

City and County of Swansea
Mumbles Coastal Scheme
Winter Bird Survey 2020

Issue | 27 April 2020

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 266544

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ARUP

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1 Introduction

Following Welsh Government (WG) approval of the Mumbles Coastal Scheme Outline Business Case (OBC) in 2017, City and County of Swansea (CCS) are seeking to progress with delivery of the preferred option. In 2019 Ove Arup and Partners (Arup) were commissioned to address key uncertainties and delivery risks.

The proposed works (Section 1.1) occur both adjacent to and within Blackpill Swansea Site of Special Scientific Interest (SSSI) and Swansea Bay Site of Importance for Nature Conservation (SINC), of which wading birds are a feature (Figure 1).

Arup were commissioned to carry out an Ecological Impact Assessment¹ for the proposed works in relation to coastal birds, specifically waders, and marine mammals, specifically harbour porpoise *Phocoena phocoena* and grey seal *Halichoerus grypus*. Natural Resources Wales (NRW) reviewed the assessment and comment was provided. On 26th November 2019, NRW recommended, in relation to winter birds:

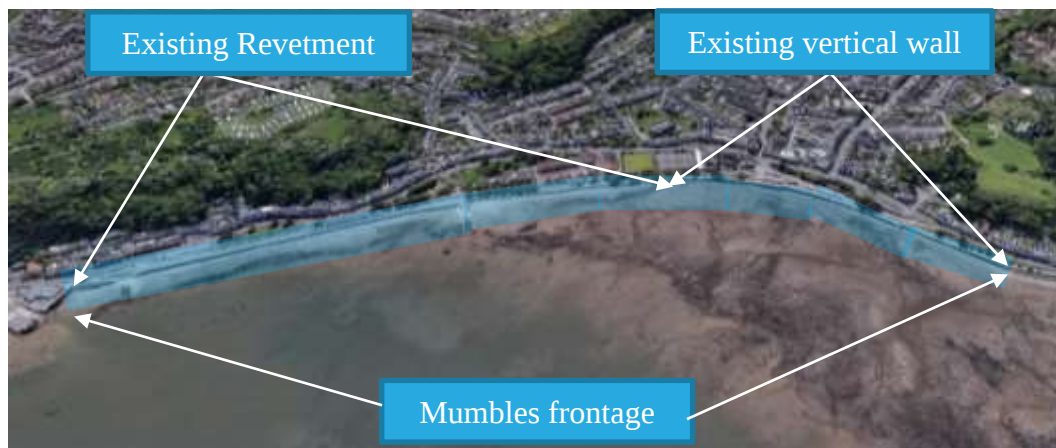
“...site specific surveys to identify high tide roosts within the application area.”

Consequently, Arup have been commissioned to complete winter bird surveys. This report provides baseline results of survey work completed from January to March 2020. External desk study data are excluded from this report, as the desk study are comprehensively discussed separately within the assessment report¹.

1.1 Proposed Works

The Mumbles coastal frontage extends from Knab Rock Slipway (National Grid Reference: SS62390 87727) in the southwest to Mumbles Road in the north (NGR: SS61579 88471), see plan below Plan .

¹ Arup, 2019. Ecological Impact Assessment: Coastal Birds and Marine Mammals. Mumbles Coastal Scheme, City and County of Swansea.



Plan - The Mumbles Frontage

Mumbles promenade is currently retained by a 0.5km long mass concrete vertical seawall and a 0.7km long sloping revetment, with a series of low-setback walls acting as de-facto defences. The OBC set out the justification for works to address the current issues of the condition of the Mumbles seawall and address long-term flood risk affecting the community. The works will also deliver improvements to the amenity and recreation value of the promenade for visitors and residents.

The proposed works involve repair and replacement of the seawall / revetment and associated public realm improvements / reinstatement. Preliminary designs include seawall toe scour protections measures and 4.1ha of works in the intertidal area (Appendix A). This works area represents 0.4% (2.0ha) of the Blackpill Swansea SSSI (467 ha) and 0.6% (4.1ha) of the Swansea Bay SINC (660 ha), working on a 20m offset from the existing parapet and / or designated site boundary. Further design development and surveys are planned.

The works are to be phased over multiple years and no more than 50% of the site will be worked on at once, which reduces the impacted area for wading birds and harbour porpoise.

The OBC noted:

Works risk impacting on the environmentally sensitive foreshore, designated as a SSSI for wintering birds. Encroachment of the foreshore by new structures has been minimised. Works also risk impacting on the promenade, adjacent businesses and amenities. The business case assumes construction activities will be restricted to between March and June (inclusive) and between September and October (inclusive).

1.2 Survey Objectives

The survey objectives were to:

- identify any high-tide roosts within the site boundary;
- gain an understanding of the wintering bird assemblage present using a transect survey methodology within the site boundary;

- highlight any key species of particular conservation value that may influence the design of the project; and,
- provide sufficient information to support the Ecological Impact Assessment, produced in relation to Coastal Birds.

1.3 Legislative and Policy Context

1.3.1 Designated Sites

A network of nationally designated sites has been established through the designation of SSSIs under the Wildlife and Countryside Act 1981 (as amended) (WCA). Sites are designated if they are of special interest by reason of their flora, fauna (e.g. birds), or geological or physiographical features. The protection afforded by the Act means it is an offence to carry out or permit to be carried out any operation listed within the notification without the consent of the Statutory Nature Conservation Organisation (Natural Resources Wales, NRW). The protection afforded to SSSIs is used to underpin the designation of areas at a European Level.

Some bird species are listed as features of European designated sites, notably Special Protection Areas (SPAs) and Ramsar sites. SPAs are classified in accordance with Article 4 of the EC Birds Directive (2009/147/EC). The provisions of the Birds Directive are implemented and transposed to UK legislation through the WCA and the Conservation of Habitats and Species Regulations 2017 (as amended). The Conservation of Habitats and Species Regulations 2017 transposes EC Habitats Directive (92/43/EEC) on the conservation of natural habitats and of wild fauna and flora into UK national law.

Ramsar sites are also afforded protection under the Ramsar Convention 1971.

These designations are applied to areas that support nationally important numbers of birds, the conservation of which is necessary for the maintenance of the range of that species across Europe. A site may be designated as an SPA based on its importance to breeding, wintering, or migratory birds. In the UK, SPA designations are underpinned by national legislation which identifies them as Sites of Special Scientific Interest (SSSI).

1.3.2 Species

Annex 1 of the EU Birds Directive 2009 and Schedule 1 of the WCA list species that are protected at all times because of their rarity and nature conservation value.

Section 6 of the Environment (Wales) Act 2016 includes a duty on all public authorities to “seek to maintain and enhance biodiversity” so far as it is consistent with the proper exercise of those functions. In so doing, public authorities must also seek to “promote the resilience of ecosystems”. This duty applies to government bodies, local authorities and statutory undertakers.

To assist in complying with this duty, public authorities must have regard to relevant evidence provided in the State of Natural Resources Report and any

relevant area statement for an area in which the authority exercises functions, as well as having regard to the list of living organisms and habitats published under Section 7 of the Act. Species and habitats listed on Section 7 are considered to be of principal importance for the conservation of biological diversity.

Additional conservation importance is ascribed to certain species by their presence on the Red List and Amber List of the RSPB's publication *Birds of Conservation Concern* (BoCC4)² in the UK and on the *Population Status of Birds in Wales*³ (BoCCW3).

The conservation status of birds in the UK and Wales classifies birds into three lists as follows:

- Red List: species that are globally threatened, whose population or range has declined rapidly in recent years, and those whose populations have declined historically and not exhibited any signs of recovery. Species that have experienced a population decline of >50%;
- Amber List: species with an unfavourable conservation status in Europe, whose populations have declined moderately in recent years, including species that show a historical decline but whose populations have shown a substantial increase, species that are rare, with localised populations and those species of international importance with UK populations and species that have experienced a population decline or breeding range decline of 25% to 49%; and,
- Green list: All regularly occurring species that do not qualify under any of the Red or Amber criteria are green listed. The Green list also includes those species listed as recovering from historical decline in the last review that have continued to recover and do not qualify under any of the other criteria.

² Eaton, M. A. (2015). *Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man. British Birds*, 108, 708 – 746.

³ Johnstone, I., & Bladwell, S., 2016. *Birds of Conservation Concern in Wales 3: the population status of birds in Wales. Welsh Birds* 13: 3-31.

2 Methodology

2.1 Field Survey

2.1.1 General Methods

The transect survey method used in undertaking assessments of wintering birds was derived from current best practice as described in Bibby et al. 1992⁴ and Gilbert et al. 1998⁵, and conforms to the recommendations of the British Trust for Ornithology (BTO) and the Joint Nature Conservation Committee (JNCC).

Surveys were undertaken over three tidal states (Through The Tide Counts, TTTC): high, mid and low tide, in order to survey for presence and use of the site by waterbirds in relation to different tidal states. Each tidal state was defined as plus or minus one hour either side from high, mid and low tide.

The transect route involved walking the extent of the proposed works along the Mumbles promenade. Surveys were undertaken using binoculars and a telescope, focussing upon target species (Section 2.2). Birds were recorded up to a minimum of 500m from the proposed works. On the first visits, a large number of dunlin (*Calidris alpina*) were recorded on the pier at high tide, so the transect route was extended on all visits to survey the pier to provide further contextual information.

The total length of the transect route, to the start of the pier, was 2.0km (Figures 2 – 4).

Surveys were carried out on three occasions, once a month from January 2020 to March 2020. All wintering bird surveys were carried out by a team of two surveyors with at least one experienced in undertaking ornithological survey work using the above methods. The direction of the transect route was reversed between surveys to account for variation in wintering bird activity.

Two surveys (January and February) focused upon high tide at dawn, whilst March surveyed for high tide roosts at dusk.

The wintering bird surveys were carried out at appropriate times of the year and weather conditions on all visits were considered suitable. The dates of the surveys and weather conditions are shown in Appendix B.

Survey results were captured using tablet devices in order to improve data collection efficiency and mapping precision, and include details of weather data, species present, numbers of individuals and their behaviour.

2.2 Target Species

Given the above legislation and policy at European, national and local level certain bird species are targeted for consideration during the proposed winter bird

⁴ Bibby et al. (1992) Bird Census Techniques, Second Edition. Academic Press

⁵ Gilbert, G., Gibbons D. W., and Evans, J. (1998) Bird Monitoring Methods. RSPB

surveys. Target bird species are those listed as features of Blackpill Swansea SSSI and Swansea Bay SINIC.

Target bird species, listed within each designated site are as below (full details provided within Appendix C):

- Blackpill Swansea SSSI: **wading birds**; and
- Swansea Bay SINIC: **wading birds**.

Species not defined as target species are recorded as incidental. Species listed on Section 7 of the Environment (Wales) Act were also recorded where possible and as incidental.

2.3 Limitations and Assumptions

Highly mobile bird species, e.g. gulls, may be under-represented due to the necessity to avoid double-counting.

The transect did not extend on to the foreshore in order to reduce disturbance to birds, however observations of the foreshore were not impeded by walking on the promenade.

Access to Mumbles Pier was not always possible (March visit the pier was closed) and counts of wader roosts were limited. Nevertheless, counts of waders were still possible, though numbers are likely an underestimate. Furthermore, the Pier is outside the proposed works boundary by approximately 500m.

All surveys undertaken at mid and low tidal states observed people on the foreshore: fishermen and/or members of the public including dog-walkers. Consequently, birds are likely to be disturbed and avoid the promenade area. At all tidal states, fishermen, public and cyclists used the promenade and these activities likely further resulted in disturbance to birds on the foreshore.

The findings presented in this study represent those at the time of survey and reporting, and data collected from available sources. Ecological surveys are limited by factors which affect the presence of species, such as weather conditions, migration patterns and behaviour.

Nevertheless, these surveys were conducted at the optimal survey periods. Every effort has been made to ensure that the findings of the study present as accurate an interpretation as possible of the status of wintering birds within the study area.

3 Results

3.1 Field Survey

Full survey results are shown on Figures 2 to 4. The results in Appendix C collate all results, showing the total (summed) number of birds recorded on each of the three visits at each tidal state.

A total of six target bird species were recorded: oystercatcher (*Haematopus ostralegus*), curlew (*Numenius arquata*), bar-tailed godwit (*Limosa lapponica*), turnstone (*Arenaria interpres*), dunlin (*Calidris alpina*) and redshank (*Tringa totanus*).

The conservation status of each bird is listed in Appendix C. In summary, all target species were either Red or Amber listed on the BoCC4 or BoCCW3.

Results are discussed in turn by month, tidal state and proximity to the promenade.

3.1.1 High-tide Roosts

No high tide roosts were identified within the proposed works area.

The only high-tide roost was observed on Mumbles pier, near the kittiwake (*Rissa tridactyla*) colony, where a peak count of 69 dunlin were observed in January at high tide. Access was however limited to the pier for the high tide survey in January so the number is likely an underestimate. The mid-tide count on the pier (when access was permitted) was of 540 individuals, also indicating the use of this structure not just at high tide.

A peak count of 14 turnstone was recorded in March at high tide on the pier also. Smaller numbers of oystercatcher and redshank were also noted on the pier at high tide.

3.1.2 Monthly Variation

3.1.2.1 All Target Species

January recorded the peak count of waders in the survey area with notable counts of dunlin (540 individuals), oystercatcher (171 individuals) and turnstone (45 individuals) (Appendix C).

Numbers decreased over February and March, with the fewest birds observed in March (20 oystercatcher and 14 turnstone being most notable). Drawing 1 shows the decrease over time from January to March (note the log scale y-axis).

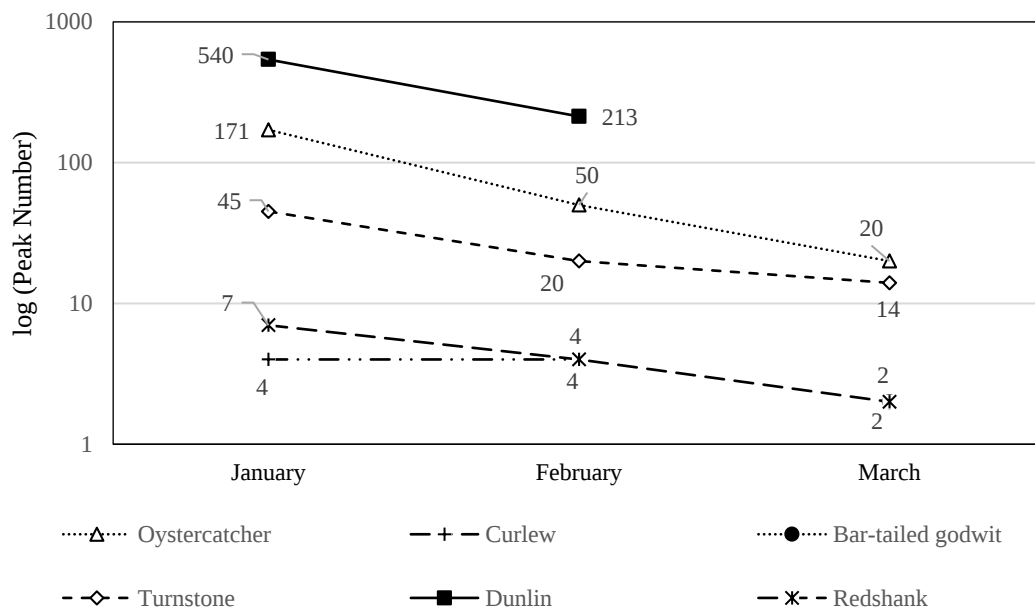


Chart 1. Peak number of waders per month. Note the log scale on the y-axis.

3.1.2.2 In Relation to Distance

The peak numbers of waders in relation to distance from the proposed works is variable, with peaks in numbers around 60 individuals at three distance bands (Figures 2 – 4, Drawing 2), with two larger peaks at >200 – 300m and >500 – 600m from the proposed works (Drawing 2). Across months, January and February had more notable counts of waders, with no peaks of waders in March.

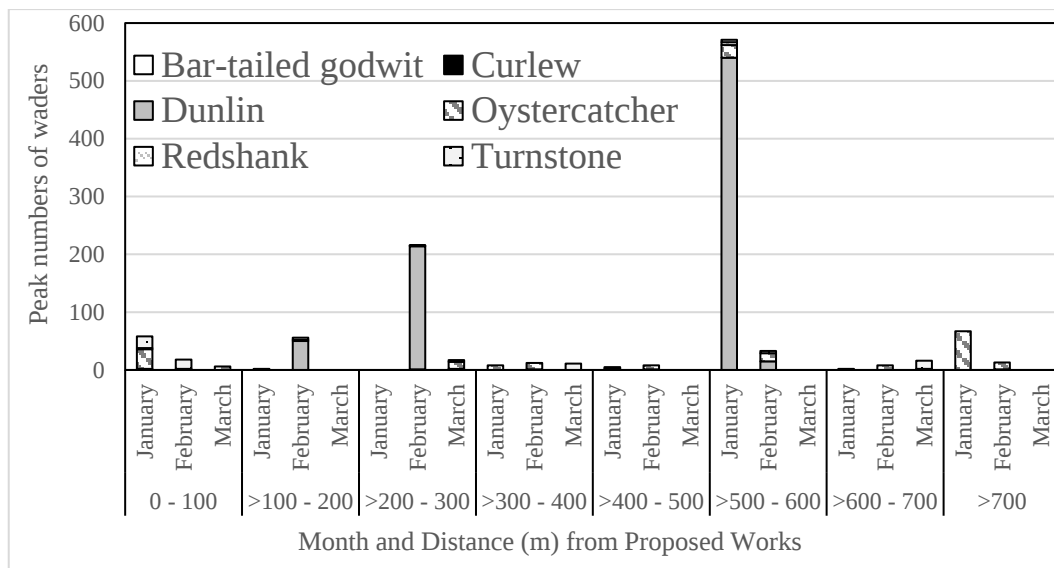


Chart 2. The total number of waders per month and in relation to distance from the proposed works. Peak numbers of waders are not separated by tidal period within the month.

There is a small peak in waders in January at 0-100m due to oystercatcher and turnstone foraging on the foreshore at low and mid tide. A second small peak in

February at <100 – 200m is due to dunlin and small numbers of redshank foraging on the foreshore at mid tide. The second largest peak occurs in February at a distance of >200 – 300m, due largely to dunlin foraging on the foreshore at low and mid tide. The largest peak at >500 – 600m is due to the roost on Mumbles pier. The small peak again at >700m is due to foraging oystercatcher on the foreshore at low tide (Drawing 2).

3.1.3 Tidal state

3.1.3.1 All Target Species

Drawing 3 shows the variation in total numbers of waders across the three tidal states from TTTC. There are relatively few birds present at high tide, represented largely by dunlin, turnstone and redshank – all present on Mumbles pier. At mid tide there are a much large number of birds (601 individuals), again largely represented by dunlin. These target species at mid tide are found largely on the Mumbles pier and to north-west of the proposed works, with birds closest to the promenade being oystercatcher and turnstone. At low tide, there are fewer birds than at mid tide, with most birds on the tide line at distance from the proposed works. At low tide, some oystercatcher are present away from the tide line and close inshore (Figures 2 – 4).

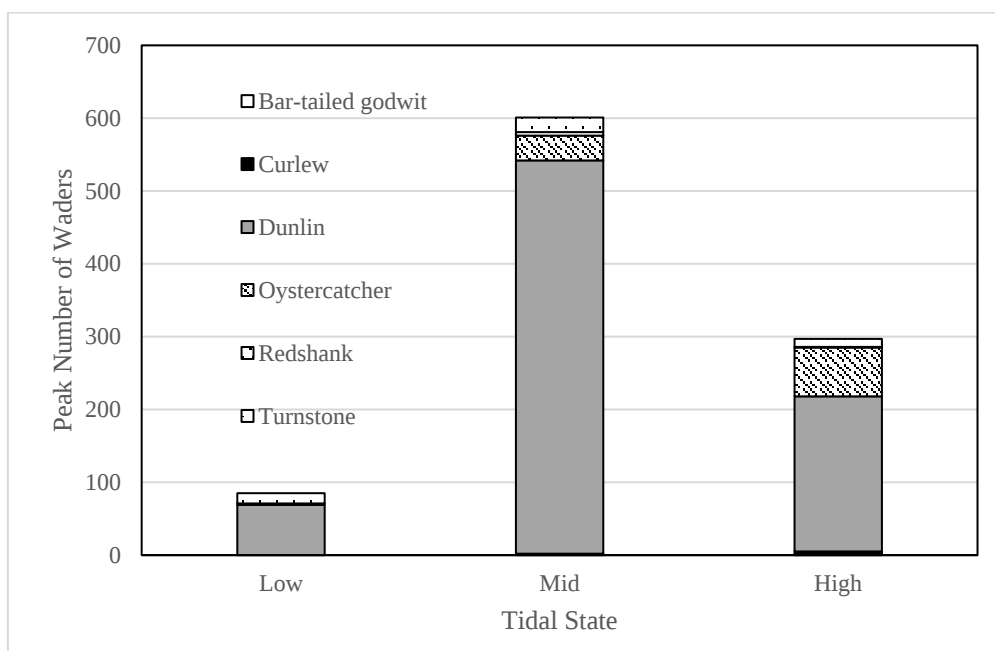


Chart 3. The peak number of waders across tidal states. Peak numbers of waders are not separated by month within tidal period.

3.1.3.2 In Relation to Distance

The numbers of waders in relation to tidal state and distance from the proposed works is variable, however it is notable that there are very few birds at high tide, except at distance, i.e. Mumbles Pier (>500-600m; Drawing 4).

There are relatively fewer birds at low tide up to >200-300m from the proposed works. This lower number is likely due to both waders foraging on the ebbing tide line and consequently being at distance from the proposed site, and also due to the frequent disturbance of people on the foreshore but relatively near the promenade, e.g. dog walkers. At the >200-300m band, waders can forage closest to the proposed works, at the low tide line off of the Verdi's café. Most birds recorded in this area were dunlin.

At mid tide, there are, relative to low tide, more birds closer inshore. Numbers of birds are on average approximately 60 birds, comprising oystercatcher, turnstone and dunlin. As above, this number of birds is likely due to waders foraging on the ebbing tide line, which at mid tide provides foraging opportunities whilst being relatively close to the shore. Equally, the closer tide line to the promenade may reduce numbers of people on the foreshore and subsequently reduce disturbance, although this point is not quantified.

Numbers of birds >300m from the proposed works are relatively low (with the exception of Mumbles Pier) at all tidal states, indicating possibly the dispersal of birds outside of the survey area or concentration at other distances from the proposed works. This may be explained by the tidal extent at >300m, which may restrict waders in where they forage in relation to distance from the proposed works.

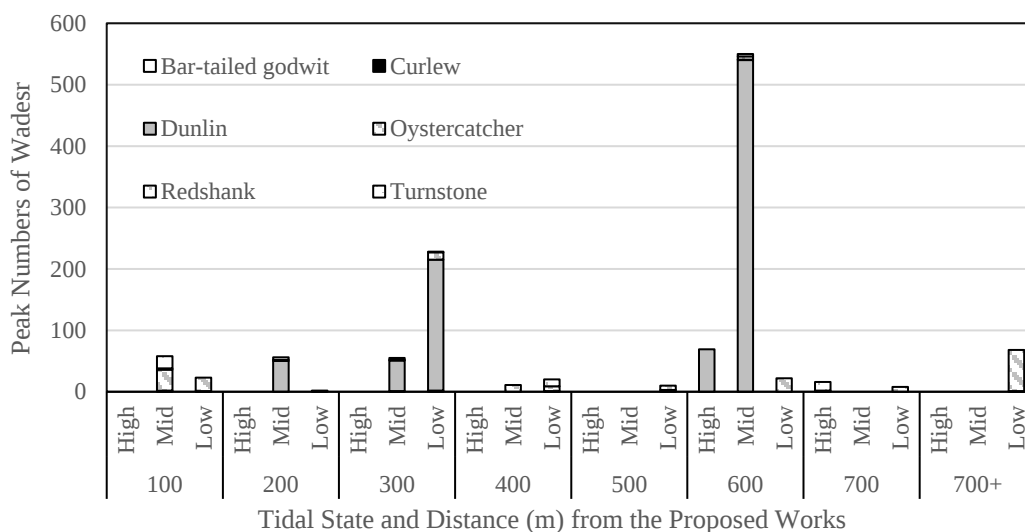


Chart 4. The peak number of waders in relation to tidal state and distance from the proposed works. Peak numbers are taken across monthly periods.

4 Conclusion

Winter bird surveys were undertaken along the Mumbles promenade, once a month, from January to March 2020. Surveys involved monitoring target species, i.e. waders, on the foreshore through the tidal cycle (high, mid and low tide).

Six target species were recorded in the survey area (bar-tailed godwit, curlew, dunlin, oystercatcher, redshank and turnstone). All are considered to be either Red or Amber listed on the BoCC4 and/or BOCCW3.

There are no high-tide roosts within the proposed works area. At high tide, there are no waders present except for at the Mumbles pier. At mid tide, relatively large numbers of waders can still be found on the Mumbles pier and to north-west of the proposed works. At low tide, there are fewer birds than at mid tide, with most birds on the tide line at distance from the proposed works.

Most birds were recorded in January, with declining numbers through to March. Approximately 100 individuals were present in each 100m band from the proposed works. Larger numbers were recorded at around >200-300m and >500-600m, representing foraging on the tide line and the roost at Mumbles pier, respectively.

There was high disturbance on the foreshore, with every survey visit recording an ambient activity that would result in disturbance to waders on the foreshore, e.g. public including dog walkers on the foreshore or fishing at high tide from the promenade.

4.1 Recommendations

Consideration should be given to timing the proposed works to the period around high tide⁶, or at low tide, when birds are either absent or at distance from the proposed works. Working around mid-tide would result in increased disturbance to birds, however, numbers are relatively low close to the promenade and there is a large area of alternative foraging locations at distance from the works.

Consequently, any works over winter are unlikely to significantly impact wading birds, assuming as stated in the Ecological Impact Assessment⁶, works are carried out with the recommended mitigation to reduce further any negative impact.

This report is based upon results of survey work carried out from January to March 2020, inclusive. These data suggest works at any tidal period are acceptable, subject to the mitigation set out in the EcIA⁶.

Further survey from October to December 2020, this calendar year, would complete survey across the winter period to further support the likely use/disuse of the site as a high tide roost and that works are acceptable across all tidal periods.

⁶ Works around high tide are in agreement with the recommendations of the 2019 Ecological Impact Assessment on Coastal Birds and Marine Mammals.

The data presented here provide a strong indication of the use of the site by birds and consultation with NRW is advised to ensure the survey conclusions are adequate and that work is permitted through the tidal period over winter.

At detailed design, construction methodology should be defined in consultation with statutory bodies to ensure agreement on the proposed methodology to both avoid and mitigate any potential impact on waders.

Any impact from the proposed works on features of designated sites, e.g. wintering birds, should be evaluated as part of any subsequent assessment to support the planning application.

This report refers, within the limitations stated, to the condition or proposed works of the site at the time of the surveys. Changes in legislation, guidance, best practice, etc. may necessitate a re-assessment/survey. No warranty is given as to the possibility of future changes in the condition of the site.

Figures

Figure 1. European and nationally designated sites within 5km and 2km of the site boundary, respectively.

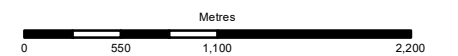
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend:

- Proposed Works Extent
- WBS Transect Route
- 2kmBuffer
- 5kmBuffer
- LNR
- SAC
- SSSI

P0	2020-04-20	DC	PC	PC
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Issue	Date	By	Chkd	Appd
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ARUP

4 Pierhead St
Cardiff CF10 4QP

Client

City and Council of Swansea

Job Title

Mumbles Coastal Scheme

Designated Sites

Scale at A3

1:43,000

Job No 252723-00	Drawing Status For Issue
Drawing No 002	Issue F1

Figure 2. Winter bird survey results – January 2020.



Legend

Tidal State

- High
- Mid
- Low

→ Flight

— Proposed Works Extent

— WBS Transect Route

□ 100m Bands

P0	2020-04-20	DC	PC	PC
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Issue	Date	By	Chkd	Appd
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Metres

0 80 160 320

ARUP

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Cardiff CF10 4QP

Client

City and Council of Swansea

Job Title

Mumbles Coastal Scheme

Winter Bird Survey Results - January

Scale at A3

1:6,000

Job No	Drawing Status
252723-00	For Issue

Drawing No	Issue
003	F1

Figure 3. Winter bird survey results – February 2020.



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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

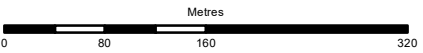
Legend

Tidal State

- High
- Mid
- Low
- Flight
- Proposed Works Extent
- WBS Transect Route
- 100m Bands

P0	2020-04-20	DC	PC	PC
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Issue	Date	By	Chkd	Appd
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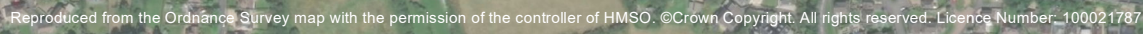
Job Title
Mumbles Coastal Scheme

Winter Bird Survey Results - February

Scale at A3
1:6,000

Job No 252723-00	Drawing Status For Issue
Drawing No 004	Issue F1

Figure 4. Winter bird survey results – March 2020.



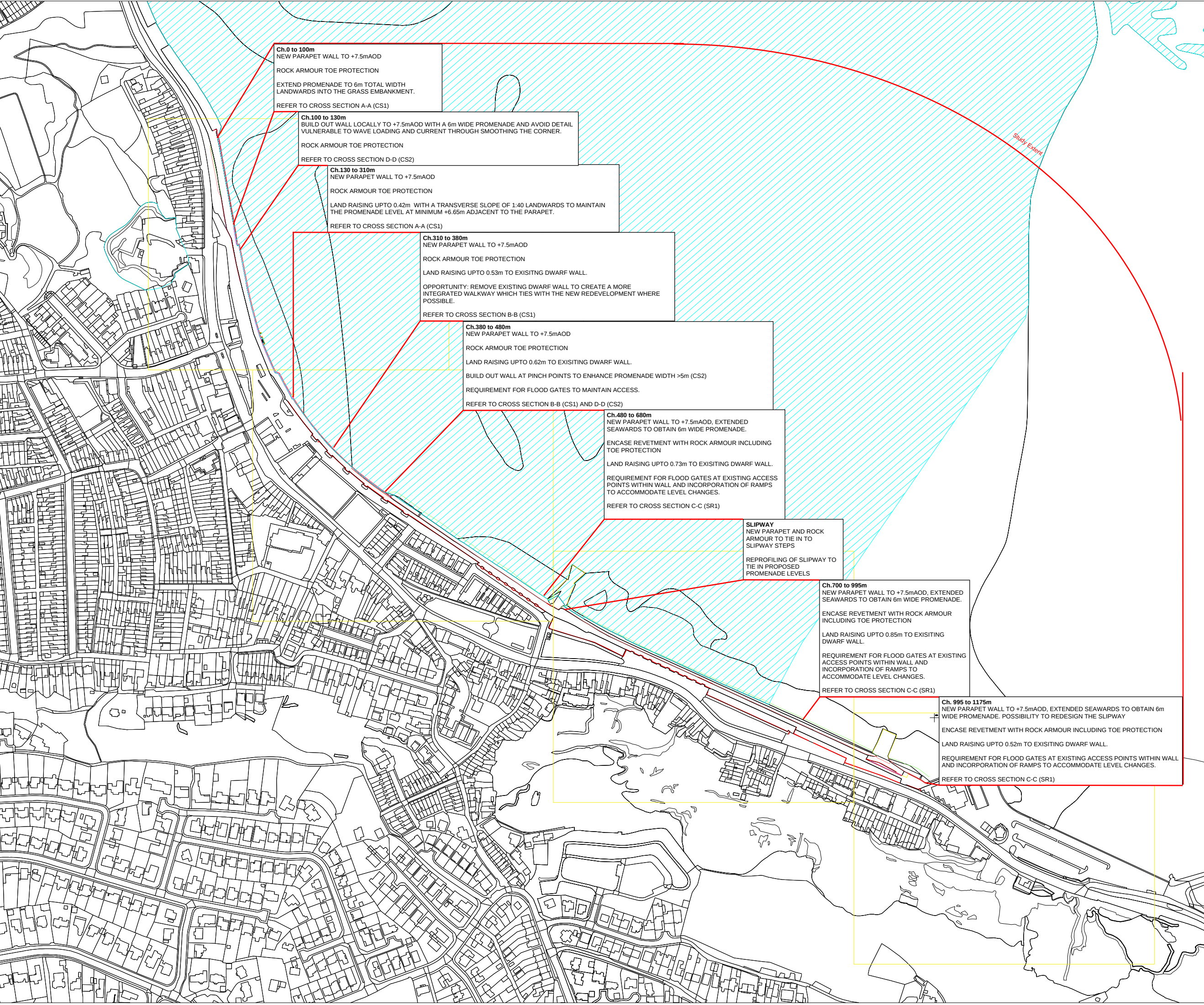
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

1

Appendix A

Proposed Works

A1 Proposed Works



KEY:

SSSI DESIGNATION

6m WIDE REQUIRED PROMENADE AREA FROM EXISTING PROMENADE SEAWARD ALIGNMENT BASED ON TOPOGRAPHIC SURVEY 2017 (2)

PROPOSED PROMENADE AREA BASED ON TOPOGRAPHIC SURVEY 2017 (2) AND PROPOSED WORKS

DŵR CYMRU WELSH WATER (DCWW) SEWERAGE EXTERNAL RISING MAIN

DŴR CYMRU WELSH WATER (DCWW) SEWERAGE EXTERNAL COMBINED RISING MAIN - BRICK SEWER

DŴR CYMRU WELSH WATER (DCWW) SEWERAGE EXTERNAL PRIVATE OUTFALL

DŴR CYMRU WELSH WATER (DCWW) SEWERAGE EXTERNAL FOUL

WESTERN POWER DISTRIBUTION UNDERGROUND HV 11kV CABLE

EXISTING OUTFALL

STEPPED PEDESTRIAN ACCESS TO BEACH

RAMPED VEHICULAR ACCESS TO BEACH

CONCRETE MASS SEAWALL

STONE REVETMENT WITH SPRAYED CONCRETE

PROPOSED WORKS INCLUDING PARAPET WALLS, ENHANCED DWARF WALLS AND NOMINAL ALLOWANCE FOR EXPOSED TOE

TOPOGRAPHIC SURVEY 2017 LEGEND:

WALLS

WALLS-RETAINING-BOTTOM

WALLS-RETAINING-TOP

BANKS-BOTTOM

BANKS-TOP

SURFACE CHANGES

CONCRETE

DRAINAGE DETAILS & PIPES

DWARF WALL

KERBS-BOTTOM

KERBS-TOP

0.72

SURVEY LEVELS & TEXT

NOTES:

1. SERVICES LOCATIONS ARE INDICATIVE FROM UNDERTAKER RECORDS.

REFERENCES:

1. OS MAP - OS AREA MUMBLES FROM CITY AND COUNTY OF SWANSEA (CCS), JANUARY 2017
2. TOPOGRAPHIC SURVEY JANUARY 2017
3. DŴR CYMRU WELSH WATER, JANUARY 2017
4. WESTERN POWER DISTRIBUTION, JANUARY 2017

MUMBLES PAR

JOB NUMBER: 252724-00

REV: A01

SCALE: 1:100 @ A3

DRAWN BY: RJ

DATE: 08/06/17

SHEET 1 OF 5

CHECKED BY: RSD

APPROVED BY: HJR

OPTIONS ASSESSMENT - GENERAL ARRANGEMENT KEY PLAN

ARUP

KEY:

- SSSI DESIGNATION
- 6m WIDE REQUIRED PROMENADE AREA FROM EXISTING PROMENADE SEAWARD ALIGNMENT BASED ON TOPOGRAPHIC SURVEY 2017 (2)
- PROPOSED PROMENADE AREA BASED ON TOPOGRAPHIC SURVEY 2017 (2) AND PROPOSED WORKS
- DŴR CYMRU WELSH WATER (DCWW) SEWERAGE EXTERNAL RISING MAIN
- DŴR CYMRU WELSH WATER (DCWW) SEWERAGE EXTERNAL COMBINED RISING MAIN - BRICK SEWER
- DŴR CYMRU WELSH WATER (DCWW) SEWERAGE EXTERNAL PRIVATE OUTFALL
- DŴR CYMRU WELSH WATER (DCWW) SEWERAGE EXTERNAL FOUL
- WESTERN POWER DISTRIBUTION UNDERGROUND HV 11kV CABLE
- EXISTING OUTFALL
- STEPPED PEDESTRIAN ACCESS TO BEACH
- RAMPED VEHICULAR ACCESS TO BEACH
- CONCRETE MASS SEAWALL
- STONE REVETMENT WITH SPRAYED CONCRETE
- PROPOSED WORKS INCLUDING PARAPET WALLS, ENHANCED DWARF WALLS AND NOMINAL ALLOWANCE FOR EXPOSED TOE

TOPOGRAPHIC SURVEY 2017 LEGEND:

- WALLS
- WALLS-RETAINING-BOTTOM
- WALLS-RETAINING-TOP
- BANKS-BOTTOM
- BANKS-TOP
- SURFACE CHANGES
- CONCRETE
- DRAINAGE DETAILS & PIPES
- DWARF WALL
- KERBS-BOTTOM
- KERBS-TOP
- 0.72

SURVEY LEVELS & TEXT

NOTES:
1. SERVICES LOCATIONS ARE INDICATIVE FROM UNDERTAKER RECORDS.

REFERENCES:
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2. TOPOGRAPHIC SURVEY JANUARY 2017
3. DŴR CYMRU WELSH WATER, JANUARY 2017
4. WESTERN POWER DISTRIBUTION, JANUARY 2017

MUMBLES PAR

JOB NUMBER: 252724-00

REV: A01

SCALE: 1:25 @ A3

DRAWN BY: RJ

CHECKED BY: RSD

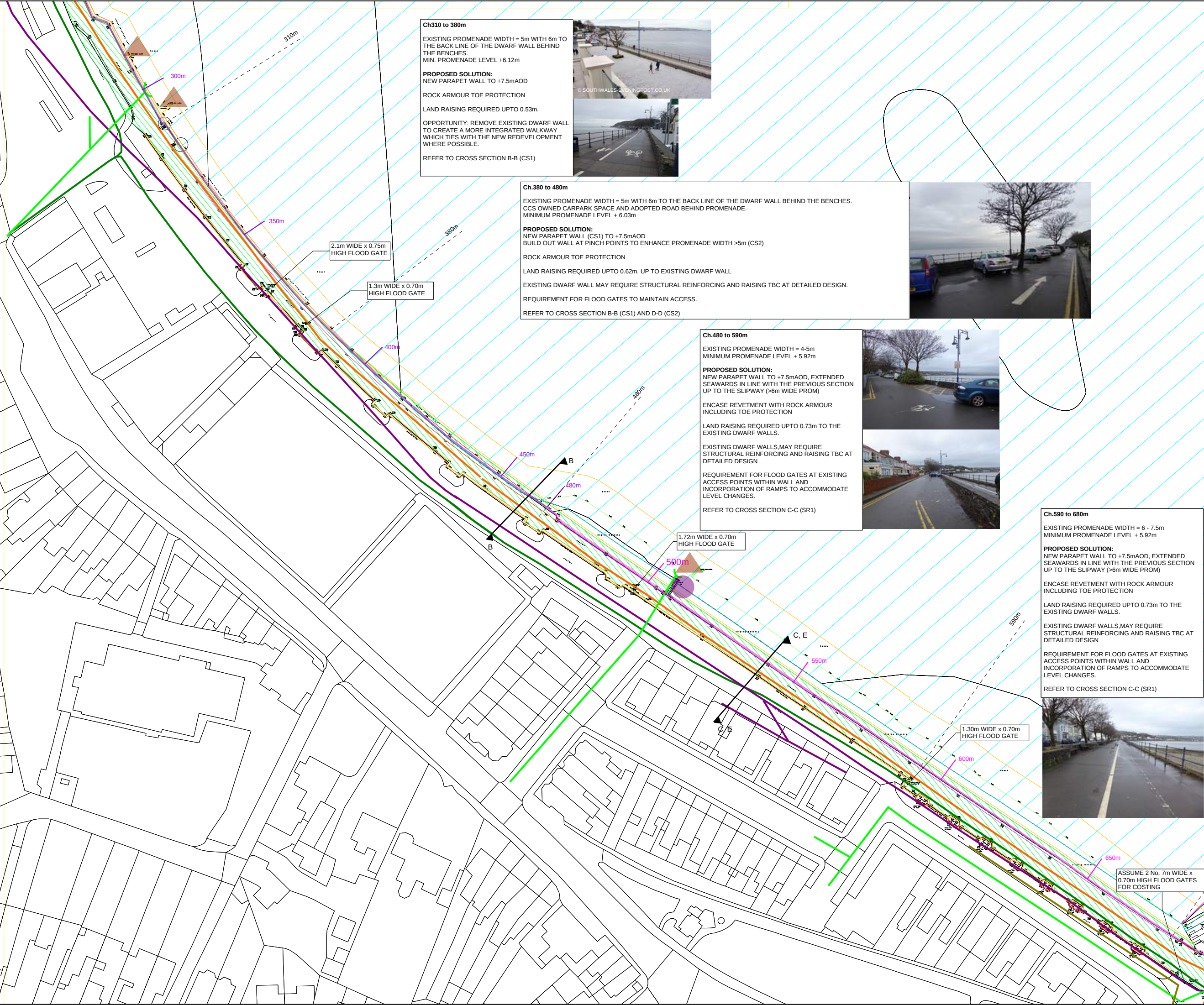
DATE: 08/06/17

SHEET 2 OF 5

APPROVED BY: HJR

OPTIONS ASSESSMENT - GENERAL ARRANGEMENT

ARUP



Ch.310 to 380m
EXISTING PROMENADE WIDTH = 5m WITH 6m TO THE BACK LINE OF THE DWARF WALL BEHIND THE BENCHES.
MIN. PROMENADE LEVEL +6.12m
PROPOSED SOLUTION:
NEW PARAPET WALL TO +7.5mAOD
ROCK ARMOUR TOE PROTECTION
LAND RAISING REQUIRED UPTO 0.53m.
OPPORTUNITY: REMOVE EXISTING DWARF WALL TO CREATE A MORE INTEGRATED WALKWAY WHICH TIES WITH THE NEW REDEVELOPMENT WHERE POSSIBLE.
REFER TO CROSS SECTION B-B (CS1)



Ch.380 to 480m
EXISTING PROMENADE WIDTH = 5m WITH 6m TO THE BACK LINE OF THE DWARF WALL BEHIND THE BENCHES.
CCS OWNED CARPARK SPACE AND ADOPTED ROAD BEHIND PROMENADE.
MINIMUM PROMENADE LEVEL + 6.03m
PROPOSED SOLUTION:
NEW PARAPET WALL (CS1) TO +7.5mAOD
BUILD OUT WALL AT PINCH POINTS TO ENHANCE PROMENADE WIDTH >5m (CS2)
ROCK ARMOUR TOE PROTECTION
LAND RAISING REQUIRED UPTO 0.62m. UP TO EXISTING DWARF WALL.
EXISTING DWARF WALL MAY REQUIRE STRUCTURAL REINFORCING AND RAISING TBC AT DETAILED DESIGN.
REQUIREMENT FOR FLOOD GATES TO MAINTAIN ACCESS.
REFER TO CROSS SECTION B-B (CS1) AND D-D (CS2)



Ch.480 to 590m
EXISTING PROMENADE WIDTH = 4-5m
MINIMUM PROMENADE LEVEL + 5.92m
PROPOSED SOLUTION:
NEW PARAPET WALL TO +7.5mAOD, EXTENDED SEAWARDS IN LINE WITH THE PREVIOUS SECTION UP TO THE SLIPWAY (>6m WIDE PROM)
ENCASE REVETMENT WITH ROCK ARMOUR INCLUDING TOE PROTECTION
LAND RAISING REQUIRED UPTO 0.73m TO THE EXISTING DWARF WALLS.
EXISTING DWARF WALLS MAY REQUIRE STRUCTURAL REINFORCING AND RAISING TBC AT DETAILED DESIGN
REQUIREMENT FOR FLOOD GATES AT EXISTING ACCESS POINTS WITHIN WALL AND INCORPORATION OF RAMPS TO ACCOMMODATE LEVEL CHANGES.
REFER TO CROSS SECTION C-C (SR1)



Ch.590 to 680m
EXISTING PROMENADE WIDTH = 6 - 7.5m
MINIMUM PROMENADE LEVEL + 5.92m
PROPOSED SOLUTION:
NEW PARAPET WALL TO +7.5mAOD, EXTENDED SEAWARDS IN LINE WITH THE PREVIOUS SECTION UP TO THE SLIPWAY (>6m WIDE PROM)
ENCASE REVETMENT WITH ROCK ARMOUR INCLUDING TOE PROTECTION
LAND RAISING REQUIRED UPTO 0.73m TO THE EXISTING DWARF WALLS.
EXISTING DWARF WALLS MAY REQUIRE STRUCTURAL REINFORCING AND RAISING TBC AT DETAILED DESIGN
REQUIREMENT FOR FLOOD GATES AT EXISTING ACCESS POINTS WITHIN WALL AND INCORPORATION OF RAMPS TO ACCOMMODATE LEVEL CHANGES.
REFER TO CROSS SECTION C-C (SR1)



ASSUME 2 No. 7m WIDE x 0.70m HIGH FLOOD GATES FOR COSTING

KEY:

- SSSI DESIGNATION
- 6m WIDE REQUIRED PROMENADE AREA FROM EXISTING PROMENADE SEAWARD ALIGNMENT BASED ON TOPOGRAPHIC SURVEY 2017 (2)
- PROPOSED PROMENADE AREA BASED ON TOPOGRAPHIC SURVEY 2017 (2) AND PROPOSED WORKS
- DŴR CYMRU WELSH WATER (DCWW) SEWERAGE EXTERNAL RISING MAIN
- DŴR CYMRU WELSH WATER (DCWW) SEWERAGE EXTERNAL COMBINED RISING MAIN - BRICK SEWER
- DŴR CYMRU WELSH WATER (DCWW) SEWERAGE EXTERNAL PRIVATE OUTFALL
- DŴR CYMRU WELSH WATER (DCWW) SEWERAGE EXTERNAL FOUL
- WESTERN POWER DISTRIBUTION UNDERGROUND HV 11kV CABLE
- EXISTING OUTFALL
- STEPPED PEDESTRIAN ACCESS TO BEACH
- RAMPED VEHICULAR ACCESS TO BEACH
- CONCRETE MASS SEAWALL
- STONE REVETMENT WITH SPRAYED CONCRETE
- PROPOSED WORKS INCLUDING PARAPET WALLS, ENHANCED DWARF WALLS AND NOMINAL ALLOWANCE FOR EXPOSED TOE

TOPOGRAPHIC SURVEY 2017 LEGEND:

- WALLS
- WALLS-RETAINING-BOTTOM
- WALLS-RETAINING-TOP
- BANKS-BOTTOM
- BANKS-TOP
- SURFACE CHANGES
- CONCRETE
- DRAINAGE DETAILS & PIPES
- DWARF WALL
- KERBS-BOTTOM
- KERBS-TOP
- 0.72 SURVEY LEVELS & TEXT

NOTES:
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REFERENCES:
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4. WESTERN POWER DISTRIBUTION, JANUARY 2017

MUMBLES PAR

JOB NUMBER: 252724-00

REV: A01

SCALE: 1:25 @ A3

DRAWN BY: RJ

CHECKED BY: RSD

APPROVED BY: HJR

DATE: 08/06/17

SHEET 3 OF 5

OPTIONS ASSESSMENT - GENERAL ARRANGEMENT

ARUP

SLIPWAY:

PROPOSED SOLUTION:
NEW PARAPET WALL TO TIE IN TO SLIPWAY STEPS.

ROCK ARMOUR WILL BE DESIGNED TO TIE TO THE SLIPWAY FROM BOTH SIDES.

PROMENADE LEVELS TO TIE IN TO EXISTING DWARF WALLS AND SLIPWAY WILL NEED RE-PROFILING/ SURFACING TO TIE IN TO NEW LEVELS.



Ch.700 to 780m
EXISTING PROMENADE WIDTH APPROX. 10m TAPERING TO 5.7m.
MINIMUM PROMENADE LEVEL + 5.90m

PROPOSED SOLUTION:
NEW PARAPET WALL TO +7.5mAOD, EXTENDED SEAWARDS IN LINE WITH THE PREVIOUS SECTION UP TO THE SLIPWAY (>6m WIDE PROM)

ENCASE REVETMENT WITH ROCK ARMOUR INCLUDING TOE PROTECTION

LAND RAISING REQUIRED UPTO 0.75m TO THE EXISTING DWARF WALLS

EXISTING DWARF WALL MAY REQUIRE STRUCTURAL REINFORCING AND RAISING TBC AT DETAILED DESIGN. NOTE THAT EXISTING DWARF WALL ALIGNMENT IS BEHIND THE CCS OWNED BOAT YARD.

REQUIREMENT FOR FLOOD GATES AT EXISTING ACCESS POINTS WITHIN WALL AND INCORPORATION OF RAMPS TO ACCOMMODATE LEVEL CHANGES.

REFER TO CROSS SECTION C-C (SR1)



Ch.780 to 880m
EXISTING PROMENADE WIDTH = 5-6m, 6m AT THE BACK OF THE BENCHES.
MINIMUM PROMENADE LEVEL + 5.80m

PROPOSED SOLUTION:
NEW PARAPET WALL TO +7.5mAOD, EXTENDED SEAWARDS

ENCASE REVETMENT WITH ROCK ARMOUR INCLUDING TOE PROTECTION

LAND RAISING REQUIRED UPTO 0.85m TO THE EXISTING DWARF WALLS

EXISTING DWARF WALL MAY REQUIRE STRUCTURAL REINFORCING AND RAISING TBC AT DETAILED DESIGN.

REQUIREMENT FOR FLOOD GATES AT EXISTING ACCESS POINTS WITHIN WALL AND INCORPORATION OF RAMPS TO ACCOMMODATE LEVEL CHANGES.

REFER TO CROSS SECTION C-C (SR1)

Ch.880 to 995m
EXISTING PROMENADE WIDTH = 4.5-5m
MINIMUM PROMENADE LEVEL + 5.84m

PROPOSED SOLUTION:
NEW PARAPET WALL TO +7.5mAOD, EXTENDED SEAWARDS

ENCASE REVETMENT WITH ROCK ARMOUR INCLUDING TOE PROTECTION

LAND RAISING REQUIRED UPTO 0.81m TO THE EXISTING DWARF WALLS

EXISTING DWARF WALL MAY REQUIRE STRUCTURAL REINFORCING AND RAISING TBC AT DETAILED DESIGN.

REQUIREMENT FOR FLOOD GATES AT EXISTING ACCESS POINTS WITHIN WALL AND INCORPORATION OF RAMPS TO ACCOMMODATE LEVEL CHANGES.

REFER TO CROSS SECTION C-C (SR1)



Ch.995 to 075m
EXISTING PROMENADE WIDTH = 6m
MINIMUM PROMENADE LEVEL + 6.13m

PROPOSED SOLUTION:
NEW PARAPET WALL TO +7.5mAOD, EXTENDED SEAWARDS

ENCASE REVETMENT WITH ROCK ARMOUR INCLUDING TOE PROTECTION

LAND RAISING REQUIRED UPTO 0.52m TO THE EXISTING DWARF WALLS

EXISTING DWARF WALLS MAY REQUIRE STRUCTURAL REINFORCING AND RAISING TBC AT DETAILED DESIGN. NOTE THAT EXISTING DWARF WALL ALIGNMENT IS BEHIND THE CCS OWNED BOAT YARD

REQUIREMENT FOR FLOOD GATES AT EXISTING ACCESS POINTS WITHIN WALL AND INCORPORATION OF RAMPS TO ACCOMMODATE LEVEL CHANGES.

REFER TO CROSS SECTION C-C (SR1)



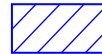
1.8m WIDE x 0.90m HIGH & 4.8m WIDE x 0.90m HIGH FLOOD GATES

6.85m WIDE x 0.75m HIGH FLOOD GATE

KEY:



SSSI DESIGNATION



6m WIDE REQUIRED PROMENADE AREA FROM EXISTING PROMENADE SEAWARD ALIGNMENT BASED ON TOPOGRAPHIC SURVEY 2017 (2)



PROPOSED PROMENADE AREA BASED ON TOPOGRAPHIC SURVEY 2017 (2) AND PROPOSED WORKS



DWR CYMRU WELSH WATER (DCWW) SEWERAGE EXTERNAL RISING MAIN



DWR CYMRU WELSH WATER (DCWW) SEWERAGE EXTERNAL COMBINED RISING MAIN - BRICK SEWER



DWR CYMRU WELSH WATER (DCWW) SEWERAGE EXTERNAL PRIVATE OUTFALL



DWR CYMRU WELSH WATER (DCWW) SEWERAGE EXTERNAL FOUL



WESTERN POWER DISTRIBUTION UNDERGROUND HV 11kV CABLE



EXISTING OUTFALL



STEPPED PEDESTRIAN ACCESS TO BEACH



RAMPED VEHICULAR ACCESS TO BEACH



CONCRETE MASS SEAWALL



STONE REVETMENT WITH SPRAYED CONCRETE



PROPOSED WORKS INCLUDING PARAPET WALLS, ENHANCED DWARF WALLS, AND NOMINAL ALLOWANCE FOR EXPOSED TOE

TOPOGRAPHIC SURVEY 2017 LEGEND:



WALLS



WALLS-RETAINING-BOTTOM



WALLS-RETAINING-TOP



BANKS-BOTTOM



BANKS-TOP



SURFACE CHANGES



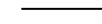
CONCRETE



DRAINAGE DETAILS & PIPES



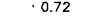
DWARF WALL



KERBS-BOTTOM



KERBS-TOP



0.72 SURVEY LEVELS & TEXT

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MUMBLES PAR

JOB NUMBER: 252724-00

REV: A02

SCALE: 1:25 @ A3

DRAWN BY: RJ

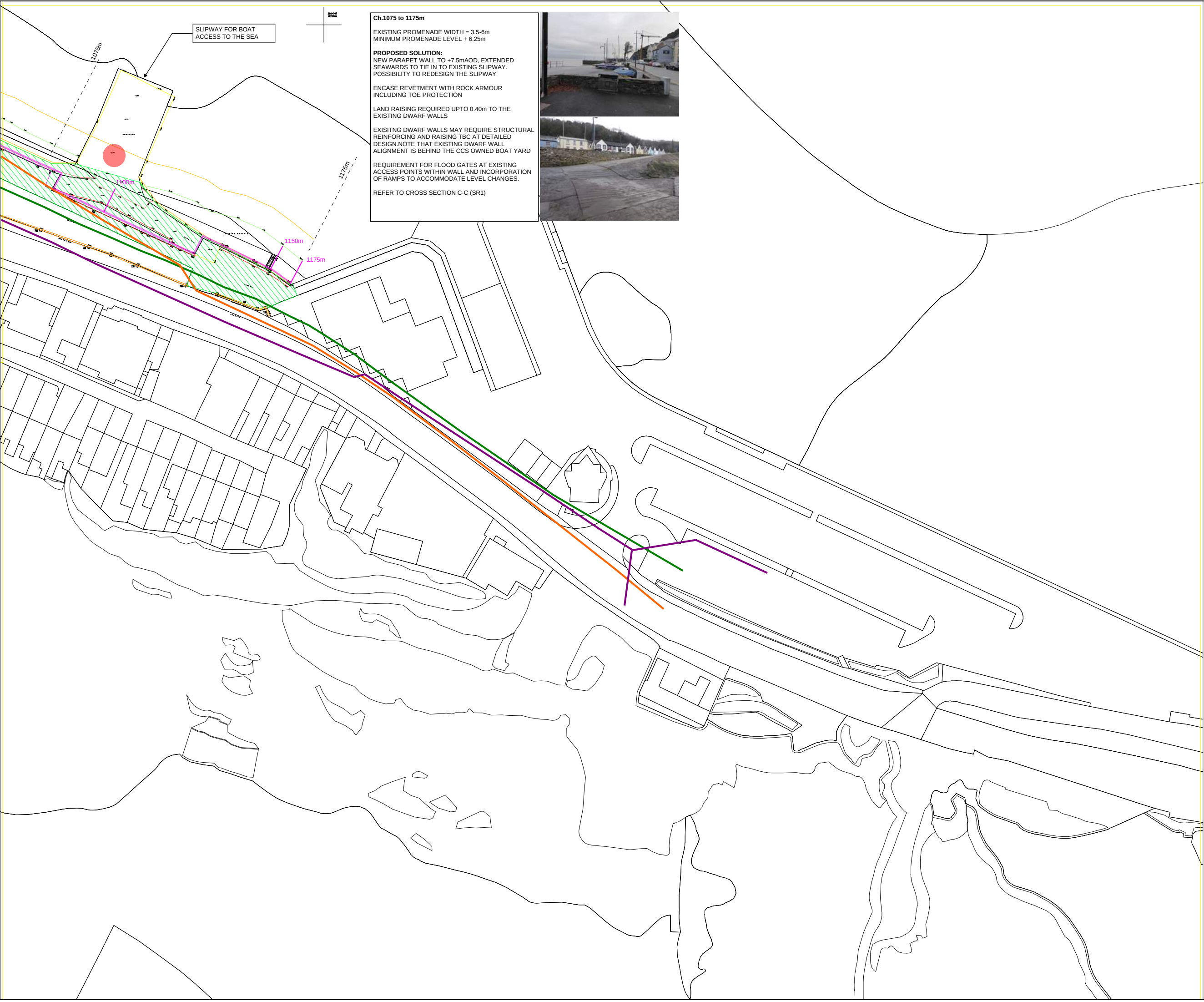
DATE: 08/06/17

SHEET 4 OF 5

APPROVED BY: HJR

OPTIONS ASSESSMENT - GENERAL ARRANGEMENT

ARUP



SLIPWAY FOR BOAT
ACCESS TO THE SEA

Ch.1075 to 1175m

EXISTING PROMENADE WIDTH = 3.5-6m
MINIMUM PROMENADE LEVEL + 6.25m

PROPOSED SOLUTION:
NEW PARAPET WALL TO +7.5mAOD, EXTENDED SEAWARDS TO TIE IN TO EXISTING SLIPWAY. POSSIBILITY TO REDESIGN THE SLIPWAY

ENCASE REVETMENT WITH ROCK ARMOUR INCLUDING TOE PROTECTION

LAND RAISING REQUIRED UPTO 0.40m TO THE EXISTING DWARF WALLS

EXISTING DWARF WALLS MAY REQUIRE STRUCTURAL REINFORCING AND RAISING TBC AT DETAILED DESIGN NOTE THAT EXISTING DWARF WALL ALIGNMENT IS BEHIND THE CCS OWNED BOAT YARD

REQUIREMENT FOR FLOOD GATES AT EXISTING ACCESS POINTS WITHIN WALL AND INCORPORATION OF RAMPS TO ACCOMMODATE LEVEL CHANGES.

REFER TO CROSS SECTION C-C (SR1)



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MUMBLES PAR

JOB NUMBER: 252724-00

REV: A01

SCALE: 1:25 @ A3

DRAWN BY: RJ

CHECKED BY: RSD

APPROVED BY: HJR

DATE: 08/06/17

SHEET 5 OF 5

OPTIONS ASSESSMENT - GENERAL ARRANGEMENT

ARUP

Appendix B

Weather Conditions

B1 Weather Conditions

Visit	Month	Date	Temp. (°C)	Wind Speed (Beaufort Scale)	Wind Direction	Cloud Cover (%)	Conditions
1	Jan	15/01/2020	9	3	W	50	Sunny, light drizzle on last survey
2	Feb	25/02/2020	6	3	W	10	Dry, low tide survey had heavy intermittent hail shower at end of survey.
3	Mar	23/03/2020	9	3	E	5	Dry

Appendix C

Target Wintering Bird Species

C1 Wintering Bird Species

Total numbers of birds across month, tidal state and species. Numbers in parentheses represent birds in flight, whilst those outwith were total numbers of birds physically on the foreshore. Entries in bold are target species, i.e. waders. Blank entries are deliberate omissions and represent no sightings of that species under particular conditions.

Species	Scientific name	Designation*	January			February			March		
			High	Mid	Low	High	Mid	Low	High	Mid	Low
Oystercatcher	<i>Haemotopus ostralegus</i>	Amber,		36	171 (3)		19	50		6	20 (3)
Curlew	<i>Numenius arquata</i>	Red, S7		2	4		1	4			
Bar-tailed godwit	<i>Limosa lapponica</i>	Amber, Red^W, S7									2
Turnstone	<i>Arenaria interpres</i>	Amber, Green^W	8	45 (5)	1		20		14	3	11
Dunlin	<i>Calidris alpina</i>	Amber, Red^W	69	540	(65)	(250)	159	213			
Redshank	<i>Tringa totanus</i>	Amber, Red^W		7			4	1	2		
Kittiwake	<i>Rissa tridactyla</i>	Red							226	185	146
Black-headed gull	<i>Chroicocephalus ridibundus</i>	Amber, Red ^W , S7	7	67	42	30 (6)	86	118		3	
Mediterranean gull	<i>Ichthyaetus melanocephalus</i>	Amber, Green ^W	1	2	2		1	4			
Common gull	<i>Larus canus</i>	Amber, Red ^W					1 (2)	2			
Great black-backed gull	<i>Larus marinus</i>	Amber, Red ^W		(1)	2		(2)	2			2
Herring gull	<i>Larus argentatus</i>	Red, S7	(1)	12	31	9	23 (2)	16	2	43 (1)	124
Lesser black-backed gull	<i>Larus fuscus</i>	Amber	(5)				1	1			1
Cormorant	<i>Phalacrocorax carbo</i>	Green	(1)								
Rock pipit	<i>Anthus petrosus</i>	Green	2	1			1				

* Designation: Annex I = Species designated on Annex I of the Birds Directive; Red, Amber, Green = Status of each species on the BOCC4 or BOCCW3 (the latter designation is denoted by a superscript W), respectively; S7 = Species of principal importance, with regards to S7 of the Environment (Wales) Act 2016.