Harbour Resilience, Boating, & Tourism Appraisal

A report commissioned by the Sark Property Company Limited

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Disclaimer

The advice, opinions and suggestions expressed herein are totally those of the author and are based upon his findings and observations during two brief visits to the Island in summer 2023, and upon some archive material. The Sark Property Company Limited, the Government of Sark, and any other readers of this report are advised to take appropriate additional and/or professional advice before actioning any of the suggestions made herein.

About the Author

Arrol has worked on harbour, marina, and waterfront projects in 41 countries. He graduated from the University of Manchester Institute of Science and Technology (UMIST) with an honours degree in Civil Engineering and was later awarded a Fellowship of the Institution of Civil Engineers.

Arrol spent 14 years in the dredging and maritime civil engineering industry, much of the time with *Royal Bos Kalis Westminster Group* of the Netherlands, the world's largest dredging company. This was followed by 16 years as the Managing Director of the marinas division of *Camper & Nicholsons* (established in 1782); he expanded its activities internationally.

In 2005 he launched *Island Global Yachting*, an affiliate of the Government of Dubai, and was responsible for the design and development of the marinas on the Palm Island and Festival City megaprojects.

Since 2008 Arrol has been in private practice.

Full details of all of the above may be found in the Capability Presentation at **www.arrol.com**

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1. The brief

In response to a request from their investors, *Sark Property Company Limited* has tasked me with reviewing the current facilities and operations of the harbours with a particular focus on the efficiency, resilience, and growth of future passenger and freight operations, and related logistical matters. At the same time, they have asked me to identify possible means to improve the visitor arrival experience, and to attract more yacht visits, thus boosting tourism revenue.

Accordingly, I have considered the following:

- Making Maseline Harbour less susceptible to closure during heavy seas from North through East, or to optimise alternatives during such closure periods.
- Improving the arrival and departure experience for tourists.
- Making Creux Harbour a more attractive destination for visiting yachts, and for tourists generally.
- Improving the facilities for residents, local fishermen and leisure boat owners.

I have also been invited to comment on a recent suggestion that Sark should build a yacht marina.

2. My approach

My approach is to suggest measures that I believe to be financially viable, technically and environmentally appropriate, and achievable within a useful timeframe. I have also considered how some existing facilities can be re-purposed.

Many of the minor works I suggest can be executed by Sark's own tradesmen, and some works can even be handled by local volunteers.

Subject to funding, a number of the suggested measures could (and ideally should) be completed before in a relatively short timeframe.

I have no doubt that most, if not all of the possibilities mentioned herein will have been made at some time in the past. But I hope that by presenting them together, a **consensus** will be forthcoming from the Island's residents.

3. Maseline Harbour

3.1 Wind & sea state

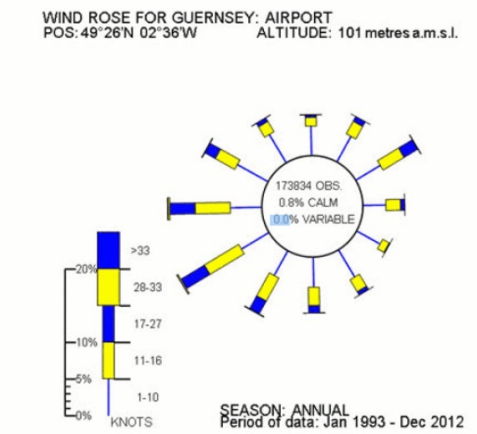


Fig. 1

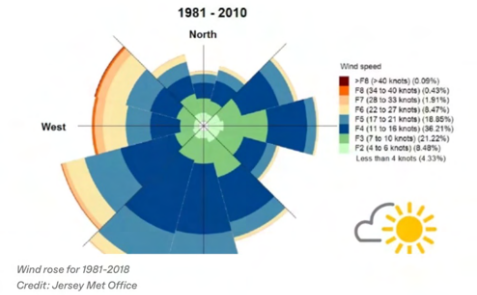


Fig. 2

Maseline Harbour can become untenable when subject to waves from North-through-East (the "NE quadrant").

The annual wind roses for Guernsey airport (Fig. 1) and Jersey airport (Fig. 2) show a significant percentage of the time when the wind is from this direction. I estimate that as a consequence of the wind blowing from the NE quadrant at a mere Force 4 (and at times even Force 3), the waves entering the harbour will often reach WMO Sea State 3 with a wave of up to 1.25m. At these times I imagine that berthing becomes hazardous, with safe passenger embarkation/disembarkation all but impossible.

I do not currently have the raw data needed to accurately calculate this downtime, but my guess is that in a bad year it might total up to 10% of the time[1].

To shelter the berth from NE quadrant seas, it would be necessary to extend the pier or build a detached breakwater.

3.2 Floating breakwater

I have heard it suggested that a floating breakwater[2] might be suitable for protecting the berth, but this is not so. Most of the readily available types (Fig. 3) are only suitable for waves up to about 1.2m with a period of 4s or less; in other words, they are only suitable for moderating a 'chop' of the type generated over a short fetch, typically 2Km to 10Km, not an ocean swell. Floating breakwaters – even the very largest ones (Fig. 4) – are absolutely not suitable for open-sea conditions.

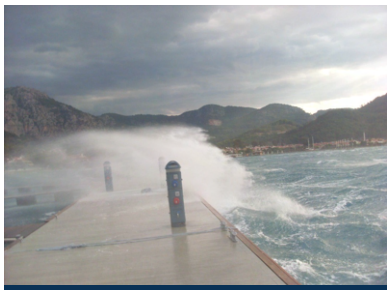


Fig. 3

Fig. 4

[1] I understand that the prolonged period of NE winds during May/June this year caused considerable inconvenience.

[2] More correctly referred to a wave attenuator.

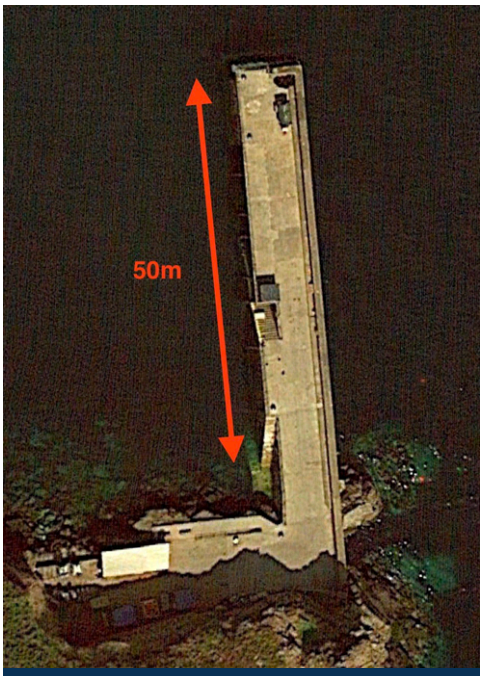


Fig. 5

3.3 Length of the berth

Allowing for the presence of the rocky seabed at the south end of the pier, the usable length of the berthing face is approximately 50m (Fig. 5).

By reference to the original construction drawing of 1948, it may be seen that the foundations project for 18ft (5.5m) beyond the northern toe of the pier, a distance which is rather less than was mentioned to me during my visit. The value of this projection is thus fairly inconsequential in the context of extending the pier.

As a matter of interest, documents show that the contract to build the access road and the pier was let in 1937 for the sum of £45,000 (£3.5 million in today's money, which seems remarkably good value!).

It is a matter of debate as to whether the pier should be extended to 'future-proof' it for the next generation of *Sark Shipping* vessels which may be larger/longer[3], and because (as one would hope) the Island will in future handle a ferry service from France. In the latter context, it is noted that the M/V GRANVILLE, operated by *Manche Illes Express*, is 41m length and 8m beam, compared to the 21m length and 8m beam of the M/V SARK VIKING. Naturally, the optimum future-proof berth length should be discussed with *Sark Shipping* and other professionals.

It should be noted that operators customarily buy, build, charter, or deploy their vessels to suit a port's characteristics (not the other way around), in the same way that airlines dispatch aircraft types suited to the destination airfield.

It is timely to refer to the 1993 article that was recently reprinted in the Guernsey Press. This showed the fast catamaran CONDOR 9 visiting Sark in 1993. She is 49m length and 18m beam; having to prepare for such a vessel would significantly affect the design of the works being contemplated herein. However, the CONDOR 9 type is really designed for longish, high capacity, open sea routes rather than the Bailiwick's inter-island routes and so I feel that we can safely disregard her. We may well see the deployment of more fastcat ferries in the future, but I doubt that they will be much different from the aforementioned GRANVILLE. In any case, passenger embarkation/ disembarkation for a CONDOR type would be extremely difficult at Maseline.

[3] Larger vessels might become desirable with an increased population and tourist footfall.

3.4 Breakwater arrangements

In order to shelter the berth from all but the most extreme sea-states, there are two principal solutions, both of which would need to be the subject of wave modelling.

Fig. 6

OPTION A – Dogleg Extension

The pier might be extended a little as part of this option, but the main element would be the addition of a dogleg at about 45-degrees for a length of, say, 30m.

To minimise wave reflection and to absorb wave energy within the harbour, rock revetments should be placed at the head of the berth and on those parts of the foreshore which have vertical rock faces.

Some dredging may be required since the vessels will have to pass around the dogleg and will thus be a little further inshore than now, but the extent, volume, and hardness of the dredge cannot be determined until such time as a detailed hydrographic survey accompanied by geotechnical probing has been carried out.

Safety would be enhanced with a double fixed-red light on the end of the pier, and perhaps with buoys or beacons along the edge of the dredged area.

Please refer to the enclosed conceptual layout (Drawing 0001).

The most economical construction method will probably see the use of a concrete caisson floated into position, sunk, and stone ballasted (Fig. 6). If this method of work is available then it will, in my opinion, prove to be the fastest and least disruptive way to extend the pier.

OPTION B – Detached rock breakwater

A ‘detached’ breakwater is one that is not connected to the foreshore. There would be no advantage in continuing a breakwater all the way into the Maseline Bay beach, and not doing so will leave open an inshore passage for small boats.

With this option the existing pier remains unaltered, and all wave protection is provided by the detached breakwater positioned to the north. Expert advice will be needed for its design, but for the purposes of my conceptual plan (Drawing 0001) I have assumed that the slope along the North face and the roundhead will be 1:2, and along the South face 1:1.5. The crest height (i.e., the top level) of the breakwater will depend on whether there is a berm on its seaward slope, and on the over-topping criteria. Certainly the crest can be lower than that of the Maseline pier.

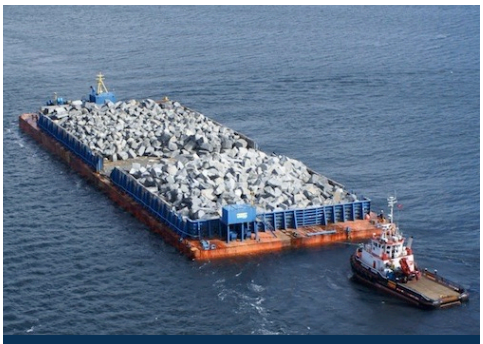


Fig. 8

Many breakwaters have multiple layers of rock (Fig. 7) but given that all material for this project will have to be imported and placed from barge (Fig. 8), my inclination would be to explore a design that is as simple and uniform as possible (Fig. 9). Even so, I estimate that a 100m long breakwater as described will require about 80,000m^3 of rock, or say 160,000t.

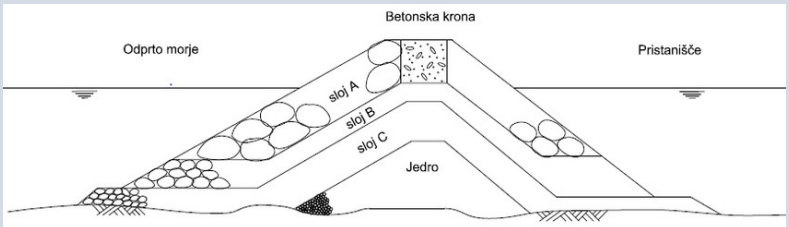


Fig. 7

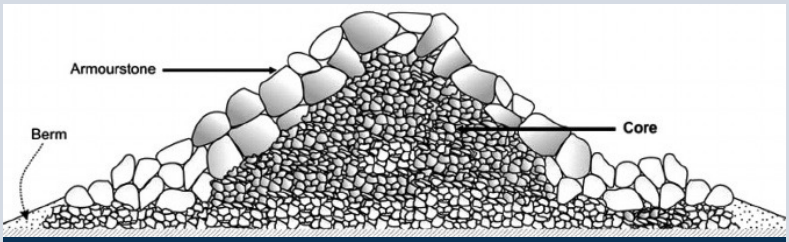


Fig. 9

As with OPTION A, rock revetments should be placed around the bay, some dredging may be required, and buoys or beacons installed.

When referring to the drawing please bear in mind that the footprint of the breakwater can only be calculated very approximately because we do not have a detailed hydrographic survey[4].

The best way to minimise cost and disruption for either option would be to provide adequate data[5] at tender stage and to invite contractors to bid on a design & build basis whereby they are fairly free to offer their preferred, and hopefully most competitive solution.

It remains a sad fact, however, that marine works are extremely expensive, especially in an exposed location like this. For example, for the OPTION B detached breakwater I anticipate that the cost of the rock will be at least £100/t which implies a total cost of at least £16 million, and possibly considerably more. I would expect Option A to be somewhat less costly, but it might still run to £10 million. Such prices are clearly unaffordable.

[4] I have relied upon the small-scale soundings shown on the Navionics digital charts.
[5] To include hydrographic and geotechnical surveys, and design wave conditions.

Fig. 10

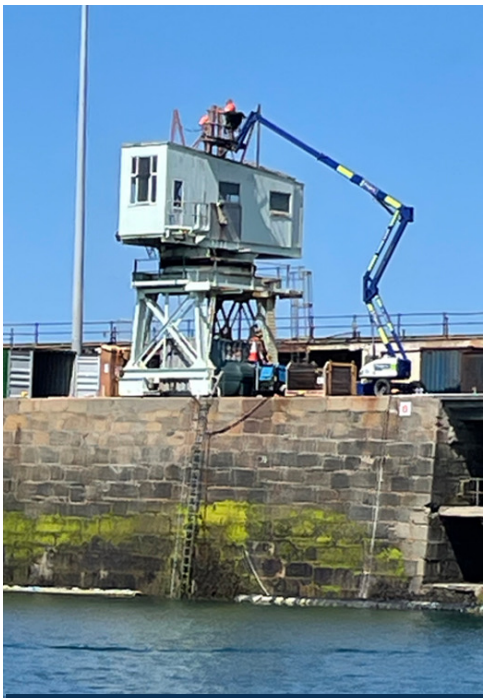


Fig. 11

There is also a **Do-Nothing** option, which I anticipate will be the choice forced upon us on the grounds of the aforesaid costs. However, vessels can be diverted to Creux Harbour as they have in the past (and as was the norm before the pier at Maseline). For the Creux Harbour options needed to better support such diversions, see section 4.6 below.

In the case of the Do-Nothing option, placing of the rock revetments as mentioned above may still be beneficial; *Sark Shipping* will doubtless have a view on this.

3.5 Cargo handling

The KATO mobile crane presently in use has a self-weight of 20t and a maximum lift of 20t. This means that in the worst case (i.e., with 20t on the hook and the crane about to tilt over) there could theoretically be a load of 20t on each of the two quay edge outriggers[6]. I was concerned to see that one of these outriggers was positioned mid-span of the slab edge beam (Fig. 10) which passes above the staircase. If the strength of this beam has not been checked by a structural engineer, then it should be. I note from the 1948 drawing that the original crane was mounted on the outer, solid end of the pier.

I understand that the KATO crane is soon to be exchanged for a newer but almost identical model. Mobilising and demobilising a crane to/from the harbour is bound to be disruptive if at the time it is employed on jobs elsewhere on the Island.

It would be worthwhile to consider fitting the pier with a dedicated crane. If the new crane were rail-mounted, it would avoid point loads on the edge beam and would also allow the crane to travel along a considerable length of the pier which would make cargo handling and temporary storage more efficient. Rail-mounted cranes are no longer the ubiquitous design they once were, but this is not really an issue because most cranes are anyway made-to-measure. I note that St Peter Port still has a rail-mounted crane (Fig. 11), although I am unsure whether it is currently being dismantled or is merely under repair.

I believe that a rail-mounted crane would suit Maseline very well; it would be faster and safer than using a mobile crane, would cost less to operate, and would decongest the pier. And it would allow the KATO mobile crane to work uninterrupted at its other jobs around the Island.

[6] I do, however, acknowledge that 20t lifts are unlikely to take place.

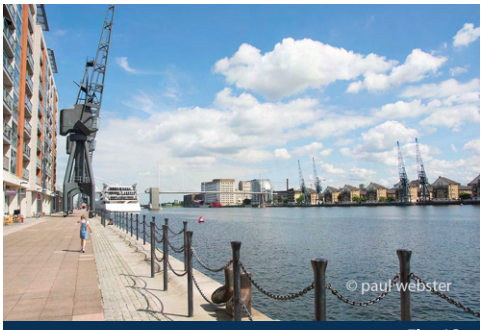


Fig. 12

The crane need not be bulky like those of the past (e.g., like the one at St. Peter Port), and it need not be very tall as it does not have to offload high-freeboard ships. It is interesting to note that cranes are nowadays considered attractive structures in their own right and are invariably retained on urban waterfront redevelopments (e.g., London Docklands, Fig. 12) and even on superyacht marinas (e.g., Porto Montenegro, Fig. 13).

I suggest that the crane be diesel-hydraulic so as to be independent of the Island's power supply. And in an exposed location like this, hydraulics will be more reliable and less complex to maintain than electrical systems.


Fig. 13

It appears to me that cargo handling could be made more efficient, secure, and safer with the deployment of a purpose-designed container and basket system to replace the 8ft blue containers currently in use. Cargo flow will substantially increase in line with the growth of the population and the consequent property development / refurbishment, and with increased visitor footfall (including, perhaps, from France). Hence a range of aluminium closed and open-top containers suited to baggage, foodstuffs, building materials and the like, would seemingly make sense. Clearly, this concept should be discussed with *Sark Shipping*.

In the context of improved safety and speed, loading and unloading by crane would do away with the manual handling of heavy suitcases up and down the pier's steps. Aboard M/V CORSAIRE DE SERCQ, space could be found for baggage containers on the top deck, and for a smallish container on the aft deck.

In the future, I wonder if the tractor/trailer combinations might not be replaced with a number of electrically powered vehicles which could deliver and pick-up anywhere on the Island. I think that the use of such vehicles would be quicker and quieter. In any event, cargo sorting and distribution would be more conveniently undertaken at the new incinerator site (see section 5).

3.6 Passenger waiting

It is surely unacceptable that whilst waiting to embark, passengers have to stand in the open, often for considerable periods.

It is natural that most departing passengers will always wish to wait in sight of the ferry berth[7] and so I suggest a new building of about 12m x 8m fitted-out as a waiting room and with a ticketing desk. An artist's impression of this concept is enclosed (Illustration A).

A building of this size would not interfere with the adjacent tractor turning area.

[7] People are naturally fearful of waiting out of sight of their ferry/train/plane in case they miss it!

I believe that this building would prove adequate to accommodate at least 50 waiting passengers[8]. Admittedly, this is only about half the capacity of SARK VENTURE and CORSAIRE DE SERCQ. Additional seating could be provided by an approximately 12m long covered bench to replace the current single stone seat; it should be protected from vehicle impact by an ARMCO barrier (Illustration A). A similar 8m long bench (probably not covered) could be provided alongside the railings near the embarkation steps. Additional seating would be available in the proposed new Harbour Square building (see section 6.3).

Fig. 14

Fig. 15

3.7 Embarkation & disembarkation safety

The staircase (Fig. 14) is in fairly sound condition, but some minor modifications would enhance safety, especially bearing in mind that the Island tends to attract many middle-aged and elderly tourists who are prone to slipping and falling.

a) A portable staircase platform is currently in use (Fig. 15). A slightly larger one with integral handrails and a slip-resistant composite deck grating would provide an incremental improvement.

b) With particularly the elderly in mind, I consider that a centreline, or just-off-centre, handrail should be fitted so that passengers can steady themselves with both hands when ascending and descending. This may cause some slight inconvenience to the manual loading and unloading of baggage, although not if this is handled by crane in the future (see section 3.5 above). The handrail will probably have to be in sections of, say, 2m length so that one section can be lifted when the aforementioned staircase platform is deployed. Aluminium or FRP handrails would be much lighter than ones of stainless steel, although consideration would have to be given to them being dislodged by wave action.

The above suggestions should be discussed with *Sark Shipping*.

I have heard it suggested that Maseline should be equipped with a pontoon and gangway, like the ones at St. Peter Port. Apart from the very considerable expense, this cannot be progressed until such time as the breakwater arrangements have been built (assuming they are built) and the resulting tranquillity of the water verified. Such pontoons have to be attached to wall guides and as such they can only survive in calm waters. In the absence of the breakwater arrangements discussed in section 3.4, it would be only a matter of time before the pontoons and gangway would be badly damaged or even destroyed.

[8] On the basis of about 20ft² per passenger.

Incidentally, a gangway meeting disabled-access guidelines has a very shallow gradient; often as flat as 1:14 (the statutory requirements vary country by country). In St. Peter Port the gangway at Albert Pier meets a 15-degree requirement and is thus 48m long; even the gangway to the pontoon used by *Sark Shipping* is 33m long[9].

It is appropriate at this point to question the suitability of Sark as a destination for physically challenged visitors. In my opinion, given the embarkation and disembarkation facilities, the Island is not suitable (and neither, incidentally, is Herm) and for reasons of honesty I think that this should be made clear in the marketing materials and ticketing.

[9] This 33m length appears to derive from applying the internationally accepted 1:4 gradient for non-disabled access at yacht marinas.

4. Creux Harbour

Fig. 16

4.1 Harbour depth

Much of the harbour basin dries (Fig. 16) and from perusing old photographs it appears always to have been much like this.

I suggest that an excavator be used to dig trial pits to determine what depths can be achieved. During a low water spring tide, the same excavator could also test the seabed at the entrance of the basin. We would, of course, have to take care when excavating close to the pier, at least until such time as further research leads to a better understanding of its foundations.

With the powerful excavators and rock-splitting equipment available nowadays I think there is a good chance that the basin can be deepened at modest expense.

Fig. 17

4.2 The eastern quayside

The old storage sheds and the other materials stored ashore at the east end (Fig. 17) massively detract from the beauty of this charming harbour which in other respects is comparable to the picturesque harbours of Devon and Cornwall. In my opinion, therefore, the store sheds should be demolished, and the fishermen's gear stored in the western end of the workshop building (see section 6.2 and Drawing 0004).

Inflatable dinghies are presently stored in the concrete building; they should be removed and stored in a roofed rack at the rear corner of the site.

Fig. 18

I suggest that the existing building (Fig. 18) be re-purposed as a cafe/bistro, with a canopy and side-screens providing shelter for the customers sitting outside. The adjacent area should be re-surfaced, probably with tarmac because cobbles do not provide a stable surface for tables and chairs. Some beautifications with perimeter planting and trees in tubs would not go amiss. In high season this then becomes a pleasant seating and dining area (Drawing 0005 and Illustration B). Some or all of the area may need to be vacated in winter to allow for the storage or repair of local boats that are too large to pass through the tunnel and so all planters should be moveable.

Fig. 19

Toilets must be provided for bistro customers and staff. This might be achieved by refurbishing the existing small building (Fig. 19) which is shown on old plans as a "WC". However, if the harbour is later upgraded (see section 4.5) it will host many more yachtsmen than now, and they will expect their own toilet and shower block. It would therefore make sense to build a new block that can service both the bistro and the yachtsmen.

The adjacent cliff face needs to be checked against the risk of falling rocks. This can be done at the same time as the other areas which need attention (see section 7).

4.3 A northern reclamation

I have considered the idea of reclaiming the northern part of the harbour. This reclamation could provide a hardstanding for the storage of boats. But the area would have to be reclaimed to the same elevation as the pier to avoid it flooding during spring tides and southerly gales.

If this reclamation were to go ahead, very considerable cliff face work would be required (see section 7), although I note that notwithstanding the ever-present danger from falling rocks[10], this beach is used by Sark residents for bathing.

Such reclamation would, however, destroy the originality of the harbour as this beach was the Island's principal landing place before the pier was built. And it would make the area less attractive for bathing. I therefore consider the reclamation concept to be historically, socially, and environmentally inappropriate, as well as very expensive.

Fig. 20

4.4 The 1588 Tunnel

I suggest that this historic tunnel should be made more of a tourist attraction. The tunnel is currently open to anyone who cares to enter it; indeed, it is often used by local people who wish to access the north beach for bathing[11]. There is, however, a rockfall hazard.

Assuming that an engineering assessment finds the tunnel itself to be safe, I suggest that canopies be erected over both portals (the eastern portal would have to be quite extensive) to protect against falling rocks.

I also suggest that the tunnel be cleaned out, surfaced, and have internal LED lighting installed. At the eastern end the two wooden huts (Fig. 20) should be dismantled, the area soft landscaped, and an interpretation display erected (Illustration D).

[10] The erection of additional warning and liability signs would seem a wise move.
[11] Access to the beach via the Creux Harbour slipway is impossible once water rises above about half-tide level.

4.5 Improvements afloat

Fig. 21

The biggest potential for improvement as far as attracting yachts is concerned is to build a fixed sill across the entrance. A sill is like a dam; it retains water in the basin, allowing boats to remain afloat over the low tide period (Fig. 21).

At the Victoria Marina in St. Peter Port the water is retained inside the marina basin by a sill lying at +4.2m LAT. A boat drawing 1.5m (5 feet) can access that marina for about 6 hours per tide.

A sill across the entrance to Creux Harbour might be +4.2m, the same as at St Peter Port; on the other hand, it might be somewhat lower, which would give more access time. It very much depends on the level to which the Creux basin can be dredged/excavated. Since there is convenient access for plant and machinery down the slipway, and since the basin entrance is very shallow, I believe such a sill will be relatively inexpensive to construct. The extent of water in the basin at tide levels of +1.8m and +2.8m may be seen on the photographs (Figs. 22 & 23). My current best guess is that if a significant reduction in bed level can be achieved by dredging/excavation, a sill at around +3.5m will be suitable.

Fig. 22

Once the sill is in place, we might choose to install pontoons (Drawing 0007). It may justifiably be argued that pontoons will detract from the 'originality' of the harbour, and for this reason I advocate Option B, the single pontoon. This means that the quay wall will be unaffected and can still be used by yachts and other vessels (Drawing 0008), and the ferry when necessary (Drawing 0006). The inner part of the pontoon might be reserved for small commercial fishing boats.

Fig. 23

The sill can be designed such that inflatable dinghies and other tenders can be safely launched and recovered across it during low tide periods. It will also incorporate a valve to allow the basin to be drained down to low tide level when necessary.

4.6 Ferry berthing options

In section 3.4 above I refer to the Do-Nothing option in the context of protecting Maseline Harbour from NE quadrant waves. In this case, the ferry might on occasions have to use Creux Harbour (Drawing 0006), as it has before. In fact, pre-Maseline, the ferries always used Creux Harbour.

If the Creux basin is fitted with a sill, access for the ferry to enter the basin will be slightly more restricted than now but I believe this reduction will not be too significant.

Fig. 24

It has been mentioned to me that at one time the seaward face of the pier was fitted with fenders to allow a large vessel to lie alongside. I have reviewed archive photographs and have found no evidence of this. Vertical fenders could certainly be fitted to the pier face, and some mooring bollard and lines could be fitted to the pier top; this would be fairly straightforward. However, if a ferry were to berth on the outside of the pier it would be a challenge to embark and disembark passengers. A narrow opening in the parapet wall could be formed; this would normally remain closed with a storm-resistant steel door. When open, embarkation/ disembarkation would then take place across a lightweight/portable gangway landed on the ferry's main deck or upper deck according to the height of the tide[12].

It should be noted that even with a sill in place, the staircase in the pier's bullnose (Fig. 24 & Drawing 0006) would remain an option for the ferry to use at some states of the tide.

It might be a good idea to provide the ferry with an insurer-approved, bad weather layby mooring in the bay. Another possibility is to place a gravel drying pad on the seaward face of the pier as the Sark Shipping vessels are designed to take the ground.

Before considering these ideas any further, a detailed hydrographic survey needs to be carried out.

Fig. 25

4.7 Safety railings

It would be advisable to erect traditional cast-iron post and chain railings along the quay edge (similar in principle to Fig. 25).

[12] The gangway would be exceptionally light and very easily manhandled if made of carbon fibre instead of the customary aluminium.

5. The Incinerator & Waste Handling

5.1 The Incinerator

Many of the possibilities described in this report depend upon the incinerator and the other waste handling activities being relocated. The incinerator is thus the *critical path* item.

I understand that the desirability of moving the incinerator away from this site has been widely discussed and agreed. I also understand that an order for its replacement is imminent. If the replacement incinerator arrives this year, then well and good. But if not, I see no reason why the current incinerator should not be relocated inland; if necessary, it could be temporarily sheltered beneath a scaffold cladding.

5.2 Waste compaction

Fig. 26

Waste is currently being handled in loose form, which is inefficient. Nowadays it is customary at most establishments to use a compactor which compresses domestic waste by a factor of about 10:1 (Fig. 26). The pros and cons of compacting the waste before it is fed into the incinerator is something that needs to be discussed with the manufacturer of the incinerator. But in any event, compacting the waste as soon as it arrives on site would substantially reduce the space needed for storage, would reduce smell and rodent attack, and would make subsequent handling much easier.

5.3 Glass crushing

Fig. 27

Bottles are currently being crushed with a powered roller, which is an untidy, imprecise, and potentially hazardous procedure (Fig. 27).

I suggest procurement of a bottle crusher of which there are many types and sizes on the market (Fig. 28 shows a small one). This will reduce storage volume by a factor of about 5:1 and will discharge the finely crushed material into a bin or skip for convenient disposal.

This activity should be co-located with the new incinerator.

Fig. 28

5.4 Wood

Fig. 29

I was surprised to see to see a skip full of wood on Maseline pier, presumably destined for Guernsey (Fig. 29).

Handling and transporting waste wood to Guernsey in this way seems to me to be an unnecessary expense. Beneficial alternatives would be to sort the wood, cut it up, and sell it for firewood; or to feed it into a chipping machine to produce garden mulch.

This activity should be co-located with the new incinerator.

5.5 Other materials

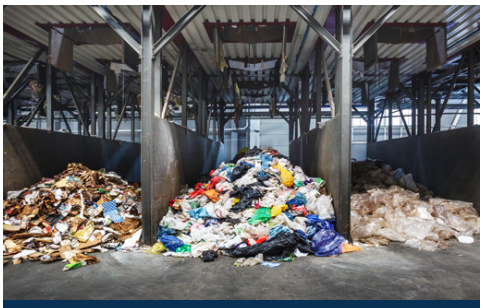


Fig. 30

Separate bins should be built for the storage of separated materials that cannot be incinerated or recycled on-Island and instead need to be shipped to Guernsey (Fig. 30). Such materials include steels, alloys, plastics, waste oils, and paints/chemicals in their containers.

This facility should be co-located with the new incinerator.

5.6 Re-purposing the incinerator site

Once the incinerator and waste handling operations have been relocated, the site can be re-purposed. I propose that the shed be used for the repair and maintenance of local boats and the rest of the site made available for the storage of local boats in winter (Drawing 0003).

If, as I recommend, trailer parking near the Maseline tunnel is to cease (see Section 6.1 below), it would be tempting to park the trailers on the existing incinerator site. In my opinion, however, it would be much better to park all trailers adjacent the new incinerator site. I see no reason why parking the trailers inland would result in any significant inconvenience for the tractor drivers. It would merely mean a change in operational procedures, but some changes would anyway come as a consequence of the new crane on Maseline pier and other improvements to cargo handling.

6. The Harbour Square

Fig. 31

For want of a better name, I refer to the area between Maseline Harbour and Creux Harbour as the Harbour Square.

6.1 Landscaping

The passenger arrival experience is blighted by the sight of trailers parked alongside the approach to the Maseline tunnel (Fig. 31). The trailers are not only an eyesore, but also a hazard to passers-by whenever the tractors are hitching and un-hitching. This area should, in my opinion, be landscaped (see Drawing 0003 and Illustration C). This newly landscaped area would be sufficiently spacious to later erect a customs and immigration office in the event that Maseline secures the desirable Port of Entry status.

Henceforth, all trailers should then be parked close to the site of the *new* incinerator site, or at some other inland site.

Note that if a travelling crane is installed on the pier there will be less of a rush to load and unload trailers, and I anticipate that fewer will be needed, especially if improved cargo handling arrangements are made (see Section 3.5). If necessary, cargo can remain on the pier for some time.

Fig. 32

6.2 The workshops

I understand that the chimney structure (Fig. 32) is redundant. Its removal would improve the appearance of the building. A further aesthetic improvement would result from erecting a fence to partially screen the workshop and its parking area. (See Drawing 0004.)

The eastern part of the main building is badly maintained and disorganised. It should be cleared out, the floor resurfaced and sealed with epoxy paint, and storage cages installed.

The western end of the building is currently almost empty, and I suggest this be used as a fishermen's store (Drawing 0004) to replace the sheds that I have proposed be removed from Creux Harbour. As with the eastern part of the building, it should be cleared out, the floor resurfaced and sealed with epoxy paint, and storage cages installed.

The front corner office is currently used for miscellaneous storage; these materials could be moved to the afore-mentioned storage cages. I suggest that this office then be re-purposed as a First Aid room (Drawing 0004).

6.3 Replacing the cafe

Fig. 33

The cafe (Fig. 33) serves an important purpose, but the building is unattractive (and we should remember that "first impressions count"), and the roof is in poor condition. I suggest the building be demolished and replaced with one that is primarily a waiting room (Illustration D), serving both arriving and departing passengers. It will supplement the capacity of the new waiting room at Maseline pier, and a CCTV showing a live picture of the pier will allow departing passengers to relax without fear of missing the boat!

The new building should incorporate a coffee bar; this would be particularly valuable when the proposed bistro at Creux Harbour is closed (as it may well be during low season).

6.4 The toilets

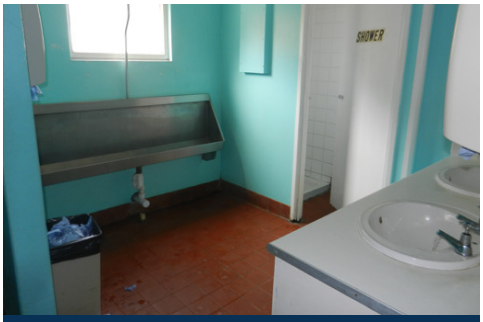


Fig. 34

The existing toilet and shower block is very disappointing in terms of both design and cleanliness (Fig. 34). The availability, design, and cleanliness of toilets is a core element of 'tourism quality'. It makes a huge impact on visitors and how they report back to friends and family.

I suggest that the toilets be totally gutted and re-built to a high standard. As far as I could ascertain, there is no need to include showers in the re-build (but see section 4.2 which remarks on showers and toilets for visiting yachtsmen).

7. Rockface Works

7.1 Previous study

A detailed study[13] was carried out in the late 1990s in the form of an MSc dissertation, and it covers all the areas with which we are concerned.

7.2 Safety

The study identifies areas of rockface needing attention for safety reasons (Fig. 35). These areas are much as one would expect.

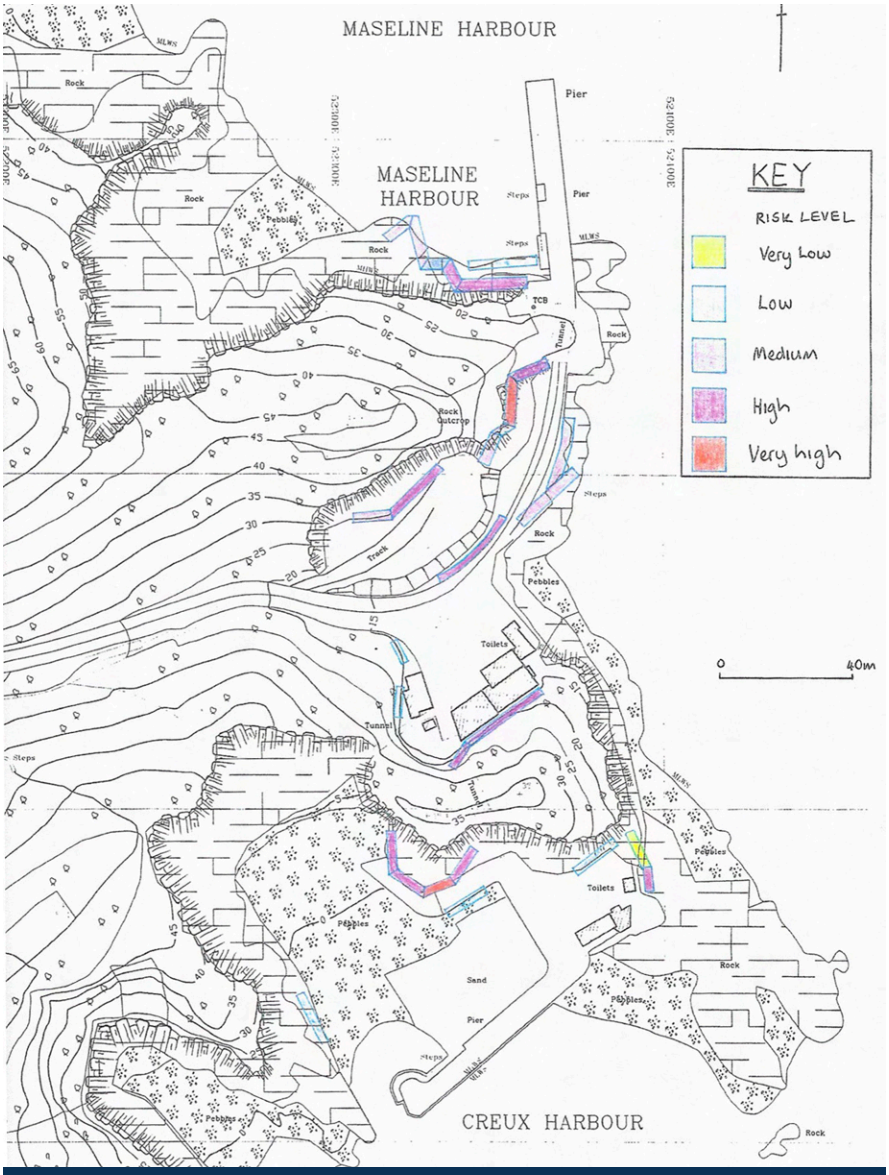


Fig. 35

[13] Rock Slope Stability Assessment of the Harbour Complex, Isle of Sark; Neil Humphris, Department of Civil Engineering, University of Newcastle-upon-Tyne. Thanks to SocSerqc for making this report and other material available.

8. Marina Development Opportunities

8.1 Feasibility

I have been asked whether or not it is possible to build a yacht marina. The answer, of course, is that anything is possible but the question is, can it be financially viable? Regrettably, the answer is *No*.

The number one rule of marina development is to find an area of water that is sheltered either by the hand of God, or by the works of a property developer. There is no such naturally sheltered water on Sark, and neither is there any likelihood that a property developer is going to build a waterfront village (the usual rationale for creating a marina).

Even if the funds were available to build the necessary breakwaters and other infrastructure, what would be the berthing demand? Assuming the population increased by 1,000 over today's figure, the number of persons wanting to own a yacht (as opposed to a small motorboats and RIBs) would probably not exceed 20 or so. Clearly, spending tens of millions of pounds to berth such a small number of boats is never going to happen.

As regards the ownership of small motorboats and RIBS, these can be kept on moorings (as now) or 'dry-sailed'. Dry-sailing means that the boats are stored at home or in a boat park, and when required are towed to the waterside and launched. Quite a large motorboat can pass through the tunnel, especially if the island were to invest in a modern boat trailer.

8.2 And if a marina had to be built?

Probably the only site that is even vaguely suitable from a technical perspective is Creux Harbour Bay.

The Northern Entrance option (Fig. 36)

This closes the south side of the bay with a rock breakwater stretching from Les Laches across to Les Burons, a distance of some 300m. Furthermore, the Goulet Passage would have to be semi-closed with wing-breakwaters to protect the marina from Northerly waves. But even then, I anticipate that wave energy entering the marina would very much limit the extent of the pontoon system.

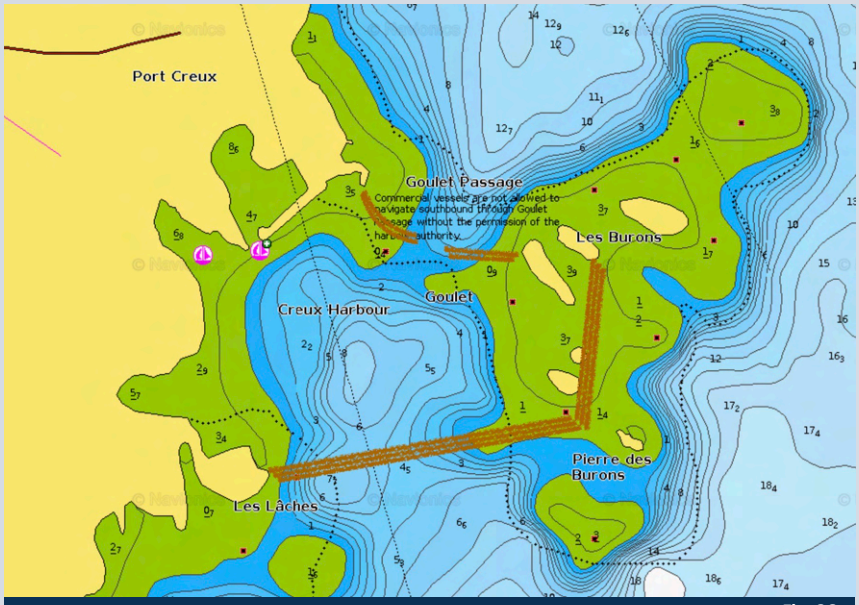


Fig. 36

The Southern Entrance option (Fig. 37)

This would probably provide a more sheltered solution for the pontoon system which, it is assumed, would spring off the pier.

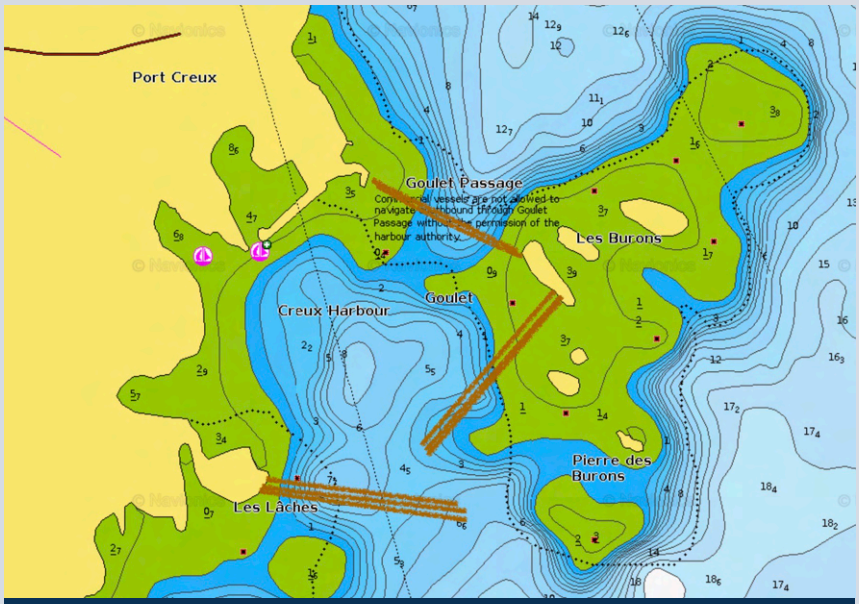


Fig. 37

These closures would have to be adequate enough to ensure that the maximum wave height inside the marina did not exceed the internationally accepted figure of 0.3m.

There is no good option, and certainly no financially viable option.

Both options would prevent the installation of a tidal turbine in Goulet Passage (see section 9.1).

9. Miscellaneous Matters

9.1 Tidal turbine

It occurs to me that the Goulet Passage is probably the best location on Sark in which to install a floating tidal energy convertor (also known as a tidal turbine). This would generate considerable electricity from the strong current that flows through this gap.

There are very few sites suitable for floating tidal turbines, but I think that this site may be suitable. Alderney had a scheme for installing turbines in The Race, but the challenges of that open sea site are an order of magnitude greater than those in the Goulet.

I understand that the previous owner of Sark Electricity did consider this many years ago. I further understand that an exploratory visit was made by people from Exeter University and from HydroWing Limited. Technology has moved on a lot since then and I suggest re-establishing contact.

9.2 Personnel transport to & from the harbours

The current generation of passenger trailers are un-sprung which results in extremely violent jolting, especially when the trailer is lightly loaded. I experienced this and, in my opinion, these jolts are not merely uncomfortable but potentially injurious to someone with a back condition, and this represents at best bad publicity and at worst a legal liability. I do not know if the trailers can be retrofitted with suspension but if not, then consideration should be given to their early replacement.

I have discussed the provision of waiting rooms in sections 3.6 and 6.3 above. But by contrast, there are no facilities at the top of Harbour Hill where people can wait for the ride down to the Harbours. The Bel Air Inn complex provides customer seating, but this is uncovered. One possibility would be to erect a canopy over the whole courtyard. It seems to me that this would benefit the Inn, the shop, and the Island's tourism product as a whole.

9.3 Port of entry

I understand that securing Port of Entry status had been discussed on previous occasions. This is surely critical to attracting visitors from France and so I support a fresh review of this subject.

10. Phasing the Works

Should the recommendations / suggestions / possibilities in this report be well received then the following phasing would seem appropriate. Design and procurement would be taking place in parallel to the physical works.

Phase	Description of physical works
1	[These activities can be started before relocation of the incinerator.] • Improvement to the eastern part of workshop building. • Prepare the western part of the workshop building for use as fishermen's store. • Prepare the front corner office as a First Aid room. • Refurbish the toilets. • Demolish the old fishermen's stores at Creux Harbour.
2	• Stabilisation of rock faces in this order: – Maseline waiting room area – Maseline tunnel approach – Creux Harbour east end – Portals to the 1588 tunnel – The incinerator site
3	After the incinerator is relocated: • Trailer parking ceases so as to allow the area near Maseline tunnel to be landscaped. • Incinerator shed re-purposed for boat R&M, and rest of site prepared for boat storage.
4	• Build Maseline waiting room • Build Harbour Square waiting room • Convert Creux Harbour building to a cafe/bistro • Build yachtsmen's showers & toilets at Creux Harbour
5	• Install sill to Creux Harbour basin • Install pontoon

Drawings

0001 Maseline harbour breakwater options

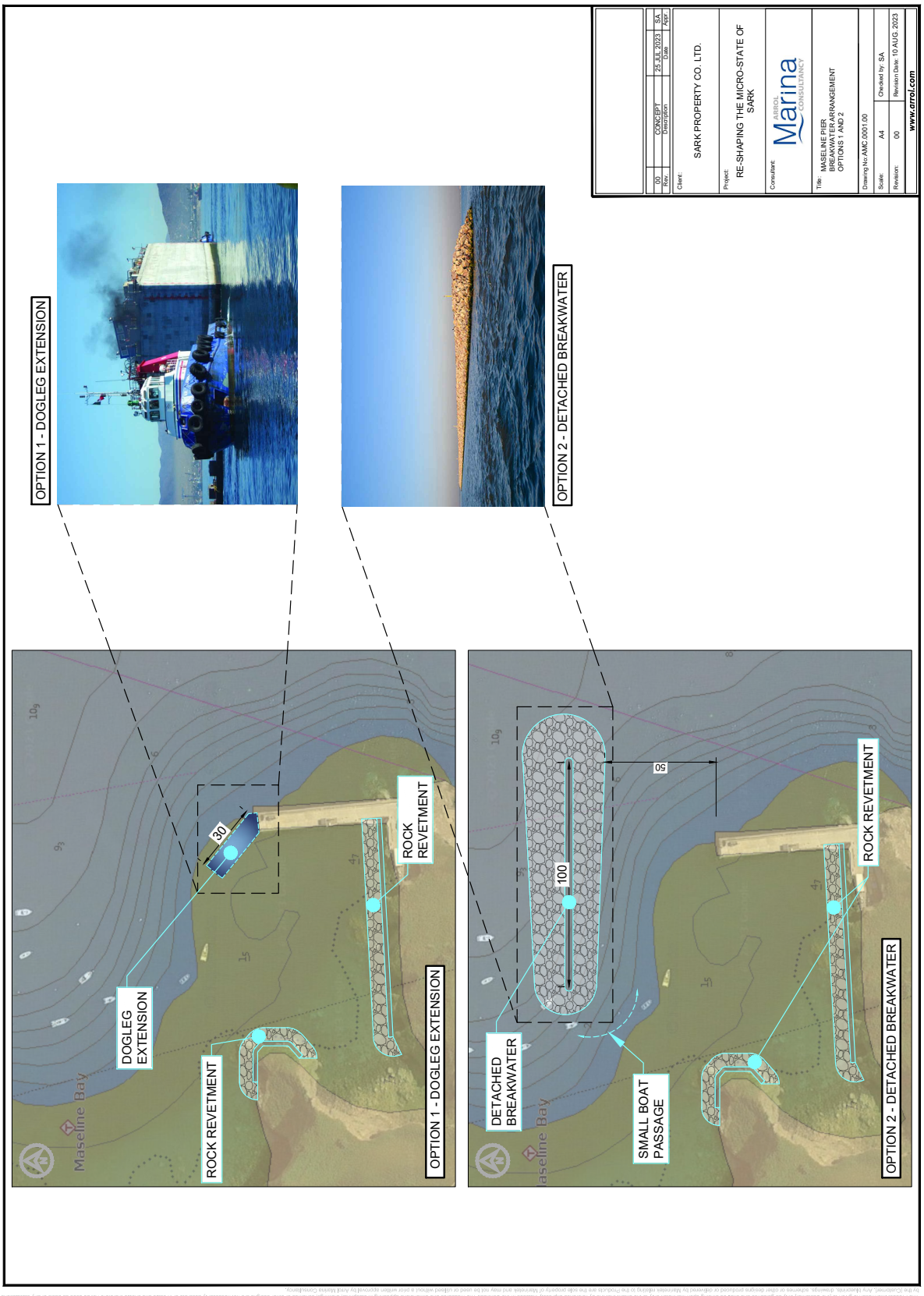
0002 to 0005 Possible harbour improvements

0006 Ferry berthing options in Creux Harbour

0007 Pontoon options in Creux Harbour

0008 Future berthing in Creux Harbour

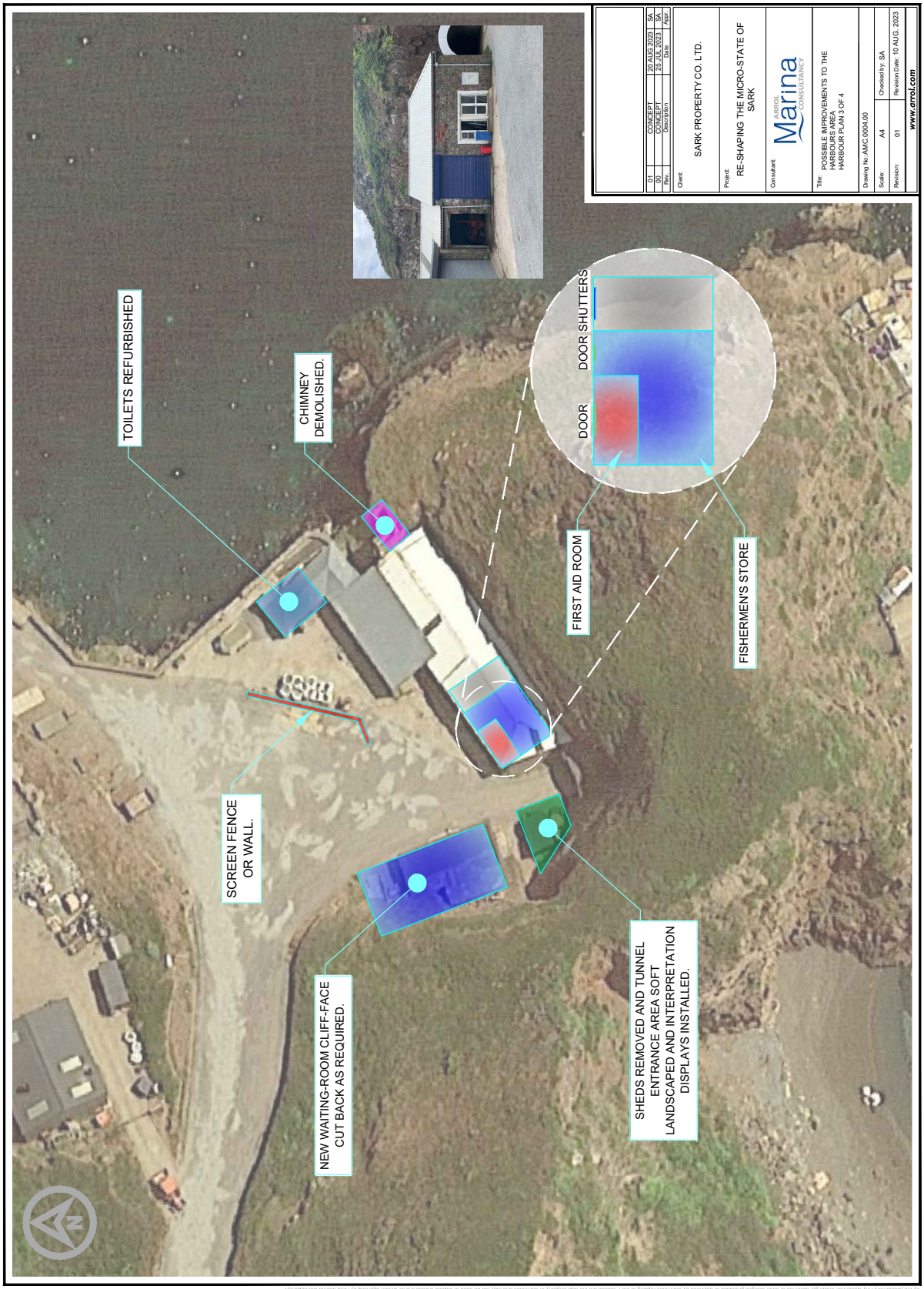
0001 – Maseline harbour breakwater options



0002 – Possible harbour improvements

0003 – Possible harbour improvements

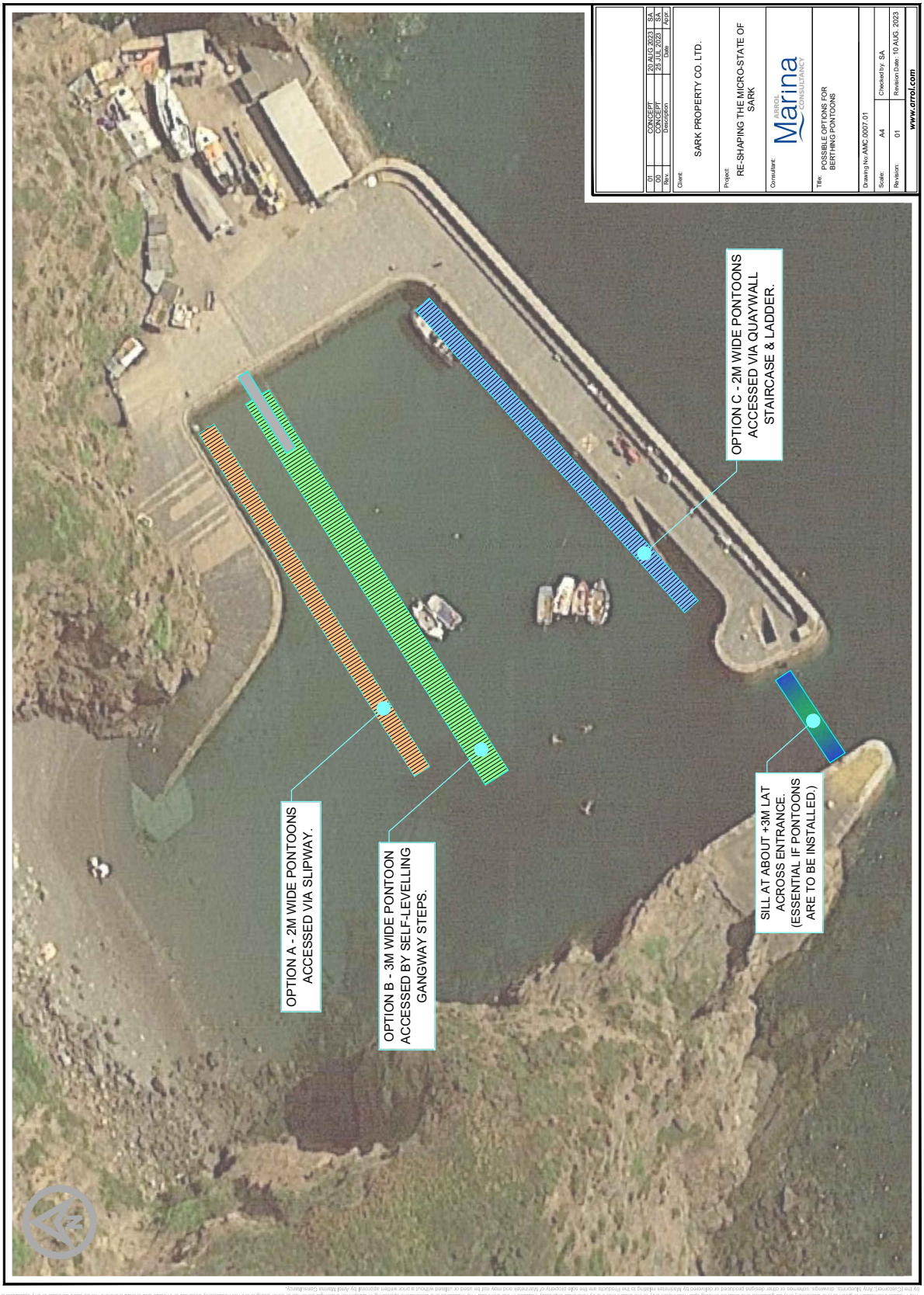
0004 – Possible harbour improvements



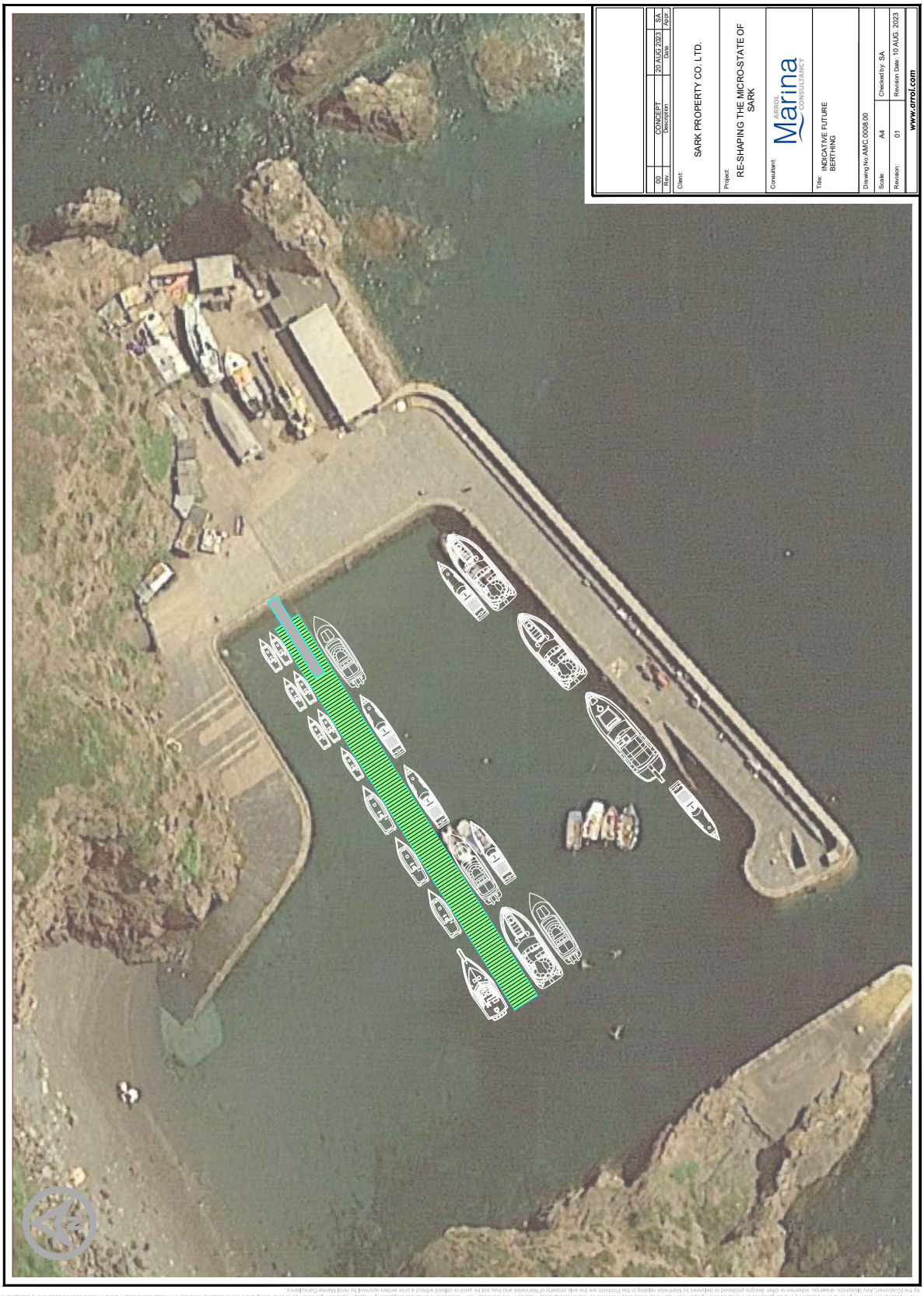
0005 – Possible harbour improvements

0006 – Ferry berthing options in Creux Harbour

0007 – Pontoon options in Creux Harbour



0008 – Future berthing in Creux Harbour



Illustrations

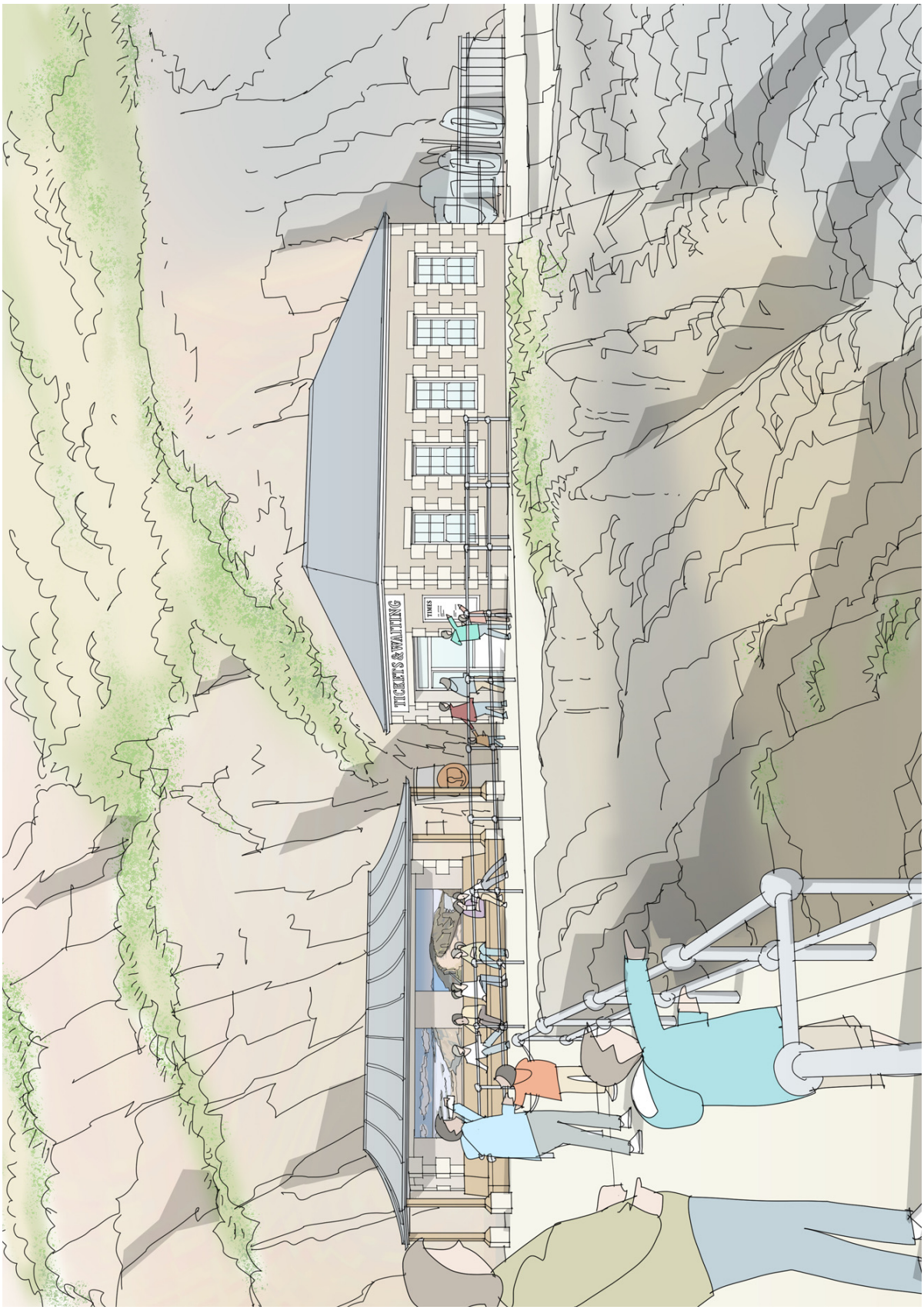
A. Maseline harbour ticket office & waiting room

B. Creux Harbour bistro

C. Maseline approach landscaping

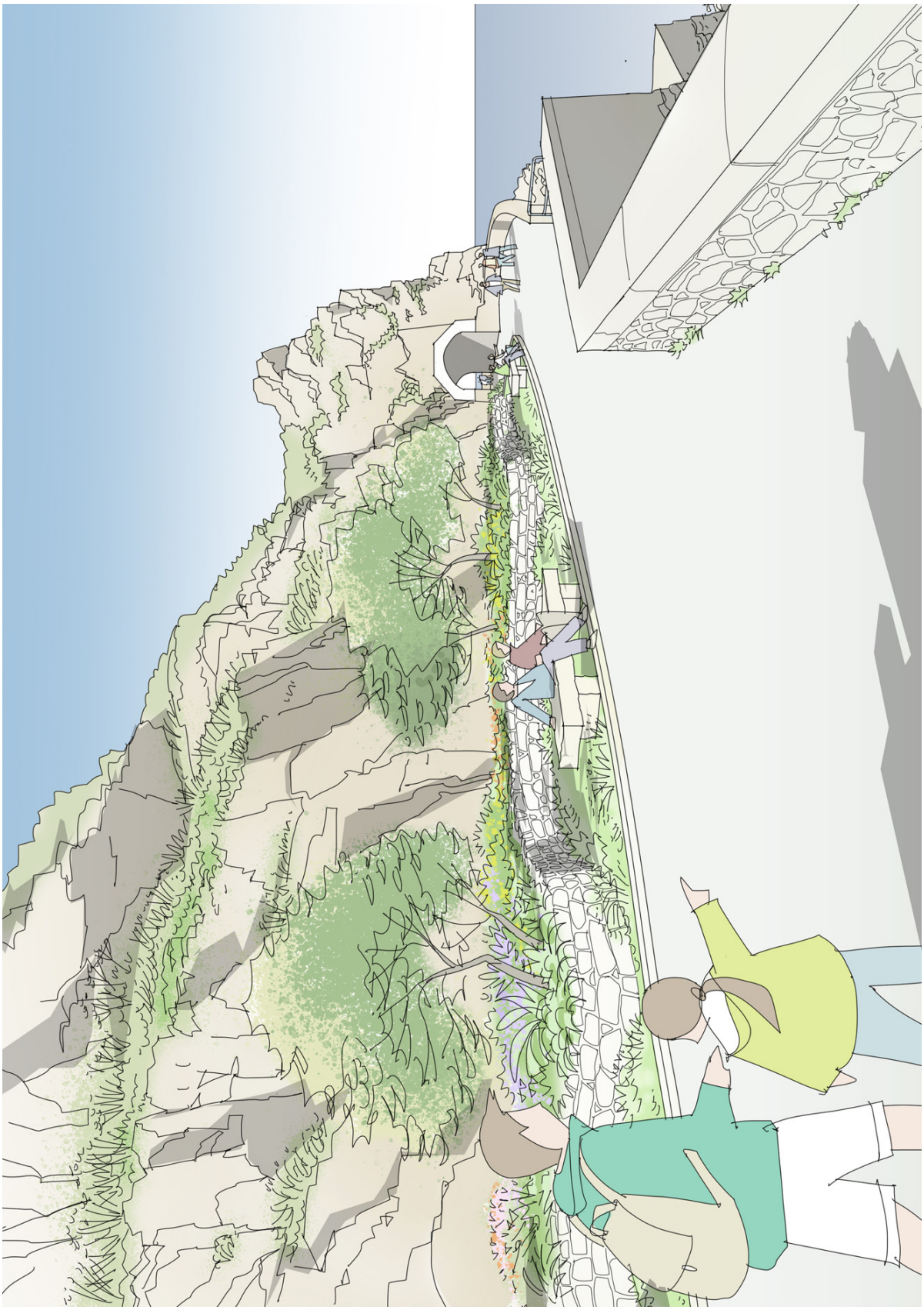
D. Harbour Square waiting room

A. Maseline harbour ticket office & waiting room

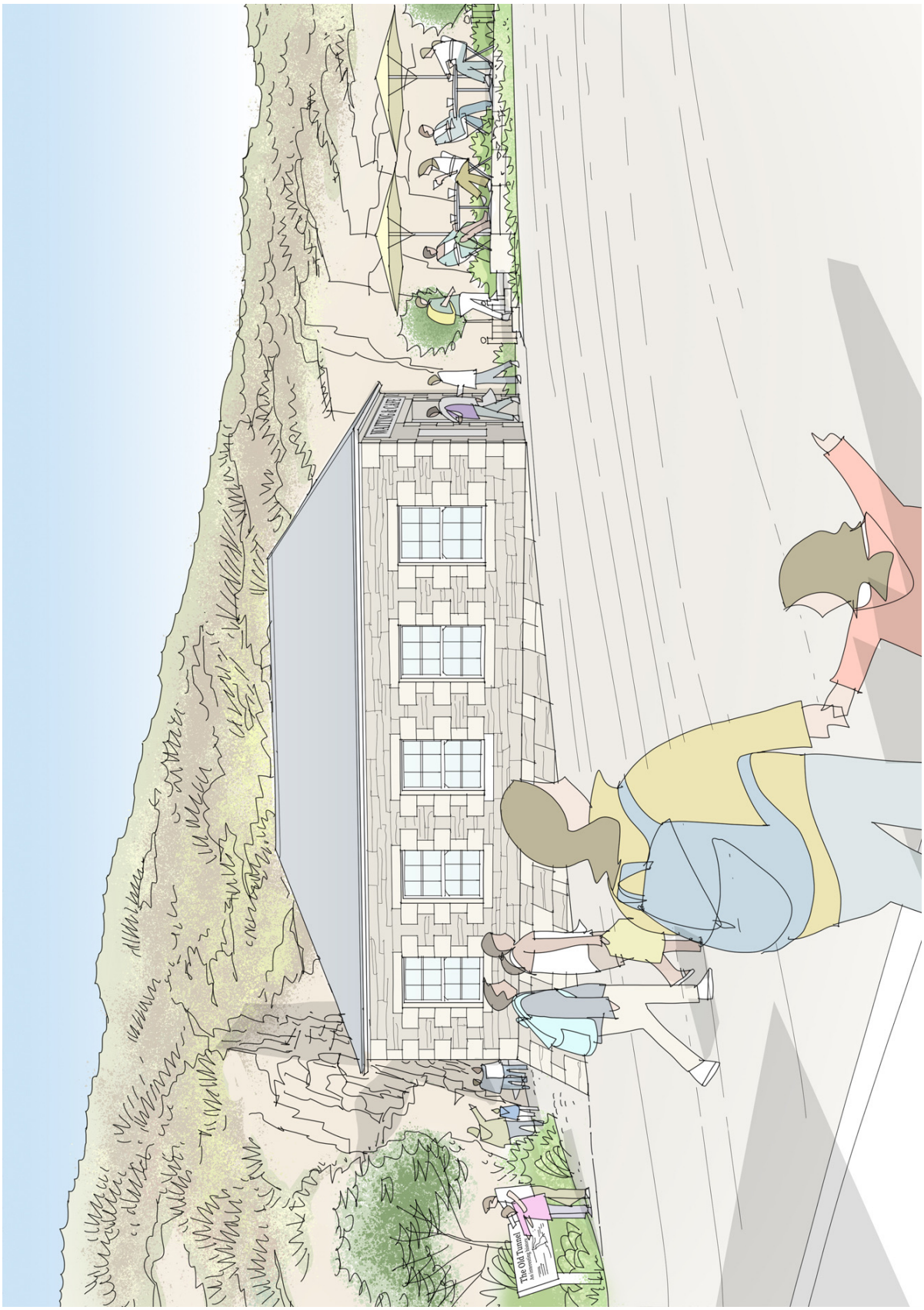


B. Creux Harbour bistro

C. Maseline approach landscaping



D. Harbour Square waiting room



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