Schull Harbour Development, Schull, Co. Cork

Harbour Development Foreshore Design Report

Date: 23 September 2011
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Client: Schull Community Harbour Development Company
## Report Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 Introduction</td>
<td>3</td>
</tr>
<tr>
<td>2.0 Rubble Mound Breakwater Design</td>
<td>4</td>
</tr>
<tr>
<td>2.1 Introduction</td>
<td>4</td>
</tr>
<tr>
<td>2.2 Hydrodynamic Environment</td>
<td>4</td>
</tr>
<tr>
<td>2.3 Breakwater Design</td>
<td>6</td>
</tr>
<tr>
<td>2.4 Geotechnical Design</td>
<td>7</td>
</tr>
<tr>
<td>3.0 Commercial and Fisheries Development</td>
<td>11</td>
</tr>
<tr>
<td>3.1 Introduction</td>
<td>11</td>
</tr>
<tr>
<td>3.2 Need for the Development</td>
<td>11</td>
</tr>
<tr>
<td>3.3 Proposed Works</td>
<td>12</td>
</tr>
<tr>
<td>3.4 Pontoon Layout &amp; Protection</td>
<td>13</td>
</tr>
<tr>
<td>3.5 Pontoon Access</td>
<td>14</td>
</tr>
<tr>
<td>3.6 Anchoring System</td>
<td>14</td>
</tr>
<tr>
<td>3.7 Water Depths</td>
<td>14</td>
</tr>
<tr>
<td>3.8 Services</td>
<td>14</td>
</tr>
<tr>
<td>4.0 Marine Leisure Development</td>
<td>16</td>
</tr>
<tr>
<td>4.1 Introduction</td>
<td>16</td>
</tr>
<tr>
<td>4.2 Marina Berth Type/Size Demand Analysis</td>
<td>16</td>
</tr>
<tr>
<td>4.3 Marina Berth Design Information</td>
<td>17</td>
</tr>
<tr>
<td>4.4 Marina Layout &amp; Protection</td>
<td>18</td>
</tr>
<tr>
<td>4.5 Marina Access</td>
<td>19</td>
</tr>
<tr>
<td>4.6 Pontoon &amp; Anchorage System</td>
<td>19</td>
</tr>
<tr>
<td>4.7 Marina Water Depths</td>
<td>19</td>
</tr>
<tr>
<td>4.8 Marina Facilities &amp; Services</td>
<td>20</td>
</tr>
<tr>
<td>4.9 Landside Facilities</td>
<td>22</td>
</tr>
<tr>
<td>4.10 Navigation &amp; Existing Moorings</td>
<td>23</td>
</tr>
<tr>
<td>References</td>
<td>24</td>
</tr>
<tr>
<td>Appendices</td>
<td>25</td>
</tr>
</tbody>
</table>

### Revision Control Table & Document History Record

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
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</table>

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1.0 Introduction

Schull Harbour is a south facing inlet on the Mizen Peninsula, approximately 85km south west of Cork City. Schull Pier is located in the north west corner of the harbour and is the primary marine infrastructure in the harbour. The pier is predominantly used by both inshore fishing vessels and larger offshore trawlers for berthing and loading/unloading operations. The pier is also used by ferry operators and marine leisure craft during the summer months.

The existing infrastructure in Schull Harbour no longer meets the requirements of the current volume of vessels using the harbour. Schull Pier provides approximately 100m of berthing space along the north face of the pier while the east and south faces of the pier generally remain unoccupied due to their orientation to the prevailing weather conditions. This 100m of quay wall is utilised by 26 licensed inshore fishing vessels, 8 offshore trawlers, a ferry service and in excess of 100 leisure craft for berthing and mooring purposes. The pier has far exceeded its operating capacity.

Schull Community Harbour Development Company (SCHDC) have identified the development of the inner harbour (Schull Pier and immediate surrounds) as being of strategic importance to both commercial and leisure industries in Schull. SCHDC propose constructing a 270m long rubble mound breakwater to the east of the existing Schull Pier and installing a series of heavy duty floating pontoons on the sheltered side of the breakwater for berthing of fishing vessels. 20 inshore fishing vessel berths and 4 trawler berths will be provided on this pontoon. An additional 10 inshore pontoon berths will be provided on the north face of the pier. The existing storm wall on the pier will be extended and raised to prevent flooding during extreme storm events.

On the north shore adjacent to the pier an area of land c. 0.55 hectares will be reclaimed from the foreshore. A car park, marina facilities building and concrete slipway will be constructed on the reclaimed foreshore. The car park will provide 95 parking spaces and will be fronted by a sloping armoured revetment. The marina facilities building will provide sanitary and changing facilities to marina users. An office will also be located within the building. A 235 berth marina, with access platform, gangway, floating breakwaters and associated infrastructure will be installed to the south of the reclaimed foreshore. The marina will be constructed of proprietary floating pontoons and held in position using steel piles. Adjacent to the car park, a 10m wide concrete slipway will be constructed on the foreshore; the slipway will be open to the general public to use. A small pier will be constructed beside the marina for launching and recovering vessels. Diesel refuelling facilities and a sewage removal system will be provided at the designated services berth as part of the works. A planning application for the proposed development was granted on 12 April 2007 (Planning Reg. No: 06/1375).
2.0 Rubble Mound Breakwater Design

2.1 Introduction

The principal function of a rubble mound breakwater is to protect a coastal area from excessive wave action. Incident wave energy is dissipated by the armour layer of a rubble mound breakwater through wave runup within and over the layer. Most of the wave energy is transmitted internally through the structure, with limited overtopping acceptable in the majority of cases.

The purpose of this section of the report is to outline the key design parameters of the rubble mound breakwater to be constructed in Schull Harbour. Boundary conditions such as the extreme still water level and extreme wave height data at the site will be used to establish the crest elevation, slope, layer specification and toe protection. Site Investigation data will be utilised to establish the geotechnical design of the breakwater foundation.

2.2 Hydrodynamic Environment

2.2.1 Tide Levels
The United Kingdom Hydrographic Office publishes tide level information for ports around Ireland. The predicted tidal levels for Schull are displayed in Table 1.

<table>
<thead>
<tr>
<th>Datum</th>
<th>Chart Datum Schull (CD) m</th>
<th>Ordnance Datum Malin (OD) m (Approx.)</th>
<th>Ordnance Datum Poolbeg (D) m (Approx.)</th>
</tr>
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<tbody>
<tr>
<td>HAT</td>
<td>+3.5</td>
<td>+1.38</td>
<td>+4.08</td>
</tr>
<tr>
<td>MHWS</td>
<td>+3.2</td>
<td>+1.08</td>
<td>+3.78</td>
</tr>
<tr>
<td>MHWN</td>
<td>+2.6</td>
<td>+0.48</td>
<td>+3.18</td>
</tr>
<tr>
<td>MLWN</td>
<td>+1.1</td>
<td>-1.02</td>
<td>+1.68</td>
</tr>
<tr>
<td>MLWS</td>
<td>+0.4</td>
<td>-1.72</td>
<td>+0.98</td>
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<tr>
<td>LAT</td>
<td>+0.0</td>
<td>-2.12</td>
<td>+0.58</td>
</tr>
</tbody>
</table>

Table 1: Tide Levels at Schull, Co. Cork (Adapted from Admiralty Tide Tables)

The above information is used to calculate the design level for the crest of the breakwater.

2.2.2 Water Level Variation
Predicted tide levels (as presented above) can be significantly altered by the effects of Storm Surge, Barometric Surge and Sea Level Rise.

2.2.3 Storm Surge
Storm surge is an increase in water level resulting from shear stress by onshore wind over the water surface. Southerly winds can cause a significant storm surge at this location. Design wind speeds were obtained from BS6399-2:1997 (as recommended by HR Wallingford when site specific data is unavailable). This was adjusted by various factors to determine a 1 in 100 year wind event and yielded a value of 27.8m/sec. Applying the methods described in Kamphuis
(2006), this design wind speed would cause a 0.195m increase in still water level at the site of the proposed wind turbine.

2.2.4 Barometric Surge
Changes in atmospheric pressure can cause significant increases in still water level. On 17 December 1989, an atmospheric pressure of 94.3kPa occurred at Cork (Met Eireann). This is the lowest recorded barometric pressure to be recorded at the weather station in Cork Airport and will be used to determine maximum barometric surge in Schull. Kamphuis (2006) recommends a barometric surge of 0.100m for every kPa of pressure difference. Using a corresponding high pressure of 101.3kPa (as recommended by CIRIA SP93) yields a barometric surge of 0.700m.

2.2.5 Sea Level Rise
From 1961 to 2003 an average of 1.8mm/year was established for sea level rise in Ireland. This value increases to 3.1mm/year when averaged from the period 1993-2003. (Devoy, 2009).

In 2007, the UNESCO Intergovernmental Panel on Climate Change (IPCC) estimated a value for sea level rise of 1.8mm-5.8mm/year until 2100. It is generally accepted that a value of 5mm/year may be used when determining the effects of Sea Level Rise. A value of 0.500m should be added to predicted tide levels to allow for sea level rise over a 100 year period.

2.2.6 One Hundred Year Extreme Still Water Level
The maximum predicted water levels plus the maximum estimated water level changes were summed to establish the One Hundred Year Extreme Still Water Level:

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean High Water Springs</td>
<td>+3.780m OD Poolbeg</td>
</tr>
<tr>
<td>Storm Surge</td>
<td>+0.195m</td>
</tr>
<tr>
<td>Barometric Pressure Change</td>
<td>+0.700m</td>
</tr>
<tr>
<td>Sea Level Rise</td>
<td>+0.500m</td>
</tr>
</tbody>
</table>

Extreme Still Water Level

≈+5.18m OD Poolbeg
or ≈+2.48m OD Malin
or ≈+4.60m CD
2.2.7 Wind Generated Waves
Locally generated wind waves are incident at the site of the proposed breakwater. A numerical model study for the proposed harbour development concluded that locally generated waves are not as critical as offshore swell waves and have therefore been ignored in the analysis of the breakwater.

2.2.8 Offshore Swell Waves
The Hydraulics and Maritime Research Centre (HMRC) of University College Cork carried out a numerical model study for the proposed marina development at Schull Harbour. MIKE21 software was calibrated with wave measurements from the marathon gas platform, offshore waverider buoy M3 and a Valeport 730D wave measurement device deployed in Schull Harbour. The results of the model study revealed that an offshore swell wave from a south south west orientation, with a return period of 50 years, could produce a wave in the order of 1.3m (Hs) with a period of 16s (Tm) incident on the breakwater.

2.3 Breakwater Design

2.3.1 Crest Elevation
The design crest level for the breakwater was determined to be +6.50m OD Poolbeg. This is based on the following calculation:

<table>
<thead>
<tr>
<th>Component</th>
<th>Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean High Water Springs</td>
<td>+3.780m OD Poolbeg</td>
</tr>
<tr>
<td>Storm Surge</td>
<td>+0.195m</td>
</tr>
<tr>
<td>Barometric Pressure Change</td>
<td>+0.700m</td>
</tr>
<tr>
<td>Sea Level Rise</td>
<td>+0.500m</td>
</tr>
<tr>
<td>Design Wave Height</td>
<td>+1.300m</td>
</tr>
</tbody>
</table>

Design Crest Elevation ≈ +6.50m OD Poolbeg
or =+3.80m OD Malin
or =+5.92m CD

In addition to the above calculation the permissible level of overtopping also influences the crest elevation of the structure. In order to allow restricted access on the crest of the breakwater overtopping has to be reduced to 10 l/s/m. Using the design crest elevation determined in the above calculation the level of overtopping was calculated to be 7.6l/s/m. This value is within the prescribed limit for overtopping, therefore the crest level will be constructed to +6.50m OD Poolbeg.

2.3.2 Armour Layer Weight & Thickness
The Hudson formula was used to calculate the weight of quarystone armour required to provide satisfactory stability characteristics for the proposed rubble mound breakwater. Based on a slope of 1:1.5 the weight of the armour layer was calculated to be 1.2 tonnes. The width of the armour layer was calculated to 1.6m, measured perpendicular to the slope, comprising two
layers of 1.2 tonne rock armour. The underlayer of the breakwater was determined to be 0.85m wide and will comprise 0.1 tonne quarystone rock. The underlayer will be laid on an impermeable geotextile to prevent the core from being eroded. The core material will vary in size from 1kg – 10kg.

2.3.3 Breakwater Toe
A sacrificial toe will be provided on both the seaward and leeward faces of the breakwater. The function of the toe is mainly to provide support to the armour layer, prevent scour and place a surcharge on the seabed to guard against a slip circle failure. The last point is particularly important for breakwaters constructed on soft sediment.

2.4 Geotechnical Design

2.4.1 Site Investigation
IGSL were commissioned to complete an extensive ground investigation of the soils below sea bed level at the location of the proposed breakwater. Three boreholes were constructed along the length of the breakwater and a series of in-situ and laboratory tests were undertaken. Soft alluvial soils were noted in all locations along the length of the breakwater with bed level between -3.50m OD Poolbeg and -4.00m OD Poolbeg. Borehole refusal (presumed bedrock) was noted at about -7.00m OD Poolbeg closest to the pier deepening to about -18.50m OD Poolbeg at the eastern extremity of the proposed breakwater.

A number of issues arise from the detailed field and laboratory study. IGSL estimate that the potential load from a breakwater structure would result in settlement of the underlying alluvium varying from about 100mm closest to the pier to about 500mm at the eastern end of the breakwater.

There is also a likelihood of shear failure of the underlying alluvium which exhibits very low shear strength in places. IGSL recommend that construction of the breakwater be phased in order to reduce the possibility of shear failure. They propose initially placing heavy rock fill at bed level, allowing the rock fill to impregnate the very soft upper soils. Once the initial rock fill is placed, more general rubble or rock fill material can be used. Heavy rock fill should be utilised as facing for the proposed breakwater to ensure stability and avoid scour or wash out.

IGSL also advised that consideration be given to placement of a heavy duty combined geogrid / geotextile as a separator between the breakwater and the alluvium to avoid loss of fill material.

2.4.2 Geophysical Survey
Apex Geoservices completed a geophysical survey of the proposed harbour development in Schull in June 2009. There was a level of agreement between the borehole site investigation and the geophysical but the geophysical survey detected the presence of firm stratum at a significantly lower level than the site investigation. Bedrock was encountered at about -7.00m OD Poolbeg closest to the pier, deepening to about -18.50m OD Poolbeg at the eastern
extremity of the proposed breakwater for the site investigation while the geophysical detected bedrock at -10.00m OD Poolbeg at the pier head, increasing in depth to -30.00m OD Poolbeg at the outer portion of the breakwater.

2.4.3 Geotechnical Design Options
The presence of thick layers of soft sediment is critical for both the overall geotechnical stability of the slopes and the settlement of the structure. The issue of slope stability must first be examined before settlement can be considered. Methods of ensuring geotechnical stability of breakwater slopes include:

- Constructing a heavy toe (minimal influence on settlement)
- Strengthening soil, e.g. placing a geotextile (minimal influence on settlement)
- Applying soil improvement techniques, e.g. gravel piles (settlement decreases)
- Dredging the soft sediment and replacing it with sand (settlement decreases significantly)

The feasibility of the above techniques was assessed on the basis of technical quality, influence on construction programme and the cost of the works.

Soil replacement (dredging soft soil and replacing it with sand) has been used on the continent for breakwater construction but there are numerous drawbacks associated with the technique. A dumping at sea licence is required for disposing of the excavated material, which is difficult and costly to obtain. The cost of this process makes it financially unviable in Ireland.

The efficiency of gravel piles in soil improvement is questionable. The gravel piles are cut horizontally by a potential slip surface, so the contribution to the shear resistance along the slip surface is limited. The cost of this method is also quite high.

Soil strengthening with a geotextile is commonly used in European breakwater construction. The geotextile acts predominantly as a filter, preventing fine material from dissipating from the centre of the breakwater. Fascine mattresses, comprising bundles of interwoven willow tree weips, can be laid on top of geotextile providing additional stiffness and buoyancy. Large sections of geotextile fascine grids can be floated offshore and sunk into position by placing stone on top of the mattress. These grids are easily constructed although there is a reasonably high cost associated with the technique.

The final option of constructing a heavy toe is a common solution to slope stability problems. The enlarged toe is an extension of a conventional breakwater toe specified due to site specific ground conditions.

Based on the evaluation of the above options it is proposed to use a geotextile fascine composite combined with a heavy breakwater toe to solve the issue of slope stability.
2.4.4 Stability
A cross-section through the centre of the breakwater is shown in Figure 2. The existing sea bed level is approximately -3.10m OD Poolbeg. In order to minimise the volume of material required for the breakwater core, 2m of gravel will be placed on the sea bed beneath the centre of the breakwater. The sea bed will consolidate by an expected 0.5m beneath the gravel during the construction of the breakwater. Geotextile fascine composites will be positioned on top of the gravel, spanning the entire width of the breakwater. The composite, constructed locally, will be floated into position and sunk onto the gravel base by placing stone on top of the grid. The geotextile, providing 500kN/m tensile strength, allied with fascine mattresses will provide a stable base for the rubble mound breakwater by distributing the increased loading at the centre of the breakwater across the width of the structure.

The breakwater toes will be constructed on top of the geotextile fascine composite. The toes will produce additional stability in the breakwater by providing an adequate base for the breakwater slopes on the exposed and sheltered faces of the structure. The core of the breakwater will comprise of 1kg – 10kg rubble mound placed on top of the geotextile fascine grid. The 0.85m thick underlayer, comprising 0.1 tonne quarystone rock, and the 1.6m armour layer, made up of two layers of 1.2 tonne rock armour, will be built up to the design crest level in a phased manner.

2.4.4 Construction Phasing
In order to achieve an adequate factor of safety against shear failure construction of the breakwater will be phased, with each phase of construction having a particular consolidation period. The proposed phasing programme is as follows:

- \( T_0 \): Construct the foundation to -1.50m OD Poolbeg
- \( T_0 + 9 \) months: Construct breakwater to +2.40m OD Poolbeg
- \( T_0 + 18 \) months: Construct breakwater to +6.50m OD Poolbeg (crest level)

2.4.5 Settlement
The majority of the breakwater settlement will occur during the construction stage of the project. The phased approach to construction, with set consolidation times, allows any differential settlement along the length of the breakwater to be compensated by increasing the volume of rubble mound at specific locations. Therefore the crest level of the breakwater will not be affected by settlement of the structure. Extensive monitoring of settlement will be undertaken during construction to ensure that a level crest is achieved along the length of the breakwater.
Figure 2: Section A-A of Rubble Mound Breakwater
3.0 Commercial and Fisheries Development

3.1 Introduction

This section of the report will focus on the commercial and fisheries element of the Schull Harbour development. Schull Community Harbour Development Company (SCHDC) proposes installing a series of heavy duty floating pontoons on the east side of the pier for berthing of fishing vessels. 20 inshore fishing vessel berths and 4 trawler berths will be provided on this pontoon. An additional 12 inshore pontoon berths will be provided on the north face of the pier. The existing storm wall on the pier will be extended and raised to prevent flooding during extreme storm events.

3.2 Need for the Development

Currently there are 26 licensed inshore fishing vessels, 8 offshore trawlers, a ferry service and in excess of 100 leisure craft utilising Schull Pier for berthing and mooring purposes. Schull Pier provides approximately 100m of berthing space along the north face of the pier while the east and south faces of the pier generally remain unoccupied due to their orientation to the prevailing weather conditions. The existing pier is unable to cope with the current volume of vessels using the facility.

Fishing vessels are the primary users of the Schull Pier. Currently fishing boats “raft” outside one another in a line due to the limited berthing area available at the pier. Up to 10 vessels “raft” side by side at any given time creating safety issues in relation to access and egress to/from craft to the existing pier. This is particularly an issue for offshore trawlers. Due to the limited availability of berthing space there is only one designated fish landing bay at the pier. When a number of vessels are landing their catch simultaneously, vessel manoeuvring and berthing operations can become hazardous. An increase in the number of trawler berths at the pier is desperately needed in order to mitigate health and safety issues at the site. Fishermen have also been prevented from up-scaling their vessels due to the lack of deepwater berthing area for larger vessels.

Inshore fishing vessels, engaged in potting and crabbing, are accommodated extremely poorly at the pier. These inshore boats have to attempt to land catches and load strings of lobster pots from steps that are overcrowded by non-commercial recreational craft. No permanent berthing facility is available to inshore boats at the pier. The vast majority of inshore boats are kept on swing moorings to the north and east of the pier. There are severe health and safety implications associated with accessing vessels on swing moorings on a year round basis. It is generally recognised that swing moorings are a poor alternative to floating pontoon infrastructure for small inshore vessels, particularly in a harbour with such large numbers of small boats.

A small berthing pontoon was installed at the middle set of steps at the Schull Pier a decade ago. The pontoon serves as a mooring point for small tenders that are used to access inshore
fishing vessels on swing moorings. This method of accessing vessels is hazardous and particularly dangerous after dark. The pontoon itself is congested and vessels are regularly damaged due to overcrowding.

Ferry and charter boat operations are severely restricted at Schull Pier. There is one set of steps set aside for ferry, charter and leisure operations at the pier. The approach to the steps when fishing vessels are “rafted up” to the east of the steps is extremely difficult. Accessing vessels via the steps is awkward, particularly when mooring lines from fishing vessels run across the steps. The number of passengers using the ferry service has increased dramatically since the berth was constructed in 1986; the current berthing infrastructure requires renovation to be brought in line with current access regulations.

During the summer months a private ferry service transports passengers from Schull Pier to Cape Clear Island. A year round ferry service to Cape Clear operates from Baltimore, although Schull is closer to Cape Clear and provides superior facilities and services e.g. secondary school, banking and medical facilities that are not available in Baltimore. The ferry service from Baltimore, which is subsidised by the government, was established as the primary ferry route due to the existence of sheltered berthing infrastructure. The lack of sheltered year round berthing facilities at Schull has prevented Cape Clear residents from taking advantage of the greater facilities that Schull has to offer. A second ferry service operates between Colla Pier, in Schull Harbour, and Long Island. Although the ferry services operates from Colla Pier many islanders travel directly to Schull Pier to avail of the services available within the village of Schull. The islanders experience similar difficulties to other user of the pier with regard to berthing facilities and mooring on swing moorings.

The level of the Schull Pier deck is approximately 1.75m above Mean High Water Springs which consistent with modern pier decks around the country yet Schull Pier experiences flooding in extreme tide events. During a storm surge event a wave could overtop the pier and damage the vessels sheltering in the lee of the pier. A storm wall at the south face of the pier is required, due to its exposure, in order to rectify this issue.

3.3 Proposed Works

There have been a number of proposals to develop the existing infrastructure facilities for commercial and fishing industries in Schull Harbour. The original development that received planning permission in 2007 comprised of an extension to the existing pier, constructing a breakwater adjacent to the pier extension and installation of commercial pontoons. It was proposed to extend the pier by 100m, to a similar width as at present. The deck of the pier was to be raised, storm wall extended and new pier furniture provided. The existing pontoon on the north face of the pier was to be removed and replaced by an array of commercial pontoons. Construction of a 150m long (crest length) rubble mound breakwater was proposed at the end of the pier extension to provide protection to the inner harbour area.

The original development has been revised due the availability of finance for the project. The amended development involves constructing a 250m long (crest length) rubble mound breakwater rather than the originally proposed pier extension and 150m breakwater. 178m of
linear commercial pontoons and an array of inshore fishing vessel pontoons will be installed in
the lee of the breakwater. Additional inshore boat pontoons will be installed on the north face of
the existing pier. The storm wall will be extended to the end of the existing pier on the south
face of the pier. The wall will be 1.3m high and set 2m back from the edge of the deck.

A recent site investigation has revealed that the volume of overburden to the east of the
existing pier increases significantly the further eastwards one moves. As a consequence of
these findings the originally proposed pier extension, suspended on 130 piles driven into the
seabed, would have cost far more than was originally estimated. The design of the new
breakwater makes allowance for on-site ground conditions and will be constructed in a phased
manner to ensure an adequate factor of safety against shear failure and an acceptable level of
settlement are achieved. There are significant monetary savings associated with the amended
scheme as opposed to the original development in light of the ground investigation findings.

3.4 Pontoon Layout & Protection

178m of linear heavy duty pontoons will be installed on the harbour-side of the rubble mound
breakwater. The pontoons will be 3m wide and held in position with steel piles. The breakwater
will project c. 270m eastwards from the eastern end of the existing Schull Pier providing
protection to the commercial pontoons from prevailing wind and wave conditions. The
orientation of the pontoons has been chosen to continue the line of the existing pier,
maximising the use of available foreshore, and provide the highest level of shelter to berthed
vessels. The pontoon provides four trawler berths; a series of secondary walkways and
pontoon fingers at the western end of the pontoon provide berthing accommodation for 20
inshore fishing vessels. An additional 12 inshore boat berths will be provided in the lee of the
existing pier.

The layout of the eastern pontoon, with offshore trawlers on the east side of the pontoon and
smaller inshore boats on the inside of the pontoon, aids vessel manoeuvring and allows for
safe access to and from the berths. The pontoon on the north face of the existing pier will
replace the existing pontoon at the pier, bringing order to the area. The layout of this pontoon,
designated for inshore fishing vessels, will provide safe berthing and loading conditions for
small vessels. The proposed entrance channel, between the rubble mound breakwater and
floating breakwaters to the north, will be 60m wide providing enough scope for commercial and
marine leisure activity to coexist adjacent to one another.

The secondary walkways, comprising 2.5m wide proprietary floating pontoon units, will provide
access to the inshore fishing vessels. Floating finger pontoons are positioned perpendicular to
the secondary walkways (on either side) to accommodate the double berthage of vessels. The
widths of the double berths vary according to the class of vessel and allow for the safe
manoeuvring of vessels into and out of berths. The length of the finger pontoons are 100%
accommodated overall vessel length (LOA). The finger pontoons are between 0.65m to 1.0m
wide, depending on the berth length. Mooring points will be provided at regular intervals on the
pontoons.
3.5 Pontoon Access

Access to the commercial pontoons from the sea will be via the proposed 60m wide entrance channel between the array of floating breakwaters and the armoured breakwater.

Access to the commercial pontoons to the east of the pier from the landside will via a 20m aluminium gangway. The gangway will be hinged at the landside connection and have a roller system at its base. The pin/roller system will allow the gangway to move freely in the vertical axis, thus accommodating the rise and fall of the tidal cycle. The maximum slope of the gangway will be 1:4.9, which will occur at Mean Low Water Springs (MLWS). The gangway will have a clear width of 1.5m. Access to the pontoons on the north face of the pier will be provided by the existing middle set of steps.

3.6 Anchoring System

The commercial pontoons will be anchored using circular hollow section steel piles. These piles will be 813mm x 17.5mm CHS driven 6m-10m into the seabed. Piles will be protected using a suitable epoxy coating and/or cathodic protection. The piles will be connected to the pontoons using pile brackets which will allow vertical movement but restrict lateral movement of the pontoon units. The system is extremely robust and reliable and requires minimal maintenance. The system has minimal impact on the seabed as there are no chains to scour the bed and the footprint of the piles is very small. Additional vertical H-piles will be utilised to anchor the pontoon on the north face of the pier to the quay wall.

3.7 Water Depths

The tidal range in Schull Harbour is 2.8m (MHWS to MLWS). The commercial pontoons to the east of the pier will have a natural water depth of between 3.5m and 4.5m at Mean Low Water Springs. The pontoons in the lee of the pier will have between 0.3m and 1.5m at Mean Low Water Springs.

3.8 Services

3.8.1 Service Bollards
High quality service bollards will be located throughout the commercial pontoons. The service pedestals will provide electricity, water and lighting to the fishing vessels. Additional lighting will be provided along the primary walkway and the gangway.

3.8.2 Water Supply
Potable water will be available from the taps on the service bollards which will be strategically positioned on the secondary walkways and on the trawler berth section of the primary walkway. The water system will be connected to the public water supply system.
3.8.3 Safety Equipment
Emergency bollards equipped with a lifebuoy, fire extinguisher and first aid kit will be provided at regular intervals on the commercial pontoons.

3.8.4 Lighting
Pontoon lighting will be provided integrally in the service bollards. Additional footlighting will be provided along the access gangway and primary walkways.

3.8.4 Crane
A HIAB Loader Crane will be positioned on the north face of the existing pier adjacent to the proposed commercial pontoon. The crane will aid vessel loading and unloading operations.
4.0 Marine Leisure Development

4.1 Introduction

One of the primary functions of the proposed harbour development is to provide separate designated areas for leisure and commercial operations. This section of the report will focus on the leisure portion (marina and associated facilities) of the development. The marina incorporates the full range of facilities and services required for a modern marina. The marina has been designed and will be operated in accordance with the requirements of the Blue Flag for Marinas criteria. Details of these criteria are contained in the appendix. The marina design and specifications have been prepared in accordance with BS 6349 “British Standard Code of Practice for Maritime Structures”, as well as Irish, UK, European & US marine leisure facility guidelines.

4.2 Marina Berth Type/Size Demand Analysis

A detailed analysis of the type and size of boats using and visiting Schull Harbour and the South West coast generally was carried out. The results of this analysis were used to determine the range of berths sizes required for a marina of this type in Schull Harbour.

4.2.1 Need for Development

A small berthing pontoon was installed at the middle set of steps on the Schull Pier a decade ago. The pontoon serves as a mooring point for small tenders that are used to access vessels on swing moorings and is the only berthing infrastructure available to marine leisure users in Schull Harbour. This method of accessing vessels is hazardous and particularly dangerous after dark. The pontoon itself is congested and vessels are regularly damaged due to overcrowding. Unfortunately this is the only facility available to patrons of Schull Pier and as a result the potential of Schull as a marine leisure tourist destination has been severely undermined.

The majority of leisure craft in Schull Harbour are owned by frequent visitors to Schull that stay in rented accommodation or a secondary home away from their primary residence. People are drawn to this area of West Cork due to its spectacular scenery and proximity to attractions such as Mizen Head and Roaringwater Bay. The facilities available to holiday makers are a major drawback in expanding the tourism sector in the area. Leisure boat owners choose alternative locations with sheltered marina berths to moor their boats due to the lack of facilities provided in Schull Harbour resulting in a loss of revenue to businesses in the area. Yachts and cruisers are dissuaded from stopping over in Schull due to the lack of safe berthing facilities and services. In order to recharge batteries, fill water tanks and refuel, cables and hoses have to be run across the pier and across vessels when crawlers are rafted up outside the pier. In addition to these issues there are no waste pump-out facilities in Schull. Basic sanitary and changing facilities are not available at Schull Pier, visitors use the facilities at local hotels and guest houses.
4.2.2 Existing Marinas & Moorings
There are not any existing marinas in Schull Harbour. Lawrence Cove Marina on Bere Island is a 60km journey around Mizen Head to the north west of Schull while Castlepark and Kinsale Yacht Club Marinas in Kinsale are 90km by sea to the east. Both Castlepark and Kinsale Yacht Club marinas are full and report strong demand for additional berths.

There are more than 150 no. swing moorings in Schull Harbour. These moorings are located throughout Schull Harbour with a number of moorings located in the site of the proposed marina. It is accepted that swing moorings are a poor alternative to berthing in a marina and they have very high health and safety risks associated with them. Swing moorings must be vacated during the winter/spring months due to weather conditions and they occupy a disproportionate area of foreshore compared to marina berths.

4.2.3 Berth Demand
Ireland currently has one of the lowest boat ownership rates in the EU, with per capita boat ownership of 1:171. By comparison Sweden has 1:7, Netherlands 1:30, France 1:66 and the UK 1:100. (World Marine Markets, 2005)

Ireland also has one of the lowest berth rates, with 24 coastal marinas nationwide providing approximately 2,000 berths. (Marine Institute, 2005)

There is strong demand for berths in Ireland, especially in the South and South West regions. Consultations with boat sales agents shows steady demand for the full range of power and sail boats in Ireland. Many agents reported that the lack of marina berths is a major disincentive for potential buyers when considering purchasing a boat.

The current density of boats in Schull Harbour is significantly lower than other harbours in the UK, Europe and the USA. There is huge potential for the sustainable exploitation of the marine leisure resource in Schull Harbour, subject to proper planning, implementation and management.

2.3 Berth Size/Type
The general trend is for boat sizes to increase over time. The average boat length in Ireland is 10m (approx.). Approximately 67% of boats in Ireland are greater than 6m in length. (Irish Sea Marine, 2007)

The ratio of sail boats to power boats in Ireland is currently 60:40, although there is a gradual increase in the percentage of power boats to sail boats nationally. This has an impact on the design of marinas.

4.3 Marina Berth Design Information

4.3.1 Number of Berths
The results of the analysis in section 2.0 above were used to determine the range of boat types/sizes that would be attracted to the proposed marina in Schull. A breakdown of the proposed berths is detailed in table 2 below.
### Number of Berths:

<table>
<thead>
<tr>
<th>Class</th>
<th>Number of Berths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class II (8m to 10m)</td>
<td>170 no.</td>
</tr>
<tr>
<td>Class I (up to 8m)</td>
<td>64 no.</td>
</tr>
<tr>
<td>Service Berth (all vessels)</td>
<td>1 no.</td>
</tr>
</tbody>
</table>

*Table 2 – Proposed Berths*

### 4.3.2 Marina Staff

The number of staff proposed to manage the marina and its facilities is as follows:

- Marina Manager/Administrator: 1 no.
- Dockmaster/Operative: 1 no. (Peak periods)

### 4.4 Marina Layout & Protection

The marina will be protected by a rock armour breakwater to the south and an array of proprietary floating concrete breakwaters to the east. The breakwater will project c. 270m eastwards from the eastern end of the existing Schull Pier providing protection from prevailing wind and wave conditions. The floating breakwater units will be 4m wide with 1.0m draft. The breakwater will form part of the berthing infrastructure.

The marina berths have been oriented in a north east – south west alignment to maximise the use of foreshore. The internal marina layout has been designed to facilitate easy and safe manoeuvring within the marina and allow for safe access to and from the berths.

The proposed entrance channel to the inner harbour will be 60m wide. The inner navigation channel and the fairways vary in width to suit the expected design vessels.

The primary walkway, which will connect with the secondary walkways, will be 3.0m wide. The primary walkway will be comprised of proprietary floating pontoon units. There will be 6 no. secondary walkways. These walkways will be 2.5m wide proprietary floating pontoon units.

Floating finger pontoons are positioned perpendicular to the secondary walkways (on either side) to accommodate the double berthing of vessels. The widths of the double berths vary according to the class of vessel and allow for the safe manoeuvring of vessels into and out of berths. The length of the finger pontoons are 100% accommodated overall vessel length (LOA). The finger pontoons are between 0.65m to 1.0m wide, depending on the berth length.

Navigation lights will be installed at the eastern corners of the floating breakwater and the adjacent armoured breakwater in accordance with the requirements and specification of the Commissioner of Irish Lights and the Marine Survey Office.
4.5 Marina Access

Access to the marina from the sea will be via the proposed 60m wide entrance channel between the array of floating breakwaters and the armoured breakwater.

Access to the marina from the landside will be controlled via a high quality aluminium security gate which will be located at the proposed car park. A card type security access system will be installed to control access to the marina. Pedestrian movement around the marina will be via the primary and secondary walkways.

The gangway, which will be constructed from high quality aluminium, will be hinged at the landside connection and have a roller system at its base. The pin/roller system will allow the gangway to move freely in the vertical axis, thus accommodating the rise and fall of the tidal cycle. The maximum slope of the gangway will be 1:4.8, which will occur at Mean Low Water Springs (MLWS). The gangway will be 20m long and have a clear width of 1.5m.

4.6 Pontoon & Anchorage System

4.6.1 Pontoon System
The proposed pontoon system will be a high quality proprietary system. The pontoons will be comprised of aluminium or steel frames, supported on concrete floats. The proposed decking material is a timber composite plank, which will have the visual appearance of hardwood and the stability and durability of plastic.

The outer breakwater will be of high strength reinforced concrete construction.

4.6.2 Anchoring System
The marina will be anchored using circular hollow section steel piles. These piles will be 813mm x 17.5mm CHS driven 6m-10m into the seabed. Piles will be protected using a suitable epoxy coating and/or cathodic protection. The piles will be connected to the pontoons using pile brackets which will allow vertical movement but restrict lateral movement of the pontoon units. The system is extremely robust and reliable and requires minimal maintenance. The system has minimal impact on the seabed as there are no chains to scour the bed and the footprint of the piles is very small.

4.7 Marina Water Depths

The tidal range in Schull Harbour is 2.8m (MHWS to MLWS). The area enclosed by the marina will have a natural water depth of between 2.0m and 4.0m at Mean Low Water Springs.

The marina development will not require any dredging, due to the position of the marina in relation to the natural seabed levels. This has many positive benefits as there will be no disturbance to the marine ecology of the area.
4.8 Marina Facilities & Services

4.8.1 Service Bollards
High quality service bollards will be located throughout the marina. There will be a minimum of one bollard per four berths. The service pedestals will provide 240v electricity, water and lighting for the marina. Additional lighting will be provided along the primary walkway and the gangway.

4.8.2 Foul Water Pump-Out System
Foul water will be generated from two sources at the proposed development: shower and toilet facilities in the marina facilities building; and the pump out unit at the marina. It is proposed to treat these effluents with an on-site package treatment plant before discharging to the sea via an outfall.

4.8.3 Effluent from Proposed Marina
Most modern sail boats and motor boats are constructed with on board foul water storage tanks. The purpose of these tanks is to store any foul water generated while at sea before discharging. In the past, the majority of this waste would be discharged at sea. Recently, boat owners/users have become more environmentally conscious and choose to discharge effluent at dedicated ‘pump out berths’ located in harbours and marinas.

The proposed pump out unit for this development is a Rolec CCD pump (see Appendix 2). This pump is capable of pumping a horizontal distance of 400m and a discharge height of 22m. The effluent will be conveyed from the pump out unit to the proposed underground package treatment plant.

**Table 3 – Estimation of Foul Water Generated by Development**

<table>
<thead>
<tr>
<th>Source of Foul Water</th>
<th>Usage/Day (Max)</th>
<th>Flow Rate/luse</th>
<th>Flow Rate/l/day</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Toilets</strong></td>
<td>150 uses</td>
<td>15</td>
<td>2250</td>
</tr>
<tr>
<td><strong>Showering</strong></td>
<td>60 uses</td>
<td>100</td>
<td>6000</td>
</tr>
<tr>
<td><strong>Sub Total</strong></td>
<td></td>
<td></td>
<td>8,250</td>
</tr>
<tr>
<td><strong>No. of Berths</strong></td>
<td></td>
<td></td>
<td>235</td>
</tr>
<tr>
<td><strong>Assumed percentage of berths discharging on any given day</strong></td>
<td>5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maximum size of berth pump out holding tank</strong></td>
<td>235 l</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total discharge/day from marina</strong></td>
<td>2820 l</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub Total</strong></td>
<td></td>
<td></td>
<td>2,820</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>11,070</td>
</tr>
</tbody>
</table>

(1) Kiely, 1996
(2) Based on consultations with existing marina operators in Ireland

The discharge from the development is estimated at 11,070 litres/day peak discharge, as shown in Table 3 above. It is proposed to install a Condor Environmental Techflo NSAF 60
(See Appendix 3) to treat the effluent from the marina and dinghy park. This unit can accommodate 12,000 litres/day (12m³/day), giving a 930 litres/day contingency.

4.8.4 Fuel
A diesel fuel pump, which will be located on the Services Berth, will provide refuelling facilities for all expected vessel classes. The unit will be supplied from a land based underground diesel tank (Capacity 10,000 litres).

4.8.5 Water Supply
Potable water will be available from the taps on the service bollards which will be strategically positioned on the secondary walkways. The water system will be connected to the public water supply system.

4.8.6 Waste Reception Facilities
Waste reception banks will be located at the marina facilities building. The reception banks will be comprised of 3 no. separate bins for the following waste streams: recyclables, refuse & hazardous.

4.8.7 Dock Carts
Dock carts will be located adjacent to the marina facilities building. The proposed carts will measure 1400mm long x 850mm wide x 650mm high.

4.8.8 Safety Equipment
Fire extinguishers (6kg dry powder units) will be provided at a minimum ratio of one unit per fifteen berths.

Lifebuoys will be provided at a minimum ratio of one per 30 berths.

Escape ladders will be provided at a minimum ratio of one per 30 berths.

A first aid kit will be provided at the services berth and in the marina office.

A fuel spill emergency/clean up kit will be provided adjacent to the services berth.

4.8.9 Lighting
Pontoon lighting will be provided integrally in the service bollards. Additional footlighting will be provided along the access gangway and primary walkways.

4.8.10 Security Systems
Access to the marina will be controlled via a card type security system. The card will control access to the marina and allow use of electricity from the service bollards. 2 CCTV cameras will be located at the security gate – one facing the marina and one facing the carpark. The system will be relayed to a monitor in the marina facilities building.

4.8.11 Crane
A Loader Crane will be positioned on the south east face of the proposed loading pier. The crane will be used to launch and recover vessels.
4.8.12 Navigation Lighting
Navigation lights will be installed at the eastern corners of the floating breakwater and the adjacent armoured breakwater in accordance with the requirements and specification of the Commissioner of Irish Lights and the Marine Survey Office.

The proposed locations for all of the above equipment and systems are detailed on the Marina Services Layout drawing (C347/F/4/A).

4.8.13 Public Slipway
Adjacent to the car park, a 10m wide concrete slipway will be constructed on the foreshore; the slipway will be open to the general public to use. The slipway will aid launching and recovering of vessels on the marina and surrounds.

4.9 Landside Facilities

4.9.1 Marina Office
The marina office will be located on the reclaimed foreshore adjacent to the marina access point.

4.9.2 Car Parking
Parking for the marina will be provided by the proposed car park to be built on reclaimed foreshore. 95 parking spaces will be provided. The marina users will access the car park via an approach road connecting to the R592. Two or three “drop off” spaces close to the marina access area will be provided to allow people to load/unload bags, equipment etc.

4.9.3 Sanitary & Changing Facilities
The sanitary and changing facilities will be located within the marina facilities building. The total number of sanitary convenience/facilities proposed is detailed in the Table 4.

<table>
<thead>
<tr>
<th></th>
<th>WC’s</th>
<th>Urinals</th>
<th>Showers</th>
<th>Lockers (large)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td>Female</td>
<td>4</td>
<td>-</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td>Disabled</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

*Table 4 – Proposed Sanitary Facilities*

Laundry & Drying Room
The laundry room will contain 2 no. washing machines (coin operated) and 2 no. tumble dryers (coin operated) together with ancillary equipment, i.e. shelves, washing detergent dispenser, baskets.

Vending Machines
Vending machines for the use of marina users will be provided, dispensing drinks, snacks etc.

Drying Room
The drying room will include a series of racks for the hanging of clothes, protective sailing clothing etc. A high capacity heat source will be installed in this room.
4.10 Navigation & Existing Moorings

4.10.1 Navigation
The marina has been designed to comply with all recognised standards and guidelines. The proposed marina will be located away from the main navigation channel to the north of the existing Schull Pier. The marina location and layout has been refined to ensure that the marina does not impede or have any negative impact on the navigation of fishing vessels and commercial operations.

Navigation access to the existing Schull Pier and slipway will not be impacted upon by the proposed marina. The marina and rock armour breakwater will significantly reduce wave activity at the pier and slipway, which will be particularly beneficial during times of poor weather.

4.10.2 Existing Moorings
The site for the proposed marina is within an existing swing mooring field. Fishing vessels, commercial operators and private pleasure craft moor their vessels in this area.

Swing moorings are extremely inefficient in terms of the area of foreshore occupied per boat. The technical staff from DoECLG Foreshore Section have indicated that their preferred mooring option is marinas rather than swing moorings, wherever possible.

Fishing and commercial vessels currently using these moorings will be accommodated by the proposed commercial pontoons to be installed at the Schull Pier. Present leisure craft users of these moorings will be encouraged to relocate to the new marina, which will provide safer sheltered year round berthing. Users who do not wish to berth in the marina will be offered an alternative location for their mooring.
References:

United Kingdom Hydrographics Office, Admiralty Tide Tables, 2009


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Introduction to Coastal Engineering and Management, J. William Kamphuis, 2006

HMRC Flood Defences and Coastal Structures Seminar, Robert J N Devoy, January 2009

Intergovernmental Panel on Climate Change Report, UNESCO, February 2007


Douglas-Westwood Ltd., World Marine Markets, 2005

Marine Institute, Water-Based Tourism and Leisure, 2006

Irish Sea Marine, The potential for marine leisure, 2007
Appendix 1

Blue Flag Programme Criteria
Blue Flag Programme Criteria

It is proposed to implement the necessary systems and provide the required facilities to ensure that the marina is developed and managed in accordance with the Blue Flag Programme. This would be a major attraction for many users and visitors to the marina. It would also enhance the credentials of the marina and the surrounding area.

The Blue Flag Programme is concerned with the following four primary areas:

(1) Environmental Education & Information
(2) Environmental Management
(3) Safety & Service Facilities
(4) Water Quality

The criteria for each of these primary areas are detailed below:

Environmental Education & Information

i. Information relating to the coastal zone eco system and nearby natural sensitive land and marine areas must be available to marina users.

ii. Code of environmental conduct is displayed in the marina.

iii. Information about the Blue Flag Marina Programme and the Blue Flag marina criteria is displayed in the marina.

iv. The marina is responsible for at least three environmental education activities on offer to the users and staff of the marina.

v. The individual Blue Flag for boat owners is offered through the marina.

Environmental Management

i. Production of an environmental policy and plan at the marina. The plan should include references to water, waste and energy consumption, health & safety issues and the use of environmentally sound products when available.

ii. Adequate and properly identified and segregated containers for the storage of hazardous wastes. The wastes should be handled by a licensed contractor and disposed of at a licensed facility.

iii. Adequate and well managed litter bins and/or garbage containers. The wastes should be handled by a licensed contractor and disposed of at a licensed facility.

iv. The marina has facilities for receiving recyclable waste materials, such as bottles, cans, paper, plastic, organic material etc.

v. Bilge water pumping facilities are present in the marina.

vi. Toilet pumping facilities are present in the marina.

vii. All buildings and equipment must be properly maintained and in compliance with national legislation. The marina must be well integrated into the surrounding natural and built environment.

viii. Adequate, clean and well sign-posted sanitary facilities, including washing facilities and drinking water. Controlled sewage disposal to a licensed sewage treatment.

ix. If the marina has boat repairing and washing areas, no pollution must enter the sewage system, marina land and water or the natural surroundings.

x. Promotion of sustainable transportation.

xi. No parking/driving in the marina, unless in specific designated areas.
Safety & Service Facilities

i. Adequate, clean and well sign-posted lifesaving, first-aid equipment and fire-fighting equipment. Equipment must be approved by national authorities.

ii. Emergency plan in case of pollution, fire or other accidents must be produced.

iii. Safety precautions and information must be posted at the marina.

iv. Electricity and water is available at the berths, installations must be approved according to national legislation.

v. Facilities for disabled people.

vi. Map indicating the location of the different facilities is posted at the marina.

Water Quality

Visually clean water (no oil, litter, sewage or other evidence of pollution).
Appendix 2

Rolec Pumpout Unit Manual
Low cost sanitation pump-out

- Sanitation and bilge pump-out system
- One pump-out bollard for all to use or individual pump-out at each berth
- Easy to install and maintain
- Reliable diaphragm pumps virtually maintenance free due to the use of high quality materials such as bronze and stainless steel
- Pumping distances from 120mtr to 470mtr
- Various pay to use options including card, token or coin
- Pump-out bollards in aluminium or stainless steel
- Euro specification suction probe complete with manual valve
- Supply only or full design and installation
- Optional illumination, rinse taps, etc
ROLEC PUMP-OUT SOLUTIONS

Over the past 7 years Rolec has been manufacturing sanitation pump-out equipment for sanitation pump-out specialists who then sell this equipment on with increased sales margins.

In 2003 we made a decision to produce our own range of competitively priced pump-out equipment and sell directly to the marina industry.

Page 26 of our current 2006 brochure and this pump-out solutions information pack are a result of that decision.

We have now designed and installed many pump-out systems with our range of reliable diaphragm pumps and pump-out control bollards, many to the customer’s individual specifications.

From a single pump-out bollard available to everyone to a multi-point pump-out system offering pump-out facilities at each berth, Rolec has the solution.

Having had experience with both vacuum and diaphragm pumps we have made a judgement that all Rolec’s pump-out systems will exclusively use the diaphragm pump options.

All our diaphragm pumps are chosen for their reliability and use of high quality materials including bronze and stainless steel where ever practical.

All our pumps are both sewage and seawater resistant and virtually maintenance free.

Each pump-out system is available with a range of “free to use” or “pay to use” control systems including keyswitch, token or card options.

**Self-contained pump-out bollards**

The most cost effective sanitation pump-out system in our range is the M60K self-contained sanitation pump-out bollard.

This option is a 1000mm MAXI plus powder coated aluminium bollard containing its own built-in M60K pump, able to pump approximately 120 metres to discharge.

The bollard will have all the “free to use” and “pay to use” options available to it as a standard pump-out system, as well as a range of accessories including illumination, water, etc (see specifications included).

This self-contained option only requires fixing down, an electrical supply and a 2 inch sanitation pipe connected and it’s ready to go.

**Single bollard with remote pump**

This option allows you to install the pump-out bollard anywhere on the marina, with the pump itself being installed remotely from the bollard.
For example, the pump-out bollard could be located on a floating service pontoon with the pump being located on land at a convenient out of sight location or simply next to the bollard itself.

This type of bollard and remote pump system is usually provided when the distance to be pumped is greater than the 120metre capacity of the self-contained M60K pump-out bollard.

For example

a) For distances above 120metres and below 150metres we would recommend the MDV pump with its 150metre pumping capacity.

b) For distances above 150metres and below 400metres we would recommend the CCD pump with its 400metre pumping capacity.

c) For distances above 400metre and below 470metres we would recommend the CD pump with its 470metre pumping capacity.

Note: The pumping distance can be greatly affected by any vertical height in the pipework, basically if the pump-out bollard is 5metres below ground level at low tide and the discharge pipework has to run up the quay wall or access bridge, the overall discharge distance will be reduced.

When calculating a pump size we would need to know:

a) Distance from pump-out point to discharge point
b) Any vertical height in the discharge pipe system
c) Size of boats to be pumped
d) Estimated frequency and concentration of use.

Item d is important to assist in the gauging of the discharge rate.

For example, on a standard marina with relatively low boat movement (high long term berth occupancy and low visitor numbers) the required discharge rate may not be too important, as discharge time is not a critical factor.

However, if the marina is host to fleet hire, holiday hire or charter boats the discharge rate and time could become an important issue.

In many circumstances you could be in a position where 20x boats return together from a sailing holiday and all require sanitation pump-out at the same time.

A small pump could potentially struggle to cope with such a concentrated demand and potentially create a long waiting time due to slow discharge rates.

This remote pump system can also be designed to provide multi pump-out bollard locations around the marina.
Anything with multiple pump-out bollards will require specifically designing, these designs will take into consideration whether the marina wishes to use multiple pump-out bollards at the same time or one bollard at a time, locking out the remaining bollards until discharge is complete.

**Pump-out at each berth**

Many marinas catering for MEGA YACHT sized boats are now beginning to offer sanitation pump-out facilities at the berth itself.

This is usually provided by a dedicated 500mm pump-out bollard containing an internal 2inch sani-coupler and manual valve.

On a recent installation we completed, 25x MEGYACHT berths had their own dedicated 500mm pump-out bollard with the remaining small berths sharing the use of a 1000mm MAXI communal pump-out bollard.

A CD pump and housing was installed on land with a control panel located adjacent to the pump.

The 25x 500mm dedicated pump-out bollards were “free to use” keyswitch operated with the communal 1000mm pump-out bollard being a “pay to use” version.

Each of the 26 bollards were equipped with an LED which illuminated when one of the pump-out bollards was in use.

As soon as the first persons discharge time period was complete, the pump stops and the light goes out allowing the second user to initiate their pump-out cycle.

**Unique pump-out systems**

Rolec have the ability and equipment to design any size and style of pump-out system once provided with a full customer requirement and scale drawing.

Please use the attached pump-out specifications and price structure to create the pump-out system you require.

If you have any difficulties or require any technical advice, please contact Rolec sales in Wisbech UK.

Kindest regards,

Kieron
CCD pump-out system complete with:
- 1000mm pump-out bollard
- remotely sited CCD pump
- Powder coated aluminium pump housing

The CCD pump is prime assisted centrifugal pump.

This pump is virtually maintenance free due to the use of high quality materials such as stainless steel and bronze.

The pump is sewage and seawater resistant.

**CCD Pump Specifications**

- Pumping distance (horizontal) 400 metres
- Discharge height (vertical) 22 metres
- Discharge rate 380 litres/minute
- Motor rating 3 KW
- Voltage 415 volts
- Amperage 7.5 Amps
- Weight 275Kg
- Dimensions 1250mm x 750mm x 550mm
- Mounting position Horizontal
- Connection 3”
- Conforms to ISO 8099

**The pump system consists of**

- 1x CCD pump
- 1x 1000mm powder coated aluminium maxi remote pump-out bollard
- 1x start / stop control
- 1x variable time system
- 1x electrical contactor
- 1x motor overload protection
- 10mtr of flexi-suction hose (38mm)
- 1x valve operated euro suction probe
- 4x pump-out labels
- 1x instruction label
- 1x set of incoming cable terminals
- 1x incoming 50mm pipe coupler
- 1x aluminium powder coated housing
SINGLE PUMP-OUT BOLLARD CONTROL PANEL OPTIONS

- NO PAYMENT
  - STOP / START
  - NO PAYMENT
  - KEYSWITCH
- MAGNETIC CARD PAYMENT
  - PAUSE / STOP
- SINGLE COIN / TOKEN PAYMENT
  - PAUSE / STOP
- MULTI-COIN PAYMENT
  - PAUSE / STOP

NOTES:

- ALL CONTROL PANELS COME COMPLETE WITH
  - A) TIMER CONTROL
  - B) SWITCHING CONTACCTOR
  - C) MCB PROTECTION
  - D) PLASTIC WEATHERPROOF ENCLOSURE (LOCATED INSIDE THE PUMP-OUT BOLLARD)
  - E) ASSOCIATED WIRING BETWEEN CONTROL PANEL AND ENCLOSURE

---

ROLEC SERVICES LTD
Specialised services to the leisure industry including Boating, Marina, Street lighting & Leisure Electrics
ALDERSHOT, GU33 1TY, UK Tel: 01252 759338, Fax: 01252 764445, Email: info@rolec.co.uk

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A booklet on the properties of ROLEC SERVICES LTD and may not be copied, issued or used for any other purpose.
Appendix 3

Conder Environmental Package Treatment Plant Manual
the conder SAF range of package sewage treatment plants

Techflo™ SAF 60-600 - single stream
Techflo™ SAF 700-1800 - multi stream

above or below ground installation
granular or concrete backfill
Conder Environmental Solutions (Conder) has further developed its range of package sewage treatment plants utilising proven Submerged Aerated Filter (SAF) technology for optimum performance and dependability. Using reliable, cost effective and energy efficient blowers for aeration with an integral flow management system, the range is packaged for installation completely below ground. The range can be adapted to provide an above ground treatment solution.

In standard configuration the plants offer treatment to a 20mg/l BOD, 30mg/l SS effluent quality standard with options for 20, 10 or 5mg/l NH₃ effluent quality.

Designed in accordance with the British Water Code of Practice for Flows and Loads, the Conder range will serve a population range from 60-600PE as a single stream unit. Larger populations can be accommodated with multiple stream plants. The SAF technology utilised in the Conder Techflo range has been type tested in accordance with BSEN 12566-3.

PRODUCT RANGE

The Techflo 60–600 range is suitable for larger-scale commercial applications including leisure facilities, hotels, schools, offices and industrial situations.

For larger applications, Conder’s Technical Solutions division offers a range of modular sewage treatment systems up to 1800PE, utilising SAF technology. This modular system includes flow balancing, primary settlement/sludge storage, SAF Biozone (BOD removal and nitrification) and humus settlement as discrete stages. This design flexibility means that we can offer a bespoke solution within a package format. Please call our sales office for more information: 08702 640004. Cierflo SAF 25–50 is the solution for housing developments and other smaller scale projects where access to mains drainage is not available. Typical applications include small communities or developments in rural areas.

The combination of features, benefits, high performance, reliability and quality assurance makes the Conder SAF range the product choice for ‘off mains’ drainage solutions.

FEATURES AND BENEFITS

- Type tested in accordance with BSEN 12566-3
- Proven SAF technology with reliable performance
- Completely below-ground installation
- Low running cost air blower
- Easy to install – reduced costs
- Quiet, odourless operation
- Compact unitank design with no below ground moving parts
- Deeper inverters available
- Option for pumped influent or effluent
- Effluent Standard: 20mg/l BOD, 30mg/l SS, 20-5mg/l NH₃
- High Rate nitrification options available
- Plants suitable for installation with either granular or concrete backfill

PRODUCT SELECTOR

All applications should be specified to comply with the British Water Code of Practice for Flows and Loads. Further advice and assistance is available from our experienced internal and external sales teams. Site visits and assessments are recommended to ensure the correct equipment is proposed for each application.

The correct plant should be selected to meet the requirements of the applicable discharge consent; granted by the Environment Agency, SEPA or EHS (NI).

<table>
<thead>
<tr>
<th>PLANT</th>
<th>DRY WEATHER FLOW (LWH) m³/d</th>
<th>MAX LOAD PER DAY</th>
<th>MINIMUM DESLUDGE PERIOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Techflo SAF 60</td>
<td>12</td>
<td>3.6</td>
<td>0.48</td>
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<tr>
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<td>4.5</td>
<td>0.6</td>
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<td>Techflo SAF 100</td>
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<td>6.0</td>
<td>0.8</td>
</tr>
<tr>
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<td>7.5</td>
<td>1.0</td>
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<tr>
<td>Techflo SAF 150</td>
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<td>9.0</td>
<td>1.2</td>
</tr>
<tr>
<td>Techflo SAF 200</td>
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<td>3.2</td>
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<tr>
<td>Techflo SAF 500</td>
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<td>30.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Techflo SAF 600</td>
<td>120</td>
<td>36.0</td>
<td>4.8</td>
</tr>
</tbody>
</table>

* Desludge period is at maximum loading, plants not loaded to maximum will have longer desludge periods.
** Different desludge periods can be accommodated, please contact us for further information.
The Conder SAF 60-600 treatment plant comprises a single tank (unitank) or two tanks (semi-modular), or three tanks (modular). The tank(s) form three treatment stages: primary settlement, biological treatment (biozone) and humus settlement. Flow through all of the treatment stages from inlet to outlet is by gravity.

The incoming wastewater is received in the primary settlement zone. The purpose of the zone being twofold; to remove the majority of the incoming settleable material reducing the biological load passing forward to the biozone; and to store this material (primary sludge) along with humus sludge (returned from the humus zone) until it is periodically removed by desludging. The primary zone has two compartments to ensure efficient operation. The primary zone also incorporates a flow balancing facility where, periodically, the liquid level is lowered by an airlift transferring some of the contents forward into the biozone. This creates a storage volume which is filled before gravity flow into the biozone continues. Flow from the primary zone passes forward into the biozone.

The biozone contains a number of sections (depending on the plant size and required discharge consent), which contain structured plastic media. The high surface area of the media encourages growth of the bacteria and other organisms (biomass) which treat the wastewater. Air, by means of above ground blower(s), is introduced below the media. The air fulfils two functions: supplying the oxygen required by the biomass; scouring the media, removing excess biomass.

The combination of treated wastewater and excess humus solids is transferred forward into the humus settlement zone. In this zone the humus solids settle to the bottom of the tank with the treated water (final effluent) being discharged at the top. The humus solids (humus sludge) which settle to the bottom of the tank are transferred to the primary zone by means of an airlift pump, where they are ultimately removed by the desludging operation.

PLANT KIOSK

All Conder Techflo SAF plants are provided with a painted mild steel plant kiosk. This kiosk houses the aeration blowers, timer valve(s) and the electrical control panel.

The side channel blower(s) fitted within the kiosk vary in capacity and utilise either single or three phase electrical supply. Please contact us for further information.

The electrical control panel provides all of the required electrical equipment for the starting, running and monitoring of the plant. The control panel can be adapted to accommodate other mechanical/electrical devices associated with the plant, for example a final effluent pump station.

The kiosk is fitted with an alarm beacon as standard and can be provided with telemetry for remote plant monitoring.
semi modular & modular

PRIMARY SETTLEMENT TANK AND COMBINED BIOZONE AND HUMUS SETTLEMENT TANK

PRIMARY SETTLEMENT TANK, BIOZONE TANK AND HUMUS SETTLEMENT TANK

* The system layout for semi-modular and modular plants is flexible, i.e. tanks can be installed in series or in parallel.
** Above ground options also available.
specification and installation

INSTALLATION
Conder advises the use of a suitably experienced and qualified installation company to install any of its products. For suggested installers in your area, please contact our sales team on: 08702 640004. Care should be taken to fully assess the site ground conditions prior to commencement of installation. Detailed installation guidelines are provided for each product. All electrical work should be carried out in accordance with current regulations (for example NIC EIC / building regulations). All Conder SAF plants are manufactured to allow installation with either granular or concrete backfill, client’s choice. Granular backfill will provide significant reductions in installation costs.

TECHFLO SAF PLANT SELECTION TABLE

<table>
<thead>
<tr>
<th>PLANT</th>
<th>DISCHARGE AMMONIA LEVEL (mg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Techflo SAF 60</td>
<td>Unitank</td>
</tr>
<tr>
<td>Techflo SAF 75</td>
<td>Unitank</td>
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<td>Unitank</td>
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<tr>
<td>Techflo SAF 200</td>
<td>Unitank</td>
</tr>
<tr>
<td>Techflo SAF 250</td>
<td>Semi Modular</td>
</tr>
<tr>
<td>Techflo SAF 300</td>
<td>Semi Modular</td>
</tr>
<tr>
<td>Techflo SAF 350</td>
<td>Semi Modular</td>
</tr>
<tr>
<td>Techflo SAF 400</td>
<td>Modular</td>
</tr>
<tr>
<td>Techflo SAF 500</td>
<td>Modular</td>
</tr>
<tr>
<td>Techflo SAF 600</td>
<td>Modular</td>
</tr>
</tbody>
</table>

* Larger applications, or those which are outside the scope of the above tables are available, please contact us for details.

OPTIONAL extras
- Client specified Control Panel e.g. Form 4
- Standby Blower
- Client specified Control Kiosk
- Access Shafts (for deeper pipework invert)
- Sample Chamber
- Phosphate Reduction
- UV Disinfection
- Scada/Telemetry
- CMS Dial Out
- Tertiary Treatment
- Heavy-duty Covers
- Acoustically lagged controlled Kiosk

SERVICE
Conder recommends that a maintenance agreement is taken out to service the plant as indicated in the Environment Agency Guideline PPG4. Desludging of the Primary Tank should take place between 60-365 days depending on the size of the plant and the plant loading. Through a nationwide network of British Water accredited engineers, Conder’s service partner Pims Service, offers a comprehensive range of services including commissioning and ongoing service contracts.

Hire/lease and buy back options available.

overground option
# Techflo SAF Standard Plant Sizing Table

## UNITANK SYSTEMS

<table>
<thead>
<tr>
<th>PLANT</th>
<th>TANK DIAMETER (m)</th>
<th>OVERALL LENGTH (m)</th>
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<tbody>
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## SEMI-MODULAR-TWO TANK SYSTEMS

<table>
<thead>
<tr>
<th>PLANT</th>
<th>TANK &amp; DIAMETER (m)</th>
<th>OVERALL LENGTH (m)</th>
<th>TANK DIAMETER (m)</th>
<th>OVERALL LENGTH (m)</th>
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<td>11.108</td>
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## MODULAR-THREE TANK SYSTEMS

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<th>TANK DIAMETER (m)</th>
<th>OVERALL LENGTH (m)</th>
<th>TANK &amp; DIAMETER (m)</th>
<th>OVERALL LENGTH (m)</th>
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<td>10.210</td>
<td>HM45-2.5</td>
<td>11.450</td>
</tr>
</tbody>
</table>

* Standard plant inlet depth is 1m. Deeper inlet options are available.

The tank sizes detailed in the above table refer to our standard plant configurations. We can offer bespoke solutions to suit different plant configurations and footprint requirements, for both below ground and above ground plants. If you have particular plant requirements please contact us for further details.

conderproducts.com
Protecting the water environment has been the mission of Conder Environmental Solutions since it was established in the early 1970s. The business is organised into specialist divisions: Conder Products, Conder Technical Solutions, Conder Pumping Solutions. Our full capability extends beyond our successful range of 'sealed-design' commodity products, to providing expert consultancy and design for hi-specification bespoke packages across all areas of wastewater pollution control.

Conder works closely with engineers, architects, specifiers, developers and self-builders. Providing support from detailed site surveys, plant selection, full technical proposals and liaison with regulatory bodies where necessary, we will ensure that our client achieves the most environmentally sound and cost-effective solution.

CONDER PRODUCTS

Our specialist commodity division offers a portfolio of products ranging from oil/water separators and small sewage treatment plant, to pumping stations and attenuation or storm water balancing tanks. Our Clerflo range of small-scale domestic sewage treatment plants serve 6-50 population equivalents, utilising either Activated Sludge Plant (ASP) or Submerged Aerated Filter (SAF) technology. Highly price-competitive, with minimal running costs, the Clerflo range is the low energy solution for applications where access to mains drainage is not available.

CONDER TECHNICAL SOLUTIONS

The capability of Conder’s Technical Solutions division illustrates the breadth of the company’s expertise and has established Conder as the authority in hi-specification projects. As a solutions provider our expertise extends across a product range that includes SAF technology unitank and modular sewage treatment systems up to 1800pe, Membrane BioReactor package sewage treatment up to 5000pe, attenuation, engineered vessels and other specialist tanks.

CONDER PUMPING SOLUTIONS

We offer a range of water and wastewater pumping solutions for domestic, commercial and industrial applications from off the shelf packages, through to custom-built pumping solutions.

SERVICE

Products installed to protect the environment must be maintained and serviced regularly to ensure that they continue to operate efficiently and effectively. Failure to do this will undoubtedly lead to pollution of the water environment, which is an offence and may result in prosecution. Through a nationwide network of British Water accredited engineers, Pumps Service, Conder’s service partner, offers a full service and technical package which can include product support, commissioning, waste management and ongoing service and maintenance programmes.
let us make your environment a better place to be... demand special treatment

For product enquiries, specification advice, project assessments or further information, please contact the Conder team on:

Conder Solutions Ltd, 2 Whitehouse Way, South West Industrial Estate, Peterlee, Co Durham SR8 2RA

For nationwide service enquiries please contact:

Pims (Services) Ltd

Conder Solutions Ltd is part of the EPS group of companies. We reserve the right to alter specification without prior notice.

TM - Teclito is a registered Trade Mark  TM - Conder is a registered Trade Mark