior to construction to ensure client & heritage bodies approve visual appearance		3	- Similar style to existing structure with the aim of minimising visual impact on the structure (see zone E for the aesthetic) - Small stones, not big as existing		4	- Like for like replacement with the aim of minimising visual impact on the structure.		5
Minimise capital cost	5	- Low		5	- Medium		3	- Medium		3	- Medium		3
Minimise maintenance requirement and cost	5	- Low maintenance requirement due to high durability. Marine grade concrete/suitable cover and finishes to be specified - High level cover to reinforcement required (susceptible to chloride ingress and spalling), stainless steel reinforcement required if minimal cover required - Robust detailing; anchors cast in etc.		3	- Durability a function of constituent materials, testing may be required to prove it - High level cover to reinforcement required (susceptible to chloride ingress and spalling), stainless steel reinforcement required if minimal cover required - Robust detailing; anchors cast in etc.		3	- Regular maintenance/repointing due to damage of cladding stones (superficial only) - Internal capping beam will be robust, marine grade concrete with cladding providing additional weathering protection		2	- Repointing required on regular basis		3
Minimise construction complexity	3	- Readily available construction materials - Simple construction procedure - Cast insitu construction favoured due to plan curvature in zone B - Easy to incorporated integrated handrail		4	- Simple construction procedure - Cast insitu construction favoured due to plan curvature in zone B - Easy to incorporated integrated handrail - Specific aggregate and additives required (potentially difficult to source)		4	- Simple construction procedure - Cast insitu construction favoured due to plan curvature in zone B - Easy to incorporated integrated handrail - Construction of cladding adds additional complexity		3	- Challenging construction procedure (large lifts/plant) - Requires experienced contractor/stone mason		2
Minimise H&S risks	3	- Low risk, common practice		5	- Low risk, common practice		5	- Cladding adds complexity - Cladding on seaward side will require temporary works/platforms/rope access to construct adding risk		4	- Risks associated with lifting procedures		3
Total (max score 135)		70			75			72			82		

Figure 37. Eastern Promenade (LB19363). Option Selection. Parapet Raising and Strengthening. Eastern Promenade parapet is to be raised by installing a capping beam/element in one of the following forms. All proposed solutions will be dowelling into the existing parapet using Cintec anchors (Arup Eastern Prom options matrix 29.05.2019).



**Glamorgan-Gwent
Archaeological Trust Ltd
(Projects Department)**



QUALITY CONTROL

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As part of our desire to provide a quality service we would welcome any comments you may wish to make on the content or presentation of this report.



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