

GALLOWAY'S SECRETS

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This South Western part of Scotland comprising the administrative region of Dumfries and Galloway is generally considered to be one of Scotland's best-kept secrets. It incorporates the former three counties of Dumfriesshire, the Stewartry of Kircudbright (pronounced Kir-coo-brie) and Wigtownshire and is a place where people have time for other people and where nothing is too much trouble. If you visit this lovely area you will come to appreciate the friendliness of the local people and like so many you will enjoy yourself and will not hesitate to come back again and again. The pace of life is easy and the towns and villages retain their distinctive character. There is plenty of space for all on the quiet roads and the open countryside.

I have noticed whilst on many of the RSARS nets when I exchange my location of DUMFRIES, many will break the normal net procedures and will comment that it is an area about which they know little and would like to pay a visit. But if any members have made a visit, it is likely that they have only got as far as Gretna Green where the weddings of runaways used to take place over the Anvil by the local Blacksmith. But very few say that they have turned left at Gretna Green if coming from the South or right if coming from the North to visit Bonnie Dumfries and Galloway. Most continue to head North on the M74 to Edinburgh and the North of Scotland. And I do not blame them – those areas of Scotland are also wonderful. But please, now that I have let you into one of the secrets of Dumfries and Galloway, the next time you reach Gretna Green, think about turning West and head along the A75 to this South Western part of Scotland. You will be surprised and probably learn even more secrets than you could anticipate. For instance it has been said that the small village of Garlieston in the former county of Wigtownshire, and its surrounding area, ranks along with Bletchley Park as one of the Top Secret locations during the last war. Indeed it is also said that the total work of the project, of which a part was carried out at Garlieston, ranks highly with the work carried out at Bletchley Park.

Let me explain further. This being the 60th Anniversary of the Normandy landings in June 1944, I had visited Northern France on three occasions between October 2003 and August 2004 and managed to inspect a considerable amount of the remains of the German built "Atlantic Wall". In particular I had a good look at the fortifications around Gold Juno Sword Omaha and Utah beaches. It was whilst wandering round Aromanches that I became most interested in the various remains of the Mulberry Harbour. I had remembered that when I was about aged 9 or 10, my uncle had gone to work on a secret project in the South West of Scotland. It was not until after the war that I discovered he had been working on certain parts of the Mulberry Harbour, which had been used in Normandy during the invasion of June 1944. Unfortunately my uncle is no longer with us and I couldn't question him but I determined nevertheless to find out about the works in which he was involved in South West Scotland during the build up to Normandy.

Although I have lived in Dumfries and Galloway for over 50 years, I had only heard the odd snippet that the small village of Garlieston in the former county of Wigtown and which I had visited over the years had been a secret location during the War and it had been involved in some way with the Mulberry Harbour project. I had never realised just how important that involvement had been until to day.

The Allies needed secure sheltered harbour facilities within days of the Normandy landings to supply their advancing forces. The Mulberry Harbours were designed to fill the gap until ports like Cherbourg were captured. How did they erect two harbours, each the size of Dover, in just a few days in wartime when Dover took 7 years in peacetime?

Background

When it came to ousting the Germans from their entrenched defensive positions along the 'Atlantic Wall,' planners knew that blockading and attack by air would not be sufficient. The Germans would defend their front lines with great vigour and only a large scale landing of men, materials and machines was up to the task. In the crucial days and weeks following the landing the Allies could ill afford any delays in supplying their advancing forces with munitions, provisions, and materials. From intelligence reports it was known that German forces would heavily defend French seaports and, in any event, the ports were liable to be disabled in the event of imminent Allied occupation. Planners also drew on the experience at Dieppe when it became clear that heavily defended ports could not be taken without crippling losses. The plans therefore envisaged a need to create secure harbour facilities away from heavily defended ports and close to the landing beaches.

The only certainty was that harbour facilities would need to be provided quickly where none existed. Conventional construction techniques required detailed ground and seabed survey information, precise building plans and the assembly of a construction force of thousands..... and all within easy range of enemy aircraft and long range guns. An impossible task under any circumstances but particularly so when the time available for the construction phase was measured in days! After Normandy was chosen as the location for the 2nd front, the decision to design and construct artificial harbours in the relative safety of the UK mainland was agreed but, it must be said, with misgivings especially on the part of some American top brass.

The Concept

In 1917 Churchill drafted detailed plans for the capture of two islands, Borkum and Sylt, which lay off the Dutch and Danish coasts. He envisaged using a number of flat-bottomed barges or caissons measuring 37m x 23m x 12m, which would form the basis of an artificial harbour when lowered to the seabed and filled with sand. Events moved on and Churchill's proposal was filed away and was never published.

In 1941, Hugh Iorys Hughes, a quiet unassuming Welshman from North Wales had similar ideas. He was a successful civil engineer living in London when he submitted plans to the War Office. Their potential value was not recognised until Hughes' brother, a Commander in the Royal Navy, drew the plan to the attention of more senior officers. This intervention brought Hughes and his ideas to the fore. It was to be the beginning of a long association with the Mulberry project.

Other accounts credit Professor J D Bernal with similar ideas expanded upon by Brigadier Bruce White who later helped draw up plans for the final design. It is not possible to say that the idea was the property of any one individual no more than the

invention of the internal combustion engine can be attributed a single person... but all of the above cast themselves as major players in the story of Mulberry Harbours.

Preparations

Early in 1941 a new department within the War Office was set up code named 'Transportation 5' (Tn5) under Major General D J McMullen. It had responsibility for port engineering, repairs and maintenance. The Mulberry project and the need to construct sufficient embarkation points on the shores of the UK, soon became its top priorities. Under the command of civil engineer Bruce White their first project was to construct two military ports in the Clyde estuary one of which was the Gare Loch.

There were many meetings with the Americans about the options to provide sheltered harbours.... sunken ships, concrete caissons, concrete pontoons, collapsible canvas floating barriers and Pykrete to name but some. There was scepticism on both sides of the Atlantic and some believed that Mulberry was even more fanciful an idea than Pykrete! To overcome the doubters in the ranks of the high-powered entourage, accompanying him to an important meeting in Quebec aboard the Queen Mary, Mountbatten called them to a meeting in one of the ship's bathrooms! There they saw a partially filled bath, 40 or so ships made out of newspaper and a Mae West lifebelt.

Half the 'fleet' was placed in the bath and the most Junior officer present in the crowded bathroom, Lt Cmd Grant of the RN, was asked to make waves with the back of a brush. In no time the vessels sank. The demonstration was run again this time with the fleet floating inside the Mae West. To the immortal command "More waves please Lieutenant Grant" the heavily braided onlookers saw that all the vessels survived.

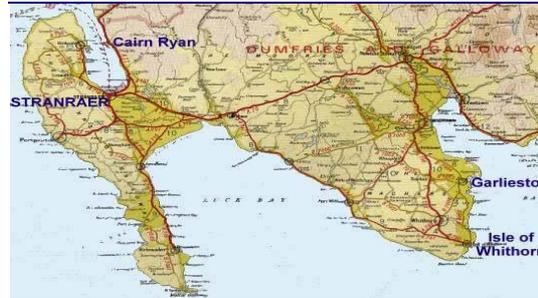
One USA sceptic, Admiral John Leslie Hall Jr., US Navy Commander, was scathing of the idea, predicting that the Mulberries would never stand up to the rigours of the English Channel and, in any event, he could unload 1000 LSTs at a time on open beaches... more than enough to supply the advancing Allied forces. His prediction was, at least in part, later proved to be correct in the case of Mulberry A (details below). But the balance of opinion was in favour of the project and approval was given to proceed. The task of progressing the idea was given to Mountbatten's Combined Operations. He soon realised, however, that the resources needed were way beyond those of his command and he contracted out the operational aspects to the War Department.

The Prototypes

Three designs were selected for further evaluation. The first from the War Office was for flexible steel bridges on pontoons of steel or concrete with pier-head units on adjustable legs to take account of the tides. The second from the Admiralty was a flexible floating construction of timber and canvas held together with steel cables and similar in appearance to a Swiss Roll in its stored condition. The third from Iorvis Hughes envisaged the use of steel bridges to be mounted on concrete caissons and

floated to the sites and sunk in position. Initially none were to be protected by breakwaters.

The search was on for 'test' beaches with characteristics similar to those off Normandy - flat, sandy, remote and sparsely populated to ensure an effective security cordon. After exhaustive surveys, Wigtown Bay on the Scottish side of the Solway Firth with its nearby harbour of Garlieston, was chosen.



The whole area from Garlieston to the Isle of Whithorn (not an island!) was declared off limits to all except local fishermen. Work started on the construction of a military camp at Cairnhead to accommodate the increasing numbers of engineering personnel (Sappers) with an additional 200 men being accommodated in the village hall in Garlieston.

The prototypes were constructed at "the Morfa," Conwy in North Wales where over 1000 local and outside labour was drafted in for the purpose. The Morfa area was transformed into a huge construction site. Hughes' three 'Hippo' caissons were towed to the site in Rigg Bay near Garlieston. Two 'Croc' roadways were attached to the metal bars on the Hippos and various combinations were tested in a variety of weather and tidal conditions including the driving of fully laden vehicles across the roadway. The testing proved invaluable since the behaviour of the components could be analysed and corrective action taken where necessary. One such problem was that the floating piers did not rise and fall with the tide as predicted but Hughes found a solution in the provision of adjustable spans between the Hippos and the roadway. A more serious problem was the unexpected pitching and yawing of the Hippos causing the attached Croc roadways to buckle. Hughes proposed the construction of Hippos of diminishing size on which the roadways would sit.

Hughes' design was not alone in experiencing problems. When the 'Swiss Roll' roadway was tested with a 3-ton tipper truck the roadway sank in under two hours. Adjustments were made but further tests in the open sea confirmed that the heaviest load that could be carried was 7 tons - far below what was necessary for the movement of tanks. The Swiss Roll roadway design was soon abandoned.

Churchill's memo of 30th May 1942 to Lord Mountbatten:

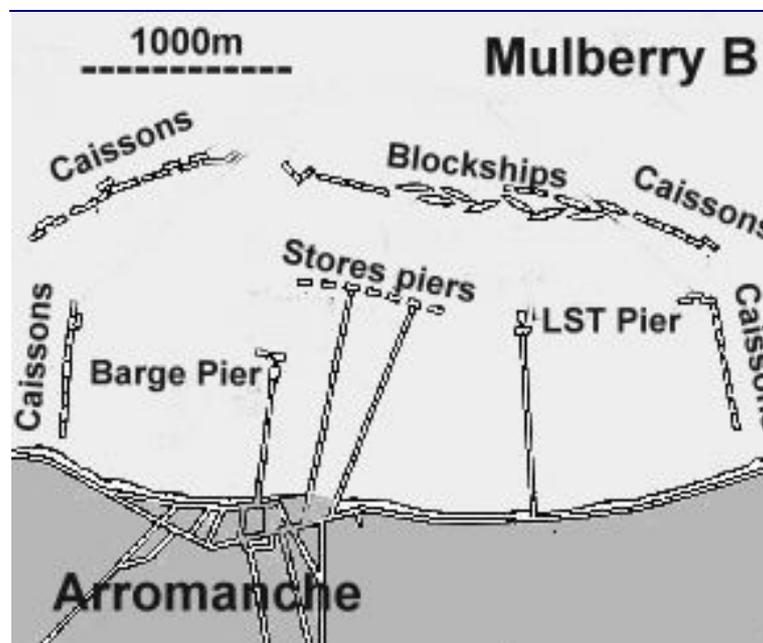
"**Piers for use on beaches.** They must float up and down with the tide. The anchor problem must be mastered. Let me have the best solution worked out. Don't argue the matter. The difficulties will argue for themselves."

I have been a Chartered Surveyor for over 50 years and I cannot remember seeing such a complete and concise specification for such a huge project than that memo from Churchill.

Progress at first was slow as discussions on competing ideas by the many interested parties were considered. Churchill was irritated by the apparent lack of progress and penned a number of increasingly irate messages culminating in the following on the 10 Mar 1943. "This matter is being much neglected. Dilatory experiments with varying types and patterns have resulted in us having nothing. It is now nearly six months since I urged the construction of several miles of pier." Some organisational changes were made to "get a grip" on the project.

These early designs did not envisage protective breakwaters but it became clear that an area of calm water would be required.. In addition to the breakwaters included in the final plans consideration was also give to "bubble breaker" and "lilo".... the former involved pumping high pressure air along perforated pipelines causing a large volume of compressible air in the sea sufficient to absorb the power of heavy breakers. The latter were large canvas bags extending some 4m below the waves and 3m above. They were inflated to low pressure and operated on a similar basis to the bubble breaker in that they would absorb the power of the waves by allowing the air they contained to be compressed.

On conclusion of the tests a final design was decided upon. There would be two harbours each comprising two breakwaters, offshore and flanking, made from hollow ferro-concrete caissons based on Hughs' Hippo designs. To provide extra protection 70 obsolete merchant and navy vessels (block-ships) would be sunk to fill gaps in the protection provided by the caissons. Inside the resultant protective cordons there would be pier-heads connected to the shore by floating steel roadways. In view of Iorys Hughes' commitment to the project and expertise he was invited by Churchill to serve the project as a consultant.



Final Specification

Mountbatten's ideal specification was for a pier a mile long that could withstand gale force winds and be capable of berthing large coasters. To do this the artificial harbours would need to provide sheltered conditions and be larger than the port of Dover, which had taken 7 years to build in peacetime! Within the sheltered areas stable-floating quays would be located some distance from the beaches to provide sufficient water depth (6.7 meters) for the docking vessels. These quays would be linked to the beaches by floating roadways to allow the discharged goods and equipment to be transported ashore in fleets of lorries. Two harbours would be required - Mulberry A for the USA beaches of Omaha and Utah and Mulberry B for the British and Canadian beaches of Gold, Juno and Sword. The designs would allow for the floating caissons to be secured in place in four days. Each harbour would have a capacity of 7000 tons of vehicles and supplies per day.

For security reasons randomly selected codes were used to describe the various components of the two Mulberry Harbours viz..

Breakwaters

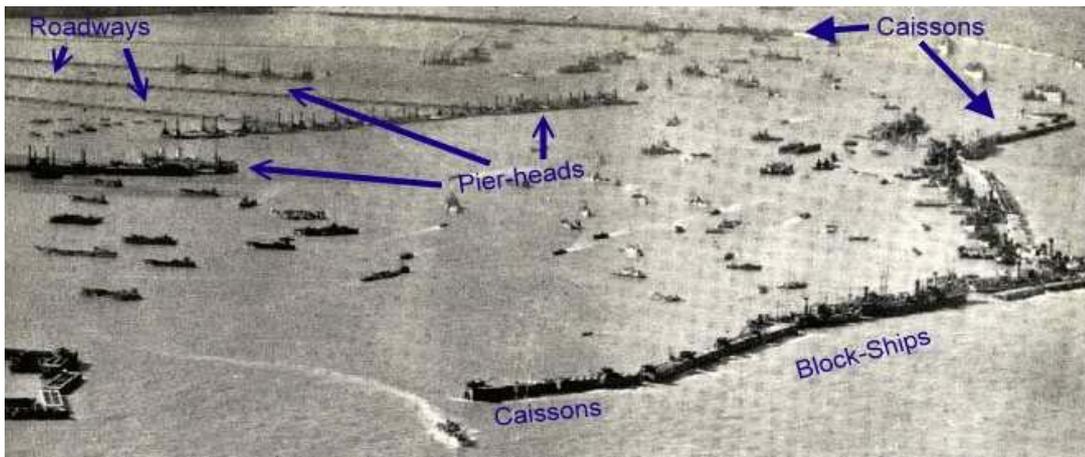
- **Bombardons** - floating breakwaters comprising huge, metal, crucifix shaped structures ballasted and firmly anchored in place. They were the outermost barrier and therefore the first line of defence against rough seas.
- **Phoenexes** - 146 concrete caissons 60 metres long, 18 metres high and 15 metres wide making up 9.5 kilometres of breakwater. They were airtight floating cases open at the bottom with air-cocks to lower them to the seabed in a controlled fashion. Around 2 million tons of steel and concrete were used in their construction.
- **Gooseberries** - 70 obsolete merchant vessels (block ships) were amassed at Oban on the west coast of Scotland, stripped down, ballasted and primed with explosive scuttling charges. The vessels sailed under their own steam and were sunk in 5 locations including the 2 Mulberry harbours.

Pierheads

- **Pierheads** were located at the seaward end of the roadways. Each stood on four legs called (Spuds) with a platform that could be raised and lowered with the tide by means of electric winches. 23 were planned for of which 8 were spares.

Roadways

- **Beetles** - concrete and steel floats or pontoons to support the roadways. Each capable of taking the weight of 56 tons + 25 tons (being the weight of a tank).
- **Whales** - 16 kilometres of roadways.
- **Buffer** - approach span from the floating roadway to beach.
- **Rhino** - power driven pontoon on which cargo was brought ashore. The final configuration of all these units when assembled and positioned can be seen in the following photograph although the Bombardons were too far out to be here



Intelligence Gathering

The success of the operation would depend on accurate and detailed topographical information about the beaches and coastal towns along the French coast. Aerial photographs helped identify likely locations but, to obtain more detailed views, the Government appealed to the public for holiday photographs and postcards of unspecified coastal areas of France. However much more detailed information on the target beaches and their approaches was required. Local conditions such as the composition of the beaches, hidden underwater banks, German defensive obstacles, depth of water, tidal conditions etc would all be taken into account in the planning of the project. The stakes were very high - bad intelligence could jeopardise the whole vast project.... there was no room for error.

On New Year's eve 1943, under the leadership of 24-year-old Major Logan Scott Bowden of the Royal Engineers, a unit set out in motor torpedo boats to reconnoitre the area around Luc-sur-Mer. They transferred to a hydrographical survey craft and moved closer to shore before Major Logan and Sgt Bruce Ogden-Smith swam to the beaches where they took samples of sand, mud, peat and gravel which they stored in labelled tubes. They were careful not to leave behind any evidence of their visit lest the Germans became alerted to their clandestine activities - much of their lateral movement along the beaches was below the tidemark! Their mission was a total success.

A month or so later, this time using a midget submarine for transport (towed part of the way), the area to the west of Port-en-Bessin and Vierville was visited and a few weeks later the Omaha beach area. Two scale models of the landing beaches were prepared using all the information gathered. One was held by the War Department in room 474 of the Great Metropole Hotel in London and a duplicate in the Prime Minister's room in the War Cabinet Offices - two of the most secret rooms in the country.

At Cairnryan, just north of Stranraer in southwest Scotland, the information gathered about the beaches was used to construct a "life size" reproduction of the beaches. This

would allow the planners to assess the effectiveness of the current landing techniques and the movement of men and machinery over the terrain. To-day Cairnryan and Stranraer comprise the main Ferry links from Scotland to Ireland and many of the old wartime relicts can still be seen on the shores of Loch Ryan.

The Manufacturing Process

The scale of the project was enormous and was in danger of over-stretching the capacity of the UK's civil engineering industry. From late summer of 1943 onwards three hundred firms were recruited from around the country employing 40,000 to 45,000 personnel at the peak. Men from trades and backgrounds not associated with the construction industry were drafted in and given crash courses appropriate to their work. Their task was to construct 212 caissons ranging from 1672 tons to 6044 tons, 23 pier-heads and 10 miles of floating roadway.

Most of the concrete caissons were manufactured on the River Thames and the River Clyde in some cases using hastily constructed dry docks. The steel "Beetle" floats were assembled in Richborough, Kent, the concrete Beetles at Southsea, Marchward and Southampton and the pier-heads and buffer ramps at the Morfa site Hughes had used for the manufacture of his Hippo caissons. Trials continued to be run in the Garlieston area of the Solway, even during the manufacturing phase, on for example, the buffers.

Hughes involvement continued throughout the manufacturing period and beyond. He helped identify Selsey and Dungeness on the south coast of England as ideal places to "park" the completed caissons until needed.

There were tensions between the War Office and the Admiralty, which sometimes resulted in poor co-operation and bad communications. After earlier allocations of responsibility had failed to resolve matters the War Office was tasked to design the caissons and oversee the development of the pier-heads and piers while the Admiralty were tasked to design and oversee the development of the floating breakwaters. This agreement was later refined to take account of continued Admiralty concerns about the berthing and navigation guides and it was therefore agreed that they would be responsible for the towing all the components across the channel, the layout and positioning of the harbours and the navigational channels and moorings.

D-Day +

A large number of British and USA tugs were requisitioned to tow the Mulberries from their assembly point near Lee-on-Solent to France. Operation Corncob got underway when the first of the tugs set off on June 4 later to hold their position in mid channel when D-Day was delayed by a day. When the invasion finally got underway most caissons were positioned about 5 miles off the French coast.

Responsibility for Mulberry B off Aromanches fell to the No 1 Port Construction and Repair Group. They received orders to sail on June 6 1944 (pm) and by the early hours of June 7, under the command of Lt Col Mais, markers were in place at high tide level and on higher ground, for alignment purposes, for the first two piers. Elsewhere further out to sea marker buoys for the caissons and block ships were

positioned under the command of Lt Col Landsdowne of the RN. This done the block-ships slipped their moorings in Poole harbour and sailed for France on their final voyages. Scuttling them in pre-determined 'overlapping' positions was a tricky operation but essential to ensure effective protection against high seas and fast flowing tides.

Similar operations were in progress at Mulberry A off Vierville-Saint-Laurent but here the vessels came under heavy enemy fire. The tugs, which had accompanied the vessels, and which were to assist in their final positioning, dispersed earlier than planned. By a stroke of good fortune the 2nd and 3rd block-ships were sunk by the Germans in roughly the correct positions. In all 5 Gooseberries were positioned to provide the best protection for the two Mulberry harbours and for other beach landing points at Utah, Courseulles, 11k east of Arromanche, and Ouistreham. These breakwaters provided a good measure of protection during and after the construction of the 2 Mulberry harbours and in the other beach locations. The UTAH beach was a major logistical supply base for the Americans up to November '44 thanks to the protection afforded by its 'Goosberry.'

The Bombardons were towed out on June 6 to their moorings, which had been laid previously by boom laying craft. However a mistaken order resulted in the Bombardons being placed in water some 20m to 24m deep rather than the designed 13m and they were strung out in a single line when there should have been a double line. The effectiveness of this outer barrier had been compromised.

On D+1 the caissons, each with a 4 man crew, two sailors and an anti-aircraft gun emplacement, were towed to positions about a mile off-shore and handed over to a fleet of powerful harbour tugs which manoeuvred them into their final positions. The caissons' sea valves were opened until they settled at previously agreed depths. Each Mulberry was about a mile long and stood about 30 ft (9m) above sea level at low tide and 10 ft (3m) at high tide. The block-ships at Mulberry B were all in position by June 13th and formed two crescent shaped harbours, which accommodated 75 Liberty ships and small craft.

The installation of the stores and LST piers proved to be more of a problem. The tows began to arrive at Mulberry B on D+4 and work continued throughout the night. Choppy seas made the manoeuvring of the bridging spans very difficult. By D+8 the stores pier and roadway amounting to 1.2k was in place and operational. The 2nd stores pier was operational by July 8. It was later discovered that the Beetle floats to support the roadway had been positioned in an alternate pattern rather than opposite each other as the design intended. This proved to be a costly error when consequential stability problems were experienced. The Luftwaffe attacked Mulberry B on July 15 but such were the defences that 9 of the 12 Messerschmitts were shot down.

Mulberry A was in use for less than 10 days when it was severely damaged by the worst period of sustained severe weather for 40 years. Out of 31 caissons laid in position 21 were damaged beyond repair with broken backs and sides. Mulberry A was never used again and parts of it were scavenged to repair damage to Mulberry B. The Americans quickly reverted to the traditional methods of unloading from landing craft and DUKWs directly onto the beaches often coming in on one tide and leaving

on the next. Such was their success that on occasions they exceeded the impressive performance achieved at Mulberry B.

Each day around 9000 tons were landed via Mulberry B until the end of August by which time Cherbourg port became available for use at least in part and, towards the end of the year, after the capture of Walchern, the port of Antwerp. Mulberry B was in use for 5 months during which time over 2 million men, half a million vehicles and 4 million tons of supplies passed through the harbour. During this period several additional caissons were used to reinforce weak points in the breakwater.

The Mulberry project was for certain a great feat of engineering - a highly complex task completed in just 6 months of manufacture, by hundreds of contractors in dozens of locations, under wartime conditions and a serious shortage of skilled labour. The planners were heavily influenced by the paramount need to secure the Allied supply line since the invasion would otherwise stall and collapse as the enemy regrouped and drew on their reserves. There are those who believe that Mulberry was unnecessary as exemplified by the Americans success in landing supplies directly onto the beaches after the abandonment of Mulberry A. We'll never know, with any degree of certainty, what would have happened had Mulberry never been built... and that for many is all the justification needed for the planners' decision to authorise the project.

With the exception of those who were there in the summer of 1944, I can find nothing similar that allows one to imagine the vastness of the operation and the absolute necessity to move men, supplies, munitions and equipment to the right place at the right time. Even the logistics faced by the largest supermarket chains today pale into insignificance when compared to the task faced by the planners in the early 1940s. They faced an awesome responsibility and the wider world faced dire consequences in the event of failure to deliver.

The Supermarket scenario offers an opportunity to put the scale of the task into a modern context. It has been calculated that each serviceman needed 6.5lb (3Kg) per day to sustain him in the field. On this basis 1000 men needed around 2.5 tons, 100,000 needed 250 tons and 1,000,000 2,500 tons per day!. As the size of the invading force grew so did the daily demand for supplies. Then there were the lorries, tanks, artillery pieces, ammunition, military field hospitals, mobile radar and communications units etc etc. all of which had to be transported across the channel. Over 4,000 vessels plied the waters between the UK and Normandy from D-Day and the contribution of Mulberry B in speeding up the operation and securing the supply chain in adverse weather conditions, is beyond question. The majority of vessels in use were not capable of beach landings.

After the war at the Nuremberg trials, Albert Speer gave the enemy perspective on the Mulberry Harbours and their Atlantic Wall defences. "To construct our defences we had in two years used some 13 million cubic meters of concrete and 1.5 million tons of steel. A fortnight after the landings by the enemy, this costly effort was brought to nothing because of an idea of simple genius. As we know now, the invasion forces **brought** their own harbours, and built, at Arromanches and Omaha, on unprotected coast, the necessary landing ramps."

The following photographs are of Aromanches to day, the top one looking east, courtesy of Nigel Stewart, and the bottom one looking west.



To conclude, let me tell you about the village of Garlieston which was highlighted throughout the above article. Garlieston is a small port on the east coast of The Machars in the former county of Wigtownshire with its origins dating back to the 1780s when Lord Garlies planned and built a small port on the sheltered shores of what later became known as Garlieston Bay. By 1800 Garlieston had grown to become home to 500 people and port to 10 trading vessels. A pier was built to expand the harbour's capacity in 1816. Local industry expanded to include the production of sailcloth and ropes, and shipbuilding also took place. At the start of the 1900s Garlieston Harbour's rail connection meant that special excursions could arrive on the quayside, allowing passengers easy access to steamers bound for the Isle of Man. However, the railway closed in 1950, but the excursions to the Isle of Man had already ceased in the 1930s. In more recent years Garlieston has become less significant as a commercial port but it remains an important centre for yachting and other leisure craft and today the village's main role is as a resort and to this end the area between the south of the village and the harbour now has an attractive and conveniently located Caravan Club site. In addition you will find an excellent exhibition entitled "GARLIESTON'S SECRET WAR". The exhibition is in its

second year and runs from 10 April – September 30th 2004 in the Forteviot Hall, Garlieston. It will be running again in 2005, but the organisers hope to have a more permanent location for the exhibition than the local Church Hall used for the exhibition at the moment. The exhibition includes photographs and commentary highlighting Garlieston's role in the Mulberry Harbour development. It includes an excellent model of a Mulberry harbour and there is also a video presentation featuring the Mulberry Harbours and D-Day together with books and souvenirs for sale. Admission is £2 for adults (children and concessions £1.50) or family £4.

So the next time any members are thinking of a visit to Scotland, or indeed already reside within Scotland, why not take that turning off the M74 at Gretna Green and head West to discover more of Scotland's best-kept secrets.