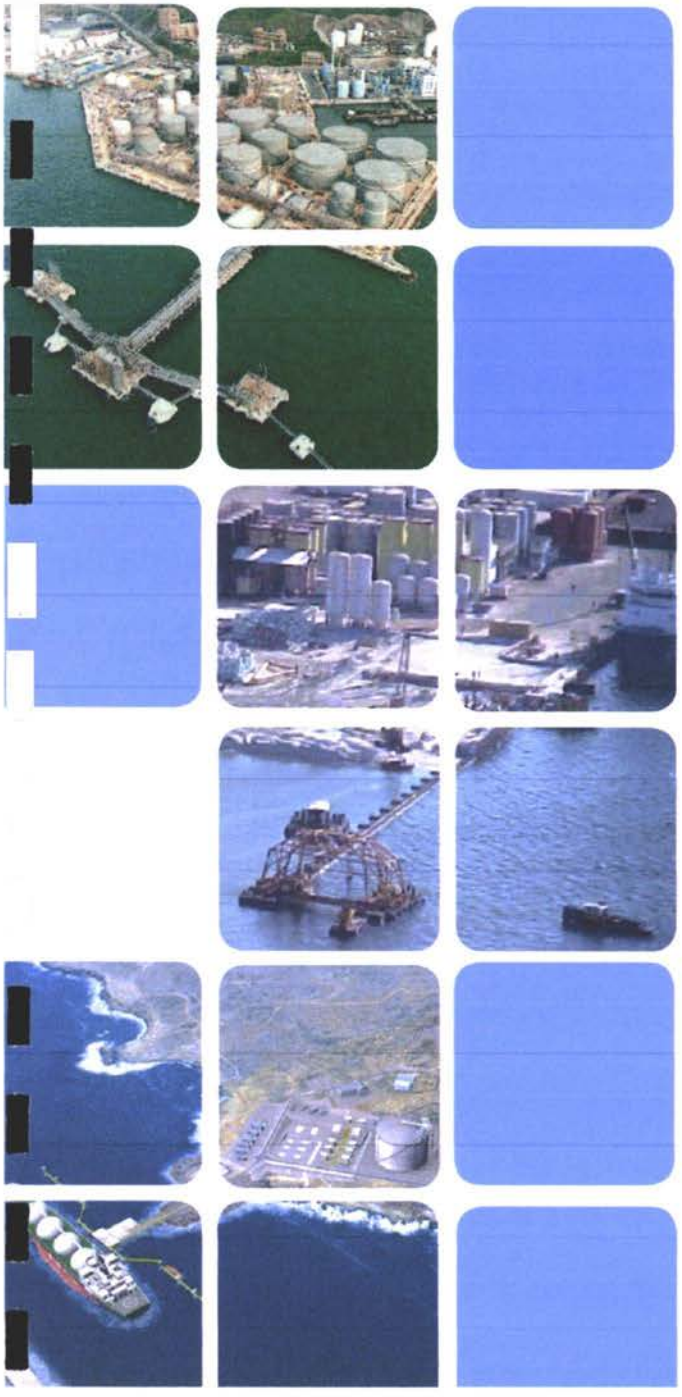

AKTAU PORT DEVELOPMENT

Masterplanning and Feasibility Study for the Port of Aktau, Kazakhstan

Ref: EuropeAid/123967/C/SER/KZ

PRE-FEASIBILITY STUDY

Prepared for

September 2007

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SUMMARY AND CONCLUSIONS

This pre-feasibility report examines the technical, economic and financial feasibility of the proposals for expansion of the Port of Aktau in broad terms.

It builds on the Conceptual Master Plan submitted in August 2007; and it will be followed by a full feasibility study in December 2007

The Terms of Reference state that the Conceptual Master Plan and Pre-Feasibility Study should be carried out on the basis of the AISCP traffic forecasts. We have generally followed that path, but have also included commentary on the implications of our work so far on the review of the traffic forecasts.

Two cargoes accounted for 97% of Aktau's cargo traffic in 2006. Oil is by far the most important accounting for 87% of the total and it is expanding rapidly. Kazakhstan's oil export volumes have increased by 15% p.a. in the last five years and are forecast to increase by almost 10% p.a. to 125 million tonnes by 2015.

Aktau's share of the growing oil traffic, however, will depend on two unknowns; whether or not the 30 million tonne p.a. CPC pipeline to the Black Sea will be expanded and whether a new oil port will be constructed at Kuryk, 70 km south of Aktau (see next page for further discussion). Both of these facilities would reduce the potential volumes available to Aktau.

The dry cargo consists mainly of steel exports. They are shipped almost entirely to Iran but tonnages have been static for the last five years. There is also a grain berth that handled 118,000 tonnes in 2006 and a ferry service that handled 148,000 tonnes of imports and oil exports.

This traffic is handled at *four oil berths, three general cargo berths, a grain berth and a ferry berth.*

The ***handling speeds*** at the berths are reasonable by international standards. The oil vessels can be loaded in half a day, but then tend to spend almost a day in port for paperwork and other formalities (this is not uncommon in other countries). The effective handling speed is about 10,000 tonnes/day. The steel is handled at about 2,500 tonnes per ship day in port and the grain handling speed averages about 3,000 tonnes per day.

The ***occupancy*** of the oil berths is very high: it is estimated provisionally at about 83%, resulting in a ratio of queuing to service time of about 2:1. The occupancy of the general cargo berths, however, is estimated at only about 42%, with no queuing.

The ***economic capacities***[1] of the berths are estimated as follows:

Table S1: Capacities of the Existing Berths

	Number of Berths	Capacity per Berth ('000 tonnes)	Economic Capacity P.A. ('000 tonnes)
Oil	4	2,550	10,200
General Cargo	3	528	1,584
Grain	1	488	488

[1] The economic berth occupancy is that above which queuing costs for berths become higher than the costs of building new berths

The Terms of Reference state that the Conceptual Master Plan and Pre-Feasibility Study should be carried out on the basis of the AISCP traffic forecasts. However, a second set of forecasts has since been presented in a report for the EBRD by Sheila Farrell and Associates (dated February 2006). Furthermore, in the course of reviewing the AISCP forecasts, Scott Wilson has examined recent traffic statistics and transport options and has drawn up some initial projections based on these recent trends. These initial impressions are compared with the AISCP and Shelia Farrell Associated forecasts in Table S2 (see Chapter 4 for details).

The most important question for the future of Aktau's traffic is whether a new oil port will be constructed at Kuryk, 60 km south of Aktau. The Kuryk scheme appears to have the support of the major oil companies - Agip, Tengizchevroil and KMG. It will require the construction of a 600 km pipeline from Tengiz, at an estimated cost of $1 billion. Initial plans were to use 60,000 DWT tankers at Single Buoy Moorings at the new port. This would permit economies of size in shipping, as Aktau can only accommodate 12,000 DWT ships. But recent reports suggest that the proponents of Kuryk are now also expecting to use 12,000 DWT tankers.

Our preliminary calculations suggest that Aktau should be more economic than Kuryk. The reason is that the cost of the pipeline is likely to cancel out the economies of size that would be gained if 60,000 DWT tankers were used. It is estimated that the costs of transporting crude oil from Tengiz to Baku would be $18 per tonne via Aktau, compared with $20 per tonne via Kuryk with 60,000 DWT tankers. And if 12,000 DWT tankers were used at Kuryk, the port's costs would rise further, to $23 per tonne.

But the oil companies may have additional reasons for favouring Kuryk They include non-cost factors such as (a) political considerations, especially security of exports, (b) the ability of the oil companies to control their transport operations and (c) the need to minimise downtime due to bad weather. It is emphasised that the cost of transport from Tengiz to Baku ($18-23 per tonne) are only a small faction of the value of the oil (approximately $500 per tonne).

Given the uncertainly over Kuryk, the *oil traffic (*shown in Table S2) is projected on two bases - *with and without the port of Kuryk.* It will be seen that if Aktau handled all the oil that could not find lower cost routes, the total would be 27 million tonnes by 2015. But if Kuryk attracted 20 million tonnes of this oil, Aktau would be left with only 7 million tonnes.

The general cargo has not yet been investigated in detail, but statistics show that there has been little growth in the last five years. The AISCP has identified some new cargoes, but no meetings have yet been carried out with the potential exporters and importers to validate these additional traffic flows. Consequently, general cargo is provisionally projected to increase in line with GDP, at about 10% p.a. up to 2010 and 8% p.a. up to 2015. To attract *additional* cargoes Aktau will have to enter new markets, and this may not be easy, as port costs and efficiency are usually of minor importance when compared with inland transport cost and efficiency that are not under Aktau's control. In addition, it would be unrealistic to ignore the following facts:

- Aktau's only significant destination for dry cargo is Iran;
- transit cargoes in the west-east TRACECA corridor are still limited mainly to oil (about 25% of Aktau's exports of 10 million tonnes of oil went to Baku in 2006, the remainder going to non-TRACECA countries). Dry cargo on TRACECA routes is limited mainly to alumina/bauxite imported through Poti destined for Tajikistan via Azerbaijan and Turkmenistan, plus minor volumes of cotton and general cargo on the Caspar ferries.

The normal routing for this traffic is via the more southerly Turmenbashi-Baku rail ferry link. The main potential new TRACECA cargo for Aktau is the export of 400,000 tonnes of processed minerals from Kazakhstan. Brief reference to a map shows that an all-land route to the Black Sea would usually be preferable to a land-sea-land route crossing the Caspian Sea; and in practice it has been confirmed that the minerals which are being exported from Kazakhstan to the west are using land routes to Novorossiysk. Some of this cargo could possibly be attracted to Aktau, if Caspar's shipping rates (up to $20 per tonne) and Aktau's Terminal Handling Charges (THCs) were reduced;

- there is little basis for trade ***between*** the oil-rich Caspian neighbours. The main countries of the Caspian – i.e. Kazakhstan, Azerbaijan, Iran and Russia – all have only one major export, which is oil. They do not therefore need each others' exports. Similarly all the countries have the same import needs, for machinery and consumer goods, and none of these goods are produced in the Caspian countries. The basis for trade between the countries surrounding the Caspian is therefore limited; and
- traffic to Aktau via the Volga Don Canal is negligible. There are plans for a new canal, but it would not affect Aktau's traffic for many years.

Better prospects for new markets may be found in:

- China's exports to Caucasus and SE Europe. If the Chinese government succeeds in generating export industries around Urumchi in the north west, their shortest and most direct route to these countries might be via Aktau. However, it has to be recognized that competition for such traffic would be significant; and
- the Special Economic Zone at Aktau which was established in 2003. So far, no port in the Caspian has emerged to take over a role similar to that of Dubai, which has consolidated its position as the commercial and distribution centre of the Middle East over the last 30 years. This has been achieved this by making the port, its Free Zone and its environs an easy place in which to do business in a rapidly expanding but highly regulated oil producing region. The creation of an efficient unregulated free zone at Aktau could also have the added benefits of attracting other industries into the area and assisting in the development of a market economy, as has happened in the Gulf region. So far, however, the Aktau SEZ has attracted only a few oil industry equipment plants, and several government-sponsored 'centres' for logistics, trade facilitation, etc.

Also, it is possible that the completion of some missing links in the rail system within Kazakhstan may allow minerals from the north and east of the country to be exported via Aktau; but the port will still face competition from the direct overland route to Novorossiysk.

The initial impressions on future traffic are shown in Table S2, which also shows the AISCP and EBRD forecasts.

Table S2: Comparison of Existing Traffic Forecasts and Initial Projections based on Recent Trends ('000 tonnes)

	2006	2010	2015
AISCP Forecast			
Oil	9,900	24,300	28,200
General cargo	1,028	3,000	3,800
Grain	118	500	500
Total	**11,046**	**28,250**	**33,595**

EBRD Forecasts			
Oil		15,800	11,400
General cargo		2,000(b)	2,500 (b)
Grain		500	500
Total (a)		**18,300**	**14,400**
Scott Wilson Initial Projections – without Kuryk			
Oil	9,900	26,500	31,500
General cargo	1,028	1,505	2,211
Grain	118	500	500
Total (a)	**11,046**	**28,505**	**34,211**
Scott Wilson Initial Projections – with Kuryk			
Oil	9,700	16,500	11,500
General cargo	1,028	1,505	2,211
Grain	118	500	500
Total (a)	**11,046**	**18,505**	**14,211**

Notes:
(a) Excludes ferry traffic
(b) Excludes grains and ferry traffic

The *need for new berths* on the basis of three optional sets of traffic scenarios is shown in Table S3.

The initial conclusions are shown in section F of the table. They are that:

- if Kuryk is built the need long term for new berths at Aktau will be limited; but
- if it is not built, six new oil berths may be needed by 2015.

There does not, however, seem to be a need for more than one additional dry cargo berth in the period up to 2015, unless significant volumes of new types of traffic were to emerge. In the absence of such new traffic streams growth could be accommodated by adopting new cargo handling practices in the existing port.

Table S3: Berth Requirements based on Optional Traffic Scenarios

		2006	2010	2015
A	**TRAFFIC FORECASTS ('000 tonnes)**			
	1 AISCP Traffic forecast			
	Oil	9,900	24300	28200
	General cargo	1,028	3,000	3,800
	Grain	118	500	500
	Total	11,046	28,250	33,595
	2 EBRD			
	Oil		15800	11400
	General cargo		2,700	3,500
	Grain		0	0
	Total		18,250	13,595
	3 Scott Wilson Initial Projection, without Kuryk			
	Oil	9,900	26,500	31,500
	General cargo	1,028	1,505	2,211
	Grain	118	500	500
	Total	11,046	28,505	34,211

	4 Scott Wilson Initial Projection, with Kuryk			
	Oil	9,900	16,500	11,500
	General cargo	1,028	1,505	2,211
	Grain	118	500	500
B	**EXISTING NUMBER OF BERTHS**			
	Oil	*4*	*4*	*4*
	General cargo	*3*	*3*	*3*
	Grain	*1*	*1*	*1*
C	**CAPACITY OF EXISTING BERTHS ('000 tonnes)**			
	Oil (a)	10,500	10,800	11,100
	General cargo	1,584	1,584	1,584
	Grain	488	488	488
D	**ADDITIONAL CAPACITY REQUIREMENTS('000 tonnes)**			
	1 AISCP Traffic forecast			
	Oil	*13,500*	*17,100*	*13,500*
	General cargo	*1,416*	*2,216*	*1,416*
	Grain	*0*	*0*	*0*
	2 Scott Wilson Initial Projections, without Kuryk ('000 tonnes)			
	Oil	*0*	*15,700*	*20,400*
	General cargo	*0*	*-79*	*627*
	Grain	*0*	*13*	*13*
	3 Scott Wilson Initial Projections, with Kuryk ('000 tonnes)			
	Oil	*0*	*5,700*	*400*
	General cargo	*0*	*-79*	*627*
	Grain	*0*	*0*	*0*
E	**CAPACITY OF A NEW BERTH '(000 tonnes)**			
	Oil (a)	3200	3200	3200
	General cargo	528	528	528
	Grain	488	488	488
F	**NEED FOR NEW BERTHS**			
	1 AISCP Traffic forecast			
	Oil	0.0	4.2	5.3
	General cargo	0.0	2.7	4.2
	Grain	0.0	0.0	0.0
	2 Scott Wilson Initial Projections, without Kuryk			
	Oil	0.0	4.9	6.4
	General cargo	0.0	0.0	1.2
	Grain	0.0	0.0	0.0
	3 Scott Wilson Initial Projections, with Kuryk			
	Oil	0.0	1.8	0.1
	General cargo	0.0	0.0	1.2
	Grain	0.0	0.0	0.0

The above highlights the potential impact of Kuryk on the future development of Aktau Port and a consequent need to consider risk mitigating strategies. Current indications are that even if Kuryk were to be constructed a percentage of the Tengiz/Kashagan field outputs would still be routed by Aktau Port, rather than total reliance on only one method. This would be a sound strategy for reducing the risk of any disruption to the efficient export of oil. For example damage to the SBM at Kuryk or any of the destination ports would

compromise the ability to distribute the output from this major field and therefore it would be logical to have alternative distribution strategies. This would suggest that in Table S3 section F that the likely demand is somewhere between Scenarios 2 and 3 indicating an initial demand for 4 oil berths.

The table also highlights the fact that, based on current figures, the case for the North Port rests mainly on the demand for oil berths. Without a firm demand for oil berths it is unlikely that the North Port expansion is currently justified. Most of the initial projection of an increase of up to 1.2 million tonnes/year in dry cargo by 2015 could be handled in the existing Port by improvements in cargo handling procedures. However, if Government policies or incentives to oil companies can guarantee that oil will continue to be handled at Aktau when Kuryk is in operation then the North Port is probably justified, providing development of the port goes ahead in parallel with development of the rail, pipeline and tank network which transfers oil to the port. The type of incentives envisaged are streamlining of operating procedures to at least the level of efficiency that the oil companies intend to install at Kuryk.

With the North Port in place it is quite possible that industry and development within Aktau will be attracted by the new port and demand for dry cargo, which is not currently visible, will be generated thereby justifying development of dry cargo facilities within the new port.

The phased development envisaged in the Conceptual Master Plan is shown on Figures I to VII.

The ***construction costs*** for the Northern Extension was estimated by Kazhydro at $ 242 million and at $334 million by the EBRD (SFA).

The main ***benefits*** of the project are likely to be (a) the avoidance of the costs of ships' time queuing for the existing berths, (b) the costs of using second best routes for the oil that could not be hanlled at Aktau and (g) the loss of , say 20% of the exports. The last cost would be pariculaly high On this basis the preliminary ***economic evaluation*** shows a high economic internal rate of return, estimated at 162%.

The preliminary ***financial evaluation*** based on AISCP traffic forecasts shows a low financial internal rate of return, estimated at only 7%, on the North Extension. With the initial Scott Wilson traffic projections it falls to 5%. These low FIRRs, however, should not necessarily be a cause for concern. Low financial rates of return on port projects[2] are quite normal, as the traffic often continues to come to the port in the "without investment" case, even if congestion costs are very high. That is to say, major economic benefits in terms of reduced queuing costs are often not accompanied by large additional financial revenues to the port. But in the case of the Northern Extension there is an additional reason for the low FIRR. It is that the revenues likely to associated with the project are low compared with the investment costs. The revenues and costs of the Northern Extension will necessarily be close to those of the existing port, as the traffic levels at the existing and new port are very similar; and the gross revenues on the existing operations are only $35 million p.a. (and net revenues after subtracting operating costs are only $20 million). These incomes are equivalent to only 6-10% of the investment costs.

The options open to AISCP may be as follows:

[2] It is emphasized that this text refers to the financial internal rate of return on the North Extension, not on the operations of the AISCP as a whole. Two sets of analysis will be carried out for the full feasibility study, due in December 2007. The first, the preliminary version of which is included in this report, evaluates the financial viability of the North Extension as a stand-alone project – to ascertain whether its revenues are sufficient to cover its costs and give an acceptable rate of return. The objective of the second financial exercise, which will examine the overall financial position of the AISCP, is to confirm whether the AISCP will be able to repay its loans. It is not included in this report, but will be presented in the full feasibility study.

a) To increase tariffs. Although the AISCP oil tariffs are a slightly high by international standards, it may be possible to increase them because the port's customers may have no options for getting oil exports to Baku. That is to say, if the oil that cannot find space in the CPC and Samara pipelines they may have to pay whatever AISCP decides to charge them. This argument, however, would be undermined if Kuryk were built and offered a large amount of capacity at competitive transport costs. The scope for increasing tariffs will depend on the costs of optional routes (both CPC and the BTC pipeline cost about $24 per tonne.

b) To identify a lower cost engineering design.

c) To separate out breakwater and channel costs and allow them a long cost recovery period and a lower required rate of return. The subsidization of breakwaters and channels is quite common practice in other countries.

It is emphasised, however, the high economic internal rate of return should take precedence over the low financial rate of return in the decision on whether or not to proceed with the project.

Risks

The main risks for Aktau will include:

- The provision of additional capacity in pipelines and ports that might compete with Aktau. The main risks would be from the CPC and the Port of Kuryk, with lesser threats from a pipeline from Kazakhstan to Iran via Turkmenistan, a pipeline from the Kumkol field to the port of Turkmenbashi and a Trans-Caspian undersea pipeline.

- The danger of a political developments in Iran that might affect trade between the countries. In 2006 almost all of Aktau's dry cargo and 40% of its oil went to Iran. The oil is shipped to Iran under "swaps" arrangements, whereby Iran receives imports oil from Aktau at the port of Neka, near Tehran, and provides, in return, oil for Kazakhstan at a port in the Arabian Gulf. The government of Kazakhstan places great importance on this arrangement which gives Kazakh oil access to East Asian markets, Also the Kazakh Intergovernmental Commission on Economic Relations and Trade has been discussing the delivery of Kazakh grain to Iran.

- Delays to the development of Kashagan oil field resulting from the environmental problems reported in August 2007.

1 PORT TRAFFIC

1.1 Cargo Volumes

The Port of Aktau handled 11.5 million tonnes of cargo in 2006 (see Table 1.1). The range of cargoes handled is limited, with oil accounting for 87% of the total and metals, mainly steel exports, for another 9%. Most of the remaining cargo is carried in the ferries connecting with Azerbaijan and Iran.

Table 1.1: Aktau Port Traffic 2006

	('000 tonnes)	%
Oil	9,960	87%
Metals	1,029	9%
Grains	118	1%
Others	398	3%
Total	**11,505**	100%

The limited range of cargo handled at Aktau is not a post-Soviet Union phenomenon. Even in the 1980s, Aktau handle only about 7 million tonnes of oil and a few hundred thousand tonnes of low value materials, such as salt and coal.

Aktau's traffic has grown appreciably by 12.6% p.a. in the last five years (see Table 1.2). This growth, however, was all in oil and 'other' cargoes, with steel exports remaining flat over the five year period. The grain traffic, for which silos have been built in the port, has been volatile and not yet taken off.

Table 1.2: Growth of Aktau Port Traffic 1996 - 2006 ('000 tonnes)

	1996	1997	1998	1999	2000
Oil	101	868	1815	2067	3386
Steel etc	222	226	140	235	702
Grain	16	11	28	8	15
Others	36	46	27	38	43
Total	**376**	**1150**	**2011**	**2348**	**4144**

	2001	2002	2003	2004	2005	2006	Growth (% p.a.) 2001-2006
Oil	5035	5553	6971	8289	8913	9960	14.6%
Steel etc	1060	574	836	1011	1024	1029	-0.6%
Grain	84	209	5	13	33	118	7.0%
Others	181	615	268	378	399	398	17.1%
Total	**6360**	**6951**	**8080**	**9691**	**10369**	**11505**	**12.6%**

1.2 Import v Exports

Almost all of Aktau's cargo consists of exports. The main reason is that Kazakhstan's imports are either carried by rail or higher value goods by road. This is necessarily so, given their origins in Russia, Iran, Turkey and China. In the third quarter of 2006, 42% of imports came from Russia or the Ukraine, and 20% from China or Korea, and almost all of this is assumed to enter Kazakhstan by rail. The traffic from Western Europe, Iran, Turkey moves predominantly by the road mode.

1.3 Origins and Destinations

Almost all of Aktau's dry cargo goes to Iran at present, along with about 40% of the oil. The other main destinations for the oil are Baku in Azerbaijan and Makhachkala in Russia.

1.4 Roro and Containers

Aktau has two ferry services – a rail ferry from Baku and a roro ferry from Bandar Anzali (Iran). A third ferry service to Makhachkala was opened in 2007, but has since been discontinued.

The main roro service is the Baku rail ferry. Its cargoes consist of oil shipments in rail wagons from Aktau to Baku and mixed general cargoes on the return voyage to Aktau. The oil shipment on the ferry has fluctuated from year to year and fell sharply in 2006. The general cargo from Baku to Aktau, however, has been gradually increasing (see Table 1.3). The ferries were designed in Soviet times to carry passengers, but passenger traffic is now minimal.

Table 1.3: CASPAR Rail Ferry Traffic 2001-2006 ('000 tonnes)

	2001	2002	2003	2004	2005	2006
Aktau-Baku	137	509	198	230	525	160
Baku-Aktau	66	83	46	112	103	148
Total	203	592	244	342	628	308

The other ferry service links Aktau with the Iranian port of Anzali. The roro service to Iran represents a partial unitization of the conventional service link between the countries that has existed for many years. Northbound the vessels bring building products and consumer goods and southbound steel and chemicals. This service also carries unitized cargo, including almost all the containers handled at Aktau. The container traffic has been very limited so far with the port only handling 1006 containers, an extraordinarily low number by international standards, in 2006.

The cargoes carried were almost all imports, consisting of oil industry equipment, consumer goods and spare parts whilst almost all the southbound containers are empty.

The gap between inbound and outbound shown in Table 1.4 implies that the majority on the containers are not being returned – i.e. the trade is based on the use of one-way boxes. The container traffic, however, has doubled in the last two years, probably due to the increase oil related activities.

Table 1.4: Aktau Container Traffic 2004-2006 (Number of Containers)

	In	Out	Total
2004	326	147	473
2005	407	268	675
2006	716	290	1006

AISCP expects that the construction of a rail line linking Djezkazgan and Saksalkaya to Beyneu will increase transit traffic from China to 200,000 tonnes, which could transit through Aktau. It is understood that there are some delays to this development that could delay its implementation.

Evaluation of the material so far available suggests the speculative nature of this tonnage assessment and possible inadequate recognition of the strength of the competitive ocean corridor. Further evaluation of these flows would be critical before considering development of specialized infrastructure to handle such traffic streams.

1.5 'Corridor' Traffic

Four international transport corridors pass over the territory of Kazakhstan. They are

1. Traceca, from Europe to Central Asia and China via the Black Sea, Caucasus and the Caspian;
2. The North-South Corridor from Northern Europe to the Persian Gulf/India, via Russia and Iran;
3. The Southern Corridor, from South East Europe to China and South East Asia, via Turkey, Iran and the Central Asian republics;
4. The Northern Corridor from Western Europe to China, Korea and Japan, via Russia and Kazakhstan.

Of these only the Traceca corridor likely to use the port of Aktau.

TRACECA

There has been much discussion of, and investment in, the attraction of cargo to the Transport Corridor Europe-Caucasus-Asia (TRACECA). Its original aims were to revive the transport route via the 'Silk Road' to give landlocked CIS counties access to world markets and to avoid the need to route via Russia. However in practice, after 13 years of promotion of the TRACECA, Aktau handles relatively little TRACECA transit traffic other than oil, which in reality is coming from port's immediate catchment area.

The only genuine transit traffic that was handled at Aktau was the steel moving between Russia and Iran, a non TRACECA routing. There were significant volumes of this traffic around 2000, but it has now been diverted back to the Russian ports as a result of a sharp reduction in Russia's domestic rail tariffs.

The Russian Railways introduced similar tariff cuts to attract steel back from Baltic ports to Russian ports. Consequently, in the last four years steel transit traffic has been very low, with the exception of 2004, when 105,000 tonnes of transit steel were handled.

There have been three fundamental problems with the TRACECA routes:

- the container shipping services between the Far East and Europe, with which TRACECA would have to compete for transit traffic, are highly efficient and tariffs are lower than 10 years ago. The container freight rate between Hong Kong and North West Europe is only $1500-1800 per 20' container, and the transit time is under 30 days. Even the Trans Siberian route, which is the most problem-free of the land routes between the Far East and Europe, handles little traffic, despite having been being managed by highly efficient operators. (It has been reported that when Russian tariff authorities almost doubled the charges in 2006, it resulted in the collapse of the already minimal cargo volumes from around 100,000 TEU in 2005 to 8,000 TEU in 2006.);
- there are alternative all-land routes to the world's sea lanes across the northern and southern shores of the Caspian. In particular, Kazakhstan can, and does, use all-land routes to Novorossiysk; and there are overland movements from Kazakhstan via Russia to Azerbaijan and Georgia. There are reportedly 8-10 trains per day at Azeri-Russian border crossing (Samur-Yalama). Also, an 80 km railway line was constructed in Dagestan in 2001-2 in order to bypass Chechnya.
- trade between the Caspian countries is by its nature limited. The main countries of the Caspian – i.e. Kazakhstan, Azerbaijan, Iran and Russia - have only one major export, which is oil. So they do not need each others' exports. While there is some demand for grain between Kazakhstan, Azerbaijan and Iran the traffic appears somewhat volatile in terms of demand. Similarly, none of the Caspian countries produce the machinery and consumer goods that are needed by the others. The basis for trade between the countries surrounding the Caspian is therefore limited.

The North-South Corridor

The North South Corridor from India (i.e. Mumbai) to north-west Russia and Europe would be unlikely to use the port of Aktau, rather than ports at the northerly end of the Caspian, such as Makhachkala or Astrakhan/Olya.

1.6 Free Zone Traffic

The Free Zone has not yet generated any significant traffic for the port.

1.7 Shipping Traffic

Ship sizes at Aktau are small, as is the case in all Caspian Sea ports. Even when volumes were high in Soviet times, the limits of the Volga Don Canal restricted vessel sizes to about 4000 dwt and therefore correspondingly the average load sizes.

The oil traffic in Aktau is handled mainly in tankers in the 5000 - 12000 dwt range that are not subject to such limitations. The port records show 1,467 tankers calling in 2006 with average load being 6,787 tonnes. The general cargo at Aktau in 2006 was handled in 305 small vessels with an average load of 3,996 tonnes. The service to Iran is an internal Caspian service so is not limited to Volga-Don dimensions but more by the limitations of the ports at each end, thus the slightly larger vessels.

Typical ships calling at Aktau are shown in the Table 1.5.

Table 1.5: Typical Ships Calling at Aktau

Vessel name	Vessel type	Length (m)	Beam (m)	Cargo draft (m)	Cargo capacity, (tonnes)	Deadweight
Alexander	Tanker	128	16.6	5.5	5700	6400
General Aslanov	Tanker	136	17.5	8.0	11500	12450
Apsheron	Tanker	137	17.4	5.3	7000	7410
Captain Pshiniscin	Tanker	134	16.5	4.5	5300	5825
Geidar Aliev	Tanker	143	17.3	7.14	12500	13470
Iran Daleer	Dry cargo	140	16.0	4.7	5700	5992
Iran Gadeer	Dry cargo	136	13.5	4.7	3809	4000
Omskyi 113	Dry cargo	108	13.0	4.7	3230	3600
Dobrogast	Dry cargo	106	16.5	3.7	3665	3983
Neferudovoz	Dry cargo	114	13.0	3.7	3070	3280
Monoxylion	Dry cargo	106	16.7	3.7	3709	4100
Compositor Rahmaninov	Ro-Ro Cargo ferry	117	16.2	4.7	3463	4673
Azerbaijan	Ferry	154	17.0	4.2	3435	11500

Source: Kazhydro

1.8 Competing Ports

There are only two ports that may be considered as potential competitors to Aktau in the Caspian basin: they are Turkmenbashi and Astrakhan.

The Caspian also has several other ports which are sometimes identified incorrectly as competitors to Aktau. In fact they are the trading partners of Aktau. Their facilities and traffic are discussed below.

Turkmenbashi

The port of Turkmenbashi has 6 oil berths, 4 dry cargo berths, and a rail ferry berth which handles service to Baku. The port is Aktau's only competitor for Traceca cargoes. It currently handles raw materials for an aluminium plant in Tajikistan and some oil producers from Central Asian countries. It also handles declining volumes of cotton.

The dry cargo, ferry and oil loading terminals have been rehabilitated with loans from the European Bank for Reconstruction and Development.

Astrakhan

Astrakhan is the largest port in the Caspian. The complex includes terminals at Olya, Astrakhan and Buzan, It has a total of 21 berths.

In 2004 the port handled 5.7 million tonnes, mainly dry cargo, including metals and metal goods (their share in 2004 was 33 %), sulphur (24 %), timber and sawn wood (6 %), paper (2 %), containerized cargo (2 %).

The port also handles transit traffic, mainly steel pipes and metal products, from the Black Sea (including Turkey and the Ukraine) to Azerbaijan and Iran.

The port benefits from competition between a large number of cargo handling companies; but suffers from being closed by ice during the winter.

The Russian government plans to set up ferry services at Astrakhan.

1.9 Aktau's Trading Partner Ports: Destination and Origin Ports

The main destination / origin ports for the ships calling at Aktau are:

Baku

The port of Baku, located in Azerbaijan, is the main Caspian transit port for crude oil for export to the west. The port has 8 berths and a maximum water depth of 7 metres.

The port's cargo traffic fell sharply from 30 million tonnes p.a. before 1990 to 3 million tons in 1998/1999; but it has now reviving again. Oil and oil products account for the majority of the traffic. In 2006 a quarter of Aktau's oil went to Baku, with 40% going to Iran and 35% to Makhachkala.

A large part of the oil goes to either:

- the port's oil terminal at Dubendy, which has two berths for tankers up to 8000 DWT. Its capacity is about 3 million tonnes p.a. The oil landed there is moved either to the local oil refinery or to the port of Batumi in Georgia by rail; or
- a private Azpetrol terminal with a capacity of about 4 million tonnes p.a..

Baku's role will expand following the recent opening of the 60 million tonnes pa. Baku-Tbilisi-Ceyhan pipeline.

There are also ferry services from Baku to Aktau and Turkmenbashi, operated by the Caspian Shipping Company. Traceca cargoes would probably have to use these ferry services, and this raises problems, as the services are generally regarded as expensive and inefficient.

Neka

The port of Neka has one berth with a draft of 4.9 metres for tankers up to 5000 tonnes.

The port took 40% of Aktau's oil shipments in 2006 – mainly under swap arrangements.

It is reported that the Iranian government is considering construing an SBM to accept 60,000 DWT tankers from Kuryk.

Makhachkala

The port of Makhachkala in Russia is free from ice all the year round. It has five berths, with a capacity of 5 million tonnes, for ships up to 12,000 DWT. Its water depth is 9 metres.

It received 35% of Aktau's oil shipments in 2006

Makhachkala has a petroleum storage depot which is connected to the pipeline from Baku to Novorossiysk and has a storage capacity of capacity of 500 thousand cubic metres, which is more than twice that at Baku.

There are plans to dredge the port and reconstruct 5 piers, increasing capacity up to 11 million tonnes.

Most of the traffic is oil, but general cargo has been increasing.

A rail ferry service between Makhachkala and Aktau was introduced recently, but lasted only a short time.

Anzali

The port of Anzali in Iran is the origin of Aktau's container traffic. About 1000 TEU were carried on the Anzali-Aktau ro-ro ferry in 2006.

The port has eight general cargo berths, and oil berth and a passenger berth.. Its capacity is around 5 million tons of cargo a year.

Its water depth, however is only 5.5 metres, limiting vessel sizes to 6,000 DWT..

Currently, the port has no railway access and the access road is in need of reconstruction.

Noushahr

Noushahr in Iran has three berths with a maximum draft of 5.5 m.

The annual throughput of the port is 1.5 million tons.

Amirabad

The port of Amirabad (Khazar) has a capacity of 5 million tonnes but only a shallow draft.

There is a plan to expand the capacity of the port to 8 million tonnes a year. The plans include a container terminal with two shore gantry cranes.

A special economic zone specializing in storage and processing has been set up and an oil-refinery is planned.

2 PORT FACILITIES

Berths

The port consists of four dedicated oil berths, three multipurpose general cargo berths, a grain berth that is also used by roro vessels, and a jetty for the rail ferries. There is also a small area for port craft. The layout of the existing port is shown in Figure 1 (see next page).

The lengths and drafts of the berths are as shown in Table 2.1:

Table 2.1: Lengths and Drafts of Main Berths

Berth	Length (m)	Draft (m)
1 Dry Cargo	150	6.3
2 Dry Cargo	150	6.3
3 Dry Cargo	100	6.3
4 Oil	192	8.7
5 Oil	192	9.0
6 Grain	150	6-7.0
7 Port fleet	70	7-8.0
8 Ferry	140	6-7.0
9 Oil	150	9.0
10 Oil	150	9.0
11 Oil (unused)	120	3-12.0
12 Small size vessels	80	4.0

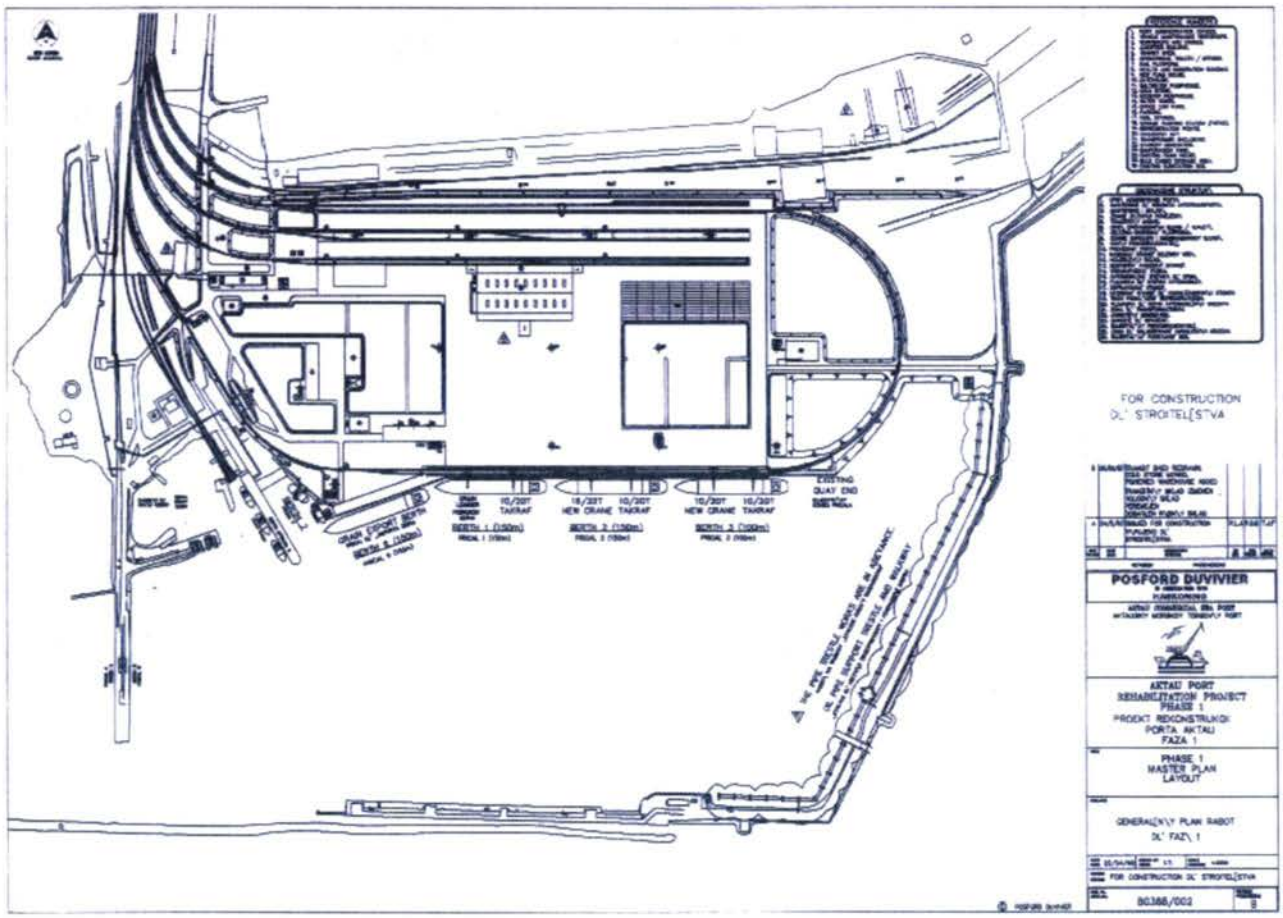
The table shows the berth sizes in terms of draft and ship lengths are well below the levels at most international ports. These smaller dimensions, as indicated, reflect the impact of the limits of the Volga Don Canal on ship design.

Typical berth details are shown on Drawings 3 and 4 in the appendices.

The port has been extensively rehabilitated. The dry cargo berths (B 1-3 and B6) were rebuilt in 1997–1999 with the aid of a US$54 million loan from the EBRD. They provide the port with 550 m of quay, some 72,000 sq m of open storage and 6,000 sq m of covered storage. In addition, new rail tracks were laid together with office buildings, workshops, electrical and mechanical services and other ancillary works.

The berths are dredged to -33.0 m Baltic Datum (BD) (-5.0 m Caspian Sea Datum). The water level in the Caspian Sea is currently at about -27.0 m Baltic Datum, having dropped from a peak of -26.63 m BD in 1995.

Figure 1 – Plan of the existing port



Since completion of the main dry cargo berth rehabilitation work, the rail ferry ramp on Berth 8 has been reconstructed and oil pipework has been added so that the berth can also accommodate tankers. However, it will only be used as a stand-by oil berth when other berths are not available. Berths 4 and 5 (oil) have been reconstructed and deepened by KMTF to handle ships of up to 12,000 dwt. Some strengthening work has been carried out to the causeway leading to the oil berths on the breakwater (B 9-10) and various improvements made to the oil pipework. There are some plans to adapt Berth 11 to handle oil tankers, but this has not yet been completed.

Oil Berths

The existing berths handling oil are as follows:

- Berth numbers 4 and 5 are at the northern end of the port that can accommodate tankers up to 12,000 dwt;
- Berth 9 on the main breakwater that can accommodate tankers up to 7,000 dwt; and
- Berth 10 also on the main breakwater that can accommodate tankers up to 12,000 dwt.

Three of the oil berths (B4, B5 and B9) were leased to Kazmortransflot, (KMTF) but these leases have been suspended and since July 2007 all berths in the port are operated by Aktau International Commercial Sea Port.

Grain

A grain terminal has been constructed adjacent to Berth 6 and it has a storage capacity of 25,000 tonnes and has three loading spouts. The loading rate is up to 300 tonnes per hour. In addition, grain can be loaded direct from rail wagons.

Storage

The port has 75 hectares of open storage and 0.6 hectares of covered warehousing. A second warehouse together with additional open storage has recently been constructed by the Port.

Immediately outside of the port there are three privately-operated tank farms with the capacities as shown in the Table 2.2:

Table 2.2: Storage Capacity of Private Tank Farms Outside on AISCP

	Storage capacity ('000m^3)	Throughput capacity (m tons p.a.)
Kaztransoil (KTO)	140	4.2+
Mobilex/Terminalix	60	3.2
Artis Overseas	60	3.2

The Mobilex tank farm was operational only between June 2004-June 2005 and is now run by another company, Terminalix.

The KTO storage tanks are supplied mainly by pipeline, whilst the other two companies are supplied mainly by rail. Most of the oil berths have pipelines to all three tank farms, the main exceptions being Berth 9 (KTO only) and Berth 11 (Terminalex only), if it were ever used.

Weather Related Downtime

In spite of the reconstruction work the port experiences significant downtime due to the poor condition of the breakwater. The crest height of the breakwater is only -24.5 to -23.5 m BD, having been constructed when the level of the Caspian Sea was some two metres lower than present levels. As a result, it is subject to serious overtopping and also, due to its form of construction, which consists mainly of large blocks of concrete, it allows transmission of waves into the harbour basin.

A project to improve the effectiveness of the breakwater was considered between 1997-1999 when the water level had risen to its highest level for over 65 years, but due to the subsequent reduction in level it was not implemented, apart from the strengthening to the approach to the breakwater mentioned earlier.

The port also suffers from strong winds, which limit the working of cranes at the dry cargo berths. The rail-mounted quay cranes have to stop work when the wind speed reaches 15 m/sec and the Liebherr mobile cranes when it reaches 18 m/sec. In addition the quay cranes cannot move along the quay in wind speeds in excess of 10 m/sec. Aktau tends to suffer from high winds throughout the winter period.

There is an average downtime of 40 - 60 days per year at most of the berths. This is due to a combination of wave transmission through the breakwater, which particularly affects B 9-10, and high winds, which particularly affect B1-3.

3 THE ECONOMY

3.1 GDP, Import and Export Growth

Kazakhstan's economy went into a steep decline in the early 1990s following the collapse of the Soviet Union, but revived with the discovery and production of oil. In the last five years Kazakhstan's GDP growth has averaged just under 10%, which is faster than China's and India's. The high growth, however, reflects not only increasing oil production, which averaged only 8% p.a. in the last five years, but also the increase in world oil prices.

Imports have also increased rapidly, by 32% p.a. in the period 2002-2006. Aktau has not benefited from this growth, as the port handles few imports.

Table 3.1: Kazakhstan's GDP, Imports and Exports 2002-2006 (% Growth p.a.)

	GDP	Exports	Imports
2002	9.8		
2003	9.3	32	19
2004	9.4	56	45
2005	9.7	37	30
2006	10.6	37	34
Average	**9.76**	**40.5**	**32**

Source: EIU

Kazakhstan's exports are dominated by oil, and to a lesser extent metals. As shown in Table 3.2 they accounted for 88% of national exports in 2006 and for imports machinery represented 45% as shown in Table 3.3.

Table 3.2: Kazakhstan's Exports, by Main Product 2006

	% of Value
Petroleum and Mineral products	72
Metals	16
Chemicals	4
Food	3
Others	5
Total	100

Source: EIU

Table 3.3: Kazakhstan's Imports, by Main Product 2006

	% of Value
Machinery and Equipment	45
Mineral products	14
Metals	13
Chemicals	11
Food	7
Others	10

Source: EIU

The main destinations of exports and origins of imports are shown in Tables 3.4 and 3.5.

Table 3.4 Origins of Kazakhstan's Imports (% of Value)

	% of Value
Russia and Ukraine	42
China and Korea	20
EU	26
Iran	4
Turkey	3
Others	5
Total	100

Source: IMF, third quarter of 2006

Table 3.5: Destinations of Kazakhstan's Exports (% of Value)

	% of Value
Italy	13
Germany	12
Russai	11
China	10
Romania	5
Iran	4
Turkey	3
Others	41
Total	100

Source: IMF, third quarter of 2006

3.2 Location of Raw Materials Activity

Oil

The existing oilfields are located mainly in the west of Kazakhstan, relatively close to Aktau, and the main ***future*** sources of oil – Kashagan, Tengiz, Karachaganak and Kurmagazy – are fortunately also all in the west, mainly at the northern end of the Caspian Sea.

Minerals

Kazakhstan is very well-endowed with minerals, but they are located mainly in the east of the country, far from the world's sea lanes. Kazakhstan has:

- 18% of world's zinc reserves and 6% of the world's copper reserves. The production plants, however, are located at Zhezkazgan, in the centre of Kazakhstan, and Balkash, in the east of Kazakhstan;
- 15% of the world's lead reserves, but the mines are located close to Ust Kamenogorsk in the north east;
- half of the FSU's tungsten reserves that are located in northern Kazakstan;
- one fifth of the FSU's coal reserves with most of the production being in the east. There are long term prospects for coal mining in the Mangystau Peninsula, but the 250 million tonne reserves located there have not yet been exploited.

Kazakhstan has the eighth largest iron ore reserves in world, but they are also in the east of the country, as are the steel plants that use these raw materials. Despite this, the steel industry exports about a quarter of its products through Aktau.

Other minerals that possibly are better located for Aktau are:

- chrome: Kazakhstan's has 90% of the FSU's chrome reserves and they are mined in the northwest near Aktobe; and
- asbestos: which is mined in the north east, but presently being exported via Novorossiysk.

4 TRAFFIC FORECASTS BASED ON INITIAL IMPRESSIONS

4.1 Petroleum

Aktaus' traffic is dominated by oil, and most of Aktau's potential traffic growth is likely to be in oil. Kazakhstan produced 67 million tonnes of oil in 2006, of which 57 million was exported; and the Government's current plans envisage rapid growth of exports to 90 million tonnes in 2010 and 125 million tonnes by 2015[3].

The oil is well-located for Aktau Port. Much of existing oil production is in the west of Kazakhstan and by 2015 the vast majority will be produced around the northern shores of the Caspian Sea. The main oilfields in 2015 will be:

- The Kashagan field, which is being developed by AGIP-KCO along with seven other companies, including ExxonMobil, Shell, ConocoPhillips and Kazmunaigaz, is the largest oilfield that has been discovered worldwide in the last 30 years, and will cost almost $30 billion to develop. It is scheduled to open around 2010, although there have been some delays;
- Tengiz, on the north east shore of the Caspian, is the largest field currently in operation. It is owned by ChevronTexaco (50%), ExxonMobil (25%), Kazmunaigaz (20%) and LukArco (5%);
- Karachaganak is an onshore field north of the Caspian Sea on the Russian border near Russia's Orenburg oilfield and refinery. It is owned by AGIP of Italy (32%), BG UK (32%0, Chevron (20%) and Lukoil (15%); and
- Kurmagazy, on the maritime border between Kazakhstan and Russia, to the west of Kashagan, is the least developed of Kazakhstan' new oilfields. It is being developed by Kazmunaigaz (50%) and the Russian oil company, Rosneft (50%).

The breakdown of production by oilfield in 2015 is forecast by the Government to be roughly as shown in Table 4.1:

Table 4.1 Breakdown of Kazakhstan's 2015 Oil Production by Area

	Current Forecast, %	Current Forecast, (million tonnes)	Earlier EIA Forecast
Kashagan	27%	35-40	50
Tengiz	20%	25-30	35
Karachaganak	16%	20-25	25
Kurmangazy	9%	10-15	30
Others (Kumkol, Uzen, Aktobe, Emba, etc)	29%	40-40	
	100%	**130-150**	**175**

Note: Some of this production is used domestically.
(a) US Energy Information Administration

[3] The government's target has been reduced from 150-175 million tonnes, partly because of delays in the development of Kashagan.

At present the oil is exported using five main routes. They are as follows:

- The CPC pipeline, which opened in 1999, and now handles about half of Kazakhstan's exports. It is nearly 1,600 km long and runs from the Tengiz oilfield to the port of Novorossiysk. It is owned by ChevronTexaco (15%), LukArco (Russia/US, 12.5%), Rosneft-Shell (Russia-U.K./Netherlands, 7.5%), ExxonMobil (US, 7.5%), Oman (7%), Agip (Italy, 2%); BG (U.K., 2%), Kazakh Pipelines (1.75%), Oryx (U.S, 1.75%), and various Russian (24%) and Kazakh interests (19%). Its Phase I capacity is was supposed to be 565,000 bbl/d (or 28 million tonnes p.a) but it is handling slightly more in practice. The original plan was to expand capacity to 1.34 million bbl/d (67 million tonnes p.a.) by 2015, at cost of $1.6 billion.

  The expansion will involve the construction of 15 new pumping stations, 12 additional tanks and a third loading buoy at CPC's Marine terminal at Novorossiysk. The Phase II expansion, however, requires Russia's approval, and Russia is reluctant to grant its consent (the pipeline's ownership is only about one third Russian). Russia has raised seven issues with the CPC Consortium, and the CPC shareholders have already agreed to lower the interest rate on the producing companies' loans from 12% to 10.5%, to accept the "deliver or pay" principle, to establish the Board of Directors and grant equal status to all lenders, to increase pipeline transportation tariff from $28.33 per ton to $30.83. There is now only one point of difference, which is the refusal of the shareholders to accept Russia's proposal to introduce a tariff revision mechanism. The concern is that this would introduce too much uncertainty into producing companies' business plans. As a result the negotiating process has been stalled.

- The Atyrau-Samara pipeline carries the second largest volumes into Russia. Prior to the CPC opening this was the main outlet for Kazakh oil exports;

- Modest volumes of oil are exported into Russia from the Karachaganak oilfield in the north east of Kazakhstan, close to the Russian border;

- China is now taking increasing volumes of oil. A pipeline is being constructed in stages and the capacity is scheduled to reach 20 million tonnes by 2011. Among the oil volumes likely to be diverted is the Kumkol production of Petrokazakhstan, which has been taken over by a Chinese oil company and Kazmunaigaz; and

- Most of the rest of the oil is currently exported via the port of Aktau. The destinations of the Aktau exports in 2006 were Iran (40%), Makhachkala, Russia (35%) and Baku, Azerbaijan (25%). Until recently, the oil unloaded at Baku had been transported onwards to the world's shipping lanes on the Black Sea and the Mediterranean via three routes – the Baku-Supsa pipeline (5 million tonnes p.a), the Baku-Novorossiysk pipeline (5 million tonnes p.a.) and by rail to the port of Batumi in Georgia. However, a **large part of this oil will be diverted to the 50 million tonnes p.a. Baku-Tbilisi-Ceyhan pipeline** (length, just over 1000 miles) that opened in 2005. This pipeline is the largest in the region. Its capacity is greater than is needed for Azeri oil exports and the Kazakh Government has recently signed an agreement for up to 30 million tonnes p.a. of Kazakh oil to be exported via this pipeline.

In 2006 the volumes of Kazakhstan crude oil exports using each route were estimated as follows, according to KOGIG:

Table 4.2 Estimated volumes of crude oil by pipelines

	Million tonnes
CPC pipeline, Tengiz-Novorossiysk	24.5
Atyrau-Samara pipeline	16.5
Atyrau-Orenburg refinery (Russia)	2.5
Atasu-Alashankou (China)	2.2
Aktau port to Baku, Neka and Makhachkala	9.7
Others	2
TOTAL	**57**

(a) Almost 10 million tonnes are shipped from Aktau, but only 2.4 million tonnes went to Baku in 2006, with 7.4 million tonnes going to Iran and Makhachkala.

Map 1 Map of Oil Pipelines and Fields adjacent to Caspian Sea

Map 2 Map of Oil Pipelines and Fields adjacent to Caspian Sea

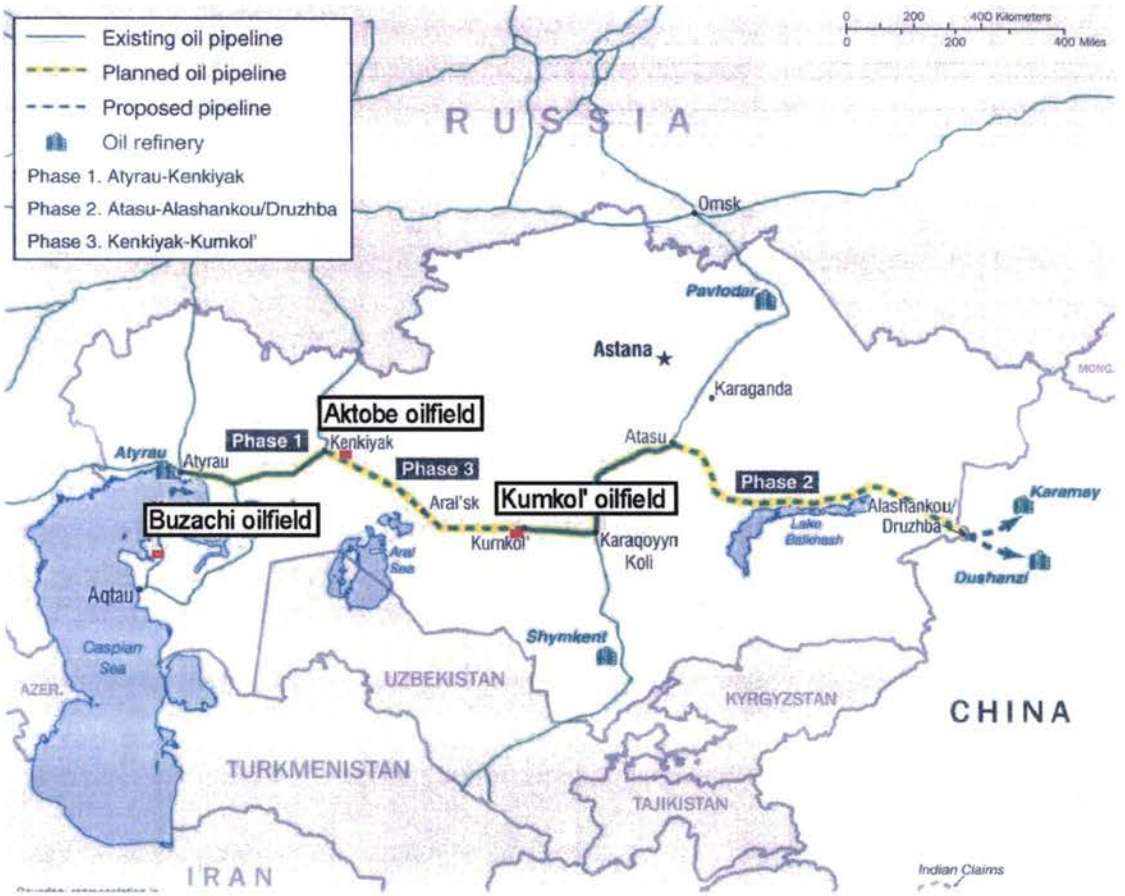


Table 4.3 Existing and Planned Pipelines in the Caspian

Name	Route	Capacity (tonne p.a).	Length	Cost
EXISTING PIPELINES				
Caspian Pipeline Consortium (CPC)	Tengiz oil field (Kazakhstan) to Novorossiisk	30 Planned: 50	990 miles	$2.5 billion for Phase 1 $4.2 billion total when completed
Baku-Ceyhan ("Main Export Pipeline")	Baku to Ceyhan (Turkey)	50	Approx 1,038 miles	$2.9 billion
Atyrau-Samara Pipeline	Atyrau (Kazakhstan) to Samara (Russia), linking to Russian pipeline system	15	432 miles	
Baku-Supsa Pipeline (AIOC "Early Oil" Western Route)	Baku to Supsa (Georgia)	Upgraded to 7	515 miles	$600 million
Baku-Novorossiisk Pipeline (Northern Route)	Baku via Chechnya (Russia) to Novorossiisk (Russia)	5 possible upgrade to 15	868 miles; 90 miles are in Chechnya	$600 million to upgrade to 300,000 bbl/d
Baku-Novorossisk (Chechnya bypass, with link to Makhachkala)	Baku via Dagestan to Tikhoretsk (Russia) and Novorossiisk	6	204 miles	$140 million

PLANNED PIPELINES				
Central Asia Oil Pipeline	Kazakhstan via Turkmenistan and Afghanistan to Gwadar (Pakistan)	50	1,040 miles	$2.5 billion
Iran-Azerbaijan Pipeline	Baku to Tabriz (Iran)	10	N/A	$500 million
Iran Oil Swap Pipeline	Neka (Iran) to Tehran (Iran)	9	208 miles	$400 million to $500 million
Kazakhstan-China Pipeline	Aktyubinsk (Kazakhstan) to Xinjiang (China)	20	1,800 miles	$3 billion to $3.5 billion
Kazakhstan-Turkmenistan-Iran Pipeline	Kazakhstan via Turkmenistan to Kharg Island (Iran) f	50	930 miles	$1.2 billion
Khashuri-Batumi Pipeline	Dubendi (Azerbaijan) via Khashuri (Georgia) to Batumi	3.5	Rail system from Dubendi to Khashuri, then 105 mile pipeline from Khashuri to Batumi	$70 million for pipeline renovation
Trans-Caspian (Kazakhstan Twin Pipelines)	Aqtau (western Kazakhstan, on Caspian coast) to Baku; could extend to Ceyhan	N/A	370 miles to Baku	$2 billion to $4 billion (if to Ceyhan)

Source: US EIA

AISCP Forecasts

The AISCP's current forecast of oil traffic at Aktau, which was based mainly on information, including letters, received from the oil companies, is shown in the Table 4.4.

Table 4.4: AISCP Forecast of Oil Traffic via Aktau ('000 tonnes)

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Name of Companies									
Agip					*5000*	*7000*	*7000*	*7000*	*7000*
Tengis Chevron	*1000*	*2000*	*2000*	*2000*	*4900*	*4900*	*5100*	*5300*	*5900*
Buzachi Operating LTD	1500	2400	2600	3100	3100	3000	3000	3000	3000
Karagambasmunai	1300	1300	1300	1300	1300	1300	1300	1300	1300
Mangistau Munaigas	1200	1200	1300	1300	1300	1300	1200	1200	1200
JV Kazgermuny	2000	2000	2000	1700	1500	1500	1300	1100	900
Maersk Oil Kazakhstan	400	500	600	700	900	900	1000	1000	600
CNPC Aktobe Munygas	1500	600	600	600					
Petro Kazakhstan	500								
TOTAL	**9400**	**10000**	**10400**	**10700**	**18000**	**19900**	**19900**	**19900**	**19900**

Source: AISCP

Much of this traffic is from local oilfields including Mangistau Munaigas, Karagambasmunai and Buzachi that have been using the port for several years. In 2006 40% of Aktau's exports came from the Kumkol field to the east near the Aral Sea, 25% from the local Buzachi field. The traffic from these fields is considered to be relatively captive, except that some will go to China in the future.

The new traffic from 2010 onwards, however, is mainly from AGIP and Tengizchevroil in the north Caspian, and the routing of this oil must be regarded as uncertain for reasons discussed in the following paragraphs.

The future routings of Kazakhstan's oil exports are difficult to predict. There is a large amount of commentary on the future capacities of the main routes out of west Kazakhstan, but there are two main unknowns:

- First, the future capacity of the CPC pipeline. As described previously, the non-Russian shareholders want to expand its capacity from 30 million tonnes p.a. to 67 million tonnes, but this proposal has been blocked by the Russian Government (the pipeline passes mainly through Russian territory). The Russian authorities have been creating tension by threatening to withdraw CPC's operating licence, by demanding high back taxes from the CPC and by insisting that the fees should be increased. Nevertheless, it was reported in the press in May 2007 that Presidents Putin and Nazarbayev had agreed to an expansion. The reports, however, were inconsistent. Some suggested that the agreement was for an expansion to 40 million tonnes, others suggested to over 60 million tonnes and others stated that there was no agreement. Despite their opposition, the expansion of the pipeline would clearly have some advantages for Russia: as it would send more oil via Russian territory in a pipeline with a significant Russian share; Russian revenues from the pipeline would increase; and Russia would have the potential ability to "turn off" the oil. It would also divert Kazakh oil from the independent BTC and Batumi rail route. It might be considered surprising that these advantages appear to be outweighed by the facts that (i) the Russians consider that the CPC tariffs are too low, (ii) interest rates on the loans for construction are too high, (iii) the pipeline assists one of their competitors' (i.e. Kazakhstan's) oil exports and (iv) that the pipeline is making a large loss. It might be speculated that Russia' eventual aim is to have the pipeline closed down on the grounds that it is accumulating losses, and then renegotiate the ownership to give Russian interests a much larger share. The assumptions made for forecasting purposes, however, are that the CPC will have a capacity of 40 million tonnes by 2010 and 67 million tonnes p.a by 2015; and
- Secondly, plans have been announced for a new port with single buoy mooring (SBM) for oil exports at Kuryk, 70 km south of Aktau (loading at the Kashagan oilfield is reportedly not possible in winter due to ice). The initial reports suggested that Kuryk port would require a 600 km pipeline, three 60,000 dwt tankers and SBMs at the receiving ports. However, more recent reports suggest that the KCTS group, which is developing the plans for the ports (it includes Agip, Chevron, ExxonMobil, Lukarco, KMG and Total), may now be now considering 12,000 dwt tankers, the same size as those using Aktau. It is to be noted that Agip and Chevron, which account for a large part of AISCP's forecast, are members of the KCTS group. The operators would be Kazmunaigaz, Kazmortransflot and AGIP. There have been differing reports on the planned capacity at Kuryk, ranging from 20 million tonnes p.a. to 38 million tonnes p.a. Cost estimates have also varied over a wide range.

The outcomes of these plans[4] for CPC and Kuryk will determine how much oil is potentially available for Aktau.

[4] There are also plans for three additional pipelines. They are:

To clarify the competitiveness of the various routes the next two sections will examine the cost of transport via:

- Aktau versus Kuryk; and
- Sea routes across the Caspian versus other routes.

Aktau versus Kuryk

This section compares the cost of transport Tengiz to Baku via (i) Aktau and (ii) Kuryk.

The main costs of using ***Aktau*** are:

- The rail tariff from Tengiz to Aktau. No traffic is moving on this route at present, but when it did in recent years the rail tariff was reportedly $5-6 per tonne (this is similar to the tariffs currently charged for oil on the Azerbaijan and Georgian railways).
- Aktau port charges, including cargo handling and ships dues. The port's accounts show this to be around $3/tonne, the largest charge being $1.65/tonne for handling.
- Sea freight rates to Baku. Calculations based on operating costs for ships of 12,000 DWT, shown in ANNEX I, suggest that the cost of the Aktau-Baku sea voyage should be $3.7/tonne and, if port charges are included, $8.7/tonne. In practice, however, Caspian Shipping Company has been charging 50% more than this cost-based rate.

On this basis, the total cost of transport from Tengiz to Baku via Aktau is estimated at $18 per tonne (see Table 4.5).

Table 4.5: Transport Costs from Tengiz to Baku via Aktau

	$ per tonne
Rail, Tengiz-Aktau	5
Aktau port charges	3
Sea freight rate to Baku	8(a)
Baku port charges	2
TOTAL	**18**

(a) Based on ship operating costs with a 15% return (see ANNEX I), rather than Caspian Shipping Companies charges, which are about 50% higher.

The main costs via ***Kuryk*** are:

- The pipeline from Tengiz to Kuryk. The pipeline has not yet been built and its cost and tariffs are unknown. There is, however, a high level of consistency in the costs and tariffs for the main pipelines built in recent years (CPC and BTC), and they

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- A 50 million tonnes p.a. pipeline from Kazakhstan to Iran via Turkmenistan This would displace Aktau's shipments to Iran, which accounted for 40% of the total in 2006. It may be ruled out by US laws against investment in Iran
- A pipeline from the Kumkol field to the port of Turkmenbashi. Most of this line exists and would only require rehabilitation. The purchase of the PetroKazakhstan, the main operator at Kumkol, but CNPC (Chinese) makes it less likely that a westbound line will be built.
- A Trans-Caspian pipeline under the sea.

The probabilities of these pipelines being built does not appear to be high, but they nevertheless pose some risk for Aktau's traffic volumes.

would not require breakwaters or dredging, would permit port charges/costs to be lower than at Aktau. The rate assumed is $2 per tonne.

- Sea freight rates to Baku. Calculations based on ship operating costs for 60,000 DWT tankers, as shown in ANNEX I, suggest that the cost of the Aktau-Baku sea voyage should be $1.5/tonne, and, with port charges, $4.5/tonne. It should be noted, however, as stated above, that Caspian Shipping Company has been charging 50% more than cost based rates.

On this basis, the total cost of transport from Tengiz to Baku via Kuryk is estimated at $20 per tonne (see Table 4.6)

Table 4.6: Transport Costs from Tengiz to Baku via Kuryk

	$ per tonne
Pipeline, Tengiz-Kuryk	11
Kuryk port charges	2
Sea freight rate to Baku	5
Baku port charges	2
TOTAL	**20**

It is concluded that Aktau should give slightly lower transport costs than Kuryk.

Sea routes across the Caspian versus other routes.

The dominant route likely to be served by the sea route across the Caspian is the Aktau/Kuryk-Baku-BTC-Ceyhan route. The costs of this route, however, will be high, at $42-44 per tonne (see Tables 4.7and 4.8). This is well above that cost of most other routes. The CPC pipeline currently costs only $30 per tonne; the Atyrau-Samara pipeline is understood to cost less than that; the rail route to Batumi would cost about $29-33 per tonne if (see Table 4.11); the Supsa pipeline costs only $5 (see Table 4.10); and the Northern Route pipeline costs $15 per tonne (see Table 4.9). The last two pipelines, however, are used mainly by Azeri oil.

Table 4.7: Transport Costs from Tengiz to Ceyhan via Aktau

	$ per tonne
Via Aktau	
Rail, Tengiz-Aktau	5
Aktau port charges (a)	3
Sea freight rate to Baku	8 (a)
Baku port charges	2
BTC. Baku-Ceyhan	24
TOTAL	**42**

(a) Based on costs, not actual tariffs.

Table 4.8: Transport Costs from Tengiz to Ceyhan via Kuryk

	$ per tonne
Pipeline, Tengiz-Kuryk	11
Kuryk port charges	2
Sea freight rate to Baku	5
Baku port charges	2
BTC. Baku-Ceyhan	24
TOTAL	**44**

Table 4.9: Northern Pipeline (Tengiz-Aktau/Kuryk-Baku-Novorossiysk)

	$ per tonne
Via Aktau	
Tengiz-Baku (a)	17
Northern Route Pipeline to Novorossiysk	15
TOTAL	**32**

NB the Northern Pipeline is mainly used for Azeri oil

Table 4.10: Supsa Pipeline (Tengiz-Aktau/Kuryk-Baku-Supsa)

	$ per tonne
Via Aktau	
Tengiz-Baku (a)	17
Pipeline to Supsa	5
TOTAL	**22**

NB the Supsa Pipeline is mainly used for BP's Azeri Oil.

Table 4.11: Rail Route to Batumi

	$ per tonne
Via Aktau	
Tengiz-Baku (a)	17(a)
Rail to Batumi	12
TOTAL	**29(a)**

(a) The cost shown is based on ship operating costs. If Caspian Shipping company charges are use the total would be about $4 per tonne higher.

To summarise, the costs via the various routes are:

Table 4.12: Cost Summary by Routes

	$ per tonne
CPC	30
Atyrau-Samara	
Northern Route pipeline to Novorossiysk	32
Batumi 20 on cost 32 actual	29-33
BTC via Aktau	43
BTC via Kuryk	44

(These cost are based on existing information and may need updating)

It can be concluded that the Kazakh oil exports will use the alternative routes to the extent possible, leaving the remainder for the relatively expensive BTC route.

On this assumption the following preliminary estimates of the traffic are calculated on two bases – "with" and "without Kuryk" in Tables 4.13 and 4.14.

Table 4.13: First Impressions on Traffic Available to Aktau without Kuryk (million tonnes)

	2006	2010	2015
CPC (a)	25	34	51
Atyrau-Samara	17	20	25
Atyrau-Oldenberg	3	3	3
China	2	7	20
Kuryk		0	0
Others	2	2	2
Aktau	**10**	**27**	**27**
TOTAL	**55**	**90**	**125**
(a) It is assumed that the full capacity of the pipeline used, but 15% is dedicated to Russian oil, currently that of Rosneft and TNK-BP			

Table 4.14: First Impressions on Traffic Available to Aktau with Kyryk (m tonnes)

	2006	2010	2015
CPC (a)	25	34	51
Atyrau-Samara	17	20	25
Atyrau-Oldenberg	3	3	3
China	2	7	20
Kuryk		10	20
Others	2	2	2
Aktau	**10**	**17**	**7**
TOTAL	**55**	**90**	**125**
(a) It is assumed that the full capacity of the pipeline used, but 15% is dedicated to Russian oil			

The future routeings, however, may lie somewhere between these two "either-or" scenarios. In fact, Tengizchevroil (TCO), despite apparently supporting the new port at Kuryk, have sent a written request to the AISCP to route 5 million tonnes p.a. via the port, at least until 2013, and a contract is reported to be under negotiation. TCO is requesting some exclusivity for berths N4 and 5 and some other concessions if it is to ship oil again via Aktau from 2008.

Although Tengizchevroil has not been routeing crude oil via Aktau in recent years, they used it until 2001/2002, until the opening of CPC, reportedly for approximately 5-6 million tonnes per year. But, although Tengizchevroil was charged only $5-6 per tonne for the rail journey from the oil field, the full tariff from the oil field up to Batumi (FOB) was 32-34 $/tonne, depending of deadweight of the tanker.

When the CPC opened its tariff was 2-3 $/tonne lower, and TCO been using the CPC pipeline since then. (NB Tengizchevroil does not have access to pipeline connection to Aktau. The existing pipeline from Aktau to the north (i.e to Jetiby, 80 km from Aktau) is used for northbound movements: it is part of the major pipeline from Atyrau to Samara).

Conclusions

- Aktau handles oil from local oilfields and also more distant fields.
- The local oil – especially that from Texaco North Buzachi, Karazambasmunai and Mangystaumunaigaz – is likely to continue to use Aktau (although it could divert to Kuryk).
- The more distant oil, however, especially that from the high volume oilfields of Tengiz and Kashagan, will only use Aktau only if its costs are lower than alternative routes.
- There are several alternative routes which give lower costs than routes via Aktau or Kuryk. In particular, the CPC pipeline has much lower tariffs (as do routes via the two "early oil" pipelines to Supsa and Novorossiysk; but they are being used mainly for Azerbaijan oil)
- The traffic likely to use Aktau or Kuryk to feed the BTC pipeline is therefore the residual after the capacities of the lower cost routes have been fully used.
- The oil requiring routes via Aktau or Kuryk is estimated at 27 million tonnes in 2015 (see Table 4.2)
- The costs via Aktau are estimated to be slightly lower than via Kuryk, as the cost of the pipeline to Kuryk cancels out the economies of size with larger ships via Kuryk. But the difference between the two ports is small.
- If Aktau handled all the oil that could not find lower cost routes, the total would be 27 million tonnes by 2015. But if Kuryk attracted 20 million tones of this oil, Aktau would be left with only 7 million tonnes.
- It is emphasised, however, that non-cost considerations will have a major influence on routeings . They will include (a) political considerations, especially security of exports; (b) the ability of the oil companies to control their transport operations and (c) minimising downtime due to bad weather. It is emphasised that the cost of transport from Tengiz to Baku ($18-23 per tonne) are only a small faction of the value of the oil (approximately $500 per tonne at present).

4.2 Steel

Steel exports to Iran account for almost all of Aktau's dry cargo. Kazakhstan's steel production, which had fallen sharply after independence, revived strongly after LMN Mittal took over the country's largest steel plant in 1995 and invested $1billion doubling production. Kazakhstan produced 4.1 million tonnes of steel in 2006.

The country's main steel producter is Mittal's Ispat Karmet, who has its plant at Termirtau in the east of Kazahkstan. It exports almost all of its production. The second plant that uses Aktau is Castings LLP. It is also located in the east, north of Almaty, at Pavlodar. It opened in 2001 to exploit casting facilities in an old tractor production plant and currently produces 0.3 million tonnes, but is expected to expand to 0.7 million tones per annum.

The main destinations of Kazakhstan's steel exports are China and Russia, but about a quarter goes to Iran via Aktau. Aktau handled 1.13 million tonnes of steel in 2006 with the traffic being transported from the Ispat Karmet and Castings LLP plants to Aktau by rail. This traffic has been static in recent years at around 1 million tons, as shown in Table 1.2.

Table 4.15: Steel Exports at Aktau, 2004-2006 ('000 tonnes)

	Ispat	Casting	Other	Russian	Total
2004	719	209	7	20	955
2005	683	149	21	105	958
2006	608	287	47	5	947

Future growth will depend on Iranian demand.. AISCP forecasts an additional 240-350,000 tonnes, based on a shortfall of steel production in Iran of about 4 million tonnes (based on capacity 10.5 million tonnes and demand of 14-15 million tonnes). There are some dangers in this assumption in that:

- Iran is increasing its own domestic steel production;
- Kazak exporters have to compete with Russians. Large stocks, similar to those at Aktau are held at Astrakhan, as well as at Azov, Tagenrog and Novorossiysk;
- Mittal has no plans to increase production. Their planned investments are to improve quality. Castings, as indicated, plans a modest increase in production;
- Steel production dropped in 2006 because of a strike at local coal mines following an explosion at Mittal's Temirtau plant, though it is expected to revive to 4.4 million tones in 2007; and
- There is a danger that China may siphon off more of Kazakhstan's steel exports.

Despite these threats, Mittal and Castings have forecast future exports of up to 1.5 million tonnes via Aktau. Initial enquiries indicate that:

- Mital Steel exports 400 000-600 000 tonnes of steel to Europe, but they are shipped overland to the port of Novorossiysk. The transport cost via Novorossiysk is estimated to be $15-185 per tonne less than via Aktau and Georgian ports;
- Casting in Pavlodar has an annual export capacity of up to 300,000 tonnes of steel. At present, the major part of the cargo (about 2-300,000 tonnes per year) is exported through Aktau Port to Iran. In addition, about 50,000 tons per year is exported to Europe through Novorossiysk. At existing tariff scales, the transport of cargo through TRACECA corridor up to Batumi turns is $18-20 per tonne more expensive than via Novorossiysk.

[5] 2006 rates

4.3 Grain

Kazakhstan is the fifth largest wheat producing country in the world. It produced 16 million tonnes of grains in 2006 and of that exported 6.2 million tonnes. About 70% of the wheat is grown in the north of Kazakhstan; and in the 1990s about 90% of the grain produced in Kazakhstan was exported to CIS countries.

In 2001 a bilateral contract was proposed for Kazakhstan to export 2 million tonnes of grain to Iran through Aktau. There were also negotiations about the use of Aktau to ship Kazakh grain to Azerbaijan where a new grain facility has recently been opened. At the time, grain producers believed that export volumes to Iran would further increase after the construction of a railway link between Altynsarino and Khromtau that would shorten the export route by half. To handle these exports, Aktau built a specialised grain berth, with silos having a combined capacity of 25,000 tonnes. In the event, however, the grain traffic has never materialized. About 200,000 tonnes were handled in 2002, but since then there has been little traffic via Aktau (see Table 4.16).

Table 4.16 – Grain Exports via Aktau, 2001-2006 ('000 tonnes)

2001	2002	2003	2004	2005	2006
84	209	5	13	33	118

Kazakhstan's grain exports to Europe (about 300,000 tonnes p.a) are reportedly exported overland to the port of Novorossiysk. The transport cost is reported be $18 cheaper per tonne than via Aktau port to Poti/Batumi.

There are, however, some grounds for optimism. To secure export markets a large private grain company is trying to buy flour mills in Kazakhstan's grain markets, and has already acquired one in Georgia.

4.4 Minerals

Kazakhstan exports several different minerals to Europe, and part of this traffic could be potentially be attracted to TRACECA routes via Aktau, for shipment to Baku and then on to Georgian ports. In practice, however, it appears that most of these exports to the west go overland to Novorossiysk. In particular, initial information suggests that:

- Coal is exported mainly to Russia, but about 2 million tonnes is shipped to Europe and Turkey, but not via Traceca routes. Coal transport through the TRACECA corridor at current rates is $20-25[6] higher per tonne than via Novorossiysk;
- Ferro-alloys production is concentrated in Aktau, the main producer being Kazkhrome. The annual export volumes exceed 900,000 tonnes and they are routed mainly though Klaipeda to the Netherlands. In this case, the tariffs applied in Georgian ports, Caspar and the railways of Georgia, Azerbaijan and Kazakhstan seem to be much more attractive, but the fact that the main consumers are concentrated in Northern Europe limits the transport volumes through TRACECA corridor to 20,000 tonnes per year;
- Copper is produced mainly by the Kazakhmis Corporation based in Jeskagan. Export potential totals to around 400,000 tonnes per year. A major part of these products are exported to China, with a minor part (more than 150,000 tonnes) transported to Italy through Port of Novorossiysk and to Germany through St Petersburg. Comparative

[6] 2006 rates

analysis of existing transport tariffs suggest that part of this cargo that goes to Italy (more than 20,000 tonnes) could be attracted to the TRACECA corridor if the lower tariffs were applied;

- The main producer of asbestos is Kostanay Asbestos, which has an export potential of up to 200,000 tons per year, of which 50,000 tonnes per year is sent to Europe, and is being transported through Novorossiysk port where costs are $20-25 per tonne lower than via the TRACECA corridor; and
- Kazfosfat has an export potential up to 150,000 tonnes per year of phosphate. It uses the ports of Aktau and Astrakhan, and also the Volga-Don Channel up to Port Yuzhniy/Ukraine. Part of this cargo (possibly up to 20-25,000 tonnes per year) might be redirected to TRACECA corridor if lower tariffs were introduced.

4.5 Other Potential Cargoes

Sulphur

The oil from the region has high sulphur content, and the sulphur is a by-product of the oil extraction process. The oil companies would prefer to sell this sulphur on the commercial market, rather than to store it on a long term basis, and this has led to a review of the possible routes to market locations. Currently in Kazakhstan all companies are producing approximately 1.4 million tonnes of sulphur per annum and the volumes may reach 2.4 million tonnes by 2015.

It is unlikely that the flow of sulphur to the market will be stable, given that demand is seasonal, much of it is moved by ship, and orders tend to be placed for large quantities. The two key markets which have been identified are to China by rail for onward transit through the Chinese rail system, and to other export markets (North Africa and South America) via Aktau to the bulk terminals on the Black Sea and in Iran. Sulphur is a hazardous cargo and therefore subject to environmental restrictions during handling, and rail systems require movement in dedicated wagons given the potential contamination problems for other cargos.

Indications are that the split of volume between China and the Black Sea could be approximately 1/3 – 2/3, producing the following possible annual volumes:

Black Sea	940,000 – 1,600,000 tonnes; and
China	460,000 – 800,000 tonnes.

However, it should be recognized that development of this traffic as an export product is still at an early stage and the logistics system to get the product to potential markets has not yet been agreed. Given the low cost of sulphur the cost of the logistics will be critical.

LPG

The movement of LPG traffic in Kazakhstan has been considered. The decision to market LPG instead of consuming all production internally has yet to be taken. The assumption is that production peaks at 3,000 tonnes per day (1 million tonnes per annum) with potential expansion up to 4,100 tonnes per day (1.45 million tonnes per annum), all of which is marketed externally.

There is not yet clarity as to the markets to be served, but destinations in China, Poland and the Black Sea via Aktau are all proposed. The most likely markets to be served are Poland and the Black Sea for further export to Turkey and the western Mediterranean.

4.6 Conclusions

The Terms of Reference state that the Conceptual Master Plan and Pre-Feasibility Study should be carried out on the basis of the AISCP forecasts. However, in the course of the initial review of the AISCP forecasts, an independent examination has been undertaken looking at recent trends in traffic and transport options. Based on these some initial traffic projections have been made. These projections are preliminary as it has not been possible to conduct meetings with ports users. However these do raise important questions about the future berth requirements that are addressed in section 7.

Initial impressions on future traffic at Aktau, with and without Kuryk, are summarised in Table 4.17 along with the AISCP and EBRD forecasts for comparison purposes. This shows that:

- oil traffic is expected to increase rapidly, but the volumes available for Aktau will depend on whether or not Kuryk is built; and
- recent trends do not indicate strong growth in general cargo.

Table 4.17: Comparison of Existing Traffic Forecasts and Initial Projections based on Recent Trends ('000 tonnes)

	2006	2010	2015
AISCP Forecast			
Oil	9,900	24,300	28,200
General cargo	1,028	3,000	3,800
Grain	118	500	500
Total	**11,046**	**28,250**	**33,595**
EBRD Forecasts			
Oil		15,800	11,400
General cargo		2,000(b)	2,500 (b)
Grain		500	500
Total (a)		**18,300**	**14,400**
Scott Wilson Initial Projections – without Kuryk			
Oil	9,900	26,500	31,500
General cargo (c)	1,028	1,505	2,211
Grain	118	500	500
Total (a)	**11,046**	**28,505**	**34,211**
Scott Wilson Initial Projections – with Kuryk			
Oil	9,900	16,500	11,500
General cargo (c)	1,028	1,505	2,211
Grain	118	500	500
Total (a)	**11,046**	**18,505**	**14,211**

Notes:
(a) Excludes ferry traffic
(b) Excludes grains and ferry traffic
(c) No meetings have yet been held with exporters or importers of general cargo, but this traffic is provisionally projected to increase in line with GDP, at about 10% p.a. up to 2010 and 8% p.a. up to 2015 (these growth rates are well above that of recent years: in fact there has been no significant growth of general cargo since 2001).

5 PORT OPERATIONS

5.1 Description of Port Operations

In general, the port operations are reasonably efficient.

The port operates a three 8 hours shift system 365 days per annum. All cargo handling is undertaken by the port labour.

Oil

The oil cargo handling operations are standard as per any oil port. The vessel on berthing is connected to the shore pipe facility that connects to the pipe network from the respective tank farm. The only issue of note is that as the vessel moves towards completion the loading rate falls significantly. Further investigation is required into the causes of this.

General Cargo

The general cargo is handled in the conventional manner using one of the five ship-shore cranes, supplemented by one of the two Liebherr mobile cranes if required. Depending on the stowage and size of the vessel two cranes per vessel would normally be utilised. There is currently no pre-slinging of cargo, though some chemical shipments are in 'palletbags'.

The main cargo is steel, usually in the form of steel reels or bars. The movement from the storage area to the ship's side is undertaken either by means of a fork lift truck if the stack where the goods has been stored is relatively close to the berth or by means of tug and roll-trailer if further away. The volume of traffic loaded direct from rail wagon to vessel is very small.

The same basic methodology is used for almost all the other cargoes. If stored close to the ship's side direct movement from the storage stack to the loading crane is accomplished by means of fork truck and if longer by means on trailers for the transit movement. This is standard international practice given that fork trucks are principally designed for vertical rather than lateral transit and that the tug and trailers are the most effective equipment for lateral movement.

The only genuine general cargo traffic is that coming on the 'liner' service from Iran. This consists mainly of building materials such a window framing etc and some consumer goods. If it is construction materials this is stored alongside the berth and later forwarded to the warehouse area and loaded into rail wagons from the loading platform. Consumer goods etc are normally placed in the warehouse. Again, this is standard international practice, except that normally the imports would not be stacked close to the berth but would be moved to the rear of the storage area. However, at Aktau the storage environment whereby there is random storage of export steel means that the current system of storing imports close to the berth is logical.

If scrap metal is being shipped the cargo is brought alongside the vessel by trucks. The scrap is in a 'skip' and this is used to tip the cargo into the ships hold and then returned to the truck. This system is efficient in terms of loading, but is often constrained by the supply to the crane, as this method requires a large number of trucks constantly moving between the storage point outside the port and the berth.

Grain

Grain is loaded in two ways. Firstly, directly from the storage silos using grain that was delivered earlier by rail and secondly, loading direct from rail wagons brought alongside. Both are standard applications with the second method being substantially slower due to the need to constantly move wagons during the loading procedure.

Roll-on-Roll-off

The rail ferry uses the shore ramp to interconnect with the rail lines on board the vessel. The rail wagon are shunted aboard or drawn off using a locomotive with 'spacer' wagons to ensure that the locomotive does not need to enter the vessel. The road traffic consists only of powered units that are driven aboard by the vehicle's driver.

The roro service to Iran has a quarter ramp and berths usually at the grain terminal. Cargo handling is predominantly based on use of a fleet of small fork trucks, as the goods are either palletised or similarly unitised.

5.2 Storage Regime

An important feature of the cargo operations at Aktau port is the high requirement for storage, particularly of the steel cargoes. This situation arises due to the situation in that when the steel arrives at the port it has no vessel assigned and no identified end user. In reality, the steel cargoes are being 'stock' stored within the port area.

Most ports only undertake 'transit' storage, which covers the short time storage requirements arising at the interface of the intermodal change. This arises on imports as it takes time to clear the cargo and therefore precludes direct delivery (ship to wagon alongside the vessel) and in the case of exports it is usual to build up a supply of traffic to ensure the efficiency of loading.

At Aktau the goods are held as stock around the port, generally being stored according to production 'batch' numbers. The owner of the steel at this point is usually one of the major steel brokers or sometimes the manufacturer. When the broker or manufacture's agent in Iran has 'sold' the product an order is placed, a vessel assigned and the shipment is 'called off' the stock in the port and loaded. Usually the shipment is based on production batch numbers so that the receiver knows that all the shipment has the same characteristics.

A modern port is generally striving to become more of a 'transit' facility in a through transport logistics chain. It therefore only offers transit storage and keeps storage 'dwell' times down by giving low numbers of free storage days and gradually increasing the daily storage rates to encourage receivers to take early delivery. It can be seen that at Aktau the situation is completely different.

The port encourages stock storage activities by offering generous initial free storage time followed by low storage charges. It does this in order to offer an attractive 'service package' to its steel customers and to match the 'service packages' being offered by competing ports, most of whom have similar regimes.

5.3 Cargo Handling Speeds

Cargo handling speeds per ship day at berth were estimated as follows on the basis of a sample of two months of operational records:

Table 5.1: Cargo Handling Speeds as per operational records

	Tonnes per ship day at berth
Oil	10,000
Steel	2,500
Grain	3,000

These rates were similar to those estimated in the Posford review of cargo handling operations in 2000 (see Table 5.2).

Table 5.2: Dry Cargo Handling Speeds Estimated by Posfords in 2000

	Steel (a)	Grains (b)
Vessel Capacity (DWT)	3,500	3,500
Gangs employed	2	
Max handling speed (t/hr)		350
Tonnes per lift	6	
Lifts per hour	25	
Working hours per day	20	20
Operational efficiency coefficient(a)	60%	80%
	===	===
Hours to load cargo	23	15
Customs, hours	6	6
Berthing/Unberthing, hours	3	3
Other delays	1	1
	===	===
Hours required to turn ship round	33	25
Tonnes handled per Ship Day at Berth	**2,520**	**3,360**

Source: Calculation of Theoretical Port Capcity, Posford Duvivier Haskoning, 2000
(a) Indirect delivery
(b) Direct delivery
(c) The "operational efficiency coefficient" is the average handling speed in practice divided by the maximum possible handling speed. In practice there will be delays resulting from the need to move cranes along the berth, to move ships' hatches, breaks when cargo is not available, equipment downtime, etc. Even bulk cargoes where the operations are at there most straightforward, often have average loading times which are around 60% of the maximum rated capacity of the equipment used.

These handling speeds are reasonable by international standards given the nature of the environment at Aktau and dimensions of the vessels. Many of these standards are based on larger ports with much bigger vessel that can be loaded much faster. In the case of steel the high loading rate directly results from the heavy weight of the individual steel reels and that the bars are wired into heavy bundles.

5.4 Berth Occupancies and Waiting for Berths

The occupancy at the oil berths is very high, being estimated at 83% in 2006 as shown in Table 5.3. The occupancies at the dry cargo berths, however, are low, being estimated below at 42% at the general cargo berths and only 12% at the grain berth.

Table 5.3: Estimated Berth Occupancies 2006

Cargo	Traffic ('000 t) 2006	Handling Speed (Tonnes/ day) (a)	Number of Days Req-red	Days Avail p.a. (b)	Numberof Berths	Berth Days Avail p.a.	Occupancy 2006
Oil	9,960	10,000(c)	996	300	4	1,200	***83%***
Gen Cargo	1,029	2,500	412	325	3	975	***42%***
Grain	118	3,000	39	325	1	325	***12%***

Notes
(a) The handling speeds include time spend at berth for paperwork and other formalities. The figures shown are based on a sample of records for March-April 2007 and further checks over a longer period will be required.
(b) 365 days minus days when bad weather rules out port operations.
(c) The tankers, which had an average load of 6,700 tonnes in 2006, can load in half a day, but the total time in port is about 50% longer mainly due to port facilitation and other documentary processes.

The 83% occupancy at the oil berths levels would usually entail significant ship waiting times before being able to find a berth. There are no statistics on average waiting times for berths at Aktau, but a sample of port records, covering March-April 2007, showed an average of 10 tankers waiting outside the port fro the 4 active berths. Inspection of the records suggested that approximately two out of the ten may have been waiting for reasons other than the berths being occupied. It is provisionally concluded that the waiting to service time ratio is 2:1. This imposes high costs on port users, as two idle ship days waiting for a berth would cost about $2 per tonne.

There appears to be no significant ship waiting time at the dry cargo berths.

The berth occupancies, however, include idle time. As has already been indicated, there are delays in the port clearance procedures on arrival and departure, as well as other administrative routines that mean that vessels do not commence cargo handling within 30 minutes of arrival or sail within a hour of completion of loading, as would be expected with a modern port environment.

It will therefore be necessary to also examine the berth occupancy versus the vessel working time to obtain a clear picture of berthing efficiency and to highlight the incidence of idle time and its causes.

5.5 Downtime at Oil Berths

The berths on the breakwater are limited in their availability to about 325 days per year due to wave transmission through the breakwater and overtopping of the breakwater. Berth 4 is even more exposed and has only 270 days per year availability due to wave conditions, as it acts like an inner breakwater. Pumping rates in the winter are lower than in the summer, falling from 1,000 tonnes per hour to 900 tonnes per hour on the larger vessels.

5.6 Scope for Improvement of Cargo Handling Speeds

As indicated in section 5.3 the current cargo handling rates are considered to be acceptable in comparison to international benchmarks with due allowance for the specific cargo handling environment at Aktau. However, they are not at levels that should lead to complacency and there is always a need to strive further to enhance performance levels at any port.

In the case of oil cargoes, the cargo handling performance is dictated by external factors, mainly the pumping capacity and the efficiency of the supply from the tank farms. The only real scope for improvements would be to reduce 'idle' time arising from the non-cargo handling processes in order to make more efficient use of the berth and thus be able to increase throughput per berth.

In the case of the general cargo the situation is more complex. The performance is in many respects linked to the ability of brokers or agents to sell the product. The berth occupancy figure for the general cargo berths is estimated at only 42%, suggesting that cargo handling performance is not yet an issue. But as volumes increase then the storage 'dwell' times' would have to fall with a more rapid turnover of stock and there may at that stage be a requirements to raise performance. This could be undertaken mainly by:

- increasing the equipment levels, particularly terminal handling equipment – for trucks, tugs and trailers etc.;
- introduction of pre-slinging of cargo; and
- changes to the incentive schemes of the port labour.

6 CAPACITY OF THE PORT

6.1 Capacity at Current Handling Speeds

The economic capacities of the oil, general cargo and grain berths are estimated in Table 6.1, on the basis of the cargo handling speeds shown in section 5. The present annual capacity of the four dedicated oil berths (B4, 5, 9 and 10), assuming that the larger berths take 12,000 dwt vessels about 50% of the time, and taking into account the downtime due to bad weather, is estimated at about 10.5 million tonnes. The estimate also makes the assumptions that the berth occupancy is 85%, and that about 7 hours for each call is lost due port facilitation and berthing and un-berthing procedures.

In future as the proportion of the 12,000 dwt capacity tankers increase the capacity should increase to about 11.1 mtpa. However, it has been suggested by one of the operators that the capacity of the port may be limited to around 11 mtpa due to the limited storage capacity of the tank farms.

Table 6.1: Provisional Estimates of Economic Berth Capacities (c) Aktau

	Number Of Berths	Handling Speed (Tons/day) (a)	Working Days Available p.a (b)	Berth Days Available p.a.	Economic Berth Occupancy (c)	Economic Capacity p.a (000 tonnes) (c)
Oil	4	10,000	310 (d)	1,240	85%	**10,500**
General Cargo	3	2,500	325	975	65%	**1,584**
Grain	1	3,000	325	325	50%	**488**

Notes:
(a) Handling speeds include time spend at berth for paperwork and other formalities.
(b) 365 days minus days when bad weather rules out port operations.
(c) The economic berth occupancy is that above which queuing costs for berths become higher than the costs of building new berths.
(d) Three of the oil berths are assumed to be available for 325 days p.a. and the fourth for only 270 days due to wave conditions.

The economic capacities shown in Table 6.1 are provisional. The precise figures will depend on the costs of vessel waiting time and the costs of building new berths, which are examined in other chapters.

7 COMPARISON OF CAPACITY AND DEMAND AND THE NEED FOR NEW BERTHS

The *need for new berths* is calculated in Table 7.1 on the basis of three optional sets of traffic forecasts. The initial conclusions, shown in section F of the table, are that if Kuryk is built the need for new berths at Aktau will be limited, but if it is not built then 6 new berths may be needed by 2015. There does not however, seem to be a need for additional dry cargo berths in the period up to 2015, unless significant volumes of new types of traffic were to emerge.

Table 7.1: Berth Requirements based on Optional Forecasts

		2006	2010	2015
A	**TRAFFIC FORECASTS ('000 tonnes)**			
	1 AISCP Traffic forecast			
	Oil	9,900	24300	28200
	General cargo	1,028	3,000	3,800
	Grain	118	500	500
	Total	11,046	28,250	33,595
	2 EBRD			
	Oil		15800	11400
	General cargo		2,700	3,500
	Grain		0	0
	Total		18,250	13,595
	3 Scott Wilson Initial Projection, without Kuryk			
	Oil	9,900	26,500	31,500
	General cargo	1,028	1,505	2,211
	Grain	118	500	500
	Total	11,046	28,505	34,211
	4 Scott Wilson Initial Projection, with Kuryk			
	Oil	9,900	16,500	11,500
	General cargo	1,028	1,505	2,211
	Grain	118	500	500
		11,046	18,505	14,211
B	**EXISTING NUMBER OF BERTHS**			
	Oil	*4*	*4*	*4*
	General cargo	*3*	*3*	*3*
	Grain	*1*	*1*	*1*
C	**CAPACITY OF EXISTING BERTHS ('000 tonnes)**			
	Oil (a)	10,500	10,800	11,100
	General cargo	1,584	1,584	1,584
	Grain	488	488	488
D	**ADDITIONAL CAPACITY REQUIREMENTS('000 tonnes)**			
	1 AISCP Traffic forecast			
	Oil	*13,500*	*17,100*	*13,500*
	General cargo	*1,416*	*2,216*	*1,416*
	Grain	*0*	*0*	*0*
	2 Scott Wilson Initial Projections, without Kuryk ('000 tonnes)			
	Oil	*0*	*15,700*	*20,400*
	General cargo	*0*	*-79*	*627*
	Grain	*0*	*13*	*13*

	3 Scott Wilson Initial Projections, with Kuryk ('000 tonnes)			
	Oil	*0*	*5,700*	*400*
	General cargo	*0*	*-79*	*627*
	Grain	*0*	*0*	*0*
E	**CAPACITY OF A NEW BERTH '(000 tonnes)**			
	Oil (a)	3200	3200	3200
	General cargo	528	528	528
	Grain	488	488	488
F	**NEED FOR NEW BERTHS**			
	1 AISCP Traffic forecast			
	Oil	0.0	4.2	5.3
	General cargo	0.0	2.7	4.2
	Grain	0.0	0.0	0.0
	2 Scott Wilson Initial Projections, without Kuryk			
	Oil	0.0	4.9	6.4
	General cargo	0.0	0.0	1.2
	Grain	0.0	0.0	0.0
	3 Scott Wilson Initial Projections, with Kuryk			
	Oil	0.0	1.8	0.1
	General cargo	0.0	0.0	1.2
	Grain	0.0	0.0	0.0

The estimated number of additional oil berths is based on an average annual berth capacity of 3.2 mtpa, on the assumption that the berths would handle 12,000 dwt tankers. The capacity of a 12,000 dwt berth varies from about 2.8 mtpa for a berth occupancy of 70% and 325 days per year availability up to 3.6 mtpa if the number of days increases to 347 (95% availability) and 85% berth occupancy.

The above highlights the potential impact of Kuryk on the future development of Aktau Port and a consequent need to consider risk mitigating strategies. Current indications are that even if Kuryk were to be constructed a percentage of the Tengiz/Kashagan output would still be routed by Aktau Port, rather than total reliance on only one method. For example damage to the SBM at any of the ports would compromise the ability to distribute the output from this major field and therefore it would be logical to have alternative distribution strategies. This would suggest that in Table 7.1 section F that the likely demand is somewhere between Scenarios 2 and 3 indicating an initial demand for 4 oil berths.

The additional berths would have to be built within a protected harbour extension to the north of the existing port. Placing the berths to the south of the existing port would mean that there would be two separate port areas with no possibility for efficient sharing of tugs. It would also put the berths further away from the tank farms.

In respect of the general cargo, the port is handling 1.028 million tonnes per annum with a berth occupancy estimated at only 42%, and it is considered that by means of implementation of the proposals in section 5.7 the existing berths could handle up to 1.8 million tonnes per annum (depending on the type of cargo). This would be sufficient to accommodate almost double the existing general cargo volumes.

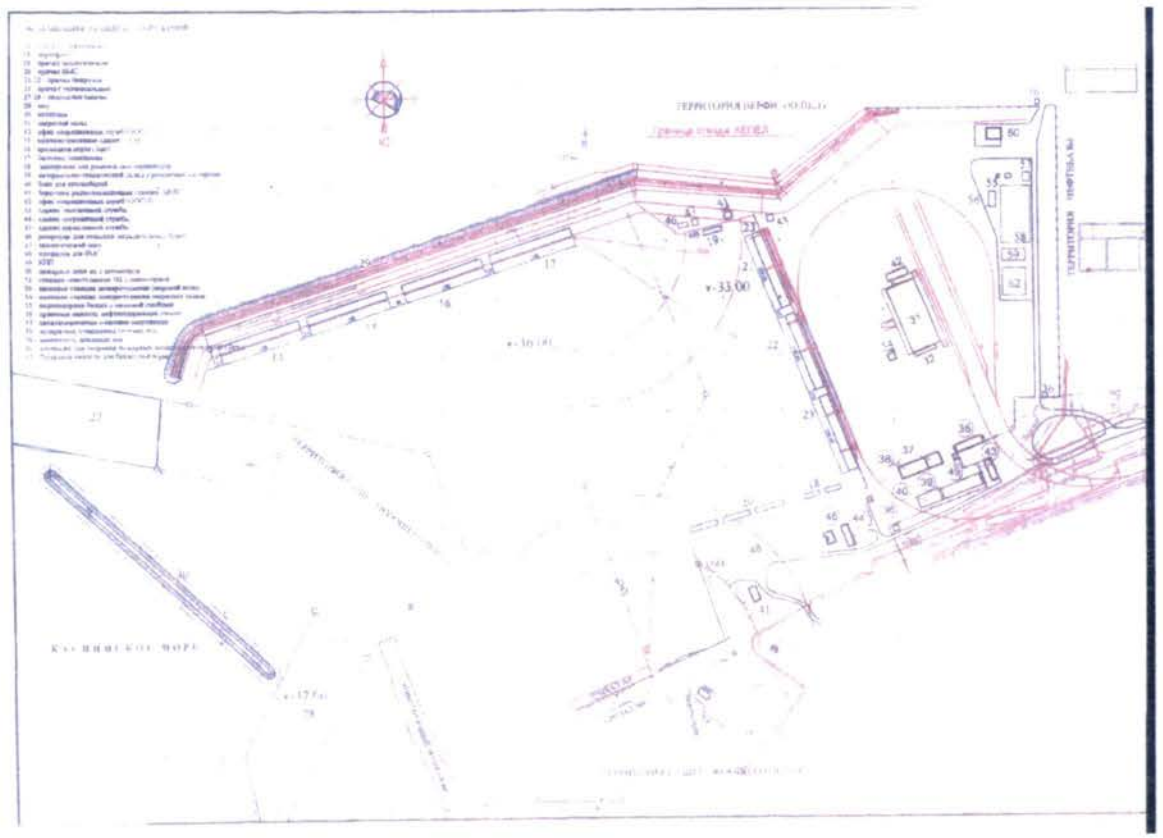
Based on initial indications and given the high cost of development of the dry cargo berths and the low profitability generated by these activities, it is suggested that development of these berths is deferred. However, this subject will be examined further after the traffic study has been completed in October.

8 PRELIMINARY DESIGNS

8.1 Commentary on oil berths proposed by the AISCP for the North Extension

The Northern Development proposed by the AISCP is shown on Figure 2. Four oil berths (berth numbers 14 to 17) dredged to -36.0 m Baltic Datum are proposed, located on the side of a new northern breakwater. With a water level of -27.0 m BD this would provide a water depth of 9.0 m. The length of each berth is 170 m.

Figure 2 – Plan of the proposed North Port



The layout as planned provides a new port entrance that faces north-west with a channel dredged to -37.0 m BD. There is a second entrance to the port between the end of the existing breakwater and the new offshore breakwater. This entrance is also to be dredged to -37.0 m BD.

The north-west entrance faces the predominant offshore wind direction, which generates the worst wave conditions outside the harbour. Winds from the west and north-west exceed 15 m/sec (about 28 knots) about 28 days per year and speeds of about 13 m/sec (24 knots) are exceeded about 55 days per year.

The entrance is about 250 m wide and this will allow considerable wave penetration into the harbour. A study by Kashydro indicated that waves (calculated as the height of the 5% highest waves) of 1.26 m could reach the location now shown as Berth 20 on the plan of the proposed Northern Development when wind speeds are 13 m/sec from the west. This speed or higher is reached on about 31 days per year. Berth 20 is well inside the harbour

and it seems likely that Berths 14 and 15 and possibly 16 and 17 would experience similar wave disturbance. The maximum wave height estimated by Kashydro for the location of Berth 20 is 2.34 m. This illustrates the fact that the proposed layout is not very effective in reducing wave heights to acceptable levels for efficient port operations. For an oil berth where the tankers are connected to loading arms wave heights should generally be below 0.8 m.

The oil berths B9 and B10 on the existing breakwater suffer downtime due to a combination of wave overtopping and wave penetration through the breakwater. In the case of the proposed oil berths numbers 14 to 17 wave penetration and wave overtopping is not likely to be a problem, as it is understood that the north breakwater will be constructed to a higher level and the berths will be backed by solid reclamation and possibly sheet piles.

However the disturbance from waves penetrating the harbour through the entrance may well cause an equal amount of down time – at least as far as berths 14 and 15 are concerned. This could mean losing about 40 days per year due to weather alone and is unlikely to be attractive to customers who can choose an alternative such as the planned terminal at Kuryk.

Further information on the proposed North Port is shown on drawings 1, 2, 6 and 7 in the Appendices. Drawing 1 shows the overall development plan. Drawing 2 shows the extent of existing survey information available for design of the North Port. Drawings 6 and 7 show the extent of work already carried out on the mole, breakwater and land reclamation for the general cargo berths.

Drawings 8 and 9 provide information on the existing rail, pipeline and tank farm networks that supply oil to the existing port. The ability of these facilities to supply the proposed new oil berths in addition to the existing berths will be examined as part of the study.

8.2 Possible improvements to the layout and construction

Layout

The layout as proposed leaves the harbour extension vulnerable to wave penetration through both entrances. The southern entrance is not really necessary to reduce ship sailing times for vessels approaching from the south as the difference in distance is small. It is understood that the Aktau International Sea Commercial Port (AISCP) wanted to have two entrances as a security in case one entrance becomes blocked due to a ship collision or grounding. Many ports do not have such an arrangement, relying on the provision of proper navigation aids and control of vessels entering and leaving the port.

The effectiveness of the offshore breakwater could be improved by changing the layout so that a bend is introduced in the entrance channel as shown on Figure 3. Such an arrangement would reduce the wave energy entering the harbour whilst still providing a reasonably direct entrance into the port for vessels. This realignment may entail a small amount of dredging outside the port and the ship handling around the bends would have to be investigated. The drawing shows the proposed southern entrance closed off to prevent waves from the south-west entering the port.

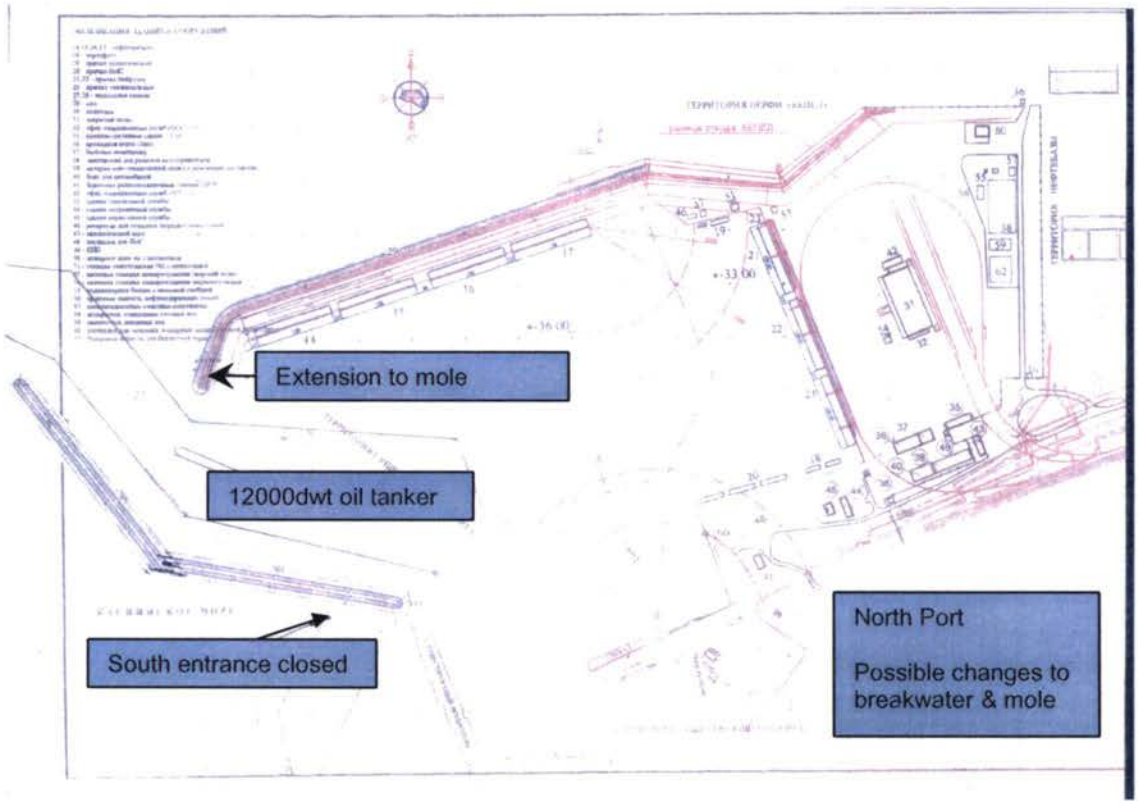
A further improvement could be made by closing off the proposed southern entrance. This would prevent wave energy being directed straight at berths 14 and 15. This would however increase the overall cost of the breakwaters.

Construction

The existing breakwater allows wave energy to penetrate through the breakwater, as it is constructed from large 40 tonne concrete blocks without any quarry run core. Whilst such construction has benefits during the construction phase as the large blocks are less vulnerable to damage during storms, the long-term effects are not very satisfactory. Model tests carried out by ABP Laboratories in 1999 demonstrated that, with an incident wave height of 4.63m a wave height of 1.17 m would be transmitted through the breakwater.

Consideration should be given to using a quarry run core to reduce the permeability of the breakwater. Measures could be taken to reduce the potential to storm damage to the core material by using material with a higher proportion of large stones and also using geotextile bags filled with the quarry run in the higher part of the core cross section. The secondary and primary armour should be placed as close as possible to the end of the core to minimise the length of breakwater that would be at risk.

Figure 3 – Possible changes to breakwaters



8.3 Scope for Operational Improvements

Vessel turnaround

Considerable time can be lost on the turn-round of oil tankers due to the time taken for port clearance and berthing and unberthing procedures. Typically port clearance can take 2 hours and berthing and unberthing a further 5 hours. For a 7,000 dwt tanker loading 6,600 tonnes of oil at a pumping rate of 800 tonnes/hour, the vessel would be fully loaded in 8.25 hours. Thus, the port clearance and berthing/unberthing would add another 85% of the loading time – i.e. almost doubling the time in port.

It should be possible to reduce this total time by several hours by better communication with the relevant authorities in relation to development of more modern procedures in line with international best practice and enhanced control of the shore gang and the tugs.

Tank farms

With the proposed increase in throughput of oil there will be pressure on the operators of the oil tank farms to hold sufficient storage of oil in case of delays in the arrival of the oil tanker trains. The planning for the volumes of oil to be stored must include consideration of the capacity of the rail system to deliver the required volumes in addition to any oil delivered by pipeline.

8.4 Recommended Action

It appears from the studies carried out by Kashydro that there is a serious risk of building a large port expansion that will experience considerable downtime due to wave action within the port unless the layout of the breakwaters is modified. It is strongly recommended that the costs and benefits of improvements to the layout of the breakwaters should be investigated by wave disturbance modelling as a matter of urgency. It will also be necessary to review the ship navigation into the port to check that the 12,000 dwt tankers can safely sail round any bends in the channel.

It is appreciated that the operation of the cranes is limited by the wind climate experienced at Aktau and so dry cargo handling would be restricted even if the wave climate in the harbour is improved. Whilst it could be argued that there would be no point in improving the wave conditions in the harbour if the cranes are restricted from working, such an argument does not apply to operations at the oil berths. The wave conditions at the oil berths should allow as near full availability as possible. If this is not achieved Aktau will have difficulty to compete effectively with other facilities on the Caspian Sea.

9 PRELIMINARY COST ESTIMATES

Kazhydro estimated the cost of the North Extension at $246 million.

The EBRD study undertaken by Sheila Farrell and Associates, however, estimated the cost at $306 million.

Both estimates excluded equipment.

10 NEED FOR INSTITUTIONAL REFORMS

The original concept was to develop the North Extension by means of a concession agreement. Unfortunately, this strategy failed and the concession agreement has been cancelled. Subsequently, legislation has been implemented with 'Degree No 431 of Government of Kazakhstan listing projects that are available for concessions and those which are not available for concessions' dated 28th March 2007. This legislation now eliminates the option of concession agreements. This decree is understood to be binding in the case of the North Extension; though "the door may be open" for private participation in longer term for the Southern Extension.

The current strategy is that the Aktau International Sea Commercial Port (AISCP) should be the sole operator of the port, as is the current situation following the suspension of the three leases on the oil berths in July 2007. Thus, the institutional arrangements would be common throughout the extended port.

In general, ports worldwide are tending to move more towards a 'landlord' function being responsible for the basic port infrastructure and contracting out the operations by means of concessions, leases, operating contracts etc. At this stage the concession option for the proposed extension is not permitted and recent cancellation of the leasing arrangements suggests that there are limited alternative institutional arrangements under consideration.

The previous chapters and Table 4.2 highlighted the importance of the Kashagan oilfield in respect of future traffic. Attracting and retaining both the Agip and Tengiz-Chevron traffic is critical to the viability of the North Extension. It is important that these organisations are 'committed' to using the Port of Aktau and therefore consideration on ways on which to obtain that commitment should be considered. For example, they would probably be more committed to using their 'own' terminal than a common user facility. Thus, it may be necessary to consider alternative institution arrangements for the specialised berths in the North Extension as part of a risk mitigation strategy.

There are proposals to separate the function of the State Port Authority from the commercial functions of AICSP, based on the 12th January 2002 legislation. It is understood that the State Procurator's office has requested the Ministry of Finance and the Ministry of Transport and Communications to enforce that legislation in respect of Aktau Port. The key concern is that compliance would require state fees for the services provided by the Port Authority to be transferred directly to the state treasury.

This institutional change could potentially dramatically affect the AISCP financing and in particular its ability to service and repay loans to the EBRD and the Development Bank of Kazakhstan. It is critical that any institutional changes do not compromise the ability of the port to service existing loans and attract the necessary funding for proposed new developments. This is known to be a concern by both banking organisations and may affect how they view funding of the development programme.

11 ECONOMIC EVALUATION

The economic evaluation in this chapter compares the costs and benefits of the Northern Extension project from the viewpoint of the national economy. It is to be distinguished from the financial analysis which assesses the revenues and expenditure from the proposed projects from the viewpoint of the investors (the AISCP). Most of the economic benefits of port construction (e.g. reductions in ships' queuing costs, avoidance of additional transport cost via second best routes and the removal of bottlenecks to additional exports) do not appear in the accounts of the port operators.

The following economic evaluation examines the costs and benefits of the Northern Extension "with" and "without" Kuryk.

"Without Kuryk"

In the absence of Kuryk, failure to build the Northern Extension would probably have three main consequences.

First, additional vessels would continue to call at the existing port, and long queues would build up. It will be assumed that an additional 2 million tonnes could be handled before the port was effectively full; but the high occupancy would result in an additional 2 days of waiting for all vessels. The cost of the queuing would be about $2 per tonne (based on two ship days at $9000 per day, divided by ship loads of about 9000 tonnes).

Secondly, after full capacity was reached, the ships would find optional routes by rail to Black Sea ports or to Baku to link into the BTC or the other pipelines to the Black Sea. Rail tariffs are high where it is necessary to cross borders, and it will be assumed that that they would have to pay at least $5 more per tonne than via Aktau. It is assumed that 6 million tonnes will use these rail routes (this will be refined in the full feasibility study.

- Thirdly, it will be assumed that not all of the traffic would be able find optional routes, as rail capacity is limited. Consequently, the final 2 million tonnes that would have been handled at the Northern Extension would no longer be exported. The loss to the economy would be the added value of the crude oil to the Kazakh economy – i.e. the sales price minus production costs. This will be assumed to be around $350 per tonne out of the selling price of $500.reductions in the costs of ships' queuing for berths; and
- avoidance of the need to divert cargoes to other transport routes or, in the extreme case, the choking off of exports.

The ***benefits*** of building the Northern Extension would be the avoidance of these costs

The economic ***costs of the construction*** are assumed provisionally to be 85% of the financial costs, on the basis that import duties and excise taxes account to 15% of total costs; and operating cost are as detailed in the financial evaluation in Chapter 12.

On this basis the economic cost and benefits are compared in Table 11.1.

The Economic Internal Rate of Return is high, at very 162%

The main reason for the very high return is the assumption that 2 million tonnes of exports would be lost without the project. If this benefit is excluded the EIRR falls to 23%.

"With Kuryk"

If Kuryk were built and were able to handle 20 million ones, the traffic remaining at Aktau could be handled at the existing berths (see Table 7.1). There would be no significant traffic for the Northern Extension and its EIRR would therefore be negligible.

Table 11.1: EIRR for the Aktau Northern Extension, WITHOUT Kuryk ($million)

	COSTS		BENEFITS			
	Investment (a)	Operating Costs (b)	Avoidance of Ships' Queuing Cost (c)	Avoidance of Additional Transport Cost to Black Sea (d)	Avoidance of Loss of Export Revenues (e)	NET BENEFITS
2008	-122.4					-122
2009	-122.4					-122
2010		-14	20	60	650	716
2011		-14	20	60	650	716
2012		-14	20	60	650	716
2013		-14	20	60	650	716
2014		-15	20	60	650	715
2015		-15	20	60	650	715
2016		-15	20	60	650	715
2017		-16	20	60	650	714
2018		-16	20	60	650	714
2019		-17	20	60	650	713
2020		-17	20	60	650	713
2021		-18	20	60	650	712
2022		-18	20	60	650	712
2023		-19	20	60	650	711
2024		-19	20	60	650	711
2025		-20	20	60	650	710
2026		-21	20	60	650	709
2027		-21	20	60	650	709

EIRR = 162%

Notes:
(a) The economic costs of the construction are assumed provisionally to be 85% of the financial costs, on the basis that import duties and excise taxes amount to 15% of total costs

(b) See financial evaluation for details.

(c) The construction of the new berths is assumed to save $2 per tonne in queuing costs for 11 million tonnes of oil which would be handled at the existing berths at occupancies far above acceptable levels.

(d) Without the new berths it is assumed that the first four million tonnes turned away from Aktau would use rail routes to the Black Sea, at an addition transport cost of $5 per and loss of a $10 per tonne premium as a result of being delivered to a Black Sea rather than a Mediterranean port.

(e) Without the new berths it is assumed that the last 2 million tonnes of exports would not be able to be transported, the loss to the economy being $350 per tonne (i.e. the value added after subtracting production cost from the export price the crude oil).

12 FINANCIAL EVALUATION

The financial analysis in this chapter assesses the viability of the proposed projects from the viewpoint of the investors, i.e. the AISCP. It is to be distinguished from the economic evaluation in Chapter 11, which compares the costs and benefits of the project to the economy of Kazakhstan.

12.1 AISCP Revenues and Expenditures

Two sets of financial evaluations will be required for the full feasibility study, which is scheduled for completion in December 2007. They are:

- a projection of revenues and expenditures to ***determine the Financial Internal Rate of Return on the Northern Extension as a stand alone project;***
- a forecast of revenues and expenditures ***for the port as a whole***, to ascertain whether the port will have sufficient reserves to repay the loan for the project (as well as the EBRD loan for the earlier project)

This pre-feasibility study contains only a preliminary version of the first evaluation – that of the additional revenues and cost associated with the proposed investment. (The second evaluation will require the setting up of a financial model).

The evaluation is based on the following assumptions:

- Traffic volumes as forecast by AISCP. The ToR required the pre-feasibility study to be based mainly on this forecast. (However, the FIRR is also calculated on the basis of preliminary SW forecasts, based on the "without Kuryk" case, see Table 4.11)
- Construction costs at the average of the Kazhydro and EBRD (SFA) estimates. Kazhydro estimated costs at $ 242 million and EBRD (SFA) estimated them at $334 million, giving an average of $288 million.
- Operating cost estimates based on a combination of estimates by Kazhydro, EBRD/SFA and the AISCP accounts (the traffic volumes at the existing ports are similar to those at the proposed Northern Extension). They are shown in Table 12.1

Table 12.1: AISCP Operating Cost Estimates

	AISCP Accounts 2005 (a)		Kazhydro Estimate	EBRD/SFA Estimate	Scott Wilson Assumption
	$ million 2005	(%)	$ million	$ million	$ million
Staff	6.6	51.3%	4.34	6.14	6.4
Maintenance and Repairs	0.4	3.4%	2.18	2.18	1.3
Fuel	0.6	4.7%	0.51	0.51	0.6
Utilities	0.4	3.4%	...	...	
Insurance	0.8	6.0%	...	...	
Tug Hire	0.0	0.0%	...	...	
Indirect taxes	1.4	10.7%	...	...	
Other	2.7	20.6%	4.39	4.39	4.8
Total	**12.9**	100.0%	**11.42**	**13.22**	**13.1**

Revenues based on the following tariffs (based on the tariff book and AISCP accounts):

Table 12.2: AISCP Revenues

Cargo Handling	$ / Tonne
Oil	1.72
Dry Cargo	6.89

Port Dues on Ships (est)	$ / Tonne
Oil	0.81
Dry Cargo	1.51

Storage (estimated: storage accounted for 9% of AISCP revues in the 2005 accounts)	$ / Tonne
Oil	0 (oil is stored outside the port)
Dry Cargo	2.30

The calculation of the Financial Internal Rate of Return is shown in Table 12.3.

As shown, the rate of return is estimated at only **7%**. With the initial Scott Wilson traffic projections it falls to **6%**.

The low rate of return should not necessarily be a cause for concern. Low financial rates of return on port projects7 are quite normal - as the traffic often continues to come to the port in the "without investment" case, even if congestion costs are very high. That is to say, major economic benefits in terms of reduced queuing costs or the removal of impediments to exports are often not accompanied by large additional financial revenues to the port.

But in the case of the Northern Extension there is a more fundamental reason for the low FIRR. It is that the revenues associated with the project are low compared with the investment costs.

The revenues and costs of the Northern Extension will be close to those of the existing port - as the traffic levels at the existing and new port are very similar - and the gross revenues on the existing operations are only $35 million p.a (and net revenues after subtracting operating costs are only $20 million). These incomes are equivalent to only 6-10% of the investment costs.

The options open to AISCP, given this low rate of return, may be as follows:

a) To increase tariffs. Although the AISCP oil tariffs are a slightly high by international standards, it may be possible to increase them because the port's customers may

[7] It is emphasized that this text refers to the financial internal rate of return on the North Extension, not on the operations of the AISCP as a whole. Two sets of analysis will be carried out for the full feasibility study, due in December 2007. The first, the preliminary version of which is included in this report, evaluates the financial viability of the North Extension as a stand-alone project – to ascertain whether its revenues are sufficient to cover its costs and give an acceptable rate of return. The objective of the second financial exercise, that examining the overall financial position of the AISCP, is to confirm whether the AISCP will be able to repay its loans, is not included in this report, but will be presented in the full feasibility study.

have no options for getting oil exports to Baku. That is to say, if the oil that cannot find space in the CPC and Samara pipelines they may have to pay whatever AISCP decides to charge them. This argument, however, would be undermined if Kuryk were built and offered a large amount of capacity at competitive transport costs.

b) Identify a lower cost engineering design.

c) Separate out breakwater and channel costs and allow them a long cost recovery period and a lower required rate of return. The subsidization of breakwaters and channels is quite common practice in other countries.

Table 12.3 FINANCIAL INTERNAL RATE OF RETURN ON THE NORTHERN EXTENSION (Pre-feasibility Study)

BASED ON AISCP FORECASTS (US$ 000)

YEAR	2008	2009	2010	2011	2012	2013	2014	2015	.....	2027
CARGO TRAFFIC AT AKTAU										
(forecast, 000 tonnes)										
Oil			24,300	25,080	25,860	26,640	27,420	28,200		37,560
Dry Cargo, excl grain			3,000	3,160	3,320	3,480	3,640	3,800		4,120
Grain			500	500	500	500	500	500		500
Total			**27,800**	**28,740**	**29,680**	**30,620**	**31,560**	**32,500**		**34,380**
Capacity of Existing Port										
(physical, @ 90% berth occupancy) (a)										
Oil			11,000	11,000	11,000	11,000	11,000	11,000		11,000
Dry Cargo			2,203	2,203	2,203	2,203	2,203	2,203		2,203
Grain			500	500	500	500	500	500		500
Traffic at North Extension										
(total traffic minus port capacity)										
Oil			10,000	10,000	10,000	10,000	10,000	10,000		10,000
Dry Cargo			797	957	1,117	1,277	1,437	1,597		1,917
Grain			0	0	0	0	0	0		0
Total			**10,797**	**10,957**	**11,117**	**11,277**	**11,437**	**11,597**		**11,917**
YEAR	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	.....	**2027**
REVENUES										
(US$ 000)										
Cargo Handling										
Oil			17,220	17,220	17,220	17,220	17,220	17,220		17,220
Dry Cargo			5,491	6,593	7,695	8,797	9,899	11,001		20,664
Storage										
Oil (c)			0	0	0	0	0	0		0
Dry Cargo			1,830	2,198	2,565	2,932	3,300	3,667		6,888
Port Dues on Ships				Port Dues on Ships						
Oil			8,150	8,150	8,150	8,150	8,150	8,150		8,150
Dry Cargo			1,203	1,444	1,685	1,927	2,168	2,410		4,526
Total Revenues			**33,894**	**35,605**	**37,316**	**39,026**	**40,737**	**42,448**		**57,448**
Invest Ment	144,000	144,000								0
OPERATING COSTS										
Staff(b)			6,372	6,691	7,025	7,377	7,745	8,133		14,605
Maintence and Repairs			1,306	1,306	1,306	1,306	1,306	1,306		1,306
Fuel			555	555	555	555	555	555		555
Others			4,820	4,820	4,820	4,820	4,820	4,820		4,820
Total Operating Costs			**13,052**	**13,371**	**13,705**	**14,057**	**14,426**	**14,813**		**21,285**
Surplus /deficit	-144,000	-144,000	**20,842**	**22,234**	**23,610**	**24,970**	**26,312**	**27,635**		**36,163**

IRR = 7%

(a) The capacity shown is the physical capacity as distinct from the economic capacity. It is assumed that ships will call until occupancy reaches 95% at which point the congestion/waiting times will be intolerable.

(b) Staff costs are assumed to increase by 5% p.a in real terms

(c) Oil is stored by companies outside the port.

13 CONCEPTUAL MASTER PLAN

Without a firm demand for oil berths it is unlikely that the North Port expansion is currently justified. Increases of up to 0.5 million tonnes/year in dry cargo can be handled in the existing Port by improvements in cargo handling procedures. However, if Government policies or incentives to oil companies can guarantee that oil will continue to be handled at Aktau when Kuryk is in operation then the North Port is probably justified, providing development of the port goes ahead in parallel with development of the rail, pipeline and tank network which transfers oil to the port. The type of incentives envisaged are streamlining of operating procedures to at least the level of efficiency that the oil companies intend to install at Kuryk.

With the North Port in place it is quite possible that industry and development within Aktau will be attracted by the new port and demand for dry cargo, which is not currently visible, will be generated thereby justifying development of dry cargo facilities within the new port.

Based on the estimated demand for berths and the condition of the existing port the following is a conceptual master plan which is primarily for future discussion and updating as further traffic forecasts are developed. However, it provides a logical development of existing and proposed new port assets to match demand and minimise disruption to ongoing port activities as new works are carried out. The size of the development packages could be increased to reduce the number of construction contacts, subject to funding arrangements. Alternatively the several development packages could come under the control of an overall management contractor and be carried out as one major investment package, again subject to funding.

The Development Plan is shown on drawings I to VI and comprises the following key elements:

- Phase I, 2007-09, Breakwater and mole to Northern Port
- Phase II, 2008, Dredging Northern Harbour Basin and Approach Channel;
- Phase III, 2008-09, Construction of 4 Oil Berths
- Phase IV, 2009-10, Construction of new pipelines, rail sidings, and tanks to serve the new oil berths;
- Phase V, 2010-12, Upgrade existing general cargo handling procedures, update oil berths 8 and 11 and construct new small craft berths;
- Phase VI, 2015-17, Construction of new bulk and general cargo facilities;
- Phase VII, 2020-22, Construct new oil berths on existing breakwater and upgrade pipelines and tank farms;

ANNEXES

ANNEX I: SHIP OPERATING COSTS

ANNEX II: COSTS OF PIPELINES

ANNEX III: TARIFFS

ANNEX I

SHIP OPERATING COSTS

Table AI.1 Ship Operating Costs, 12000 v 60000 DWT (US$)

Ship capacity (DWT)	12000	60000
Constructing Cost ($ million)	8.5	27
Speed		
Annual Costs ($000)		
Capital	1,358	4,314
Crew	600	600
Maintenance and Repair	170	540
Insurance	128	405
Supplies	500	500
Others	500	500
Total p.a.	**3,255**	**6,859**
Operating days p,a.	330	330
Daily cost in port	**9,865**	**20,784**
Fuel per day	4,167	**12,500**
Daily cost at Sea	**14,032**	**33,284**

Notes:

Interest rate	*: 15%*
Vessel Life	*: 20*
Annualised capital cost factor	*: 0.1598*
Crew	*: 20*
Number of crews	*: 2.5*
Cost per crew member ($ p.a.)	*: 12,000*
Maintenance and repair (% of construction costs)	*: 2%*
Insurance (% of construction costs)	*: 1.5%*
Fuel consumption (tonnes/day)	
12000	*: 16.7*
60000	*: 50*
Fuel cost per tonne ($)	*: 250*

AI.2 Comparison of Shipping Costs from Aktau and Kuryk to Baku. (US$)

	AKTAU	KURYK
Ship capacity	**12,000**	**60,000**
Distance, Aktau-Baku (n miles)	250	230
Ship speed	12	13
Days at sea	1.74	1.47
Days in port	2	2
Costs per ship day ($)		
at sea	14,032	33,284
in port	9,865	20,784
Costs per round voyage ($)		
Ship time at sea	24,361	49,072
Ship time in port	19,730	41,567
	44,091	90,639
	3.67	1.51
plus port dues		
Aktau/Kuryk	3	2
Baku	2	2
TOTAL SEA FREIGHT ($/tonne)	**8.67**	**5.51**

ANNEX II

COSTS OF PIPELINES

The two main pipelines which have been constructed in the recent past are the Caspian Pipeline Consortium (CPC) pipeline which opened in 2000 and the Baku-Tbilisi-Ceyhan pipeline which opened in 2005. Their construction costs, tariffs and order of magnitude revenues are summarised in Table AII.1

Table AII.1
Costs and Tariffs for CPC and BTC Pipelines

	CPC	BTC
Construction cost	$2.6 billion	$3 billion
Route	Tengiz-Novorossiysk	Baku-Tbilisi-Ceyhan (Turkish Mediterranean
Distance (km)	1600	1675
Start of Operation	2000	2005
Construction cost per km ($)	$1.8 million	$1.6 million
Tariff	$30.3/tonne	$24/tonne
Tariff per km (US cents)	**1.9 cents**	**1.4 cents**
Traffic, average over first 10 years (tonnes)	30 million	40 million (a)
Revenues (a)	$900 million	$960 million
Approximate revenues as % of construction costs (b)	**35%**	**32%**

(a) The traffic (and revenues) assumed are based on the assumption of traffic levels of 40 million tonnes p.a. The capacity of the pipeline is 50 million tonnes, but it is unlikely to carry that volume in its early years.

(b) The return on the pipeline investment would be lower than the percentage shown as the revenues have to cover capital repayments as well as interest, and also operating costs, which are estimated at about $3 per tonne. The operating cost of about $150 million for the 1600 km (source: The BTC Pipeline and BP by Claros Consulting, 2003) would suggests operating costs of around $60 million p.a. for the Tengiz-Kuryk pipeline

It will be seen that:

- The construction costs of the pipelines are similar at $1.6-1.8 million per kilometre
- The tariffs for the pipelines are similar, at 1.4-1.9 cents per km, giving an average of 1.65 cents per kilometre
- The required revenue would appear, from the charges applied for the CPC & BTC pipelines, to be over 30% of construction costs. This appears high, but the investors have had to make their investments several years before the revenues start, they may have to face traffic below maximum capacity in early years, as well as operating costs.

It may be concluded that:

- The implied cost for the Tengiz-Kuryk pipeline, for 600 km at approximately $1.7 million per km, would be $1 billion. This is in line with prices quoted in the press.
- If the Tengiz-Kuryk pipeline had to set tariffs to recover the same 30% as at CPC and BTC, the would be about **$15 per tonne** (i.e. 30% of $1 billion, divided by 20 million tonnes p.a).
- But if the tariffs for the 600 km pipeline Tengiz-Kuryk are set at similar levels per kilometre to the CPC and BTC pipelines (1.65 cents per km) this would imply a tariff of about $10 per tonne However, the diseconomies of size with the smaller capacity of the pipeline of the Tengiz-Kuryk pipeline might suggest a tariff of, say, **$11 per tonne**.

ANNEX III

AISCP TARIFFS

Table AIII.1
AISCP Tariffs

(US$)		
Ships Dues	0.13	per GRT
Light Dues	0.06	per GRT
Channel	0.08	per GRT
Berth Dues	0.88	per GRT
Environmental	81.71	per call
Quarantine	25.35	per call
Handling charges		
Oil	1.65	per tonne
Metals	6.30	per tonne

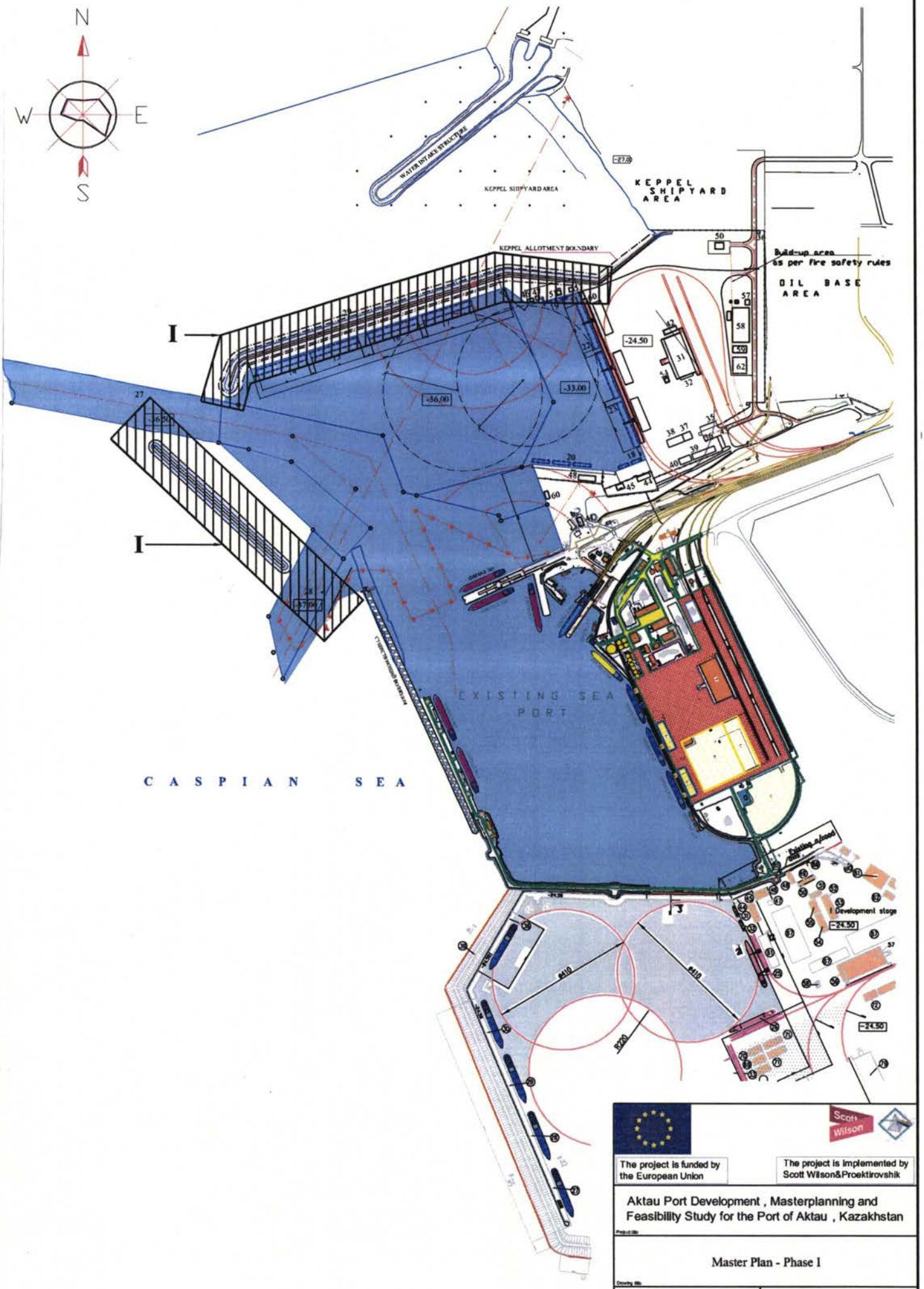
Tariffs have to be approved under the legislation governing the "Regulation of Natural Monopolies"

APPENDICES

SKETCHES I-VII: Possible phased implementation of the Conceptual Development Plan.

DRAWINGS:

DRAWING 1:	Existing Conceptual Master Plan for Aktau Port
DRAWING 2:	Existing Survey Information
DRAWING 3&4:	Typical cross sections of existing port
DRAWING 5:	Existing Conceptual Plan for North Port
DRAWING 6&7:	Typical cross sections of North Port construction to date
DRAWING 8:	Plan of existing Rail Network
DRAWING 9:	Plan of Existing Pipelines in Aktau port



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Master Plan - Phase 1

I

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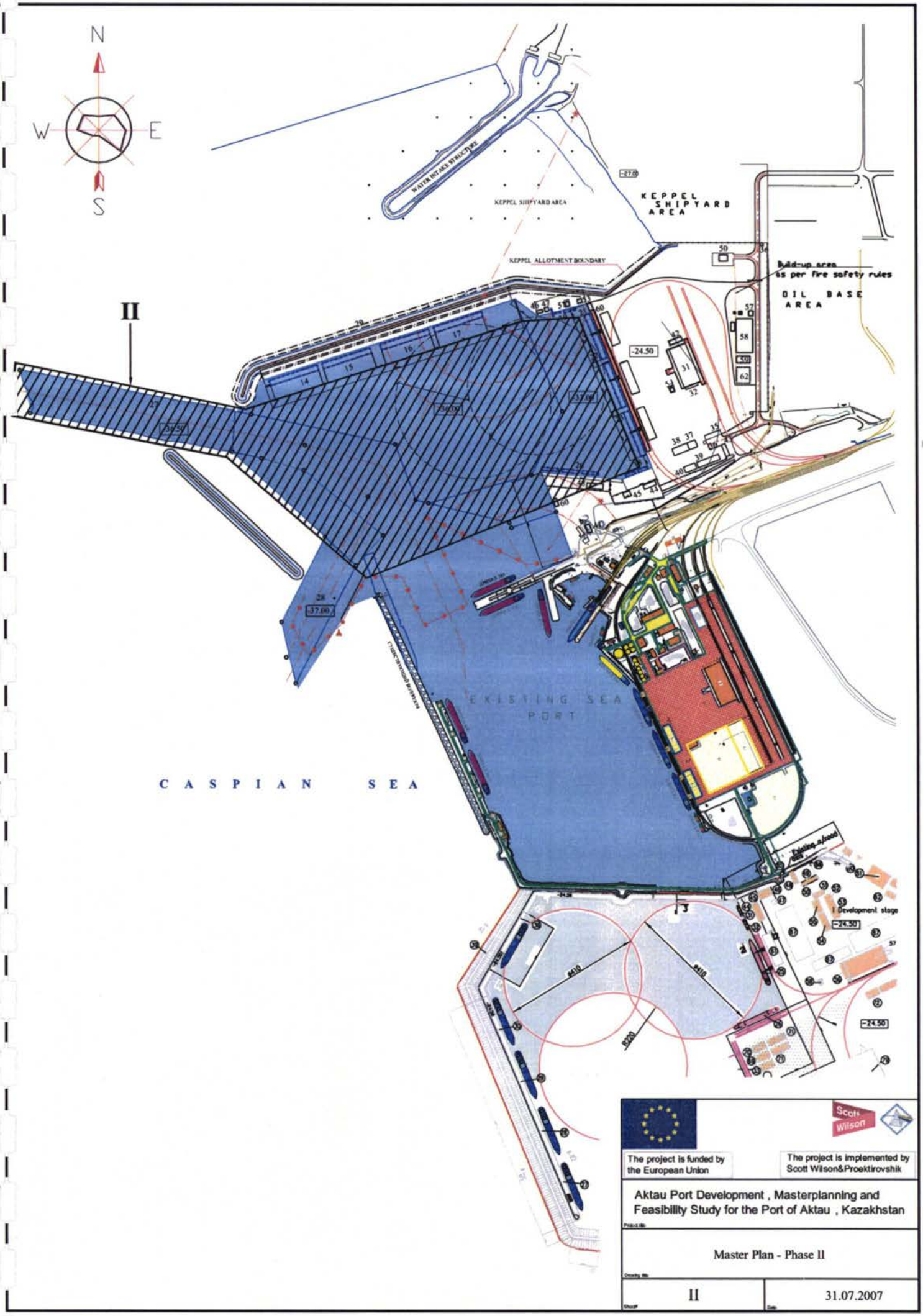
N
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WATER INTAKE STRUCTURE
KEPPEL SHIPYARD AREA
KEPPEL SHIPYARD AREA
KEPPEL ALLOTMENT BOUNDARY
Build-up area as per fire safety rules
OIL BASE AREA
II
-24.50
-37.00
EXISTING SEA PORT
CASPIAN SEA
I Development stage
-24.50
-24.50
ø410
ø410
320
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Master Plan - Phase II
II
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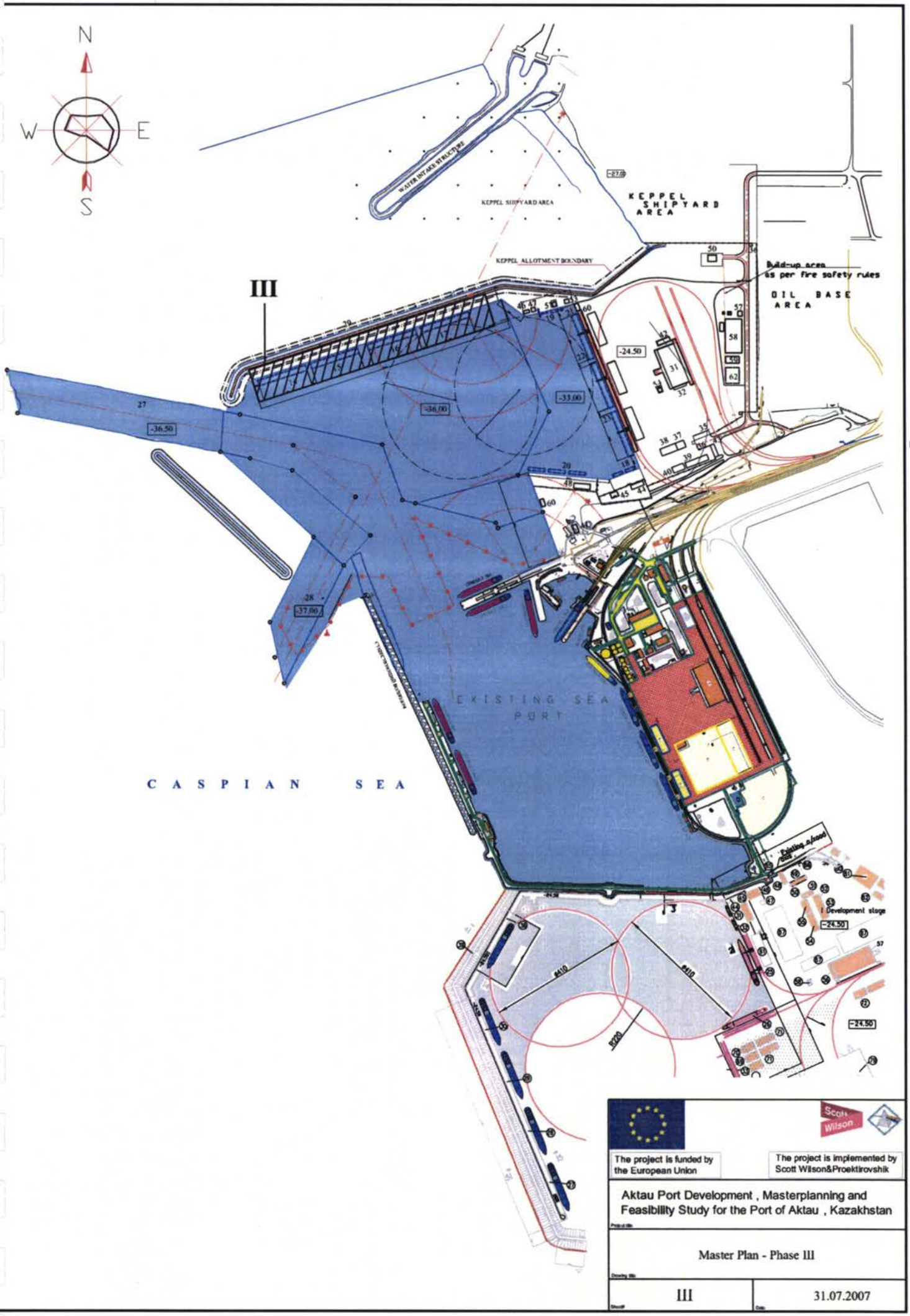
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WATER INTAKE STRUCTURE
KEPPEL SHIPYARD AREA
KEPPEL SHIPYARD AREA
KEPPEL ALLOTMENT BOUNDARY
Build-up area as per fire safety rules
OIL BASE AREA
III
-24.50
-33.00
-36.00
-36.50
-37.00
EXISTING SEA PORT
CASPIAN SEA
I Development stage
-24.50
-24.50
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Master Plan - Phase III
III
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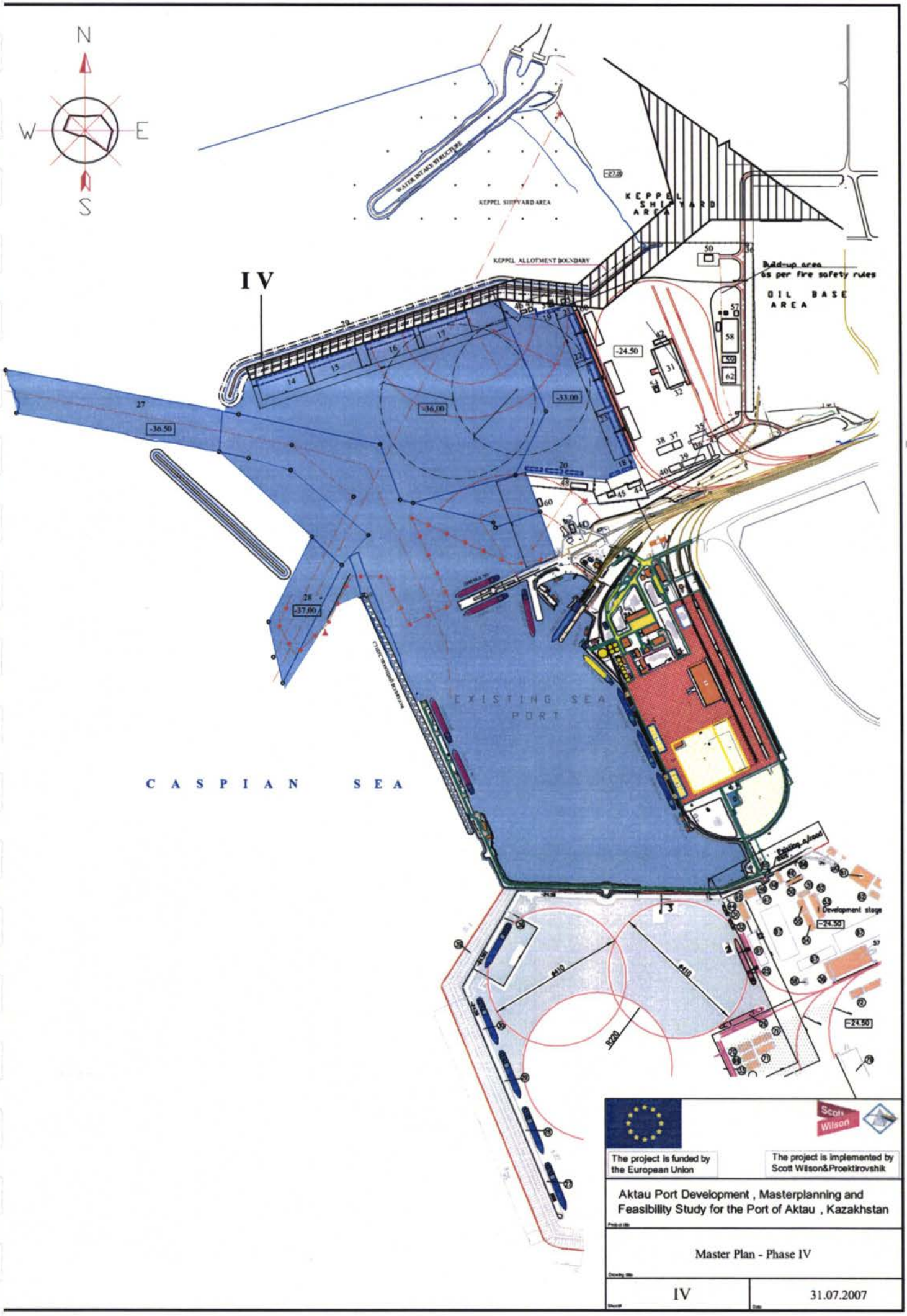
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IV
KEPPEL SHIPYARD AREA
KEPPEL ALLOTMENT BOUNDARY
Build-up area as per fire safety rules
OIL BASE AREA
EXISTING SEA PORT
CASPIAN SEA
-36.50
-37.00
-33.00
-24.50
Development stage
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Master Plan - Phase IV
IV
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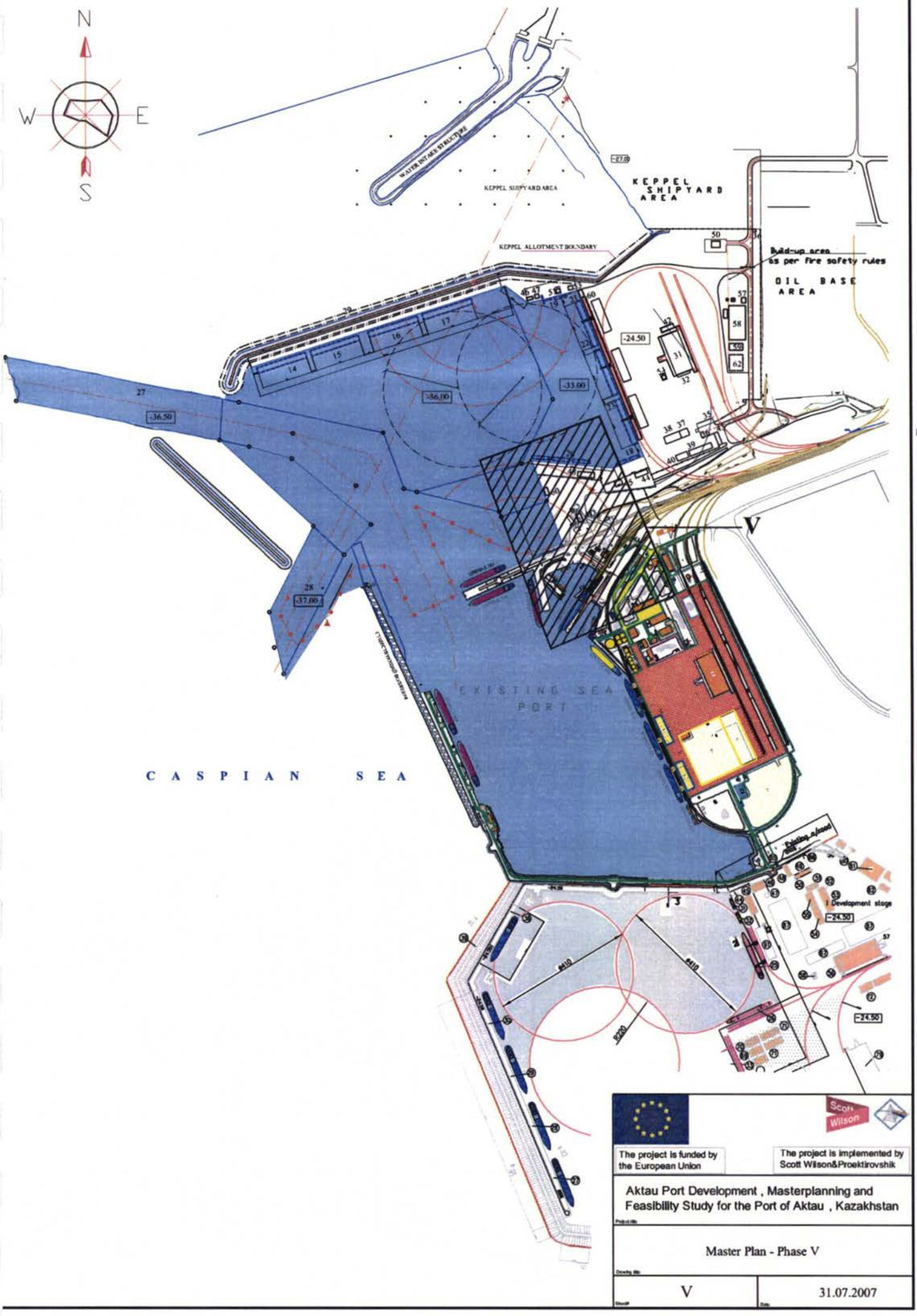

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Master Plan - Phase V

V

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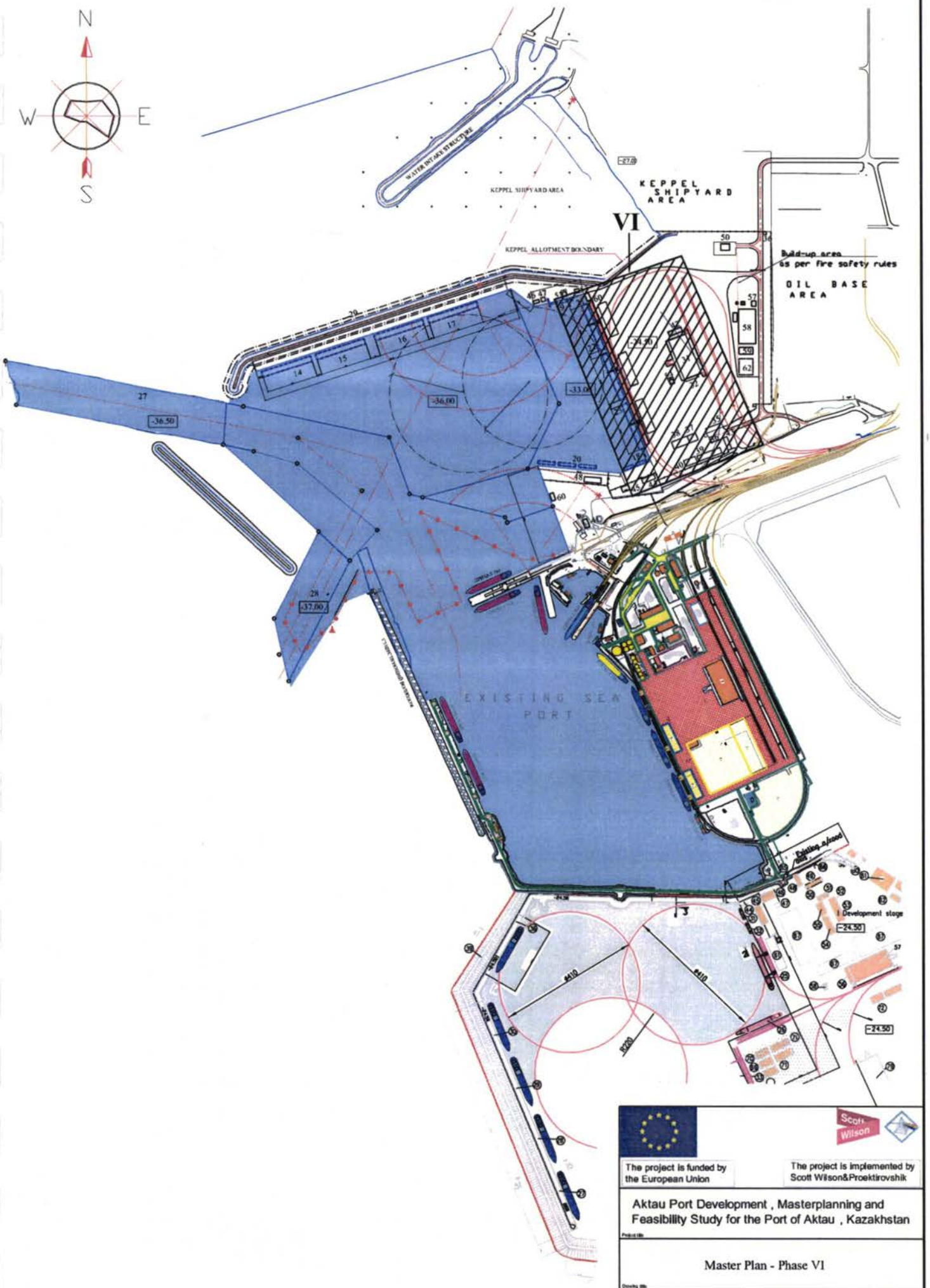
N
W
E
S
KEPPEL SHIPYARD AREA
KEPPEL ALLOTMENT BOUNDARY
VI
Build-up area as per fire safety rules
OIL BASE AREA
EXISTING SEA PORT
I Development stage
-24.50
-36.50
-37.00
-36.00
-33.0
-24.00
-27.0
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Master Plan - Phase VI
VI
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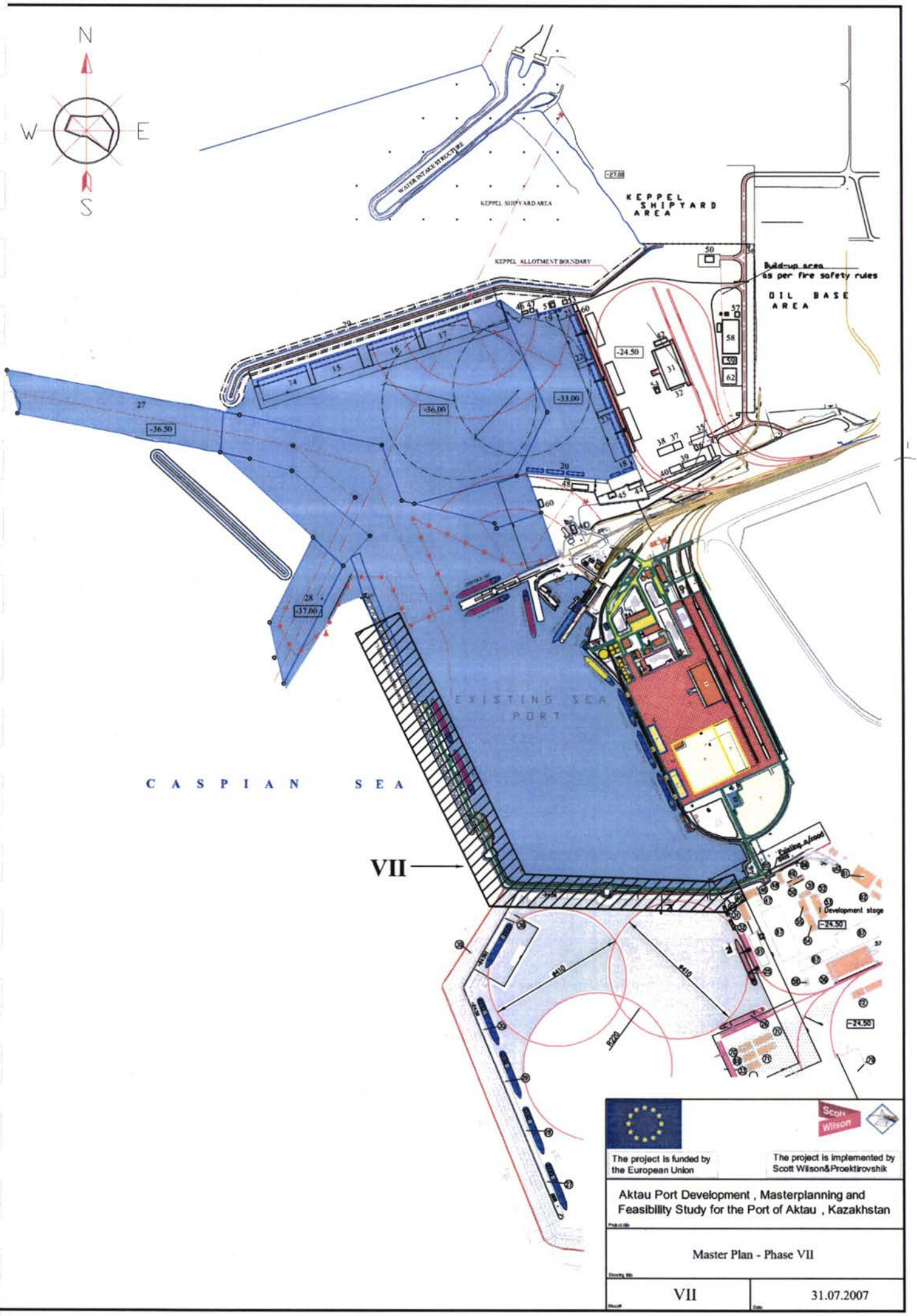
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WATER INTAKE STRUCTURE
KEPPEL SHIPYARD AREA
KEPPEL SHIPYARD AREA
KEPPEL ALLOTMENT BOUNDARY
Build-up area as per fire safety rules
OIL BASE AREA
-27.00
-24.50
-33.00
-36.00
-36.50
-37.00
EXISTING SEA PORT
CASPIAN SEA
VII
Fishing school
I Development stage
-24.50
-24.50
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Aktau Port Development , Masterplanning and Feasibility Study for the Port of Aktau , Kazakhstan
Master Plan - Phase VII
VII
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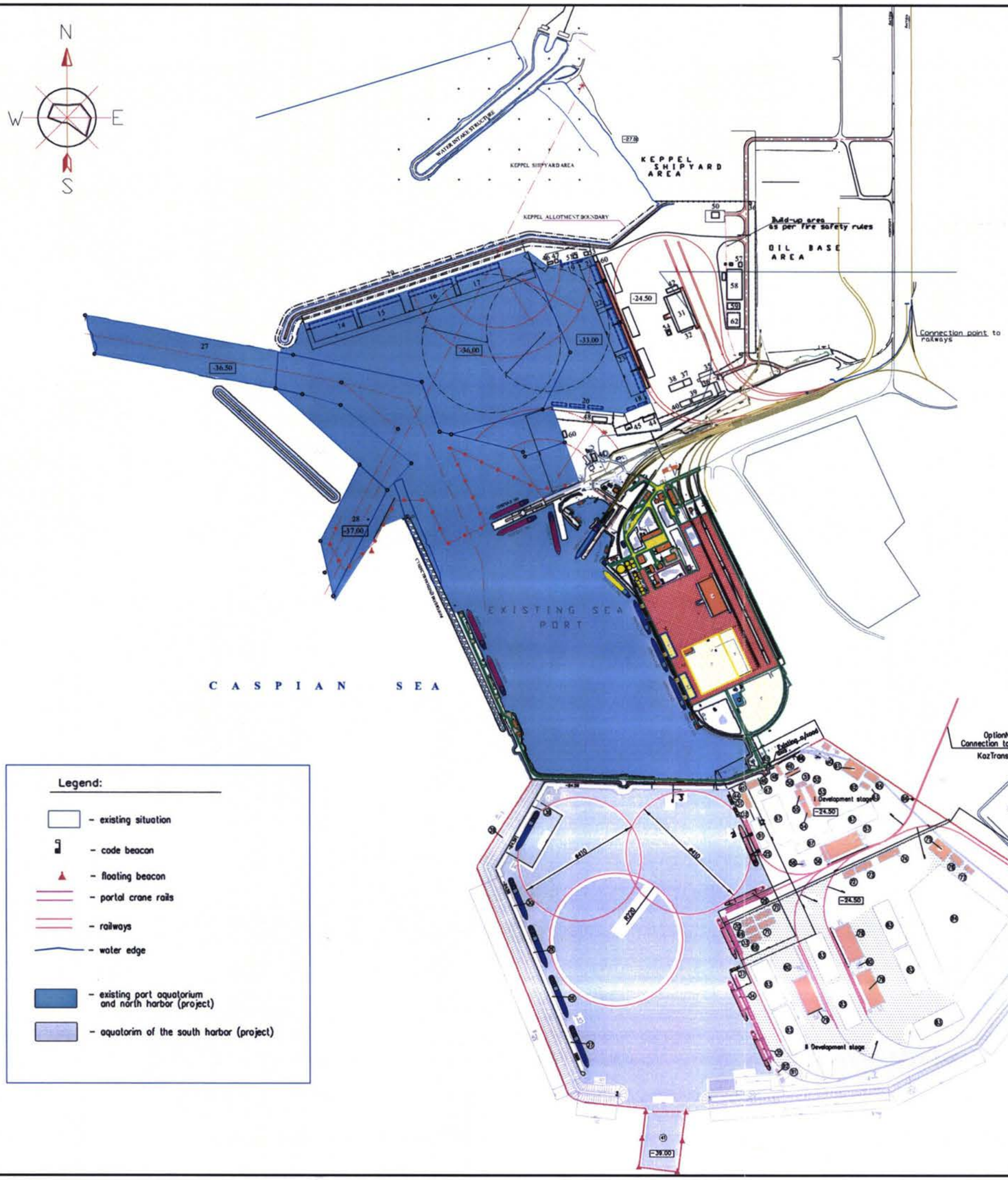

Legend:

- existing situation
- code beacon
- floating beacon
- portal crane rails
- railways
- water edge
- existing port aquatorium and north harbor (project)
- aquatorim of the south harbor (project)

LEGEND
NORTH HARBOR FACILITIES

LEGEND

14,15,16,17 - Oil Terminals
18 - Fleet vessels
19 - Ecological Terminal
20 - Naval Forces Terminal
21,22 - Main Cargos Terminals
23 - Multiple Terminal
27,28 - Approach channels
29 - Breakwater
30 - Breakwall
31 - Inside storage
32 - Operating Services Office (OSO-1)
35 - Administrative building - 5 fl .
36 - Ledges of the port (3ea)
37 - Domestic compartments
38 - Automobile repair shops
39 - Material and technical warehouse and repair shop
40 - Automobile box
41 - Coastal Radar (CR)
42 - Operating Services Office (OSO-2)
43 - Customs Service building
44 - Frontier service building
45 - Quarantine Service building
46 - Tank for washing the floating booms
47 - Ecological post
48 - Naval Forces Platform
49 - Check point
50 - Fire station for 2 fire trucks
51 - Foam fire-fighting station #1 with operator's room
53 - Fire pump station (sea water)
54 - Fire pump station of closed type warehouse
55 - Water tower with pump station
56 - Intake tank of oily wastes
57 - Sewage treatment facility
58 - Treated water evaporator
59 - Rainwater storage
60 - Filling station of the fire truck with sea water (2)
62 - Reserve tank for ballast water

LEGEND
SOUTH HARBOR FACILITIES

I development stage

25,26 – Main cargo terminal;
27,28,29,30 – Oil terminal
31 – Ecological terminal
32 – Fleet vessels
39 – Waterbreak
40 – Waterwall
41 – Approach channel
42 – Foam fire–fighting station N1 with operator's room (2)
43 – Filling station of the fire trucks with sea water

44 – Floating booms platform
45 – Building for personnel
46 – Tools and equipment storage container
47 – Sewage water tank
48 – Customs service building
49 – Administrative building
50 – Quarantine Service building
51 – Coast Guard building
52 – Material and technical warehouse and repair shop

53 – Domestic compartments
54 – Automobile repair shop
55 – Automobile boxes
56 – Operating Service Office (OOC-1)
57 – Inside storage
58 – Fire pump station for closed type warehouse
59 – Fire station for 2 fire trucks
60 – Water tower for pump station
61 – Treated water evaporator
62 – Intake tank of oily waste
63 – Sewage treatment facility
64 – Rainwater storage
65 – Check point
66 – Ledge of the port (2)
67 –Laydown site (3)

II development stage

33 – General cargo berth
34 – General cargo berth
35 – General cargo berth
36 – Oil terminal
37 – Fleet vessels
38 – Reserve berth
68 – Quarantine Service building
69 – Coast Guard building
70 – Operating Service Office (OOC-2)
71 – Domestic compartments (2)
72 – Material and technical warehouse and repar shop

73 – Automobile boxes
74 – Automobile repair shop
75 – Treated water evaporator
76 – Rainwater intake
77 – Sewage treatment facilities
78 – Fire station for 2 fire trucks
79 – Inside storage (3)
80 – Fire pump station of closed type warehouse (3)
81 – Fire pump station of closed type warehouse
82 – Filling station of the fire truck with sea water

83 – Laydown sites (7)
84 – Reserved area

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Aktau Port Development, Masterplanning and Feasibility Study for the Port of Aktau, Kazakhstan

Conceptual Master Plan for Aktau Port

1

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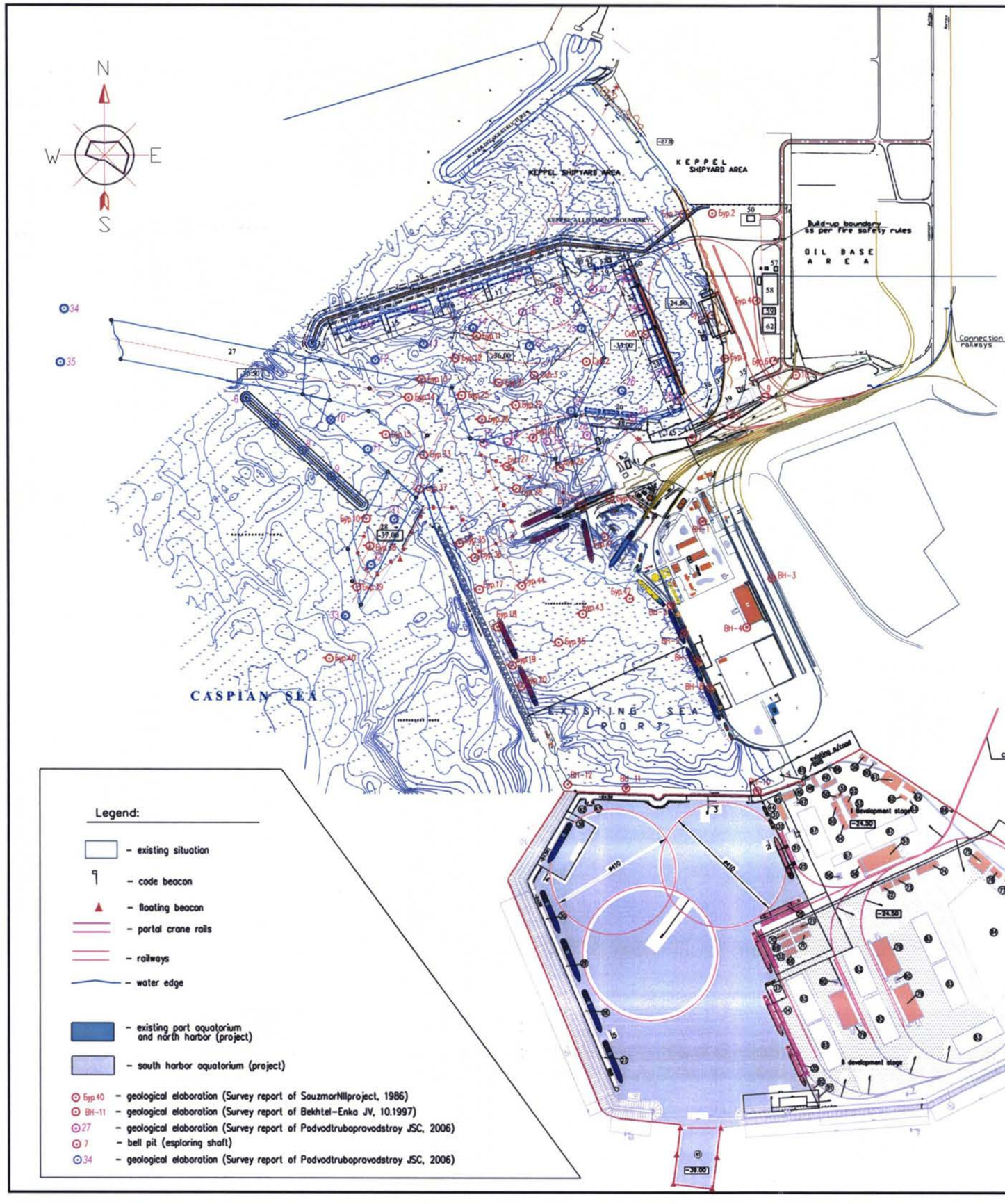

LEGEND
NORTH HARBOR FACILITIES

LEGEND

14,15,16,17 - Oil Terminals
18 - Fleet vessels
19 - Ecological Terminal
20 - Naval Forces Terminal
21,22 - Main Cargos Terminals
23 - Multiple Terminal
27,28 - Approach channels
29 - Breakwater
30 - Breakwall
31 - Inside storage
32 - Operating Services Office (OSO-1)
35 - Administrative building - 5 fl.
36 - Ledges of the port (3ea)
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57 - Sewage treatment facility
58 - Treated water evaporator
59 - Rainwater storage
60 - Filling station of the fire truck with sea water (2)
62 - Reserve tank for ballast water

LEGEND
SOUTH HARBOR FACILITIES

I development stage

25,26 – Main cargo terminal;
27,28,29,30 – Oil terminal
31 – Ecological terminal
32 – Fleet vessels
39 – Waterbreak
40 – Waterwall
41 – Approach channel
42 – Foam fire-fighting station N1 with operator's room (2)
43 – Filling station of the fire trucks with sea water

44 – Floating booms platform
45 – Building for personnel
46 – Tools and equipment storage container
47 – Sewage water tank
48 – Customs service building
49 – Administrative building
50 – Quarantine Service building
51 – Coast Guard building
52 – Material and technical warehouse and repair shop

53 – Domestic compartments
54 – Automobile repair shop
55 – Automobile boxes
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59 – Fire station for 2 fire trucks
60 – Water tower for pump station
61 – Treated water evaporator
62 – Intake tank of oily waste
63 – Sewage treatment facility
64 – Rainwater storage
65 – Check point
66 – Ledge of the port (2)
67 –Laydown site (3)

II development stage

33 – General cargo berth
34 – General cargo berth
35 – General cargo berth
36 – Oil terminal
37 – Fleet vessels
38 – Reserve berth
68 – Quarantine Service building
69 – Coast Guard building
70 – Operating Service Office (OOC-2)
71 – Domestic compartments (2)
72 – Material and technical warehouse and repor shop

73 – Automobile boxes
74 – Automobile repair shop
75 – Treated water evaporator
76 – Rainwater intake
77 – Sewage treatment facilities
78 – Fire station for 2 fire trucks
79 – Inside storage (3)
80 – Fire pump station of closed type warehouse (3)
81 – Fire pump station of closed type warehouse
82 – Filling station of the fire truck with sea water

83 – Laydown sites (7)
84 – Reserved area

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Existing Survey Information

2

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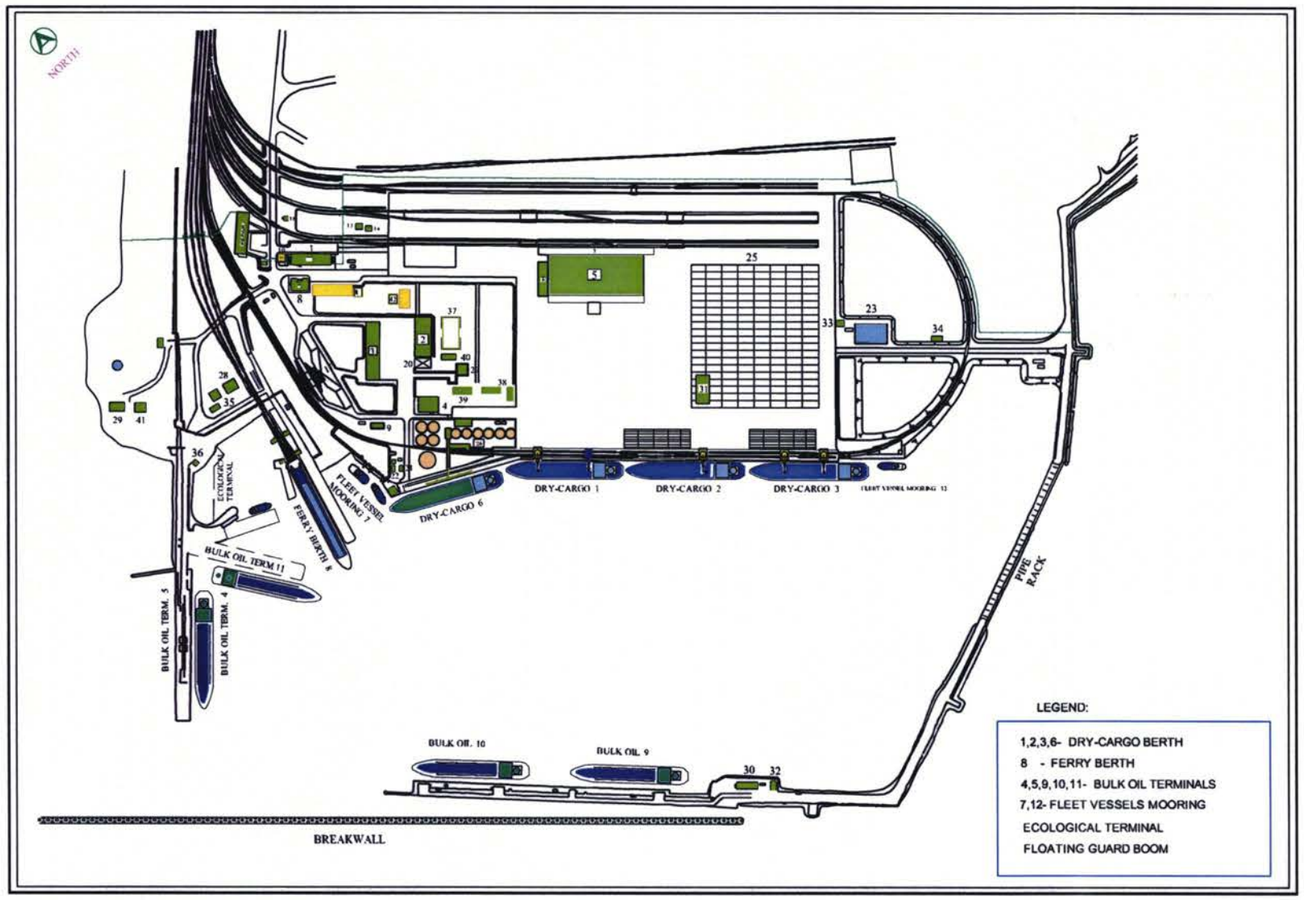

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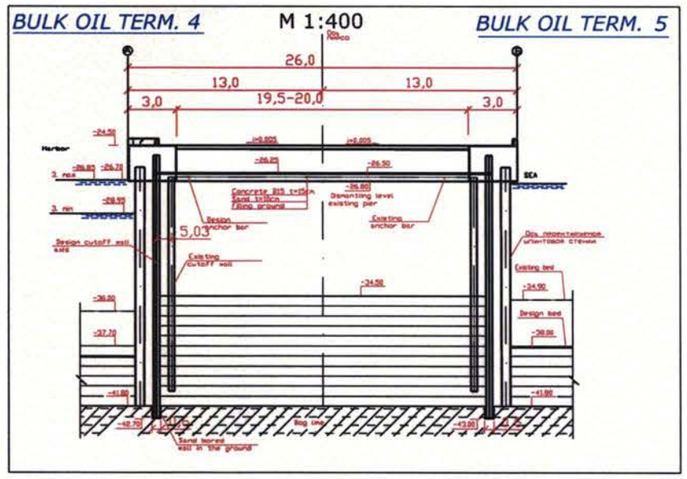

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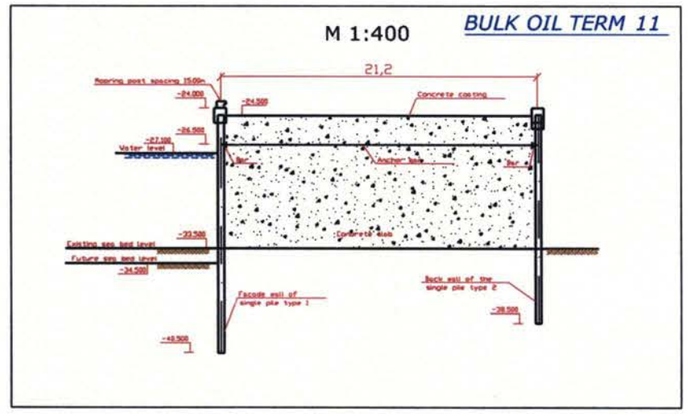

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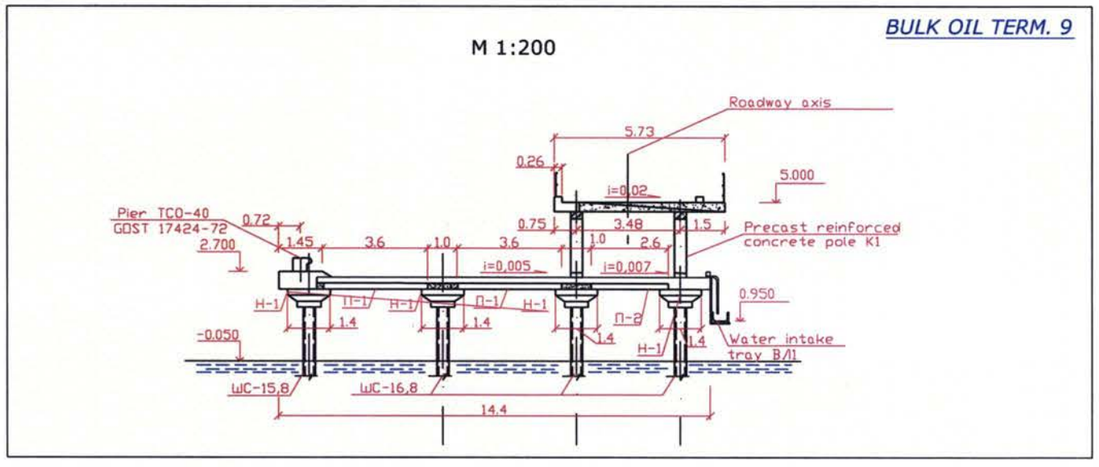

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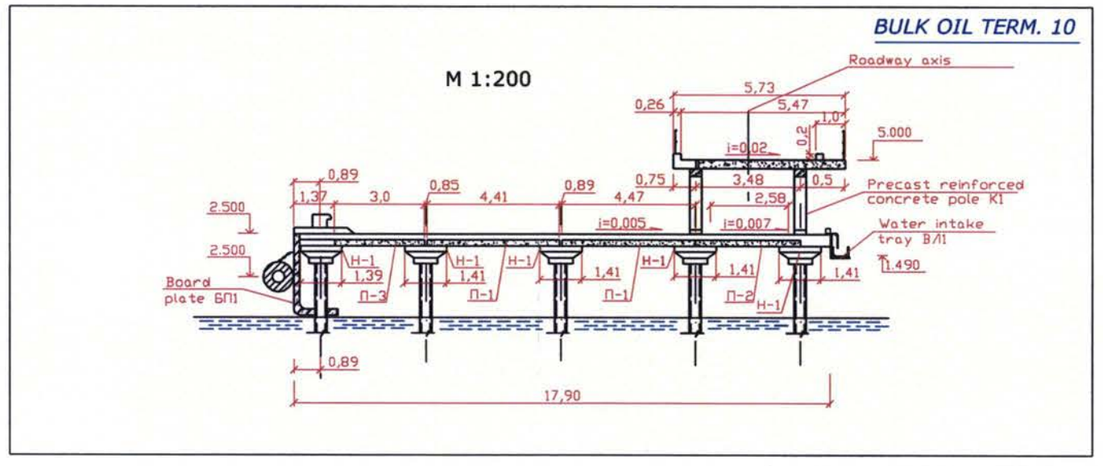

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Aktau Port Development , Masterplanning and Feasibility Study for the Port of Aktau , Kazakhstan

Typical Cross Section of Existing Port- sheet 1

3

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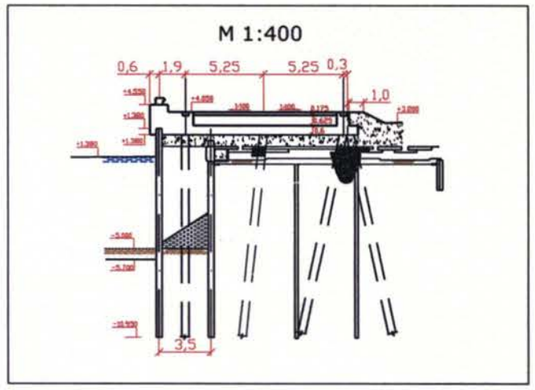
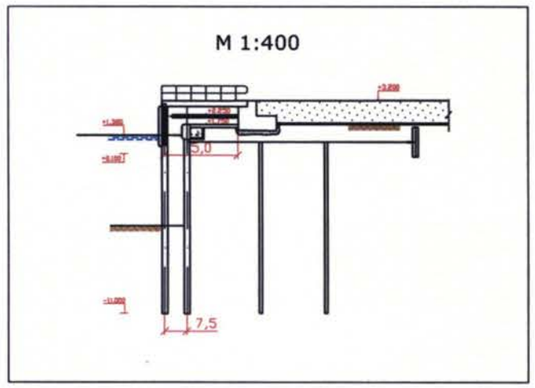
BERTHS 1,2,3,6 FOR THE GENERAL CARGOS

5.



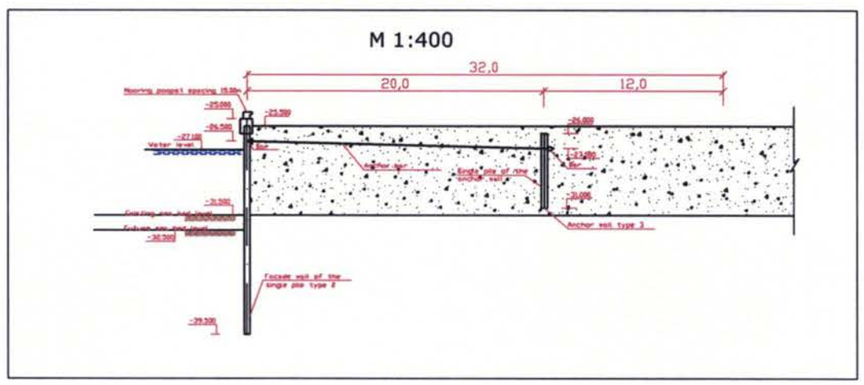
Port Service Craft 7

6.



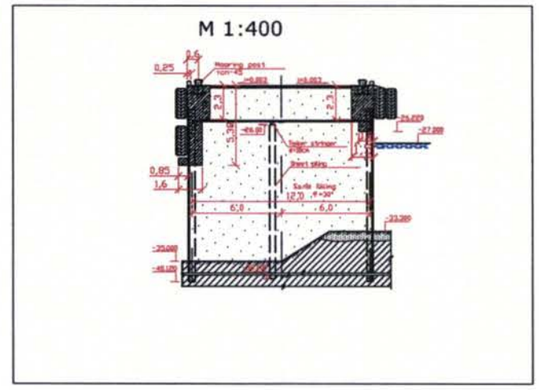
ECOLOGICAL TERMINAL

7.



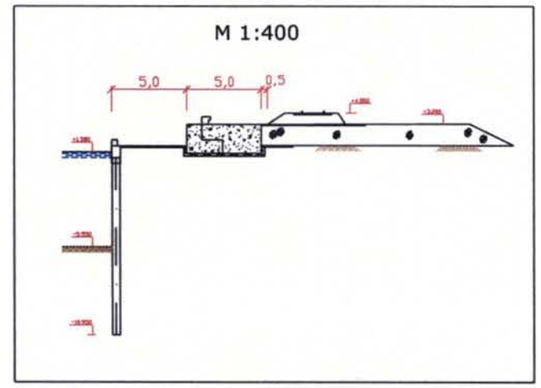
FERRY BERTH 8

8.



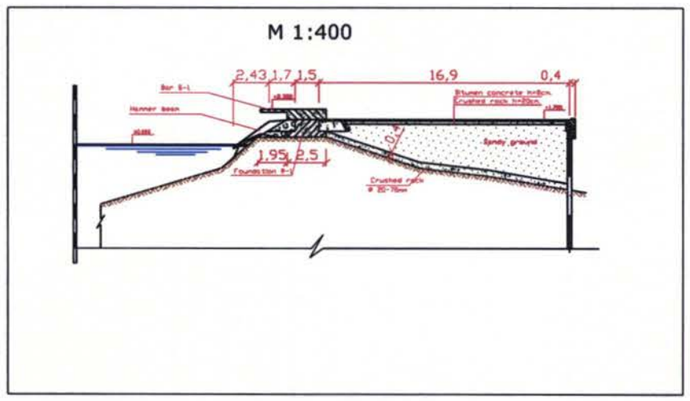
Port Service Craft 12

9.



FLOATING GUARD BOOM

10.



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Aktau Port Development , Masterplanning and Feasibility Study for the Port of Aktau , Kazakhstan

Typical Cross Section of Existing Port- sheet 2

4

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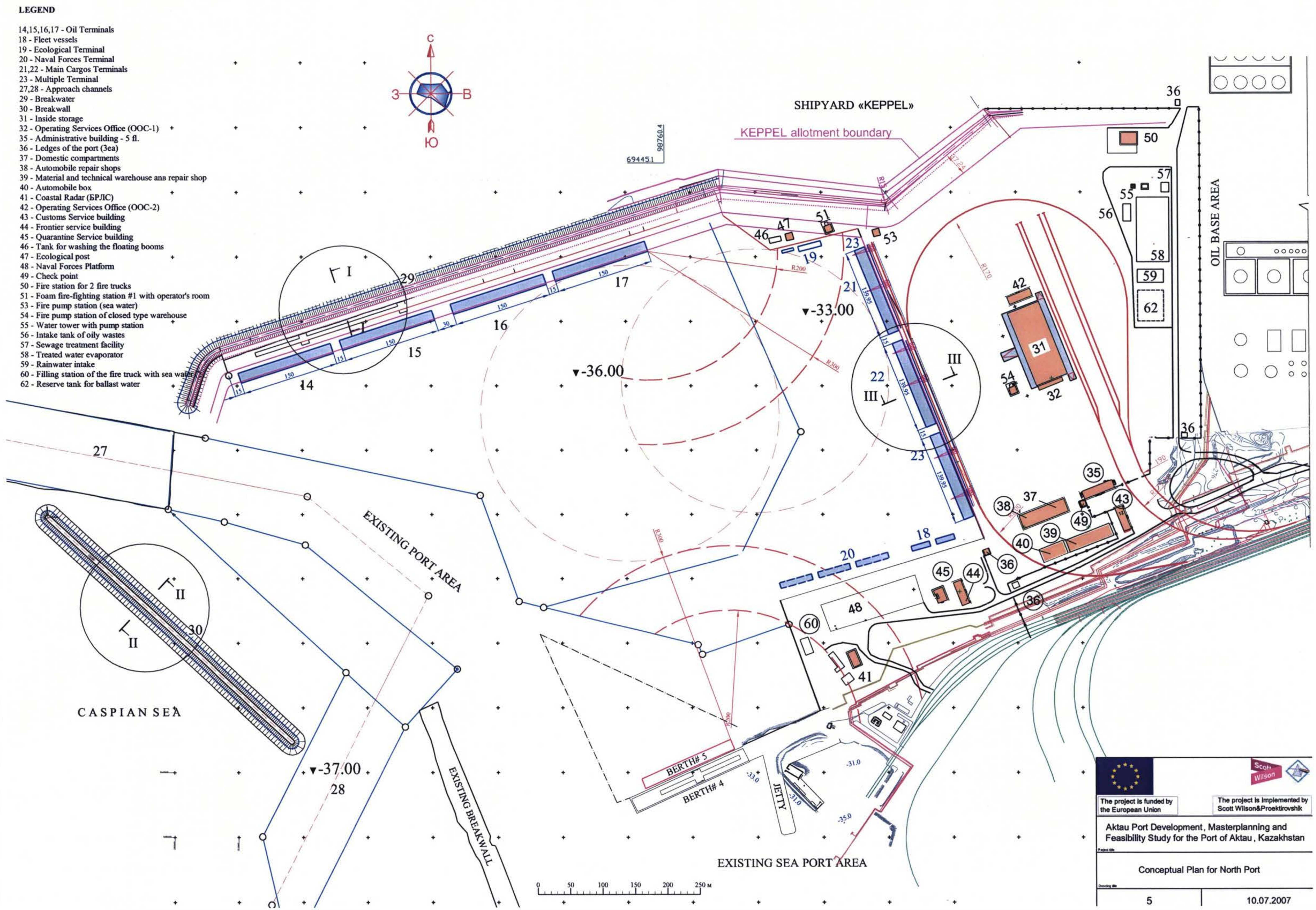

LEGEND
14,15,16,17 - Oil Terminals
18 - Fleet vessels
19 - Ecological Terminal
20 - Naval Forces Terminal
21,22 - Main Cargos Terminals
23 - Multiple Terminal
27,28 - Approach channels
29 - Breakwater
30 - Breakwall
31 - Inside storage
32 - Operating Services Office (ООС-1)
35 - Administrative building - 5 fl.
36 - Ledges of the port (3ea)
37 - Domestic compartments
38 - Automobile repair shops
39 - Material and technical warehouse ana repair shop
40 - Automobile box
41 - Coastal Radar (БРЛС)
42 - Operating Services Office (ООС-2)
43 - Customs Service building
44 - Frontier service building
45 - Quarantine Service building
46 - Tank for washing the floating booms
47 - Ecological post
48 - Naval Forces Platform
49 - Check point
50 - Fire station for 2 fire trucks
51 - Foam fire-fighting station #1 with operator's room
53 - Fire pump station (sea water)
54 - Fire pump station of closed type warehouse
55 - Water tower with pump station
56 - Intake tank of oily wastes
57 - Sewage treatment facility
58 - Treated water evaporator
59 - Rainwater intake
60 - Filling station of the fire truck with sea water
62 - Reserve tank for ballast water
С
З
В
Ю
SHIPYARD «KEPPEL»
KEPPEL allotment boundary
OIL BASE AREA
▼-33.00
▼-36.00
▼-37.00
EXISTING PORT AREA
CASPIAN SEA
EXISTING BREAKWALL
EXISTING SEA PORT AREA
BERTH# 5
BERTH# 4
JETTY
0 50 100 150 200 250 м
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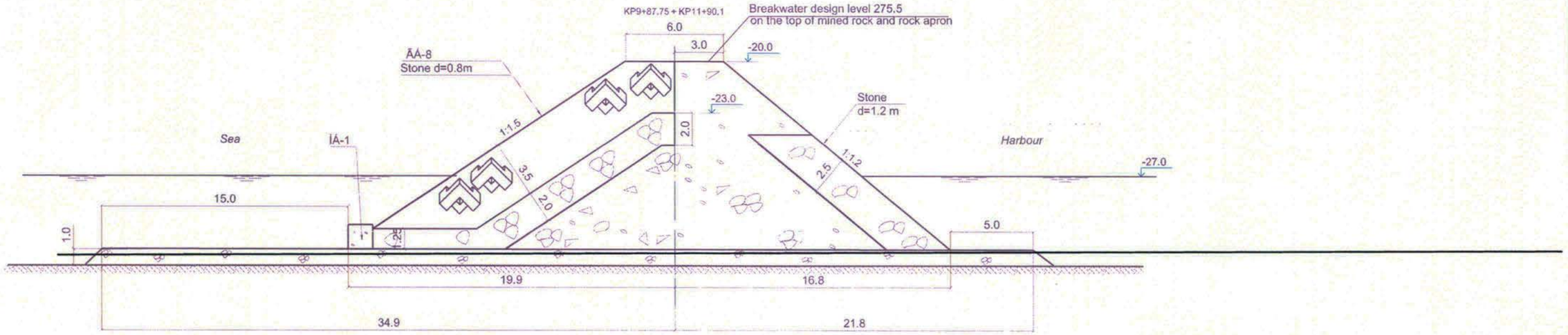
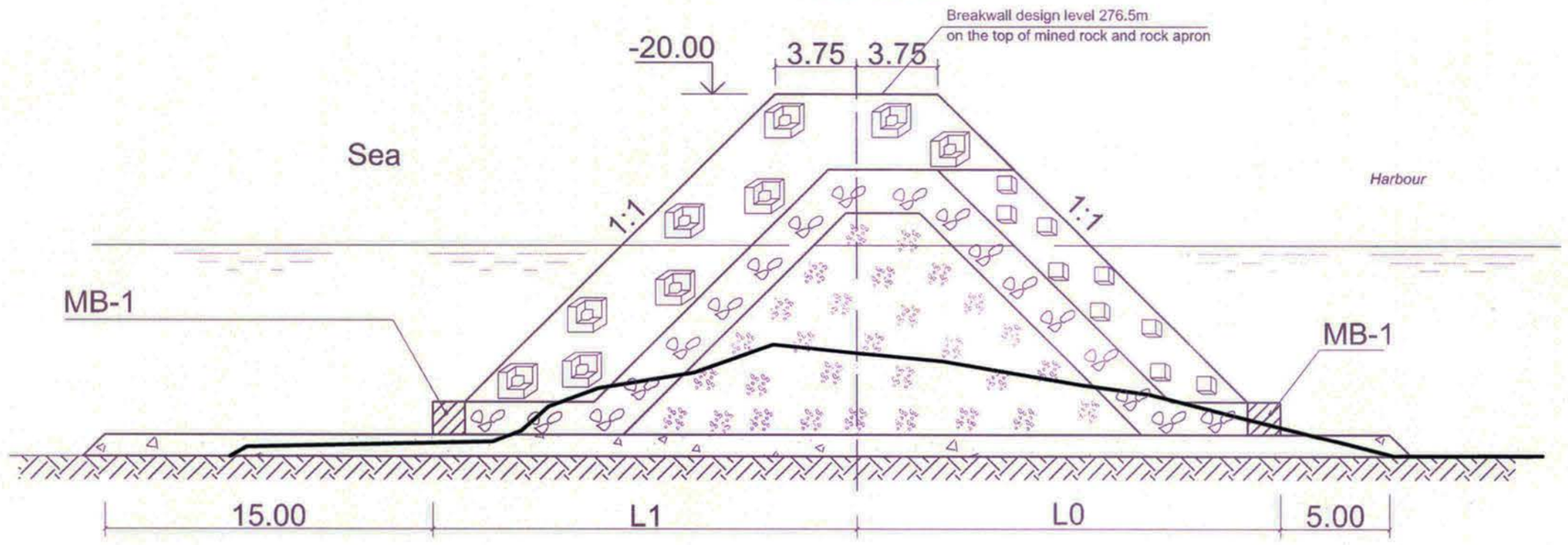
Conceptual Plan for North Port
5
10.07.2007

I - I
Breakwater cross section



II - II
Breakwall cross section

KP2+00.00



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Aktau Port Development, Masterplanning and Feasibility Study for the Port of Aktau, Kazakhstan

Project title

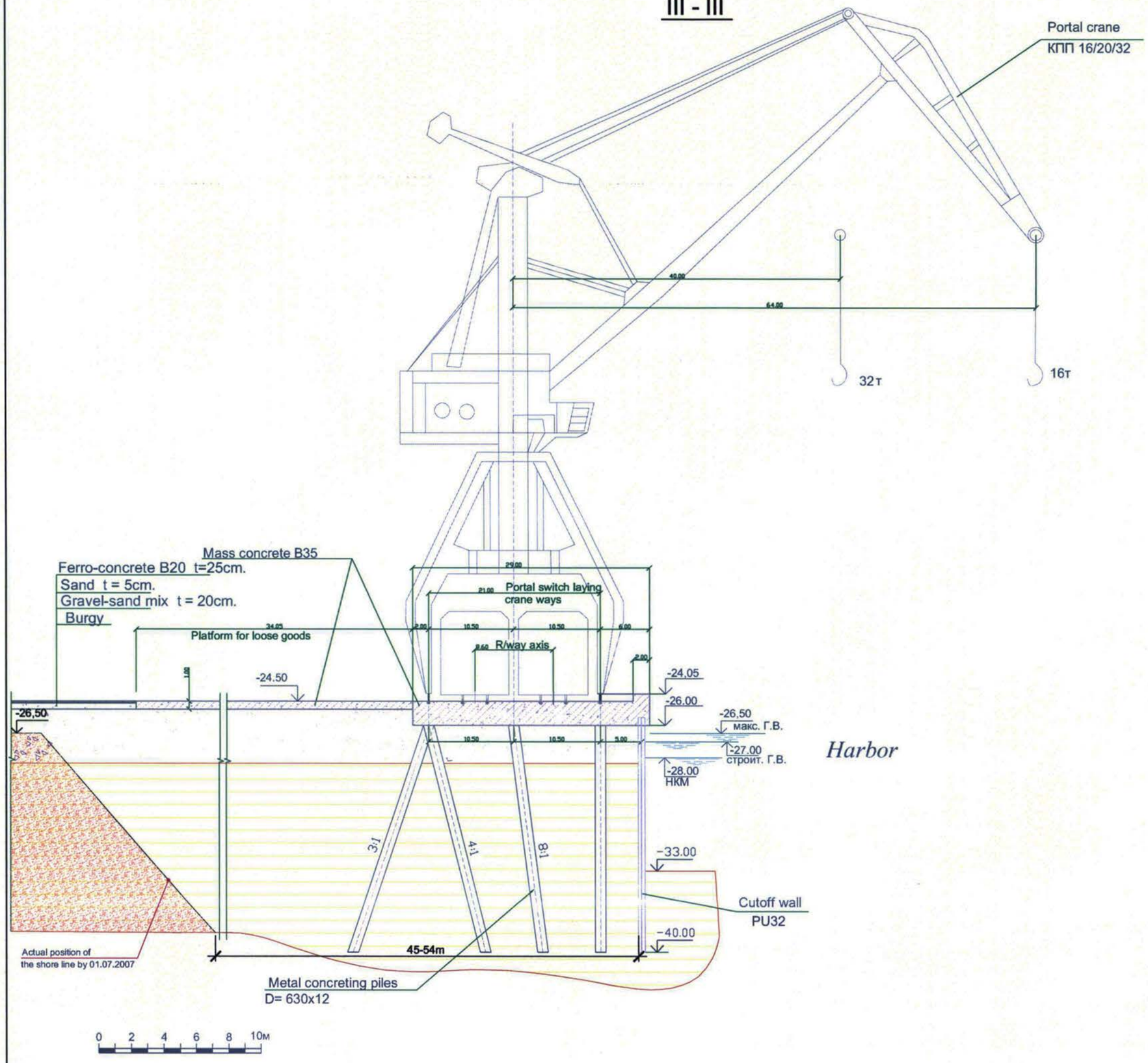
Typical Cross Section for North Port

Drawing title

Sheet	Date
6	10.07.2007

21,22 - berths for the general cargos

III - III



Harbor

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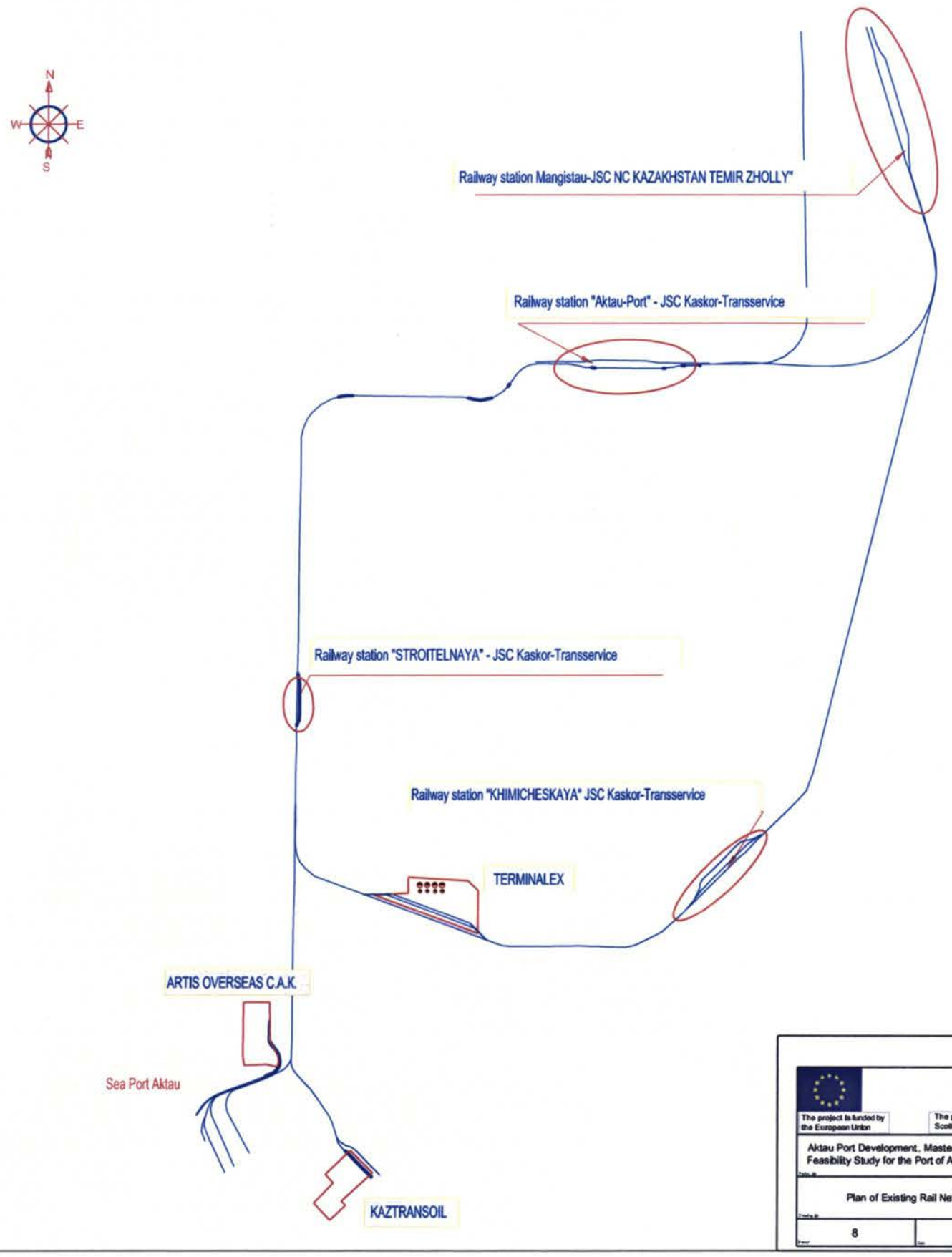
Aktau Port Development, Masterplanning and Feasibility Study for the Port of Aktau, Kazakhstan

Typical Cross Section for North Port

Sheet	Date
7	10.07.2007


N
W
E
S
Railway station Mangistau-JSC NC KAZAKHSTAN TEMIR ZHOLLY"
Railway station "Aktau-Port" - JSC Kaskor-Transservice
Railway station "STROITELNAYA" - JSC Kaskor-Transservice
Railway station "KHIMICHESKAYA" JSC Kaskor-Transservice
TERMINALEX
ARTIS OVERSEAS C.A.K.
Sea Port Aktau
KAZTRANSOIL
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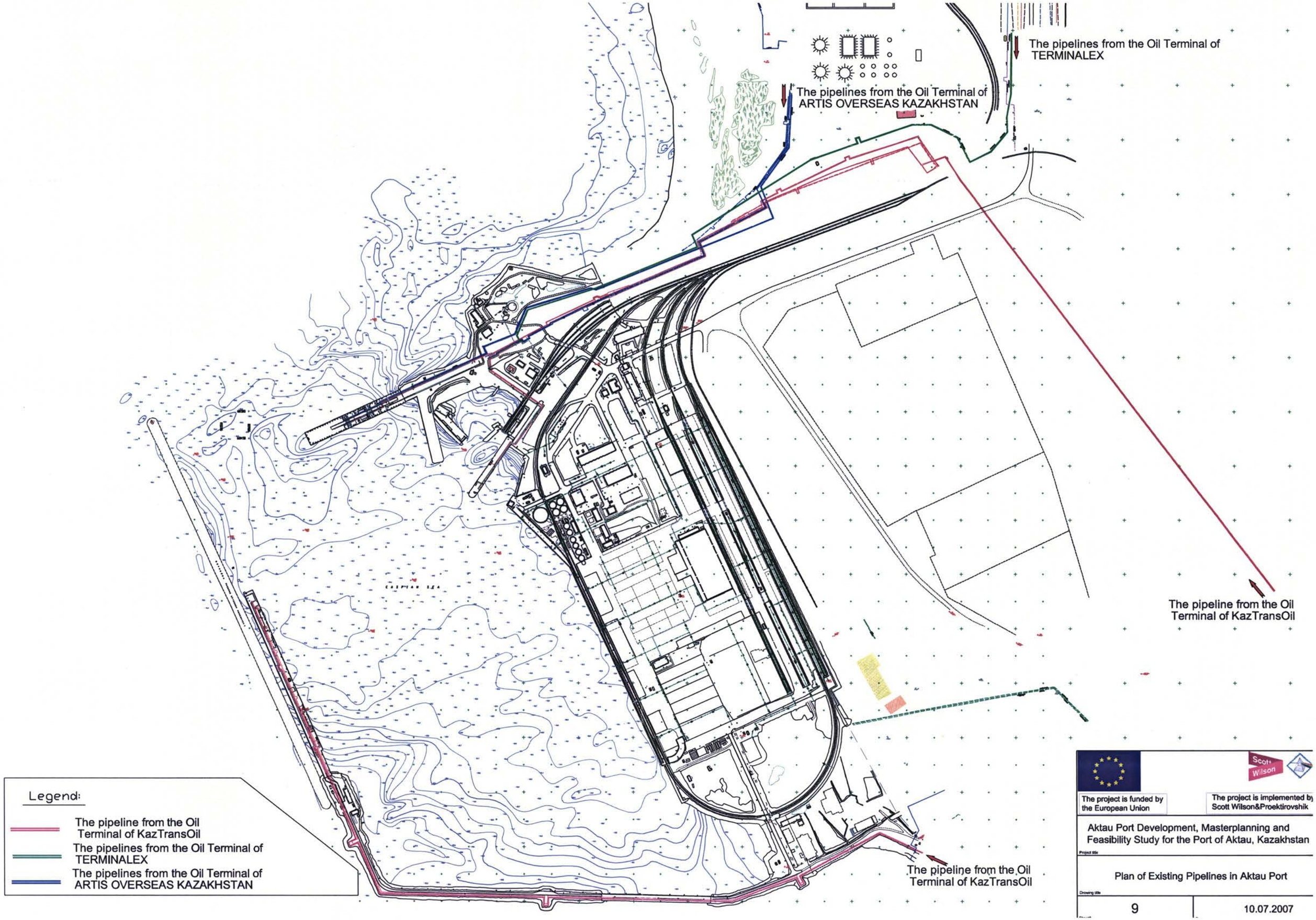
Plan of Existing Rail Network
8
10.07.2007



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Aktau Port Development, Masterplanning and Feasibility Study for the Port of Aktau, Kazakhstan

Project title

Plan of Existing Pipelines in Aktau Port

Drawing title

9	10.07.2007

Scott Wilson

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Facilities Management
Forensic Engineering
Geographical Information Systems
Geotechnics
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Human Resource Development
Industrial Development
Information Systems
Institutional Development
Landscape Architecture
Maintenance & Refurbishment
Masterplanning
Mechanical & Electrical Systems
Mining & Quarrying
Planning & Feasibility Studies
Planning & Urban Development
Ports & Harbours
Project Management
Pharmaceuticals
Quality Management
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