



Additional chart coverage may be found in CATP2, Catalog of Nautical Charts.
SECTOR 9 — CHART INFORMATION

SECTOR 9

NORTH COAST OF WALES—WEST COAST OF ENGLAND—IRISH SEA, EASTERN SIDE

Plan.—This sector describes the N coast of Wales and the W coast of England from Carmel Head to **Formby Point** (53°33'N., 3°03'W.) and includes The Skerries, the SE side of the Irish Sea, Liverpool Bay, and the Rivers Dee and Mersey.

Off-lying Dangers

9.1 The Skerries (53°25'N., 4°36'W.) are a cluster of dark-colored, rugged islets which lie 1.5 miles NW of Carmel Head on the N side of Holyhead Bay. They are separated from each other at high water by narrow gullies, with some detached rocks.

A main light is shown from a prominent tower standing on the highest islet of the group. A racon is situated at the light.

East Platters, a reef which dries 1.4m in places, lies about 0.5 mile SE of The Skerries. Middle Rock, with depths of 8.1m, lies about midway between East Platters and Carmel Head. Passage Rock, with a depth of 8.2m, lies about 0.2 mile N of Carmel Head.

West Platters, two rocks, lie 90m S of The Skerries. The rapid tidal currents in this area cause heavy overfalls at the above dangers and all the inshore patches in the vicinity.

Tides—Currents.—Tide races off **Bardsey Island** (52°46'N., 4°47'W.), **Braichy-y-Pwll** (52°48'N., 4°46'W.), **South Stack** (53°18'N., 4°42'W.) and **North Stack** (53°19'N., 4°41'W.) can be dangerous to small craft. Heavy tide-rips can be experienced in the vicinity of Langdon Ridge, between The Skerries and **Carmel Head** (53°24'N., 4°34'W.) and The Tripods.

Between The Skerries and Carmel Head, the currents begin as follows:

Interval from HW Holyhead	Direction
+0550	NE
- 0010	SW

The maximum spring rate in each direction is between 5 to 6 knots. One mile NW of The Skerries:

- 0505	NE
+0120	SW

The maximum spring rate in each direction is 4.5 knots. Off Carmel Head, rates of up to 7 knots may be experienced.

In the vicinity of The Skerries there are races over and near all the rocks and shoals; eddies may be encountered E and SE of The Skerries and Carmel Head. Tidal currents are given on the chart.

West Mouse is an islet lying 0.7 mile NNE of Carmel Head. Foul ground, with several patches of less than 5.5m, extends about 0.3 mile W and SW of the islet. St. Vincent Rock, at the NW corner of this foul ground, has a depth of 3.2m. There is a heavy overfall SW of this foul ground during the ebb current. A beacon, 7.6m high, stands on West Mouse.

Ethel Rock, with a depth of 5m, lies near the middle of a rocky bank, with a depth of less than 18m, in a position about 2

miles N of Carmel Head. A buoy, marked "Ethel Rock", is moored near the NW edge of the above bank.

Coal Rock, awash, lies near the NE end of a rocky bank, about 1 mile NNE of West Mouse. The two beacons, which stand on the NE side of Penbrynyreglwys, in range with the beacon on West Mouse indicate the position of Coal Rock. A buoy, marked "Coal Rock", is moored close SW of the cape.

Caution.—The passage inside The Skerries is unsuitable for deep-draft vessels and should not be used by any vessel at night.

A Traffic Separation Scheme (TSS), which is IMO-approved, has been established off The Skerries for vessels rounding the NW coast of Anglesey. The scheme has a separation zone, 2 miles wide, which may best be seen on the chart. Laden tankers should avoid the area lying between the SE boundary of the scheme and the coast.

Carmel Head to Great Ormes Head

9.2 Skerries Light (53°25'N., 4°36'W.) is shown day and night and a racon is situated at the tower. Radiobeacons are situated at Baily Light (53°22'N., 6°03'W.) and Point Lynas (53°25'N., 4°17'W.), and a RDF station is situated at Great Ormes Head.

Carmel Head (53°24'N., 4°34'W.), the N entrance point of Holyhead Bay, is the NE extremity of a bold and precipitous promontory of which Penbrynyreglwys is the summit. Two white stone beacons, 10m in high, stand on the NE side of Penbrynyreglwys and indicate Coal Rock.

Trwyn Cemlyn is a low and narrow point lying about 2 miles ENE of Carmel Head. Harry Furlong Rocks consist of a drying ledge which extends for about 0.3 mile N from Trwyn Cemlyn. The outer and highest portion of this ledge dries 3.9m and is marked by Furlong buoy.

Victoria Bank, with a least depth of 1.6m, lies about 0.7 mile NW of Trwyn Cemlyn. It is steep-to and is usually marked by a tide rip. A buoy, marked "Victoria", is moored close N of this bank.

Archdeacon Rock, with a least depth of 5.9m and deep water close-to, lies about 1.5 miles N of Trwyn Cemlyn. A buoy is moored about 0.1 mile NW of this rock.

Wylfa Head (53°25'N., 4°28'W.) is located 1.25 miles E of Trwyn Cemlyn. Cemlyn Bay and Porthypistyll are two bays, separated by a rocky ledge, which lie between Wylfa Head and Trwyn Cemlyn. Cemlyn Bay, on the W side of the ledge, affords good shelter in a depth of 7m, but should not be used in N winds. Porthypistyll, on the E side of the ledge, is encumbered with below-water rocks and is not recommended. The buildings of a nuclear power station, which stands on the head, are conspicuous from seaward.

Cemaes Bay is entered between Wylfa Head and Llanbadrig Point, 0.8 mile E. A church stands near Llanbadrig Point and drying rocks lie close off it. There is a pier, used by small craft, situated at the head of the bay. The shores of the bay are high and rocky and the low-water line consists of shelving ledges.

There is good anchorage, during offshore winds, in the middle of the bay in depths of 9 to 11m. This berth is out of the tidal current, but a submarine cable passes through the center of the bay and lands at the SE end.

Llanlleiana Head is located 1.7 miles ENE of Wylfa Head and a tower stands on its extremity.

Middle Mouse, 7m high, is a steep-to islet lying 0.5 mile NW of Llanlleiana Head. A clear passage leads between this islet and the coast.

Graig Wen, 88m high, is a hill with a prominent white top which stands close to the coast on the W side of a small cove, about 0.5 mile ESE of Llanlleiana Head.

Bull Bay, lying 2.5 miles ESE of Llanlleiana Head, is entered between Trwyn Melyn, on the W side, and Trwyn Costog, about 1 mile ESE. A prominent disused windmill stands on Parys Mountain, 2 miles SSE of the bay. Bull Rock, with a depth of 4m, lies about 0.3 mile W of Trwyn Costog.

The bay provides good anchorage during offshore winds from between WNW and SE, in depths of 9 to 11m, sand. The berth lies out of the strength of the tidal current which attains a velocity of only 1.2 knots within the bay, but nearly 5 knots in the offing.

East Mouse is a rocky islet which lies close off Trwyn Costog, in the E approach to Bull Bay.

Directions.—Further off the coast, the offshore (TSS) route leads almost parallel to the coastline.

The inner or coastal route leads from a position lying W of **South Stack** (53°18'N., 4°42'W.) to a position lying N of **Point Lynas** (53°25'N., 4°17'W.) and then swings around The Skerries at a least distance of 1 mile. The route then passes NW of South Stack Light, which stands on a rocky islet with dangerous tide races in its vicinity, and NW of North Stack, an islet with dangerous tide races in its vicinity. It then leads NW of Langdon lighted buoy which marks Langdon Ridge. This ridge consists of a rocky shoal, with a least depth of 9.1m, where tide-rips occur.

The route then passes NW and N of The Skerries, N of Ethel Rock buoy, which lies 2.2 miles N of Carmel Head, and NE of Carmel Head. It passes N of Archdeacon buoy, which is moored 1.7 miles W of Ethel Rock buoy, and N of Wylfa Head close SW of which stands a conspicuous power station. The route then continues N of Middle Mouse, a steep-to islet lying 5 miles ENE of Carmel Head and N of Trwyn Melyn, a rocky point located 2 miles ESE of Llanlleiana Head. It then passes N of Point Lynas where a pilot may be embarked by prior arrangement.

Caution.—A short, steep, and confused sea exists between Carmel Rocks and the coast when a fresh wind blows against the tidal current.

9.3 Amlwch Harbor (53°25'N., 4°20'W.), a tidal harbor, lies at the head of an inlet, 0.5 mile E of Bull Bay. It dries between 0.6 and 3m at LW. A rock, with a depth of 2.1m, lies about 90m offshore on the W side of the approach.

Caution.—A submarine pipeline, which is the remains of an SBM facility, extends for about 1.8 miles N from Amlwch Harbor. This pipeline is surrounded by an area within which fishing and anchoring are prohibited.

Point Lynas (53°25'N., 4°17'W.), which projects N from the coast 1.5 miles E of Amlwch Harbor, is very conspicuous from E and W. A rock, with a depth of 5m, lies close NE of the point.

A main light is shown from a prominent tower, 11m high, standing on the point. A radiobeacon is situated at the light. Lynas Bank, with a least depth of 11.3m, lies parallel with the coast, 0.5 mile offshore, between Amlwch Harbor and the point. This bank is generally marked by overfalls.

Porth Eilian is a small inlet with steep-to shores lying on the W side of Point Lynas. It is protected from the E by the same point of land. There is a mooring buoy in the center of the inlet and a slipway at the head. The inlet provides good anchorage for small craft during offshore winds, in a depth of 15m, mud and sand. An uncomfortable sea may occur when the tide is running strongly.

Mynydd Eilian, a hill surmounted by a beacon, stands 1 mile S of Point Lynas and is 174m high. A coastal radio station is situated 0.5 mile S of the hill.

Caution.—Liquid cargo transfer operations take place frequently in an area centered about 4 miles ESE of Point Lynas. Vessels engaged in these operations may be at anchor, or otherwise unable to maneuver, and should be given a wide berth.

Tides—Currents.—Between Point Lynas and **Trwyn-du** (53°19'N., 4°02'W.), the currents run SE and NW with a maximum spring rate of 1.3 knots in each direction; they are weak within Dulas and Redwharf Bays and within Moelfre Roads, though fairly strong off Ynys Moelfre.

In **Table Road** (53°19'N., 4°05'W.), the currents run as follows:

Interval from HW Holyhead	Direction
- 0535	SE
+0035	NW

The maximum spring rate in each direction is 3 knots.

Pilotage.—In bad weather or at the request of a vessel's master, Liverpool pilots will board off Point Lynas. Pilots board from a launch in a position about 2 miles N of the point.

Directions.—The coastal route to Liverpool Bay leads E from Point Lynas to Great Ormes Head, a distance of 15 miles, in deep water.

Dulas Bay (53°22'N., 4°15'W.), including Traeth Lligwy, is entered between **Ynys Dulas** (53°23'N., 4°15'W.) and Ynys Moelfre, 2 miles SSE. It is only suitable as a temporary anchorage for small craft in offshore winds. There is little protection at LW from Ynys Dulas and the shallow flat. Garreg Allan, a detached drying patch, lies close E of Ynys Dulas.

Traeth Dulas, an inlet, lies at the head of the bay. It dries completely and is only suitable for small craft. The S entrance point of the inlet consists of a shingle beach and low sandhills.

A navigable channel, with a least depth of 3.7m, leads between the coast and Ynys Dulas. A rock, which dries, lies

midway in the channel, 0.1 mile W of the N extremity of Ynys Dulas. Local knowledge is necessary.

Traeth Bychan lies in the bight, 1 mile S of Ynys Moelfre, and contains a small harbor with a slipway. This harbor was originally constructed for the use of vessels loading from the now disused quarries. The whole bight dries, but vessels can ground on a clean and sandy bottom at LW. Small craft can find anchorage within the bight with winds from between SW and NW, through S.

Anchorage.—Fresh Water Bay, 0.5 mile SE of Point Lynas, affords shelter in W winds. The anchorage has a depth of 17m. A bank lying 0.5 mile offshore has a least depth of 7.7m and fronts the bay.

Porthygwchiaid, a bay lying 0.5 mile S of Fresh Water Bay, also affords shelter in W winds. The anchorage has a depth of 8m, sand. The shore within this bay is composed of shingle with drying ledges extending from it.

Moelfre Road lies close S of Ynys Moelfre, an islet, and affords good sheltered anchorage in W winds. Moelfre Bay has a depth of 6m, mud and sand, and the tidal currents are negligible.

A deep-water anchorage lies about 2 miles NE of **Ynys Moelfre** (53°21.5'N., 4°13.5'W.) in a depth of 20m. However, two patches of foul ground lie in the vicinity of the anchorage, 2.5 miles NNE and 2 miles ENE of Ynys Moelfre.

Caution.—Cargo transfer operations take place in an area centered 2 miles NE of Ynys Moelfre.

Trwyn Dwlban (53°19'N., 4°12'W.), located 2.7 miles SSE of Ynys Moelfre, is surmounted by a steep, abrupt, and regular mass of rock which resembles the remains of a castle when seen from a distance.

Red Wharf Bay, lying between Trwyn Dwlban and Carreg Onnen, 2.7 miles E, dries out almost to the line of the entrance points. At Carreg Onnen, the cliffs rise to heights of nearly 90m. A conspicuous radio mast, 106m high, stands 0.7 mile inland near Carreg Onnen and a radio tower stands on the high ground, about 1 mile SW of the mast.

Trwyn Dinmor is located 2.5 miles E of Carreg Onnen. The coast between trends irregularly and consists of limestone cliffs. Two disused piers extend NW from the coast close SE of Trwyn Dinmor.

Table Road, which fronts the cliffs between Carreg Onnen and Trwyn Dinmor, affords anchorage with offshore winds, in depths of 11 to 16m.

Four Fathom Bank fronts Red Wharf Bay and the N side of Table Road and has a least depth of 6.3m.

Trwyn-du (53°19'N., 4°02'W.), located 0.75 mile E of Trwyn Dinmor, is the E extremity of Anglesey. It is mostly fringed by a drying rocky edge. A main light is shown from a conspicuous tower, 29m high, standing near the outer end of the rocky shelf, 0.1 mile NNE of the point.

Dinmor Bank is the NW part of the foul ground which extends up to 0.8 mile NW from Trwyn-du. This bank, which has a least depth of 2.5m, lies at the E side of Table Road and is marked by a buoy.

Ten Feet Bank lies at the E end of Four Fathom Bank, about 1 mile N of Trwyn-du. This bank has a least depth of 2.6m and is marked by a buoy moored on the SW side.

From Point Lynas, the velocity of the tidal current is much decreased by the land receding to the S, while the main part of the current runs between Point Lynas and the River Dee. However, a portion of the current circulates around the bay towards Puffin Island, at the NE entrance to the Menai Strait. The tidal currents to the E of Red Wharf Bay have a velocity of 3 knots at springs and 1.5 knots at neaps.

Anchorage.—Temporary anchorage can be found within Lighthouse Cove, a small bay, which lies close W of Trwyn-du Light. The berth lies in a depth of 4m, sand, opposite a small beach located on the E side of Puffin Island.

Puffin Island (53°19'N., 4°02'W.) lies 0.5 mile NE of Trwyn-du and the conspicuous tower of a ruined chapel stands near its center. This island and Lavan Sands, 5 miles S, are nature reserves and designated bird sanctuaries.

Perch Rock is the SW extremity of a rocky ledge which dries and extends 0.3 mile SW from the S end of Puffin Island. A conspicuous beacon, 12m high, stands on this rock. A narrow spit, which dries, extends 0.3 mile SSE from Perch Rock. Irishman Spit, a drying bank, lies about 0.3 mile SE of Puffin Island.

Directions.—The approaches to the NE entrance of the Menai Strait lie on the W side of Conwy Bay near the Anglesey shore. There are two approach channels. The NW channel, being more direct and better marked, is generally used.

The strait, which is marked by aids, passes between Dinmor Bank and Ten Feet Bank and then leads between Perch Rock and Trwyn-du. A rocky bar connects to the drying spit which extends SSE from Perch Rock. The controlling depth of the channel is 4.3m which is also the least charted depth over the bar. The channel continues between the SE coast of Anglesey and the NW sides of Dutchman Bank and Lavan Sands.

The NE channel entrance is unmarked and lies between Puffin Island and Irishman Spit. This channel then passes through a narrow swashway lying close to the extremity of the spit which extends SSE from Perch Rock. This channel should not be attempted without local knowledge.

Beaumaris (53°16'N., 4°06'W.) lies on the W side of Conwy Bay, about 3.5 miles SSW of Trwyn-du. A small pier, with depths of 4m at the head, fronts the town. There is an anchorage within the channel in depths of 7 to 13m, sand. Beaumaris is no longer open to commercial shipping, but is used by yachts and small craft. A prominent ruined castle stands at the NE side of the town and a conspicuous radio mast stands 1.5 miles NNE of it.

Port Penrhyn (53°14'N., 4°07'W.), the port for Bangor, lies 2 miles SSW of Beaumaris. It is a tidal harbor with depths of 3.3 to 4m at MHWS. A tidal basin, which dries, has two wharves with depths of 4 to 5.2m alongside at MHWS. Ro-ro vessels up to 2,300 grt can be accommodated. A conspicuous tower, 43m high, stands at the university, 0.5 mile SW of the harbor. A prominent castle stands on the high ground, about 0.8 mile SE of the harbor. An iron pile pier extends 0.3 mile NW from a point fronting the town of Bangor, close W of the



Photograph Courtesy of Jürgen Tronicke

Trwyn-du Light

harbor. Anchorage for vessels awaiting entry to the port can be taken off Beaumaris or off Bangor pier in depths of 5 to 13m. Several mooring buoys lie off Bangor.

9.4 Conwy Bay (53°18'N., 3°57'W.) is entered between Trwyn-du and Great Ormes Head, 6 miles ENE. The bay extends about 8 miles SW to Bangor, at the NE entrance to the Menai Strait. Much of the bay area is occupied by the drying sands of Dutchman Bank and Lavan Sands being broken only by Midlake Swatch and Penmaen Swatch. The Pool, lying further E of these water areas, has depths of up to 16m.

Four Fathom Bank, with depths of less than 6m, lies W of Great Ormes Head and fronts the entrance to the bay. A navigable channel lies on the W side of the bay and links the Menai Strait and its approaches with the open sea at Puffin Island.

The immediate coastline on both sides of the bay is low, backed by high ground. However, the high ground on the E side is considerably higher than that on the opposite side. Particularly noticeable are the quarry workings above **Penmaenmawr Point** (53°16'N., 3°57'W.) and a railway line which closely follows the E shoreline.

The coast N of Deganwy Point (53°18'N., 3°50'W.), at the entrance to the River Conwy, is formed by a low-lying isthmus which connects Great Ormes Head with the mainland.

Conwy (53°17'N., 3°51'W.) lies in the NE part of the bay with its massive castle standing on the W bank of the river. Conwy Sands dry and occupy much of the estuary that lies between Great Ormes Head and Penmaen-bach Point, 3 miles S.

Pilotage for the NW entrance of the Menai Strait is arranged from **Caernarfon** (53°09'N., 4°16'W.) and the boarding positions are shown on the chart.

Conwy Sands, which dry, occupy most of the estuary. A shallow approach channel passes through the S part of the sands and its entrance is marked by a buoy which is moored about 1.7 miles WNW of Penmaen-bach Point. Llys Elisap Clynnog, a patch of drying rocks, lies 1.25 miles W of Penmaen-bach Point, on the S side of the approach to the entrance. The entrance to the Conwy River lies 1.7 miles E of Penmaen-bach Point.

The town of Deganwy, fronted by the ruins of an ancient castle, is situated on the E side of the river. The coast to the N of the town is formed by a low-lying isthmus which connects Great Ormes Head with the mainland. The town of Conwy is situated on the W bank of the river, enclosed by old walls and towers, and fronted by a seawall. A conspicuous large castle stands at the S end of the town. Three bridges, situated close together, span the river near the castle and have a minimum vertical clearance of 5.5m. Tides at Conwy rise 3.6m at MHWS and 2.9m at MHWN. The harbor can be contacted by VHF and is used mainly by yachts and pleasure craft. The town quay dries at LW. A lighted beacon stands on a drying bank at the S side of the river entrance and a prominent tower stands on high ground at **Deganwy** (53°18'N., 3°49'W.).

The wharf at Deganwy is 182m long. It dries out alongside at LW and has a depth of 5.8m alongside at HW.

Penmaen-Mawr lies 2 miles SW of Penmaen-bach Point, on the S coast of Conwy Bay. A pier, which dries at LW, extends

from the shore and is used by small coastal vessels for loading stone from the nearby quarries.

Tides—Currents.—On the W side of Conwy Bay, the current is rotary, clockwise. When strong, the currents run SE towards **Penmaen-bach Point** (53°17'N., 3°53'W.) and NW to the N of Puffin Island.

In the NW entrance off Perch Rock the currents begin as follow:

Interval from HW	Direction
Holyhead	
- 0510	S
- 0025	N

The maximum spring rate in each direction is 3.5 knots. NE entrance, off Puffin Island:

- 0340	SW
+0220	NE

The maximum spring rate in each direction is 4 knots.

Outer Roads:

- 0545	SW
- 0100	NE

On the E side of Conwy Bay, about 2.5 miles SW of Great Ormes Head, the current setting E probably runs towards the latter, and the current setting W towards Lavan Sands.

In the entrance to Conwy River the currents begin, as follows:

Interval from HW	Direction
Holyhead	
- 0410	In-going
+0020	Out-going

The maximum out-going spring rate is 5 knots.

Caution.—A prohibited anchorage area extends 50m on either side of a road tunnel which lies under the river, 0.4 mile N of the bridges. The deepest part over this tunnel is marked by buoys which form a navigable channel, 50m wide.

Tidal currents in the approach channel to the harbor are strong.

Directions.—From a position to the S of the Fairway buoy (safe water), moored 1.7 miles WNW of Penmaen-bach Point, the track generally leads E through a narrow and buoyed approach channel across Conwy Sands. The route passes N of Llys Elisap Clynnog, a patch of drying rocks, then S of a rocky patch, 2 miles W, which dries. It then passes S of Bwrlingau Rock, a collection of drying boulders, and N of a lighted beacon. On rounding this lighted beacon, the track leads SE into the harbor, passing SW of a beacon which marks the head of an outfall.

Caution.—The approach channel is constantly changing and the buoys are moved frequently, but it is sometimes necessary to pass on the wrong side of them.

The white sector of the lighted beacon indicates the approach fairway, but does not necessarily indicate the deepest water.

Great Ormes Head to River Dee

9.5 Great Ormes Head (53°21'N., 3°52'W.), a bold promontory, is 203m high and one of the finest landmarks on the coast. Its N face is formed by a steep limestone cliff from which the ridge or head extends 1.7 miles SE. A prominent

hotel stands on the highest part and the stone tower of a disused lighthouse stands on the NW extremity of the promontory.

Ormes Bay (Llandudno) lies between **Pen Trwyn** (53°20'N., 3°50'W.), the NE extremity of Great Ormes Head, and Little Ormes Head, 2 miles E. Pen Trwyn, including the shore for about 0.5 mile to the S of it, is formed by a steep cliff. The head of the bay is formed by a marshy isthmus which rises at its E extremity to Little Ormes Head. The W side of the bay is fronted by rocky ledges which dry out up to about 100m, but farther E, the foreshore is formed of shingle fronted by sand. The bottom is mostly shingle with poor holding ground. A pier extends 0.2 mile NE from the shore at the W side of the bay. There is a depth of 2.7m alongside the head of the pier, but it was reported not in use. A jetty extends from the shore close S of the pier.

Little Ormes Head, with its high background, somewhat resembles Great Ormes Head, but the land at the head of the bay is low-lying.

Rhos Point (53°19'N., 3°44'W.), located 1.5 miles SE of Little Ormes Head, is low, flat, and fronted by loose stones which extend out to the low water line. The coast between is fronted by foul ground, with depths of less than 2m, which extends up to about 0.5 mile offshore. The prominent dark-colored tower of Llandrillo-yn-Rhos church stands on rising ground, 0.5 mile NW of the point. A stranded wreck, marked by a buoy, lies about 0.3 mile NE of the point.

Colwyn Bay, which contains a large resort town, is entered between Rhos Point and Tan Penmaen Head, 2.5 miles SE. The foreshore is formed of shingle and is fronted by sand which dries out up to 0.3 mile offshore. Submarine cables extend NE from a point on the W side of the bay, 0.5 mile S of Rhos Point. A drying rock lies 0.4 mile offshore midway between the entrance points of the bay. A detached breakwater, 200m long, lies close SE of Rhos Point and runs 200m and nearly parallel to the shore. A short breakwater extends E from the shore towards the S end of the detached breakwater and forms a small harbor which dries out. A stranded wreck, which lies 0.3 mile NE of Rhos Point, is marked by a buoy moored close NE. The tidal currents in Colwyn Bay are negligible.

Raynes Jetty, 218m long, and Llanddulas Jetty, 204m long, extend N from the coast about 1 mile E of Tan Penmaen Head. These jetties are used for the loading of crushed limestone and granite from the nearby quarries. Vessels of up to 3,200 tons, 92m in length, and 6m draft have been accommodated at HWS. Tides in the vicinity of the jetties rise about 7.8m at MHWS and 6m at MHWN. A shore control station may be contacted by VHF.

Gwrych Castle, a large building surrounded by trees, is a conspicuous object which stands on the E face of the hill, 2.7 miles ESE of Tan Penmaen Head. About 1 mile farther E, is the white square tower of the Abergele Church which stands 0.5 mile inland.

Rhyl (53°19'N., 3°29'W.), lying 7 miles ENE of Tan Penmaen Head, is a resort which occupies 1.8 miles of coastline to the E of the entrance of the River Clwyd. The town is prominent from seaward. The entrance to the river is simply a depression in the sand banks, scoured by the water from the

river, and is subject to change both in depth and direction. A breakwater, marked by beacons, extends N from the E entrance point of the river. The entrance channel, which dries, lies close W of the breakwater. Foryd Harbor, a small harbor which dries, lies within the entrance of the river. Depths in the harbor rise to 3.6m at HWS and 2.4m at HWN. The harbor is no longer used by commercial shipping, but is mostly used by fishing boats and pleasure craft.

Rhyl Flats, with depths of less than 5m, extend up to 4 miles offshore abreast Rhyl and are marked on the NW side by a lighted buoy.

Constable Bank is a long narrow bank, with depths of less than 10m, which extends W from Rhyl Flats. It is composed of fine sand and a lighted buoy is moored at the W extremity.

Point of Ayr (53°21'N., 3°19'W.), low and sandy, lies 6.5 miles ENE of Rhyl. The coast between is formed by a low and shingle beach, about 0.5 mile wide, with a foreshore of fine sand. The principal objects seen along this stretch of coast are the heights above Gwaenysgor, 230m high, on which stands St. Elmos Summer House and a radio mast. Lower down on the NE slope of the same ridge, stands the prominent mansion of Talacre. A prominent disused lighthouse, 19m high, stands close to Point of Ayr. A white tower, prominent from seaward, stands near the shore fronting the town of Prestatyn (53°20' N, 3°25'W).

Directions.—From a position lying N of Great Ormes Head, a route leads 20 miles ENE to the vicinity of Bar Light-float (53°32'N., 3°21'W.). It passes NNW of Constable Bank, which is marked by a lighted buoy; NNW of N Hoyle Lighted buoy, which marks a shoal ground to the N of Chester Flats; and then leads to the pilot boarding position close SE of the light-float.

River Dee

9.6 The estuary of the River Dee, most of which dries, is entered between Point of Ayr and Hilbre Point, 4.5 miles ENE. The approach to the entrance of the River Dee is barred by Rhyl Flats, previously mentioned; Chester Flats; and West Hoyle and East Hoyle Banks. These banks and flats are all of a shifting nature and dry in places. They extend up to 6 miles seaward of Point of Air and Hilbre Point.

Hilbre Islets lie on the NW part of a drying bank which extends up to 1.3 miles W and 2 miles S from Hilbre Point. The NW islet is 12m high and several small buildings stand on it. A light is shown from the NW end of this islet and a prominent beacon stands close S of the light.

Chester Flats, with general depths of less than 5.5m, extend from a position about 3.5 miles NW of Rhyl to within 3 miles of Point of Ayr. Patches, which dry up to 0.3m, lie on these flats. The S side of the flats forms the N side of Inner Passage which is described below. The W end of the flats is known as the Tail of Middle Patch and the E part as Middle Patch.

West Hoyle Bank may be said to be a continuation E and NE of Chester Flats. The E and NE sides of the bank form the W side of Hilbre Swash and the S side forms the N side of Welsh Channel. The channel over Chester Bar, between Chester Flats

and West Hoyle Bank, has altered to such an extent that it is no longer used. The E portion of West Hoyle Bank, abreast of Hilbre Point, dries as much as 6.7m and its W part dries up to 3.9m. The N part slopes off gradually, but irregularly, into deep water. East Hoyle Bank dries for a distance of about 3.5 miles N of Hilbre Point.

The principal channels through the above-mentioned banks are Welsh Channel which is entered through Inner Passage between the W, and Hilbre Swash which is entered from the N.

The inner ends of Welsh Channel and Hilbre Swash are connected by Welshmans Gut.

These channels are marked by lighted buoys and buoys which are moved to meet frequent changes.

Pilotage is compulsory for vessels over 50m in length. An ETA should be sent 24h in advance. Deep-draft vessels bound for Mostyn should anchor near the N Rhyl lighted buoy. Pilot will board near the Dee lighted buoy at 3 hours before HW.

Caution.—Local knowledge is necessary because of the frequent changes in the channels. In the summer months, numerous pleasure craft are moored in the vicinity of Hilbre Point and there is much sailing activity in the estuary and approaches.

Inner Passage (53°22'N., 3°30'W.), leading between Rhyl and Chester Flats, is frequently used by coastal vessels. In the fairway of the channel, there is a least depth of 5.1m, but at the W end, there is a detached 3.8m patch. At the E end, S of Middle Patch, a bar, with a depth of 2.3m, separates Inner Passage from Welsh Channel.

Welsh Channel, leading between the shore bank near Point of Ayr and West Hoyle Bank, has depths of 5.3 to 21.4m in the fairway, but near the W end are patches with depths of less than 3m.

Hilbre Swash, which lies between West Hoyle and East Hoyle Banks, had a least depth of 4.6m in the fairway. A dangerous wreck, with a depth of 0.4m, lies within Hilbre Swash on the W side of the channel.

Welshmans Gut (53°22'N., 3°16'W.) lies between West Hoyle Bank, on the N side, and Salisbury Middle, to the S.

Mostyn Quay (53°19'N., 3°14'W.) is a small port with a tidal basin, which dries, lying on the W side of the River Dee, 2.7 miles SE of Point of Ayr. The harbor basin is protected on the E side by a rubble wall which extends 0.4 mile NE from the shore. Tides here rise 8.7m at MHWS and 6.7m at MHW. Vessels up to 3,500 dwt, 100m in length, and 5.6m draft have been accommodated at HW. The harbor can be contacted by VHF.

Tides—Currents.—Tidal currents run at rates of 1.5 to 2.5 knots within Inner Passage and Welsh Channel. Below Mostyn Deep, the velocity of the tidal currents does not exceed 3 knots.

Connah's Quay (53°13'N., 3°04'W.) lies on the S side of the mouth of the River Dee, about 9 miles SE of Mostyn Quay. The two tidal docks are now disused. Overhead cables, with a clearance of 39m, span the river NW of the quay. Anchorage can be taken in a depth of 17m 0.5 mile NE of Point of Ayr or in depths of 7 to 14m about 1.5 miles SE of the same point.

Liverpool (53°25'N., 3°02'W.)

World Port Index No. 34690

9.7 This section describes the approaches to River Mersey, including the entrance channel; the Port of Liverpool, including Birkenhead and the oil terminal at Tranmere; the Port of Garston; the Manchester Ship Canal; and the Port of Manchester. It also provides details on the navigable reaches of the Upper Mersey.

The port limits include the River Mersey and the approaches from a line between Hilbre Point and Formby Point, extending 15 miles seaward and up-river to **Warrington Bridge** (53°23'N., 2°35'W.), excluding any waters belonging to the Port of Manchester.

Within the Port of Liverpool, a freeport area lies on the E side of the river and consists of the Royal Seaforth, Gladstone, Alexandra, Langton, and Canada Docks; an area within Birkenhead Docks has also been given freeport status.



Photograph Courtesy of John Luxton

Liverpool

The port of Liverpool stands on the banks of the River Mersey, which discharges into Liverpool Bay. The towns bordering the river are known collectively as Merseyside. The port comprises of the dock systems at Liverpool, on the E side, at Birkenhead, on the W side, and Tranmere oil terminal which lies S of Birkenhead. In addition, there are extensive repair facilities, including dry-docks, and the port provides support for oil and gas exploration activities.

The port is entered through Queens Channel and Crosby Channel which lead through Liverpool Bay. The approach to Queens Channel marked by Bar Light-float which is moored 3 miles WNW of the entrance.

The channel is encumbered by banks on either side, which extend up to 8 miles offshore, but these dangers and the fairway are marked by floating seamarks and lighted buoys so that navigating the approach is not difficult in moderately clear weather.

Queens Channel and Crosby Channel form a continuous entrance fairway through the offshore banks.

Tides—Currents

The spring tide range is 8.4m and the neap tide range is 4.5m. Strong NE winds reduce the tidal heights and SW winds increase the tidal heights.

In Queens Channel and Crosby Channel, the tidal current generally runs in the direction of the fairway, but in the dredged cut and entrance to Queens Channel, a SE set has been experienced during the ingoing current. In addition, a W set has been experienced during the outgoing current. At the bend in Crosby Channel, when the training banks are covered, an E set has been experienced during the ingoing current and a N set during the outgoing current. The sets at the bend in Crosby Channel may be very strong at springs.

From the channels up to the river entrance, the velocity of the current gradually increases from 2 to 4 knots.

Depths—Limitations

The depths in Queens Channel and Crosby Channel are maintained at or near 7m. A fairway channel, 0.5 mile wide, has been dredged through the bar at the outer end of Queens Channel. Generally, vessels with drafts of up to 12.9m can enter the port at any HW and vessels of up to 14.1m draft can enter on 75 percent of the high waters during the year. Occasionally, these drafts have been slightly exceeded by arrangement and permission of the Port Authorities. The port handles general cargo, bulk, oil, container, and ro-ro vessels.

Royal Seaforth Dock, Liverpool Docks, Birkenhead Docks, and Tranmere Oil Terminal are maintained to provide deep-draft berthing facilities.

The largest vessel handled was one of 322,912 dwt, 346m in length, 57.4m beam, and 12.5m berth which berthed at Tranmere oil terminal.

The water in the docks on the Liverpool side is impounded at a level approximately 9.7m above chart datum. The water in Birkenhead Docks is impounded at a level approximately 10m above chart datum. The level of water is apt to vary more or less from time to time and vessels must therefore take precautions while berthed alongside. However, within both docks, the levels are maintained so far as circumstances permit by pumping from the river.

Liverpool Docks and the City of Liverpool lie on the E bank of the river. Liverpool Docks are an extensive system of wet docks and basins which occupy 6 miles of river frontage. The basins are connected by passages so vessels may be transferred from one to another without having to enter the river. The dock system is entered through two locks. Gladstone Lock has a sill 5.6m below chart datum and Langton Lock has a sill 5.3m below chart datum. The water level in the wet docks is maintained, when possible, at a level of 9.7m above chart datum. Vessels of up to 75,000 dwt, 260m length, and 12.8m draft can be accommodated.

The S part of the wet dock system, on the E side of the river, is closed to commercial traffic. Birkenhead Docks, which form a part of the Port of Liverpool, occupy about 1 mile of river frontage on the W side. They consist of a series of wet docks, basins, and dry docks. Entrance from the river is via Alfred Lock which is 146m long and 30.3m wide with a sill 2m below chart datum. For vessels which are longer than the lock

entrance, the whole of the inner Alfred Dock basin is used as a lock. The water level in the wet docks is maintained, when possible, at a level of 10m above chart datum by pumping from the river. Vessels of up to 8.7m draft can be accommodated.

Tranmere oil terminal consists of a U-shaped pier which projects ENE from the W shore 1.5 miles S of the entrance lock at Birkenhead Docks. At the head of each arm, there is a floating pontoon, 112m long, with several dolphins. There are dredged depths of up to 12.6m off the berths and tankers of up to 210,000 dwt can be accommodated on reduced drafts of up to 14.8m. A jetty, which is used by vessels up to 70,000 dwt for tank cleaning, extends from the W bank of the river, close S of the tanker terminal. Bromborough Dock, which formerly led to Port Sunlight, lies 1.5 miles S of the terminal and is now closed.

Royal Seaforth Dock, provides ten deep-water berths and is entered from Gladstone Dock through a passage, 39.6m wide. The passage and the dock have a depth of 5.6m below chart datum. There is 3,170m of quayside including a ro-ro ferry service terminal. Vessels of up to 75,000 dwt, 260m in length, and 12.8m draft can be accommodated.

Gladstone Dock, located adjacent to the S side of the Royal Seaforth Dock, is one of the principal wet docks and includes three branch wet basins. It is entered from the river through Gladstone Lock. Vessels of up to 75,000 dwt, 250m in length, and 12.5m draft can berth at the grain terminal and vessels of up to 12.8m draft can berth at the bulk liquid terminal.

Hornby Dock is connected to Gladstone Dock by a lock, 196m long and 27m wide. Vessels with a maximum draft of 8m are allowed within this dock which contains a ro-ro berth and facilities for handling containers.

Alexandra Dock is connected to Langton Dock by a passage, 27.3m wide, and contains ro-ro and bulk facilities which can handle vessels with drafts of up to 8.8 m.

Langton Dock, entered from Langton Lock, gives access to the remaining docks within the N division. Brocklebank Dock, which includes a branch basin, lies adjacent to Langton Dock. This dock contains a freight ferry terminal.

Canada Dock is entered from Brocklebank Dock through a passage, 39.6m wide, and contains three branch wet basins. There are ro-ro and bulk facilities which can handle vessels of up to 30,000 dwt and 10m draft.

Huskisson Dock is entered from Canada Dock through a passage, 27m wide. It contains two branch wet basins for handling general and bulk cargoes. Vessels of up to 9.5m draft can enter this dock.

Sandon Half-Tide Dock, entered from Huskisson Dock, gives access to the smaller docks in the system. Wellington and Bramley Moore Docks are entered via cuttings, 21.3m and 18.3m wide. Nelson Dock is entered from Bramley Moore Dock through a cutting, 18.3m wide, and is used for the handling of wines and spirits by ro-ro vessels. Vessels of up to 99m in length, 15.5m beam, and 7m draft can be accommodated. Salisbury Dock is entered from Nelson Dock through a cutting, 18.2m wide, and can accommodate small vessels with bulk commodities. A narrow cutting leads into Collingwood Dock, Stanley Dock, and into the inland waterway system of the Liverpool and Leeds Canal. A second

cutting leads S into Trafalgar Dock and gives access to Clarence Graving Dock.

Liverpool Landing Stage operates a ro-ro vehicle and passenger ferry service to the Isle of Man from the N section of the stage.

Alfred Docks, at Birkenhead, have a maximum alongside depth of 8.6m and are entered directly from Alfred Lock. East Float is entered from Alfred Dock by a passage, 30.5m wide. It has grain berths with depths of up to 8.7m alongside.

Vittoria Dock, which lies within East Float, contains berths at Vittoria Wharf and South Vittoria Dock for the handling of forest products. Vessels of up to 25,000 dwt can be accommodated.

West Float is entered from East Float by Duke Street Passage which has a width of 30m. Vessels of up to 192m in length, 26.5m beam, and 8.7m draft can berth alongside Duke Street Wharf and Cavendish Wharf.

Bidston Dock is entered from West Float through Bidston Passage which has a width of 30.4m. Vessels of up to 192m in length, 26.5m beam, and 8.7m draft can be accommodated within this dock which has facilities for ro-ro vessels in its S part.

Mersey Wharf, a private wharf opened to commercial shipping in 1990, lies 1.5 miles SE of Tranmere oil terminal and fronts the former Bromborough Dock. The wharf, which handles predominantly bulk cargoes, is 280m long. Generally, vessels take the ground when alongside at LW. It is reported that for limited periods on certain HW spring tides, vessels of up to 6,000 dwt can berth alongside.

Aspect

The coast between the N entrance point of the River Dee and Rock Lighthouse, 6.5 miles NE, is composed of low sandhills. Rock Lighthouse, which stands at the W entrance point of the River Mersey, is a prominent disused light tower.

Grange Monument, a column surmounted by a sphere, stands 1.5 miles SE of Hible Point and is conspicuous. A prominent war memorial stands close NW of this monument and two prominent radio masts stand on a hill close SE of it.

A range of hills lies behind the coast and Thurstaston Hill, 86m high, rises about 3 miles SE of Hible Point and is prominent. Another prominent hill is Bidston Hill, which stands about 3 miles SSW of Rock Lighthouse, with its disused lighthouse, observatory, and mill.

Between the two hills is the prominent square church tower of Woodchurch. Near the coast, prominent landmarks include the dome of a church standing 0.5 mile SSW of Rock Lighthouse and a water tower standing close SW of the dome.

On the N side of the approach, Formby Point and the shore for 5 miles S of it consist of low sandhills. A disused lifeboat house and a flagstaff, with a triangle top mark, stand on the point. Rock Channel, parts of which dry, lies about 1.5 miles offshore, NW of Rock Lighthouse. This channel, which leads to the river, is unmarked and used only by small craft with local knowledge.



Photograph Courtesy of Jürgen Tronkce

Rock Lighthouse

Queens Channel, Crosby Channel, and the River Mersey are marked by floats and lighted buoys. The approach to the entrance of Queens Channel is marked by Bar Light-float which is moored about 2.7 miles WNW of the entrance, 12 miles NW of Rock Lighthouse. A racon is situated at the light-float.

Pilotage

Pilotage is compulsory for vessels of more than 82m in length with a beam of more than 12m, and for all other vessels carrying hazardous cargoes or with defective equipment affecting their safe navigation.

Request for a pilot should be made with the ETA notice. If a vessel is unable to arrive within 3 hours of its ETA, an amended ETA must be sent at least 12 hours before arrival and 6 hours before the original ETA. This ETA should be confirmed when within VHF range.

Pilots normally embark or disembark in the vicinity of Bar Light-float (53°32'N., 3°21'W.). In the case of bad weather or at the request of a vessels's master, pilots will board off **Point**

Lynas (53°25'N., 4°17'W.). A Communications Officer boards with the pilot on vessels of 100,000 dwt or over.

In extreme cases of poor weather, a pilot may leave an outbound vessel anywhere in the river, if the Port Control Center permits.

Regulations

A Vessel Traffic Service (VTS) is operated from the Port Control Center, although the surveillance radar is maintained at the Port Radar Station (53°28'N., 3°02'W.). The radar coverage extends over the bay and up to 20 miles from the station.

Vessels of more than 50 gross tons navigating within the Port of Liverpool must be equipped with VHF/RT communications and should establish contact with the Port Control Center, call sign "Mersey Radio." When approaching the Bar Light-float, inward-bound vessels should maintain a continuous listening watch. Vessels carrying a dangerous cargo are also required to report to the Port Control Center when passing Bar Light-float.

Vessels should send an ETA for the designated pilot boarding position no less than 24 hours in advance. Vessels carrying a dangerous cargo should send an ETA at least 48 hours in advance.

The Port Control Center, which is situated in the Port of Liverpool Building (53°24'N., 3°00'W.), broadcasts vessel movements, weather reports, local navigation warnings, and visibility reports.

All vessels carrying dangerous cargoes and all vessels towing another vessel must report when passing the following points:

1. Q1 Light-float (inward) or Q2 Light-float.
2. Crosby Light-float.
3. Brazil Light-float or C22 Light-float.
4. Woodside Stage or Dukes Buoy.

In poor visibility when the above is not practicable, vessels will, on request, be tracked by radar.

Vessels wishing to adjust compasses within the port must give 24 hours prior notice to the Port Control Center and confirm immediately before commencing adjustment.

When vessels of 150m or over in length intend to swing in the river, they must report their intentions to the Port Control Center at least 10 minutes before maneuvering.

Vessels of over 50 gross tons may not anchor inward of the Q1 Light-float without permission of the Port Control Center. In the case of an emergency anchoring, a report must be made as soon as practicable.

Anchorage

In the event of berths not being readily available, a good anchorage area lies outside the River Mersey, in the open roadstead of Liverpool Bay. It is essential that vessels anchor clear of the buoyed channel and Bar Light-float.

For vessels awaiting the tide, anchorage may be taken in mid-channel for about 1.5 miles above the river entrance.

Caution

To avoid obstructing shipping in the approaches to the River Mersey, vessels are prohibited from anchoring within an area,

which may best be seen on the chart, extending W from the Q2 and Q1 Light-floats to a position 3 miles W of the Bar Light-float.

Numerous wrecks and obstructions exist in the approaches to the port and in the river and may best be seen on the chart. Dangerous wrecks are generally buoyed and mariners are warned to give such wrecks and buoys a wide berth, particularly since dispersal operations with explosives may be conducted at any time.

During strong NW winds, a considerable swell exists on the bar and deep-draft vessels must allow for this when entering or leaving the port.

Training banks, which cover, have been constructed on each side of the entrance channel. Vessels are advised not to navigate between the floating aids, which mark the sides of the fairway, and these training banks.

The depths in the entrance channel and in the river are liable to change and the floating aids are frequently changed as necessary.

Large tankers of up to 210,000 dwt may be encountered within the port during daylight hours. Other vessels should avoid meeting such vessels in the narrow parts of the fairway. An amber quick flashing light is exhibited, by day and at night, from the Port Radar Station to warn marine traffic that a large inward-bound vessel or a deep-draft vessel has entered the approach channel.

Dredges are constantly operating within the approach channels and the river.

A regular ferry service operates within the river in the vicinity of the Liverpool Landing Stage.

At the entrance to the Garston Channel, a submerged pipeline extends SW from the shore and is marked at its head by a lighted buoy. Anchoring and fishing are prohibited within the vicinity of this pipeline.

Submarine pipelines, which may best be seen on the chart, lie in the vicinity of the tanker cleaning jetty at **Rock Ferry** (53°22'N., 3°00'W.), in an area adjacent to the N limit of the South Explosives Anchorage, and in an area lying at the middle of the South Explosives Anchorage.

The depths within the navigable entrance fairways vary so frequently that it is impracticable to describe them. No reliance can be placed on the buoys marking these channels as they are frequently dragged out of position by the strong tides.

Upper Mersey

9.8 Garston Docks lie on the E side of the river, 3.5 miles above Tranmere Oil Terminal. They consist of three wet docks and are approached through Garston Channel which lies between the E shore of the river and the tongue of a drying sandbank. Stalbridge Dock is entered through a lock and is connected to Old and North Docks by passages. The lock is 84m long, 20m wide, and has a sill with a depth of 1.2m below chart datum. The channel is marked by lighted buoys and the approach to the lock is indicated by a range. A drying rocky ledge lies close S of the approach to the lock. There are facilities for general, bulk, container and ro-ro vessels. Vessels of up to 10,000 dwt, 152m in length, 19m beam, and 8.3m draft can be accommodated.

9.9 The estuary of the River Mersey above Garston almost dries, except for the winding course of the river and several deep-water bights or blind channels which are subject to constant changes.

The channels of the Upper Mersey are marked, but local knowledge is necessary.

Liverpool (Speke) Airport is situated on the NE bank of the river, close E of Garston.

Runcorn Gap, about 6 miles E of Garston, is where the river narrows to a width of 0.2 mile and is spanned by a high-level road and railway bridge with a vertical clearance of 24.4m. The town of Widnes stands on the N shore and has a wet dock which is entered through a lock situated close W of the bridge. The lock is 48.8m long, 12.2m wide, and has a depth of 6.4m over the sill at MHWS. Small craft of up to 4.6m draft can reach Widnes at MHWS.

Warrington, an industrial town, is situated about 5 miles above Widnes. A quay is accessible to small craft with drafts up to 3.5m at MHWS. The river in the vicinity of the town is spanned by several bridges. Above Warrington, there are several weirs in the river. Locks make the river navigable for small craft and it joins the Manchester Ship Canal at a point about 12 miles below Manchester.

Queen Elizabeth II Dock lies on the S side of the river adjacent to the entrance of the Manchester Ship Canal, 4 miles SSE of Tranmere Oil Terminal. The dock is specially designed for the handling of bulk petroleum and liquid chemicals and is entered through a lock, 246m long and 30.5m wide. There are four berths, 221 to 274m long, and the dock is normally maintained at a depth of 10m.

Manchester Ship Canal

9.10 The Manchester Ship Canal is 36 statute miles in length. Figures exhibited on the bank indicate the distance from the seaward end of the canal. The entrance is via Eastham Locks which are situated on the S side of the River Mersey, adjacent to Queen Elizabeth II Dock. Between the entrance and Manchester, there are four sets of canal locks giving a total lift of 17m. Tides at Eastham Locks rise about 9.7m at springs and 7.7m at neaps.

Depths—Limitations.—Eastham Locks, the principal entrance, consists of three locks. The E or smallest lock is not used for navigation. The W lock is 183m long and 24.4 wide. The center lock is 106.7m long and 15.2m wide. These locks generally operate for 4 hours either side of HW and are closed during leveling tides.

Each set of canal locks consists of two locks; a larger one, 183m long and 19.8m wide, and a smaller one, 106.7m long and 13.7m wide. These locks are situated at Latchford, Irlam, Barton, and Mode Wheel which lie, respectively, about 21, 28.5, 30.5, and 34 statute miles from the seaward entrance.

The canal has been excavated to a depth of 9.1m from Eastham Locks to Ince Oil Wharf, about 5.2 statute miles above the entrance. From there to Manchester, the canal has

been excavated to a depth of 8.5m. The width of the canal at the water level varies from 40 to 64m, depending upon the slope of the bank and depth of water. The minimum fairway width in the canal occurs in the passage under the Runcorn railway bridge where the distance between fenders at the water level is 25.9m.

Vessels with dimensions not exceeding a length of 170.7m or a beam of 21.9m can, with a draft up to 8.8m in fresh water, proceed as far as Ince Oil Wharf.

Vessels with dimensions not exceeding a length of 165m or a beam of 19.4m can proceed as far as Manchester, subject to the following fresh water draft restrictions: 8.1m as far as Latchford Locks; 7.3m as far as Mode Wheel Locks; and 5.5m as far as the Railway Swing Bridge at Manchester.

The canal is crossed by a number of fixed, swing and vertical lift bridges. The minimum passage width through these swing bridges is 36.6m. The minimum vertical clearance of any fixed bridge is not less than 22m above normal water level. In order to avoid detention during periods of high water levels, masts and funnels should not have a greater height than 21.3m above the waterline. Gauge wires are set across the canal before the fixed bridges. Any vessel failing to clear these wires should not attempt to pass under the bridges.

If a vessel's funnels or masts are too high to pass under the bridges, the topmasts or funnel tops can be removed by the crane which is situated on the W side of the canal, 0.2 mile above Eastham Locks. The minimum vertical clearance of any overhead power cable is 25.8m above the normal water level.

When the tide rises to a height of 9.08m, Eastham Locks are opened to the river and the canal may become tidal as far as Latchford Locks. When the leveling tide starts to ebb at Eastham Locks, the gates are closed and any excess water is returned to the river through sluices. Vessels in the canal should navigate with caution during these operations.

Numerous private wharves and lay-by berths, with lengths of 83 to 375m, are situated along the canal. The wharves have facilities for oil, chemical, bulk, ro-ro, and container vessels. The principal docks within the canal are described below:

Ellesmere Port, lying on the S side of the canal about 3 statute miles above Eastham, is the terminus of the Shropshire Union Canal. There are 716m of wharfage along the canal, with a depth of 9.1m alongside, and a wet dock for barges. Bowater's Wharf (Manisty Wharf), at the W end of Ellesmere Port, is 335m long and equipped to handle pulp and forest products.

Stanlow Oil Docks are situated on the N side of the canal, about 4.5 statute miles above Eastham. These docks have berths for tankers. They are isolated and are for the loading and discharging of liquids with a low flash point. Vessels of maximum draft for the canal can be accommodated alongside and there is no limit to the height of masts or funnels of vessels using these docks. There is a turning basin at the entrance to the docks in which vessels of 170.7m overall length can be turned. Stanlow Lay-by, situated on the S side of the canal, and Ince Oil Wharf, about 1 mile farther up, are each 183m long and have depths of 9.1m.

Weston Point Docks lie on the E side of the canal, about 11 statute miles above Eastham. They are entered through a passage, 18.3m wide, which leads into Delamere Dock. Other

docks and basins are connected to Delamere Dock and provide 1,350m of quayside. Vessels of up to 2,500 tons and 4.6m draft can be accommodated.

The Weaver Navigation Canal is entered at Weston Point through a lock, 69.8m long and 13m wide. It serves Northwich and Winsford and is used by small commercial vessels and pleasure craft. Anderton Depot at Northwich, about 11 miles above Weston Point, has 183m of quayside. Vessels of up to about 1,000 dwt can be accommodated, but are limited to a length of 60m, a beam of 10.1m, a draft of 3.2m, and a vertical height of 18m. Vessels proceeding to Winsford are limited to a length of 40m, a beam of 10.1m, a draft of 3m, and a vertical height of 9.1m.

Runcorn Docks lie on the E side of the canal, about 12 statute miles above Eastham. They consist of three principal basins which are entered through a passage leading from the canal. Vessels of up to 106m in length, 15.2m beam, and 5.3m draft can be accommodated. Runcorn Lay-by is situated on the E side of the canal between Weston Point and Runcorn Docks. It is 168m long with depths of up to 6.7m alongside. There are facilities here for the handling of bulk liquids with a flash point above 23°C.

Pilotage.—Canal pilots board vessels at Eastham Locks. Helmsmen for the canal passage are also available. Vessels requiring a pilot should give not less than 4 hours 30 minutes advance notice of their ETA at the Bar Light-boat. See Pilotage for Liverpool.

Several VHF shore stations, which are situated along the canal, control the movements of vessels. A continuous radio watch must be maintained on VHF.

Signals.—At Eastham Locks, docking signal lights are shown by day and at night from a horizontal platform, mounted on a metal mast, standing at the outer end of the center lock island.

Five lights, disposed horizontally on the platform, consist of two red outer lights, two white inner lights, and one green center light. The red and white lights at the E end of the platform control entry to the center lock and those at the W end control entry to the W lock.

A white occulting light signifies that the lock indicated is available. A red occulting light signifies that the lock indicated is not available and vessels must keep well clear. A green occulting light signifies that the lock gates are open and the water in the river and the canal are level.

An emergency signal consisting of an amber flashing light and two white balls, disposed horizontally, is shown from a

mast on the W side of the lock to indicate that the lock is inoperative. At each of the sets of canal locks, signal lights are shown by day and at night from concrete columns on the lock walls at both the downstream and upstream sides of each lock.

A red flashing light indicates that the lock is not available and a white flashing light indicates that the lock is available.

Traffic signals are shown by day and at night from both the downstream and upstream sides of all swing bridges. A fixed red light over the center of the fairway indicates that the bridge is closed. Two fixed red lights at the side of the fairway indicate that the bridge is open for opposing traffic and the vessel at which the signals are directed must not approach the bridge. A flashing green light and a fixed red light at the side of the fairway indicate that the bridge is open and the vessel at which the signals are directed may proceed.

A red flashing light at either the center or side of the fairway indicates an emergency signal. The bridge is not fully open and all vessels must keep clear.

In the event of an emergency situation in the Stanlow area, the following signals may be made:

1. A flashing white light visible 230 -125 shown from the roof of the Administration Building on Stanlow Island.
2. A sound signal emitted from sirens established 0.5 mile of Ince Oil Berth and between Stanlow Lay-by and Chemical Berths, consisting of a continuous, alternating high and low pitch warning.

Vessels should avoid entering the area between Ince High Cutting and the Stanlow Chemical Berth in the event of and for the duration of the above visual and audible signals.

Three flashing red lights, displayed vertically, from positions 0.5 mile upstream and 0.5 mile downstream of Ince B Berth will be shown in the event of an ammonia spill.

A horn will be sounded from the berth and accompany the flashing lights. Vessels should avoid transiting this area when these signals are in operation.

Flashing green lights situated at the Centenary Lift Bridge indicate that vessels may proceed.

Caution.—Passing vessels should proceed at dead slow speed to prevent causing damage to vessels at moorings or alongside or to the wharves or banks.

Care is also necessary when passing open sluices.

9.11 Manchester (53°28'N., 2°17'W.) (World Port Index No. 34700) is a very large industrial center. Vessels bound for the port are limited by the restrictions of the canal

Many of the former docks are closed to commercial traffic and one dock is used as a marina.