

## REPORT OF BUILDING PROJECTS OFFICER

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### **SUBJECT:**

### **THE CAUSEWAY, CAREW MILLPOND AND CAREW CASTLE PROGRESS REPORT**

#### Purpose of Report

1. To inform members of state of play on the maintenance of the Carew Causeway and request financial support for the upkeep of this ongoing liability.
2. To inform members of the progress being made on creating an outstanding visitor attraction at Carew Castle and to request further financial support for 2 practical enhancements.

#### Background

Members will be aware of the ongoing commitment that the PCNPA has to the upgrading of the visitor attractions at Carew Castle and Tidal Mill.

In a nutshell we have already budgeted for a spend of c.£160,000 plus £123,212 grant funding for a radical enhancement scheme which includes the development of the Walled Garden and the new tea room which is already in operation.

There are 3 further items which would be appropriate to wrap up with the current construction in terms of timing, convenience and financial budget requirements if members are minded to approve.

#### Proposals

1. 5 year maintenance plan to the Carew Causeway structure.

Following the statutory annual inspection and report (under the Reservoirs Act 1975) issued on 28<sup>th</sup> November 2016, it recommended a list of measures in the interest of public safety which were to be undertaken within 12 months.

A report to NPA (27<sup>th</sup> September 2017 - 44/17) to carry out the works as recommended by the Reservoirs Engineer was approved with an estimated budget of £117,000. The works were completed on time and under budget in December 2017 with a total spend of c. £70k. (The works resulted in a significant reduction from the estimate due some below ground works being omitted from the contract following site inspection).

Following the completion of the works the remaining recommendation (highlighted in the NPA report attached) required a written plan of future repairs to ensure the integrity of the structure in the short to medium term. This plan is to be followed and adopted as an ongoing repairs programme to manage leaks through the Causeway structure and will be monitored annually by the Supervising Engineer.

The plan has now been completed (see spreadsheet and plan layout attached) which details an estimated maintenance and monitoring programme at a cost of c. £180k to be carried out over 5 years. Note: These costs are estimates and subject to change due to the specialist and unforeseen nature of the works.

The first phase of work will commence in Feb / Mar 2019 at a cost of c. £60k which will predominantly include the medium and high priority repairs. The works will result in the closure of the Causeway to the public and this will be discussed in advance with both our Site Manager and Access Manager.

Further phases of repairs will be undertaken as outlined on an annual basis.

## 2. A connection to the mains sewerage system

The original cesspit system was constructed in c. 1983 and has for many years been used to store waste prior to its removal from the walled garden which originally was 1 No. W.C. in the mason's shed more recently this has included the visitor centre toilets and the recently built tea room (grey water). This system is completely sealed with no soakaway system, which in effect would be impossible to incorporate under today's standards and also outside of the garden due to the importance of retaining the archaeological integrity of the site.

The cesspit system (3 interconnected tanks) have a total capacity of c.4000 gallons which are emptied by large tanker on a regular basis when full. At present the annual cost of this is estimated at c. £7,000 per year. During the summer months the frequency that the tanks are emptied increases as visitor numbers rise plus the recent addition of the tea room is also a factor to be considered. (Visitor numbers at Carew are steadily increasing year on year due to the investment made on site) More importantly continuing with the current arrangement does not provide a long term sustainable solution of waste management for this site.

Whilst undertaking the current design work your officers posed the question to the statutory undertaker (Welsh Water) and Cadw if there was a method by which the whole site could be connected to the mains foul drainage system which runs in the adopted highway in front of the Carew Inn.

The proposal would comprise a pumping station installed within one of the current tanks, a rising main from the walled garden to the main road would be installed adjacent to a previously excavated trench where no archaeological evidence was found. Preliminary discussions with Welsh Water, Cadw and a local Contractor have been acceptable in principal.

With an estimated capital cost of around £75,000 and an annual maintenance cost of c. £500 per annum this would provide a payback of the capital outlay of within 10-15

years. With a remaining lease on the Castle of c. 60 years it would seem practical and financially savvy to undertake the works now so that the works could be incorporated in to the current scheme and future proof the site.

### 3. Ticketing / Sales area upgrade

With the use of the tea room and the ambition of increasing visitor numbers to the castle it would be opportune to rearrange the ticketing provision which at the moment requires visitors to enter the shop building. If the current overhang of the building was incorporated into this area, visitors could bypass the shop on their way into the attraction but be guided through the shop upon exit. To undertake this minor building work and alter counters for ticketing sales would be in the region of £25,000 and could be added to the proposals planned for the at the walled garden. This would provide a much better free flow of visitors to the attraction, limiting waiting times and congestion at this existing pinch point. It would enhance the experience of browsing / purchasing in the shop including providing better space for the less mobile and wheelchair users.

### Financial considerations

See above for details of the spend – summarised as :-

1. Causeway repairs over 5 years - £180,000 (Year 1 – c.£60,000)

This project has confirmed WG funding of £130,000 with the remainder from earmarked reserves.

2. Mains Foul Water drainage connection c. £75,000.
3. Ticketing sales area upgrade £25,000

The Finance Manager has confirmed that there are sufficient funds within the Capital Receipts reserves for items 2 & 3.

### Risk & Compliance considerations

The recommendations fall under this Authorities statutory obligations as “owners” of the Causeway structure under the Reservoirs Act 1975.

### Biodiversity Implications/Sustainability Appraisal

All necessary consultations and consents will be obtained where marine works (working within the Mill Pond etc.) are required and undertaking works to scheduled monuments and listed structures. (as usual for previous works).

## Welsh Language Statement

The proposal complies with the requirements of the [Compliance Notice](#) served upon the Authority under Section 44 of the Welsh Language (Wales) Measure 2011. During the works public procurement documents, signage, public notices will be bilingual.

## Conclusion

That incorporating the above into the current programme of works at Carew Castle would be beneficial in terms of timing, programming and financial spend.

## Recommendation

***Members resolve to approve / increase current budgets to include:***

- 1. Causeway maintenance £180,000***
- 2. Mains sewerage connection £75,000***
- 3. Ticketing sales area £25,000***

## Background Documents

*(For further information, please contact Andrew Muskett 01646 624891)*

Author: Andrew Muskett – Building Projects Officer  
Consultees : Jane Gibson, Richard Griffiths, Daisy Hughes & P & P Group.

9/11/18

Pembrokeshire Coast National Park Authority  
National Park Authority - 28 November 2018

## REPORT OF BUILDING PROJECTS OFFICER

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### **SUBJECT : CAREW MILL & CAUSEWAY – RESERVOIRS ACT STATUTORY REPAIRS**

#### Purpose of Report

To request approval for capital funding to proceed with urgent repair works work at Carew Mill & Causeway as per the recommendations of the report following statutory annual inspection (2016).

#### Historic Value

Carew Mill and Causeway are Grade II\* listed buildings, the mill being the only tidal mill in Wales. First mentioned in 1541 the present building dates from c.1840. The three floors retain the complete set of machinery to a remarkable degree of preservation, comprising the bin, stone and meal floors from top to bottom. The mill ceased production in 1937, by which time structural damage had occurred due to the vibration caused by producing bone meal.

Various restorations have taken place, including in 1972 when the Carew Estate repaired the machinery and inserted tie-bars. Further repairs were undertaken by this Authority after it took the lease of the mill in 1983, including replacement of all the windows and various structural works. More recently the roof covering has been replaced (2015/16) with Natural Welsh slate.

The Causeway has undergone many phases of major and minor repair works to prevent / minimise water leakage through the structure from the mill pond which is accepted as an ongoing and permanent issue. Repairs are programmed in line with the recommendations of the Reservoirs Engineer.

Carew Mill and Causeway for part of the Carew Castle site, the Authority holds a full repairing lease with c. 70 years remaining.

#### Background

Carew Mill pond is designated as a high-risk reservoir as defined by the Reservoirs Act 1975, section 2C (1), where an uncontrolled release of water from the reservoir could endanger life. It is the duty of this Authority to appoint a Supervising Engineer and arrange for annual inspections to be carried out.

On 22<sup>nd</sup> August 2016 Carew Mill Pond, Causeway & Mill was inspected and the annual report was issued on 28 November 2016. Within the report, measures in the interests of safety under Section 10(3) (c) or maintenance under 10(3) (b) of the Act

were recommended to be carried out within 1 year of the report (These recommendations are enforceable by Natural Resources Wales) in the interest of safety. Other measures to be taken in respect of maintenance under Section 11 of the Act were also recommended and carried out as part of the maintenance programme.

### Proposed Repairs

A summary of the required works are as follows :-

Indicative costs for the purpose of budget planning are included shown below. The costs will be subject to further refinements and revision following the design / construction process.

Measures	Contractor / PCNPA	Estimated Cost	Priority
<b>Section 10(3)(b) repairs</b>			
(i) the tidal sluice gates be repaired. (includes the provision of stoplogs which will be retained for future use)	Contractor	£9,000	High
(ii) the leakage into the wheel house be stemmed/stopped.	Contractor	£64,000 (Option 2)	High
(iii) a plan be written which outlines future work to ensure the integrity of the structure in the long term	Consultant	£1,500	High
<b>Section 10(3)(c) Repairs</b>			
(i) remedial works are required to the stonework around the letter box.	PCNPA	£1,500	High
<b>Section 11 Maintenance (Ongoing)</b>			
(i) all significant and 'woody' plant growth on the causeway walls should be removed and any damage caused made good from time to time.	PCNPA	£3k every 5 years	Continue to monitor
(ii) erosion to the toe beam be repaired – say every 5 years.	Contractor	£3k every 5 years	Continue to monitor
(iii) the reservoir be emptied of water, the flap valves, sluice paddles and adjacent structure (channel base and walls) be inspected and suitable repairs put in place, and that the sluice gate operating gears be cleaned and re-greased periodically, say every 5 years.	Contractor	£5,000 (Repeat every 5 years)	Carry out immediately in conjunction with major repairs
(v) the walls of the main spillway be pointed.	PCNPA	£5,000	High
(vi) the gate/paddle in the mill should continue to be operated monthly.	PCNPA	£0	High
(vii) the operating mechanisms be refurbished as and when required.	PCNPA	£1,000 (Repeat annually)	Carry out immediately in conjunction with major repairs

## **Summary of Estimated Costs**

Total Works	c.£87,000
Fees & Consents	c.£30,000

**Estimated Contract Total            c.£117,000**

**Note : Although the investment into this structure is maintaining its condition there is continual deterioration which will inevitably lead to more major repairs in the future. Therefore it is likely that there will be the need for further significant repairs in the medium term.**

The works required to prevent leakage into the wheelhouse form the most substantial element of the repairs required. Works to prevent leakage within an old masonry dam structure with limited space for the works is challenging and requires specialist geotechnical engineering techniques to remediate. A particular difficulty is the use of concrete grouting where high flow velocities through leaking sections of wall as a result in variations in water levels between the upstream and downstream side of the dam. This can result in washout of grout materials before they can set. This problem can partly be mitigated by draining down the (upstream) pond to reduce the flow of water through the dam structure, however it is not anticipated that measures would be taken to prevent the natural variation of tidal levels on the downstream side of the dam.

Limited grouting repairs were carried out in 2002, using cementitious grout to infill voids around the sluice tunnels for both the north and south mill wheels and to the seaward facing dam wall immediately to the west of the Mill House. These repairs have been successful in reducing leaks, but due to the limited extent of the repairs and the passage of time, seepage between the flap channel and the mill building has increased in recent years and there is a need to undertake a further phase of work in the vicinity of the mill.

In 2006, works comprised grouting between the Mill House and the tidal sluice gate channel, and at the auxiliary spillway. They were partially effective, with reduction in seepage achieved, particularly to the north of the flap channel.

Atkins has investigated a number of options to reduce the leakage within the causeway, based on a range of construction techniques. This includes an option for resin grouting which has been successfully used to repair old dock walls at Milford Docks even whilst the docks remain in operation. In addition, conventional grouting of the ground has been considered as well as removal and replacement of the impermeable clay core material. The design of the repairs has had to consider sub-surface flows of water which continue to cause erosion as well as repointing repairs to wall masonry. All the options proposed have been costed and compared and will be selected to deliver both an economic solution and one which utilises construction methods sympathetic to the conservation value of the Causeway.

Photos showing leakage into the Wheelhouse (Basement)





## Procurement

Under the Authority's Standing orders relating to Major Contract (£25,000+) standing order 13 allows, under certain conditions, for the suspension of the normal procurement rules. Due to the extremely tight timescale to complete the repairs before the end of November 2017, this paper therefore also requests consent from Members to apply standing order 13. The quotations will however be returned on a date to be agreed and in accordance with the Authority's Financial Procedure No 8 which governs contract procurement up to £25,000. It is proposed to contact 3 reputable contractors as recommended by our Consultants in order to obtain 3 quotations for the works.

## Consents

- Marine Licence (pending approval)
- SSSI consent
- Public Right of Way – Temporary closure

This works are classed as repairs therefore do not require formal Planning or Listed building consent.

## Biodiversity implications/Sustainability appraisal

To enable inspections and safe access, there is a need to allow the Mill Pond (which is a Saline Lagoon) to drain down at low tide(s). This is a temporary change to the normal operating regime, where currently sluice gates on the Mill Pond impound water upstream of the causeway. Early consultation on this aspect has been undertaken with NRW & Sarah Mellor – PCNPA Ecologist (at a site meeting on 25/7/17) because it is anticipated that this will have an impact on marine ecology within the pond, specifically the tentacled lagoon worm (*Alkmaria Romijni*).

Working methods and proposed works within the Mill Pond have been provisionally agreed and a method statement for the works has been included in the Marine Licence which is pending approval. (Appendix 1 – Method Statement & Plans)

## Financial, Risk & Compliance Considerations

It is anticipated that the cost of the repairs will be funded from the Authority's General Reserves which at as 31<sup>st</sup> March 2017 stood at £938k.

## Human Rights / Equality Issues

No Issues

## Welsh language Statement

The proposal complies with the requirements of the [Compliance Notice](#) served upon the Authority under Section 44 of the Welsh Language (Wales) Measure 2011. During the works public procurement documents, signage, public notices will be bilingual.

## Wider implications

Various stakeholders and colleagues have been consulted including:

- Carew Community Council
- Natural Resources Wales
- Cadw
- Sarah Mellor – Biodiversity Officer
- Daisy Hughes – Site manager
- Anthony Richards – Rights of Way Officer

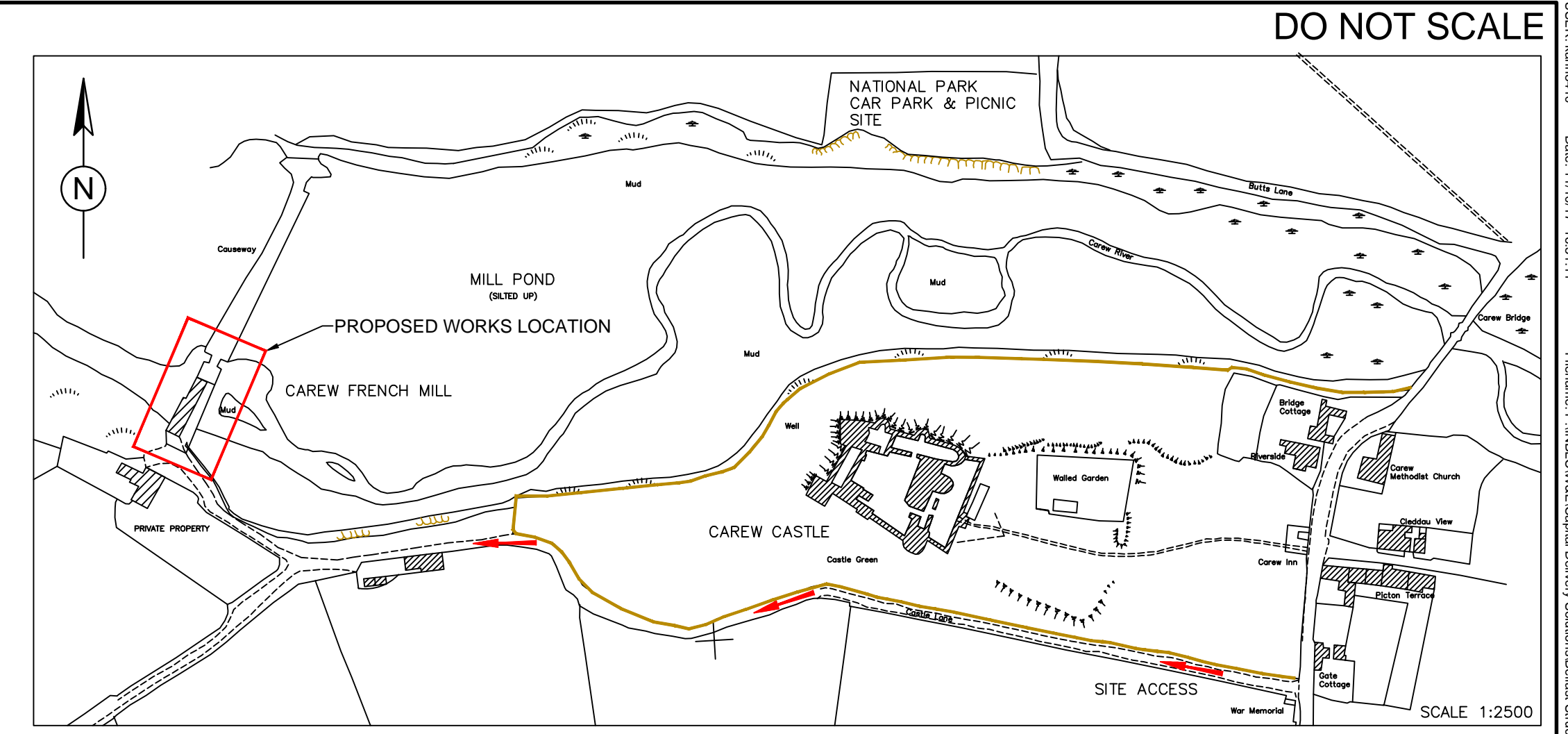
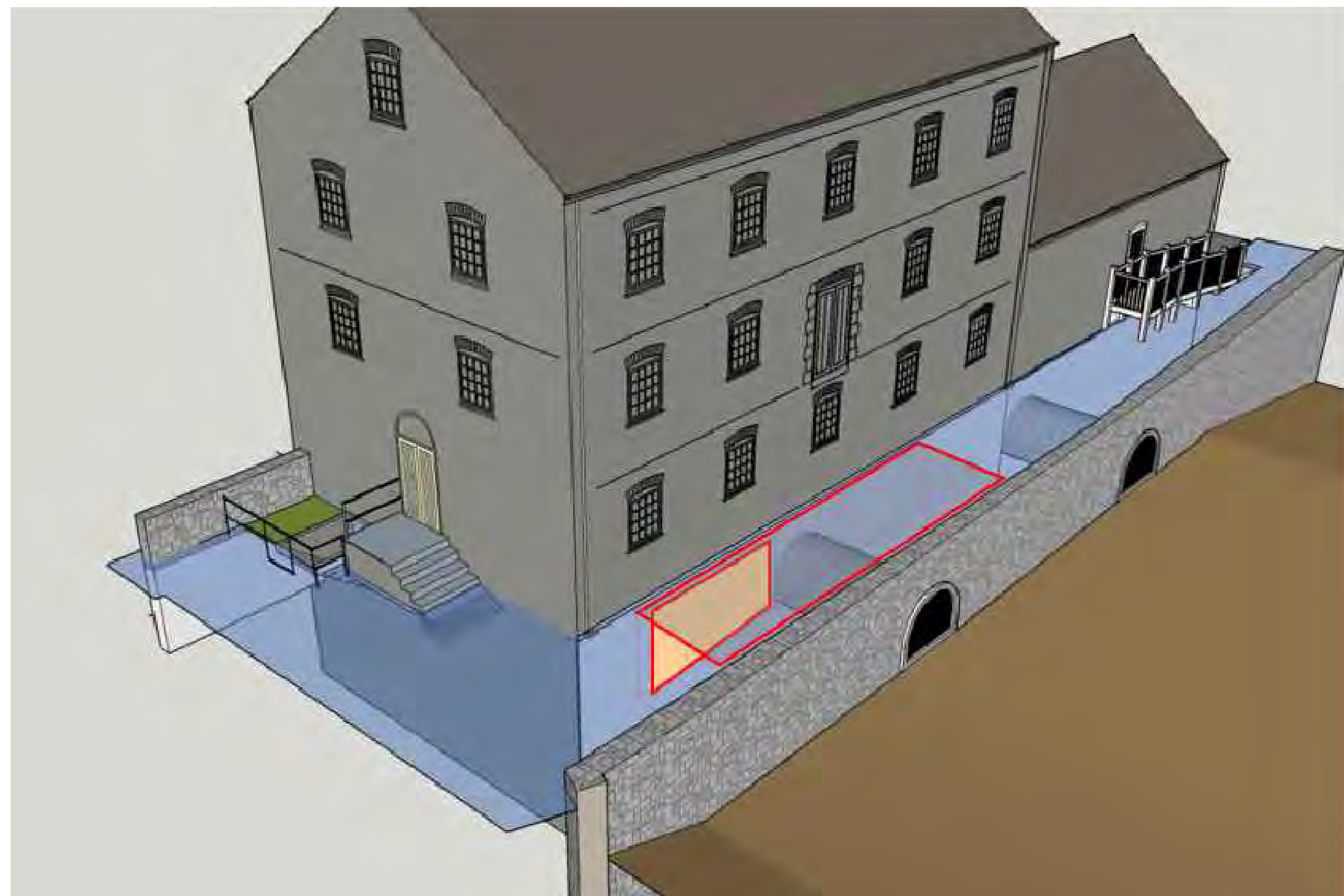
## **RECOMMENDATION**

Members are asked to approve:-

- Funding for these repairs / works from the Authority's General Reserves
- Variation to the Authority's Standing Orders on major contracts for contractor selection.

*(For further information, please contact Andrew Muskett - Building Projects Officer on 01646 624891)*

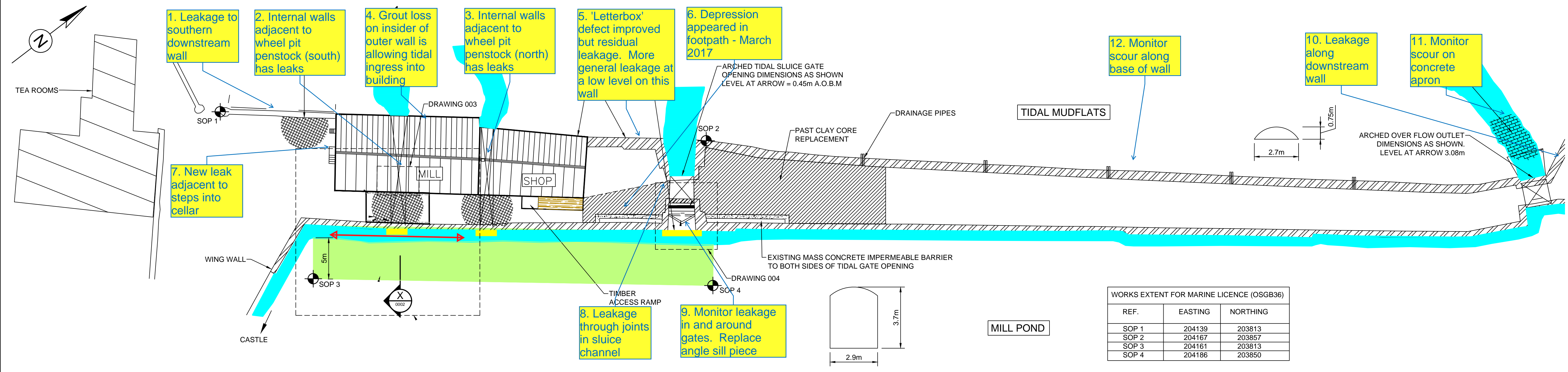
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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION	
In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:	
<b>CONSTRUCTION</b>	
WORKING ADJACENT TO A TIDAL RIVER, SUBJECT TO OCCASIONAL FLOODING. WORKING IN A CONFINED SPACE. WORKING NEAR EXCAVATIONS. WORKING NEAR OPERATIONAL FLAP GATES.	
<b>MAINTENANCE/CLEANING</b>	
CONFINED SPACE ENTRY REQUIRED FOR FUTURE ASSET INSPECTION (SLUICES)	
<b>DECOMMISSIONING/DEMOLITION</b>	
WORKING ADJACENT TO A TIDAL RIVER, SUBJECT TO OCCASIONAL FLOODING. WORKING IN A CONFINED SPACE. WORKING NEAR OPERATIONAL FLAP GATES.	
It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement	

**OVERVIEW OF EXTERNAL WORKS REQUIRED**

NTS



WORKS EXTENT FOR MARINE LICENCE (OSGB36)			
REF.	EASTING	NORTHING	
SOP 1	204139	203813	
SOP 2	204167	203857	
SOP 3	204161	203813	
SOP 4	204186	203850	

**PLAN OF CAUSEWAY SHOWING REPAIR ITEMS**

1:250

**NOTES:**

- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
- ALL LEVELS TO ORDNANCE DATUM NEWLYN UNLESS STATED OTHERWISE.
- THIS DRAWING INDICATES THE SHE RISKS FOR THE WHOLE SITE. REFER TO EACH INDIVIDUAL WORKS AREA FOR SPECIFIC SITE RISKS.
- THE LOCATION OF SERVICES IS NOT KNOWN. ALL SERVICES SHALL BE TRACED BY THE CONTRACTOR TO CONFIRM THE PRESENCE OF ANY SERVICES.
- WORKS TO TAKE PLACE IN ACCORDANCE WITH NRW LICENCE CONDITIONS.
- WORKS TO TAKE PLACE DURING LOW WATER WHEREVER POSSIBLE. CERTAIN WORKS ARE PLANNED TO TAKE PLACE WHILST MILL POND IS LOWERED - REFER TO SPECIFICATION.

Rev.	Date	Description	By	Chkd	App'd
P03.1	11/10/2017	CHECK COMMENTS ADDRESSED	KM	RM	DF
P2	26/07/2017	MINOR AMENDMENTS, SETTING OUT POINTS ADDED	MJE	RM	DF
P1	19/07/2017	FIRST ISSUE	MJE	RM	DF

Drawing Status	<b>TENDER</b>	Suitability	<b>D2</b>	Project Title	<b>CAREW MILL AND CAUSEWAY 2017 REPAIRS</b>	
<b>ATKINS</b>		West Glamorgan House 12 Orchard Street Swansea SA1 5AD		Drawing Title		
Copyright © Atkins Limited (2017)		Tel: +44 (0)1792 641172 Fax: +44 (0)1792 472019 www.atkinsglobal.com		FUTURE WORKS PLAN		
Client	Pembrokeshire Coast National Park Authority Winch Lane, Haverfordwest Pembrokeshire SA61 1PQ Tel: 01437 744336		Scale	AS SHOWN	Designed	RM
			Date	18/07/17	Drawn	MJE
			Date	18/07/17	Checked	RM
			Date	19/07/17	Authorised	DF
			Drawing Number	5129589.008-ATK-ZZ-ZZ-DR-D-0005		Revision
						P01.1



Appendix 3

Carew Mill

5129589-DG07\_Sept18

Plan for future work

Item	Defect Observation	Priority	Measures/works required	Indicative budget	Programme				
					2018	2019	2020	2021	2022
1	Leakage in southern downstream wall	Medium	Repointing of upstream wall (pond side) and low pressure grouting to wall.	5,000.00			5,000.00		
2	Internal walls adjacent to wheel pit (south) has leaks	Medium	Pressure grouting and sealing on approach arches to sluice to prevent water tracking through stonework. This is follow up work to that carried out this year to improve the impermeability.	10,000.00		10,000.00			
3	Internal walls adjacent to wheel pit (north) has leaks	Medium	Pressure grouting and sealing on approach arches to sluice to prevent water tracking through stonework. This is follow up work to that carried out this year to improve the impermeability.	10,000.00		10,000.00			
4	Grout loss on inside of outer wall is allowing tidal water ingress into building	Low	Small scale repointing works and low pressure grouting	500.00			500.00		
5	Letterbox' defect improved but residual leakage. More general leakage at a low level on this wall	High	Items 5, 6, 8 appear to be interrelated and in the same area. Repointing of upstream wall and downstream wall and low pressure grouting to walls. Pressure grouting through sluice wall to be continued from previous year where this has only been partially successful. Works to be carried out with pond drained to prevent grout washout.	25,000.00	25,000.00				
6	Depression appeared in footpath - March 2017	High	See 5	Incl in 5					
7	New leak adjacent to steps into cellar	Medium	Linked with item 1. Repointing of upsteam wall (pond side) required including low pressure grouting. In addition - localised pointing grouting required.	Incl in 1					
8	Leakage through joints in sluice channel	High	See 5	Incl in 5					
9	Monitor leakage in and around gates. Replace angle sill piece	Medium	Monitor gates, if necessary repair gate timbers. Place temporary stoplogs in place. Replace sill angle piece	20,000.00	20,000.00				
10	Leakage along downstream wall	Low	To be monitored only - noting if rate of leakage increases.	-					
11	Monitor scour on concrete apron	Low	To be monitored only to evaluate if scour has taken place	-					
12	Monitor Scour along base of wall	Low	To be monitored only to evaluate if scour has taken place	-					
<b>Budget items for potential future defects</b>									
A	Leakage in downstream walls or sluice walls near flap gates - further grouting, pointing and sealing of walls.			20,000.00				20,000.00	
B	Replacement timbers to wheel pit stoplogs			5,000.00				5,000.00	
C	Leakage to downstream wall to the south of the Mill House			5,000.00				5,000.00	
D	Leakages into the Mill House requiring further pointing, grouting repairs to walls.			10,000.00					10,000.00
E	Replacement of dam fill material, due to depressions arising			10,000.00					10,000.00
F	Concreting required for scouring of concrete aprons or base of walls			10,000.00					10,000.00
<b>Totals</b>				<b>130,500.00</b>	<b>45,000.00</b>	<b>20,000.00</b>	<b>5,500.00</b>	<b>30,000.00</b>	<b>30,000.00</b>
Consultants design fees (15%)				19,575.00	6,750.00	3,000.00	825.00	4,500.00	4,500.00
NRW Marine Licence fees (Band 2)				9,600.00	1,920.00	1,920.00	1,920.00	1,920.00	1,920.00
Site Supervision Csots				15,500.00	4,000.00	3,000.00	1,500.00	3,500.00	3,500.00
ARPE Sign off of works				5,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
<b>Grand Total</b>				<b>180,175.00</b>	<b>58,670.00</b>	<b>28,920.00</b>	<b>10,745.00</b>	<b>40,920.00</b>	<b>40,920.00</b>