

**APPENDIX D6a**  
**WATER QUALITY MITIGATION -**  
**SILT CURTAIN APPLICATION**  
**(SEQUENCE A)**



## D6-1 INTRODUCTION

- D6-1.1 For the combined TM-CLKL+HKBCF+HKLR projects, 3 scenario years have been selected for hydrodynamic and water quality modelling based on the worst case calculated sediment losses following the anticipated project programme. The anticipated programme is shown in Figure 24 of **Appendix D5a**.
- D6-1.2 The results of the construction phase water quality modelling has shown that, even with the integrated measures described in Section 6, exceedances of the water quality objectives would occur and that further mitigation would be required. The implementation of silt curtains have been proposed as the primary mitigation option. However, the application and effectiveness of silt curtains does depend on the aquatic conditions in which they are proposed and issues such as water depth and current speed can affect the viability and effectiveness of this measure, with speeds of about 0.5m/s generally being considered as allowing effective anchoring and use of silt curtains.
- D6-1.3 In order to assess the viability of the use of silt curtains as mitigation for the works sites, the flow velocities in the study area have been reviewed. The modelled flow patterns indicating the peak ebb and flood at 3 depth (surface, mid-depth and bottom) are presented in the vector plots in Annex A for each of the 3 scenario years, 2011, 2012 and 2013 (Figures 013 to 036 for each year). The location of the construction plant at those times is, also, indicated. Review of the plots shows that the flows over most of the site area, where the HKBCF, TM-CLKL southern landfall and HKLR reclamation will be constructed, are, in general, below 0.5m/s and, therefore, suitable for silt curtain deployment.
- D6-1.4 However, at the northern end of the HKBCF/TM-CLKL southern landfall works (Phase 2 of the HKBCF work), the site will be influenced by the higher east-west flows which are typically between 1-2m/s. As such, in this area, silt curtain would unlikely be effective unless additional measures to protect against the flow are deployed. Therefore, to protect against the higher flows and allow the use of the silt curtain for the Phase 2 HKBCF works, a steel sheet piled wall is proposed to reduce the flow to ensure the effectiveness of the silt curtain system.
- D6-1.5 At the TM-CLKL northern landfall works site, the southern section of the reclamation falls within areas of higher flows (again, typically 1-2m/s) and, in addition, the water depths in this area are high at over 10m and as such, the deployment of silt curtains is deemed not feasible for portions N-C and N-B of the landfall. However, in the shallow and low speed waters close to the coastline when portion N-A of the northern landfall is being constructed, a silt curtain would be able to be used.
- D6-1.6 Based upon the review, it was concluded that silt curtains could be deployed in the majority of the works site for the protection of the marine environment. Further details on the proposed silt curtain arrangement and suitability are provided below.

## **D6-2 SILT CURTAINS ARRANGEMENT**

D6-2.1 As discussed above, in order to minimise the water quality impacts during the construction stage, deployment of silt curtains has been proposed and the following systems have been recommended:

- Frame type silt curtain to fully enclose the working area of each grab dredger while carrying out the dredging works; and
- Silt curtain (single layer or double layer) around or adjacent to the site while the dredging works and filling works are in progress.

D6-2.2 Both systems are applied for the HKBCF, TM-CLKL southern landfall and HKLR reclamations while only the latter is applicable for Portion N-A of the TM-CLKL northern landfall reclamation. Indicative layouts of the proposed silt curtain arrangements are provided in Annex B, see Figures No. 25308/041/301 to 308 for HKBCF, TM-CLKL southern landfall and HKLR and Figure 9a for the TM-CLKL northern landfall reclamation.

D6-2.3 As the first measure, the frame type silt curtain is designed to enclose local pollution caused by the grab dredger. This frame type silt curtain is made by a steel frame with floating buoy fixed on the top frame such that it is floating on water. A silt curtain membrane (see attached catalogue in Annex C) or similar product is mounted on the four sides of the steel frame and ballast attached to the bottom of silt curtain extending from the seabed to the seawater level so as to cover the entire water column. The dredging works by the grab dredger would then be carried out within the frame type silt curtain. The position of this frame type silt curtain would be maintained by a chain fixed between the frame structure of silt curtain and the dredger. Details of this frame type silt curtain are shown in Figure No. 25308/041/308 in Annex B.

D6-2.4 Apart from the frame type silt curtain, deployment of silt curtain (single layer or double layer) around the site is recommended. The indicative layout of silt curtains for HKBCF, TM-CLKL southern landfall and HKLR at different stages of the construction process are shown in Figures No. 25308/041/301 to 306 in Annex B and the curtain proposed during the construction of Portion N-A of the TM-CLKL northern landfall shown in Figure 9a of Annex B. The silt curtains would basically consist of a curtain membrane made by synthetic textile (see Annex C) or similar product, a float system that hangs the curtain in the water, and a weight at the bottom of curtain to fix it at the seabed. Sufficient length of the curtain membrane will be allowed such that there is an amount of slack for the extension of the silt curtain due to wave and tidal effects.

D6-2.5 While the modelling results have indicated that single silt curtain would be effective, the proposed system would also allow for the application of a double layer of curtain should additional mitigation be required. If a double layer silt curtain is used, a second layer of silt curtain would be placed next to the first layer curtain with a separation distance of about 10m. As the water depth at the HKBCF/TM-CLKL southern landfall is about 4m to 10m and at the HKLR is about 3m to 4m, the vertical length of silt curtain would not be too long and, therefore, the separation distance of 10m between the two layers of silt curtain is

considered to be adequate, even allowing for the relative movement of the curtains under the tidal and wave actions. As a further measure, installation of silt curtains at specific sensitive receivers such as the seawater intakes could also be considered to mitigate the water quality impact if necessary.

- D6-2.6 The silt curtain should allow access of vessels that enter into or exit from the reclamation area. This could be achieved by the opening formed by two piece of silt curtain with overlapping length of 150m min and a separation distance of about 60m to allow the passage of vessels. The indicative position and details of the above openings are shown in Annex B. Local adjustment of the position of these openings is expected during construction stage to suit the actual site condition and the Contractor's working method.
- D6-2.7 The silt curtain is suitable for use in the site condition where the current velocity of 0.5m/s or less. However, as noted above, the velocity of currents near the northern edge of reclamation site for HKBCF Phase 2 is higher due to its exposure to the area of main flows. In order to enable the deployment of silt curtain to mitigate the water quality impact due to the reclamation activities in HKBCF Phase 2, a sheet pile wall is proposed to protect the silt curtain along the northern edge of the reclamation as shown in Annex B. With the implementation of the sheet piled wall, the silt curtain will not be subject to the influences of the strong currents and can be used. A separate distance of 5m between the silt curtain and sheet pile wall is allowed in this case (see Section 2-2 in figure No. 25308/041/307 in Annex B).
- D6-2.8 Yellow marker buoys fitted with yellow flashing lights will be laid along the top surface of the silt curtains at a spacing of about 50m to mark the extent of the silt curtain. As the silt curtain will not be installed in the navigation channel and the flashing lights of the marker buoys of silt curtain will be small in size, it is not considered that there would be significant impacts to the marine traffic and aviation due to the installation of silt curtain.

### **D6-3 LOSS REDUCTION ASSUMPTIONS**

- D6-3.1 The assumed effectiveness of the cage type silt curtain for grab dredgers and the single layer of silt curtains proposed are presented in **Table D6-1** below, together with the loss reductions that could be assumed for an additional layer of silt curtain if this was considered.

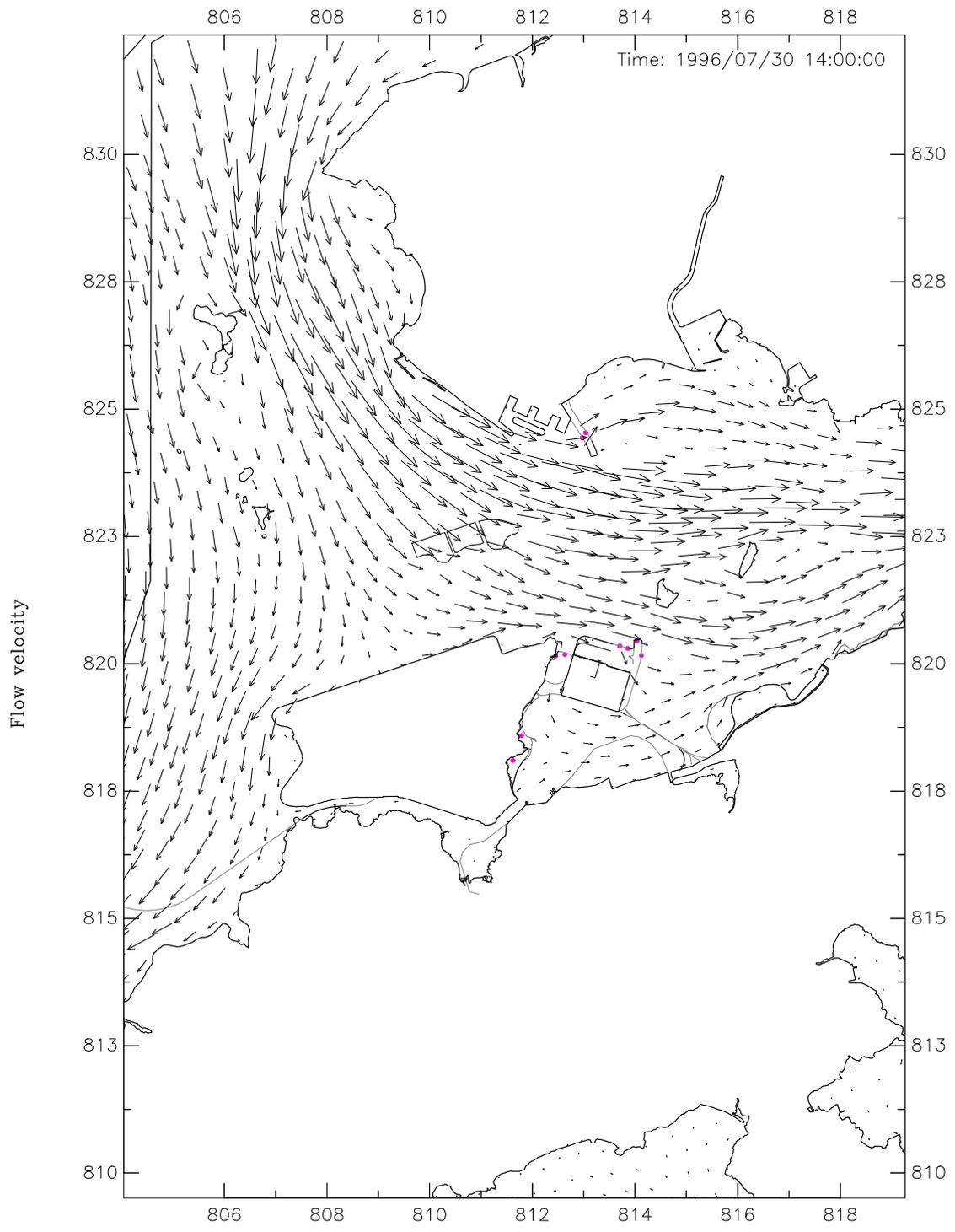
**Table D6-1 Summary Table of Loss Reductions from Silt Curtain Configurations**

Silt Curtain Type	Loss Reduction Factor	Remark
<b><i>Dredging Activities</i></b>		
Cage type for Grab Dredger (1)	80%	Typical, also reviewed in LNG Terminal EIA
Floating Single Silt Curtain (2)	75%	Manufactures Brochure
Second layer of Floating Silt Curtain (3)	50%	LNG Terminal EIA
<b><i>Combined Reduction (1+2)</i></b>	95%	For grab dredger only
<b><i>Combined Reduction (1+2+3)</i></b>	97%	For grab dredger only
<b><i>Combined Reduction (2+3)</i></b>	87%	
<b><i>Filling Activities</i></b>		
Floating Single Silt Curtain (4)	45%	
Second layer of Floating Silt Curtain (5)	30%	Proportional scaling following the reduction for dredging
<b><i>Combined Reduction (4+5)</i></b>	61%	

D6-3.2 The calculated reduction in sediment losses for these mitigation options are summarised in **Table D6-2** below.

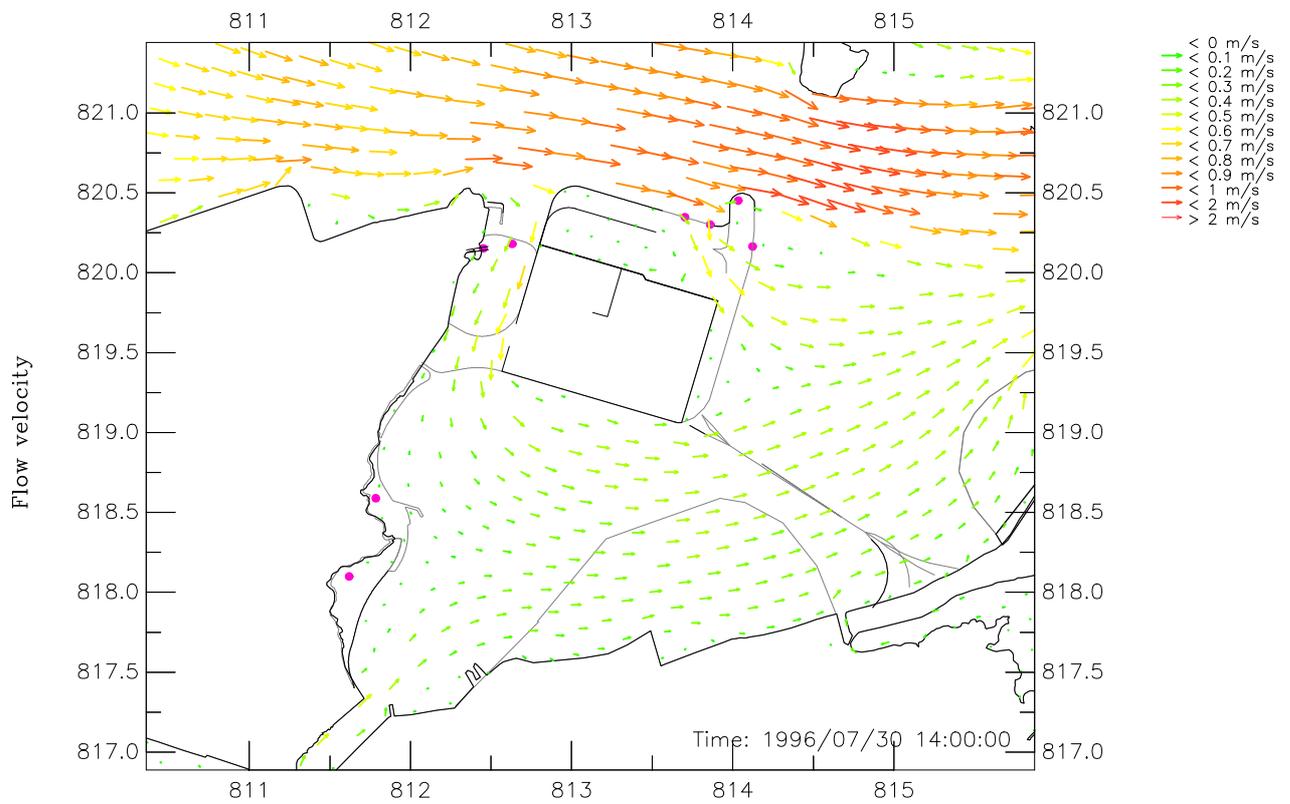
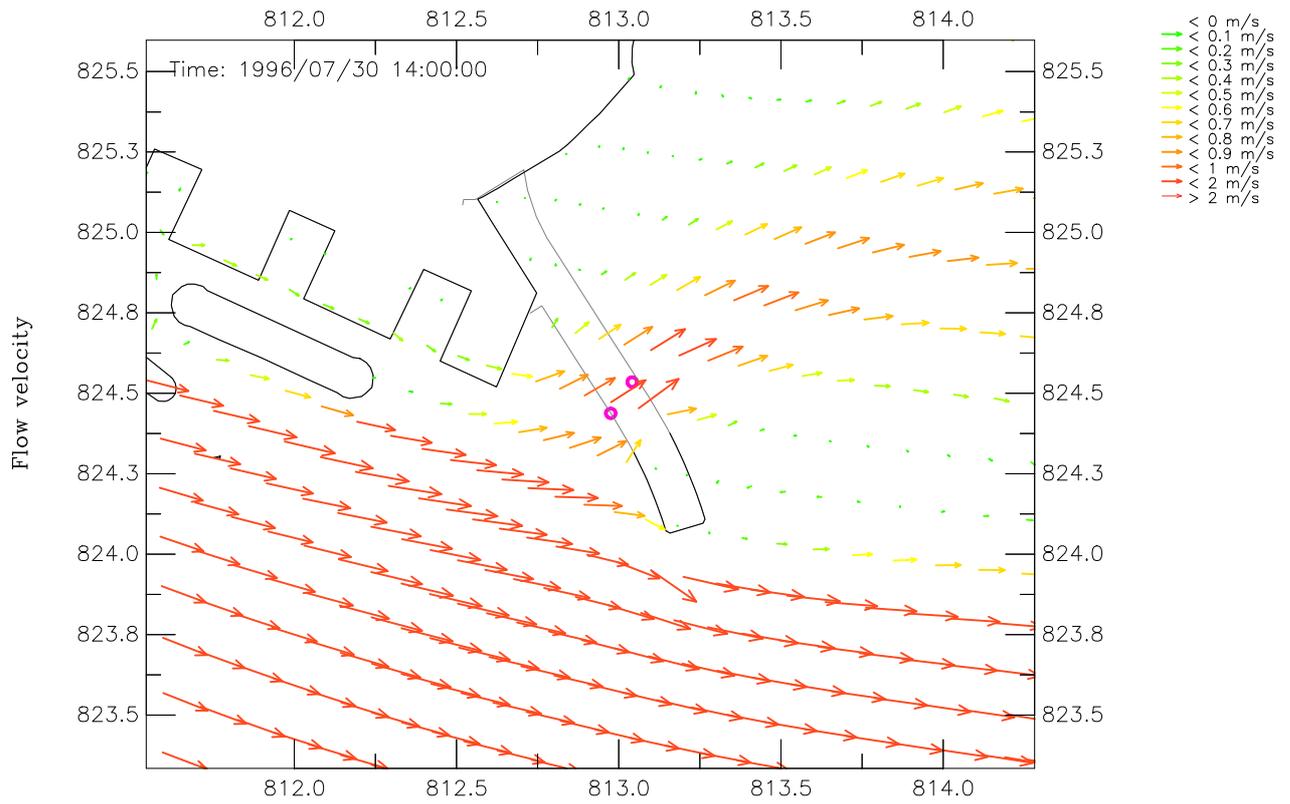
**Table D6-2 Summary of Daily Losses With and Without Silt Curtain Deployment**

Option	Silt Curtain	Public Fill for Seawall	2011 Loss (kg/day)	2012 Loss (kg/day)	2013 Loss (kg/day)	Remark
0	0	30%	4,394,000	2,008,000	1,705,000	Base case
1	1+1	30%	1,220,000	672,000	577,000	Single layer of silt curtain. Always cage for grab dredger. TM-CLKL, no silt curtain for northern reclamation except FN4
2	2+1	30%	844,000	541,000	406,000	Double layers of silt curtain. Always cage for grab dredger. TM-CLKL, no silt curtain for northern reclamation except FN4



Year 2012  
 Dry Season Velocity Vector Plot at Ebb Tide – Surface Layer

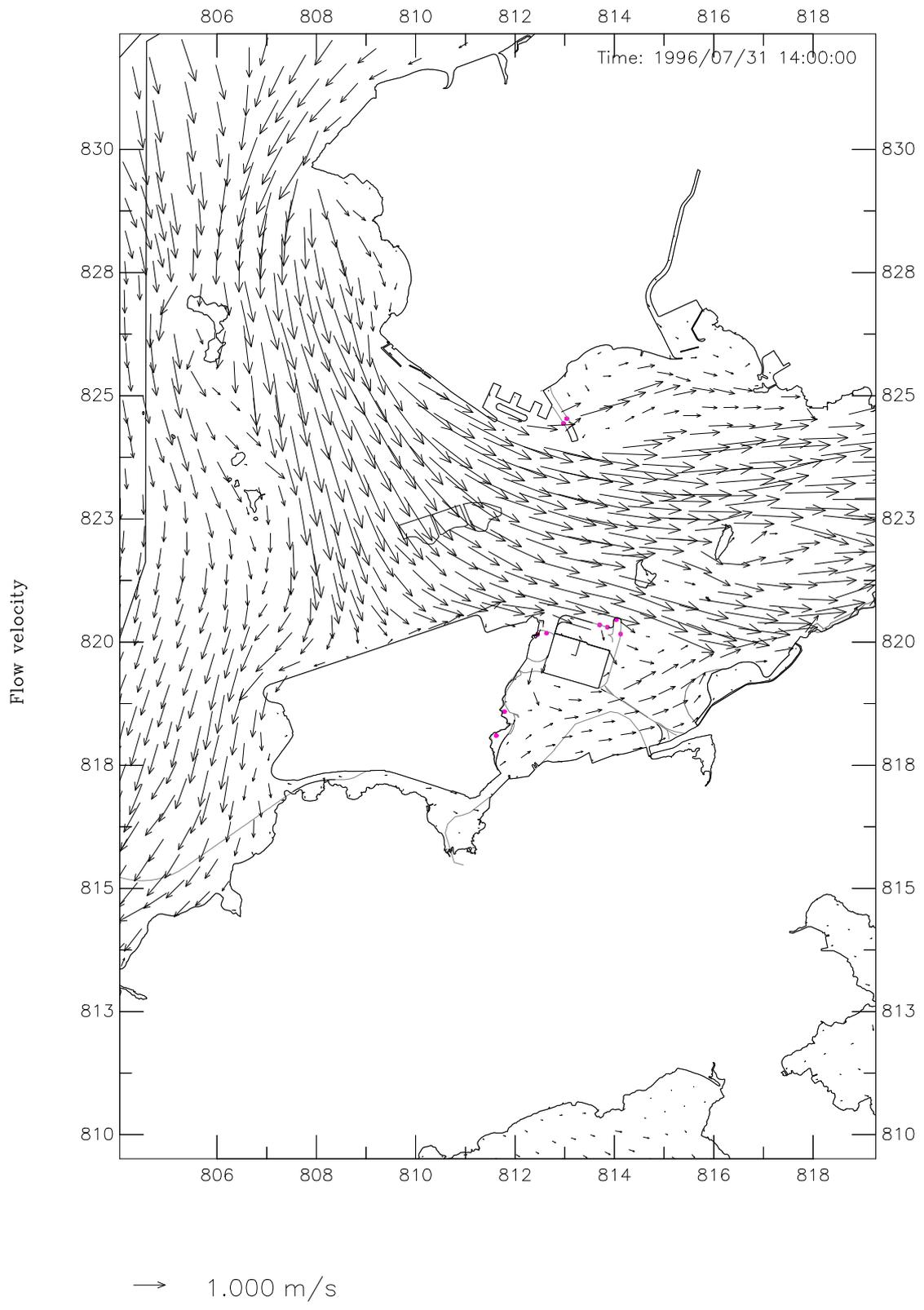
Apr 2009  
 Figure 013



Year 2012  
 Dry Season Velocity Vector Plot at Ebb Tide – Surface Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

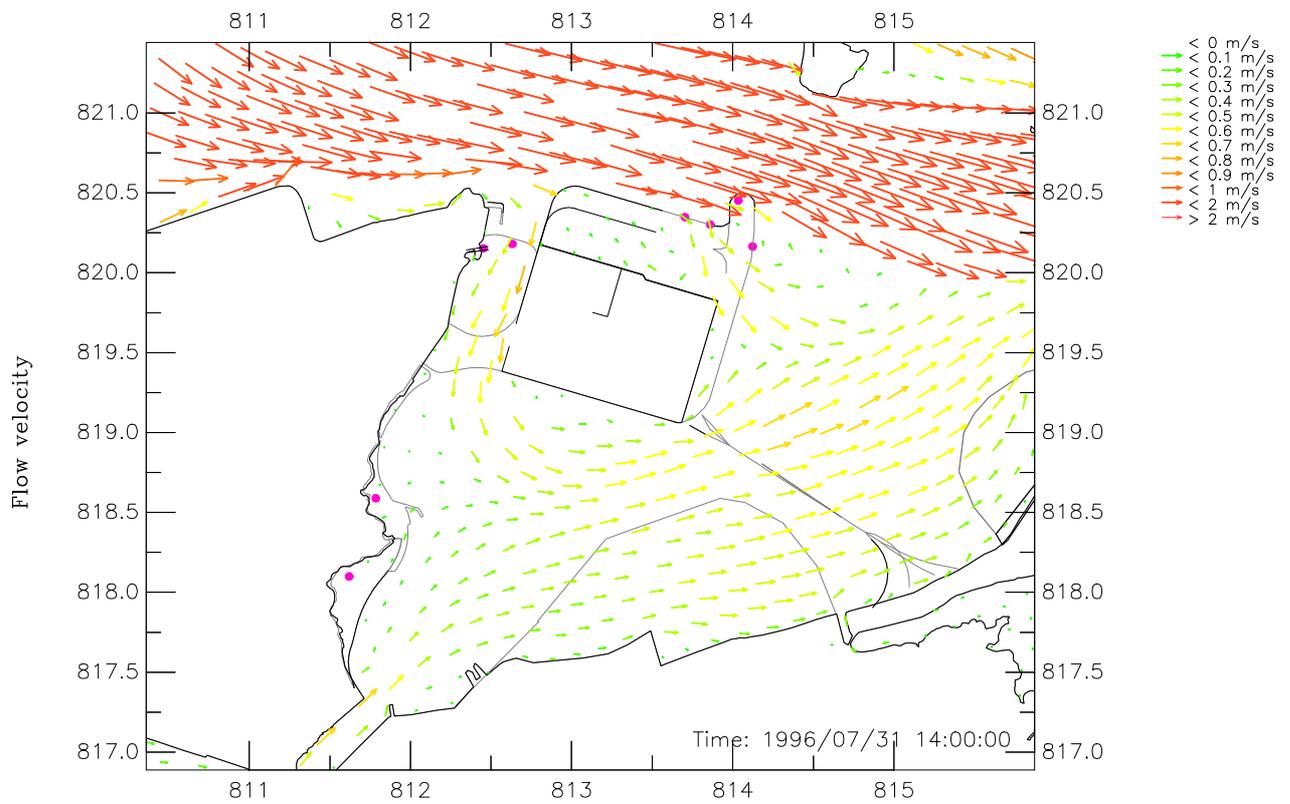
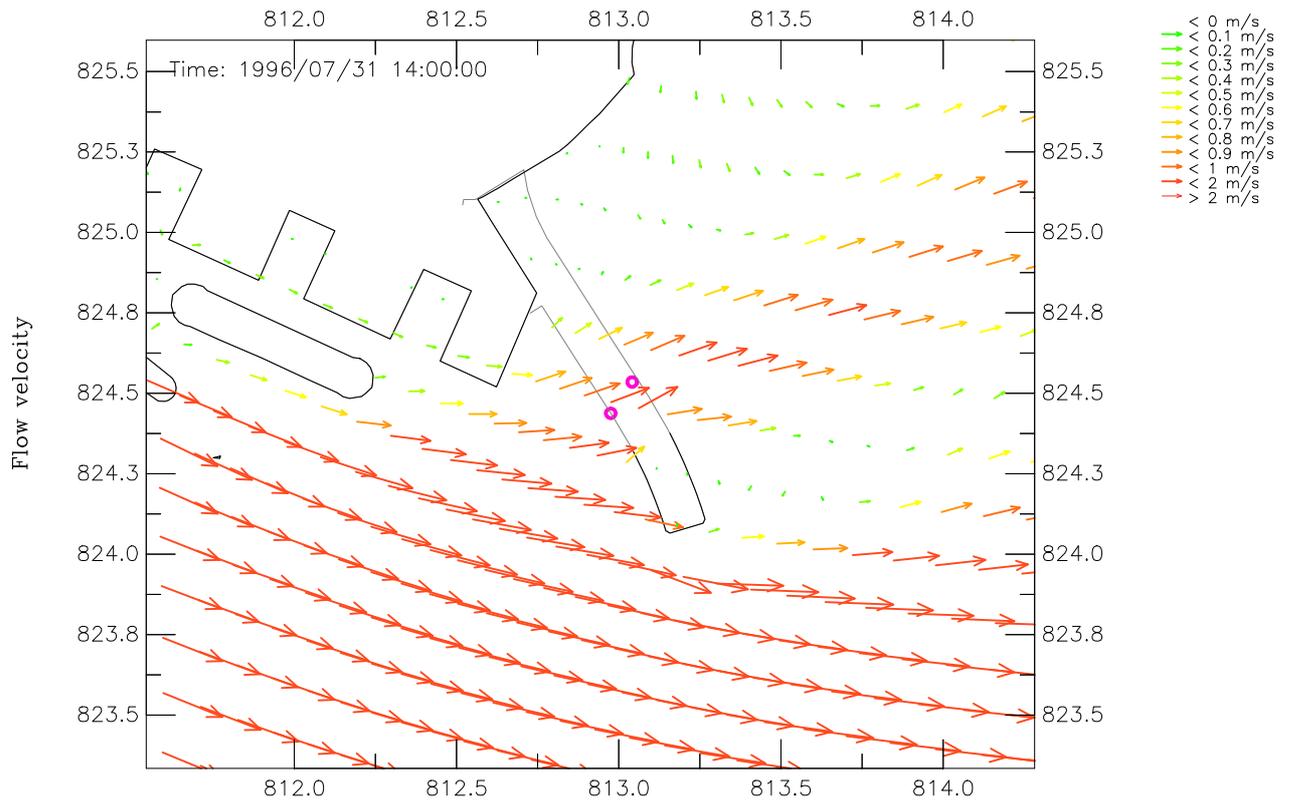
Apr 2009

Figure 014



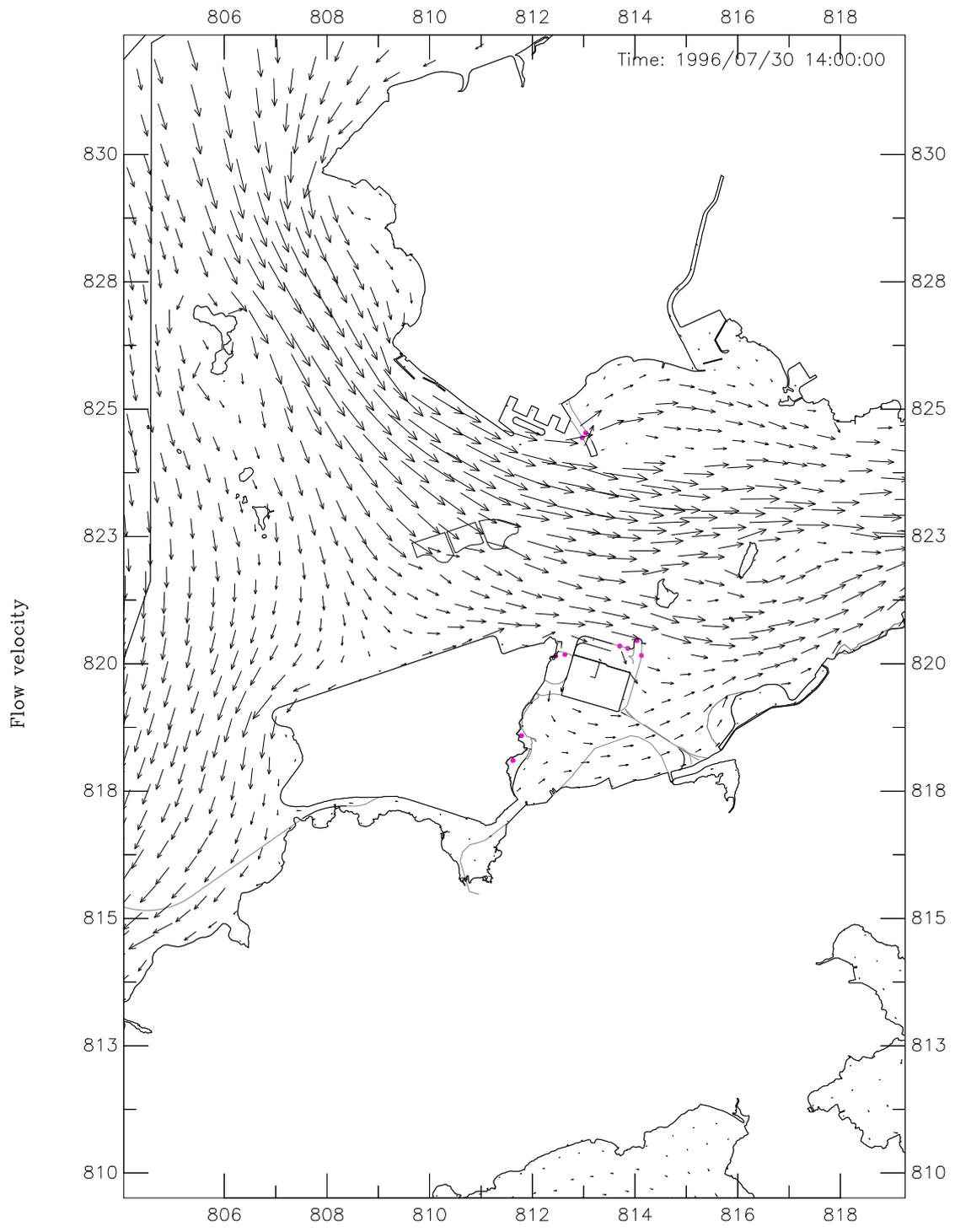
Year 2012  
 Wet Season Velocity Vector Plot at Ebb Tide – Surface Layer

Apr 2009  
 Figure 015



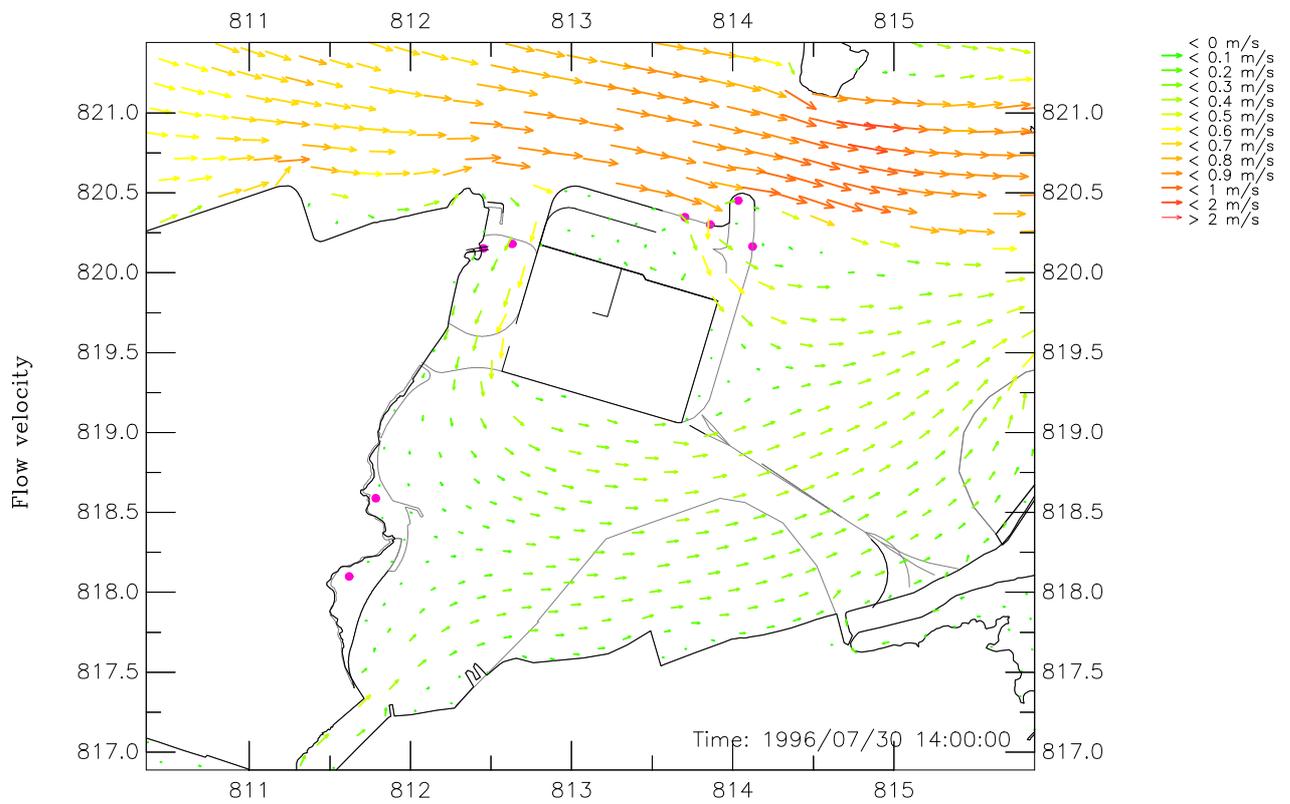
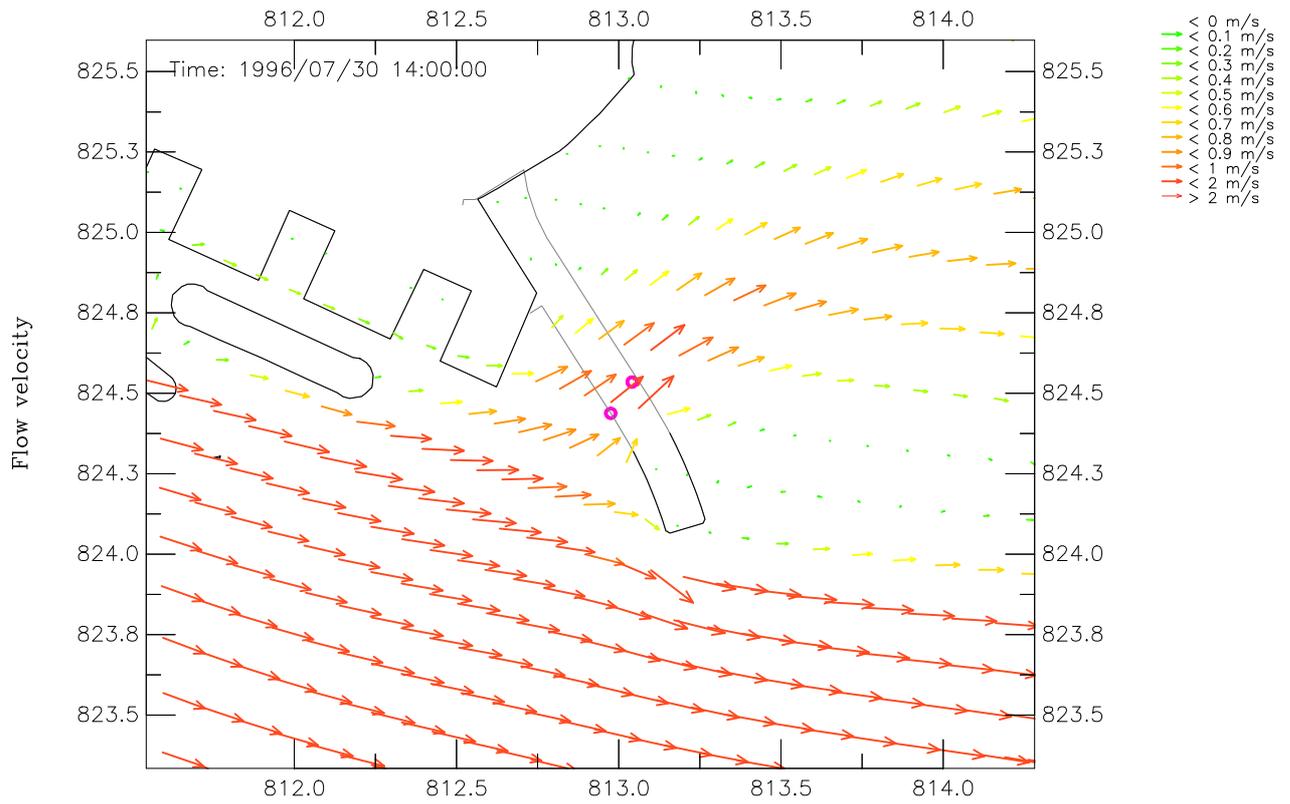
Year 2012  
 Wet Season Velocity Vector Plot at Ebb Tide – Surface Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

Apr 2009 Figure 016



Year 2012  
 Dry Season Velocity Vector Plot at Ebb Tide – Mid-Depth

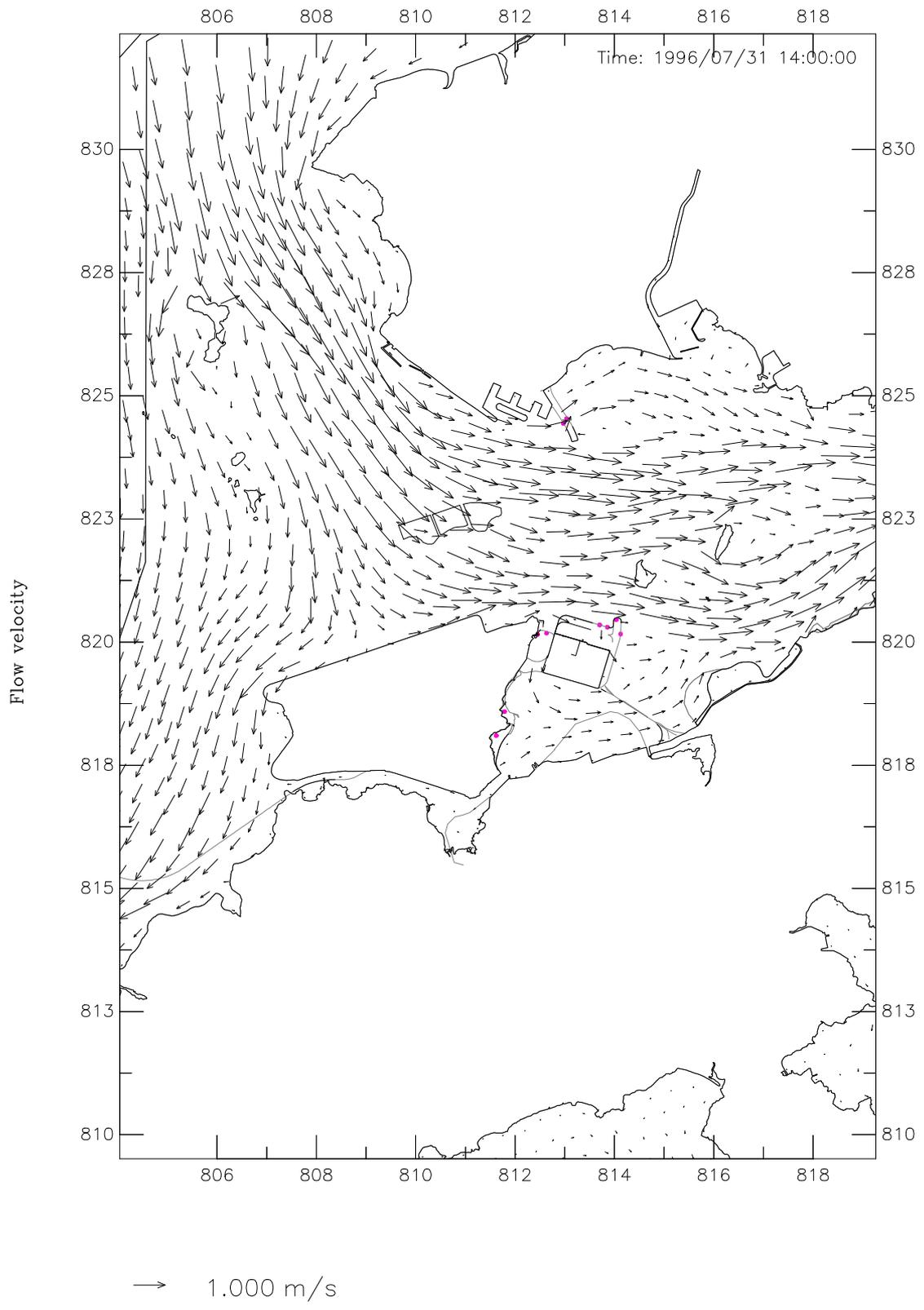
Apr 2009  
 Figure 017



Year 2012  
 Dry Season Velocity Vector Plot at Ebb Tide – Mid-Depth  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

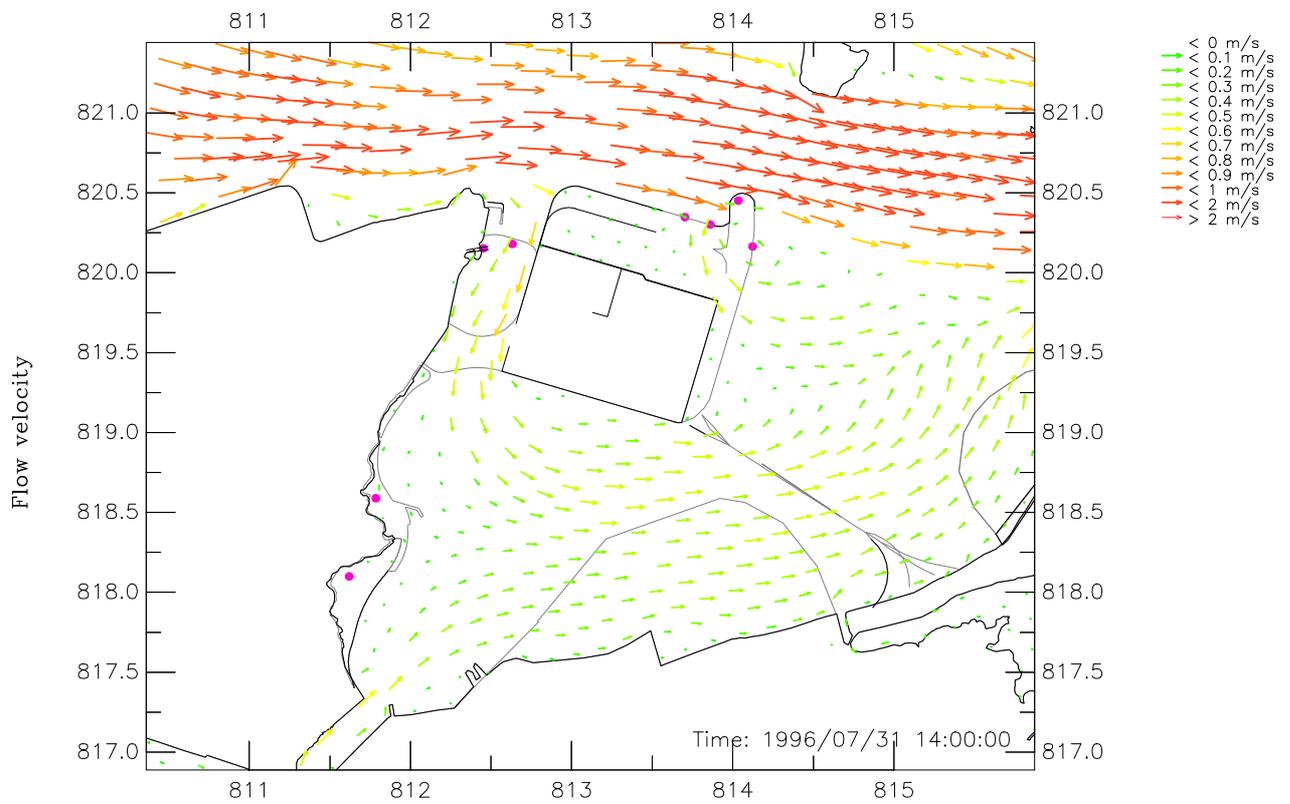
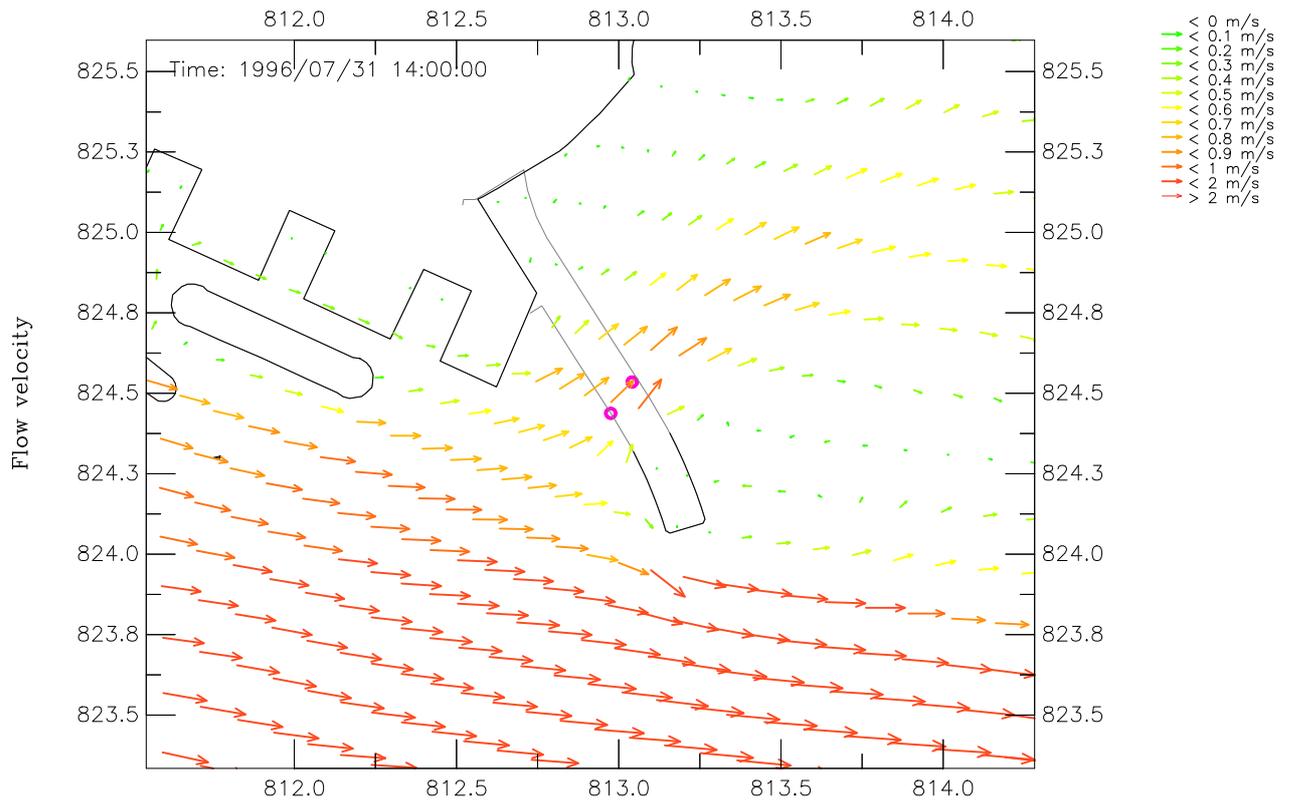
Apr 2009

Figure 018



Year 2012  
 Wet Season Velocity Vector Plot at Ebb Tide – Mid-Depth

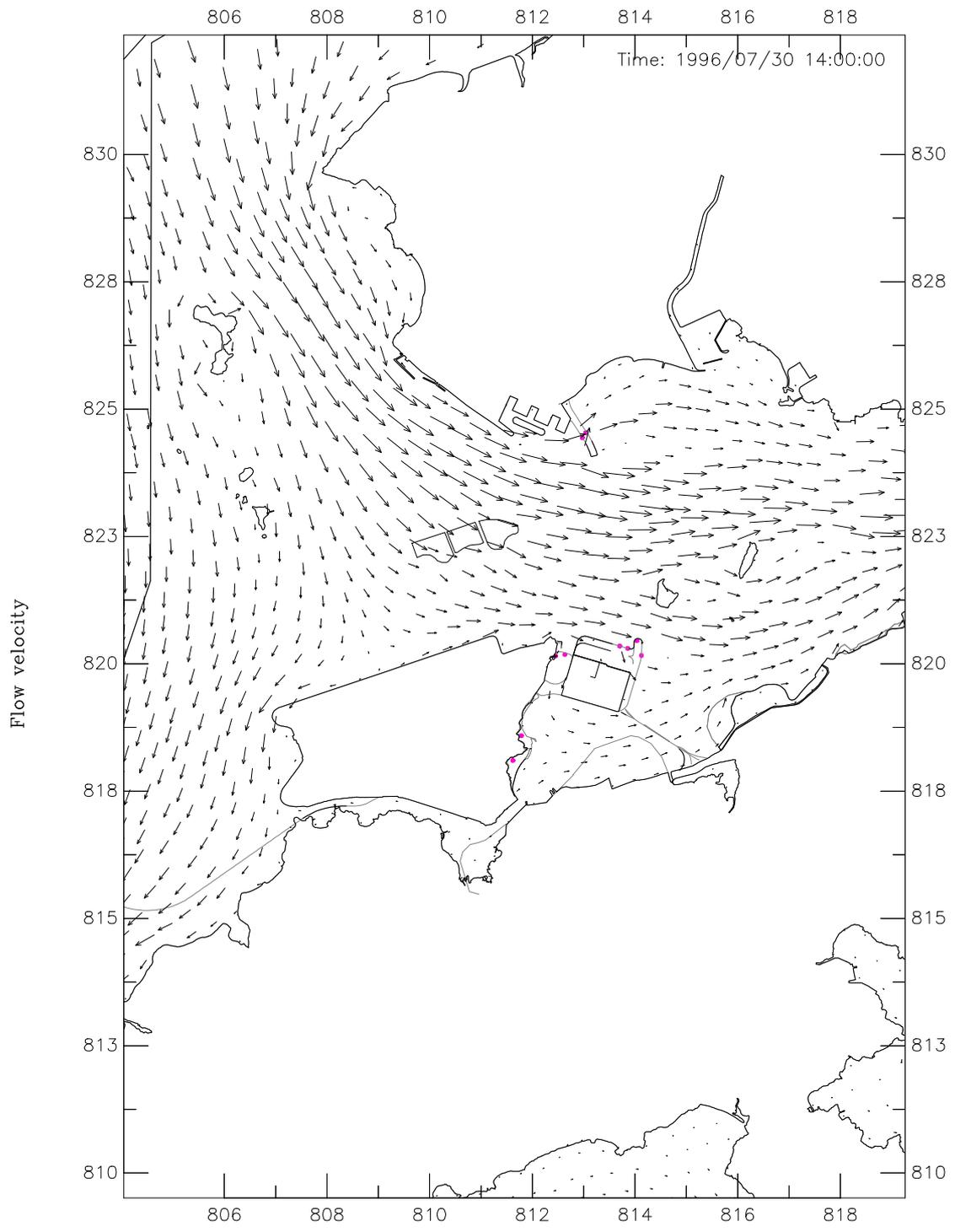
Apr 2009      Figure 019



Year 2012  
 Wet Season Velocity Vector Plot at Ebb Tide – Mid-Depth  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

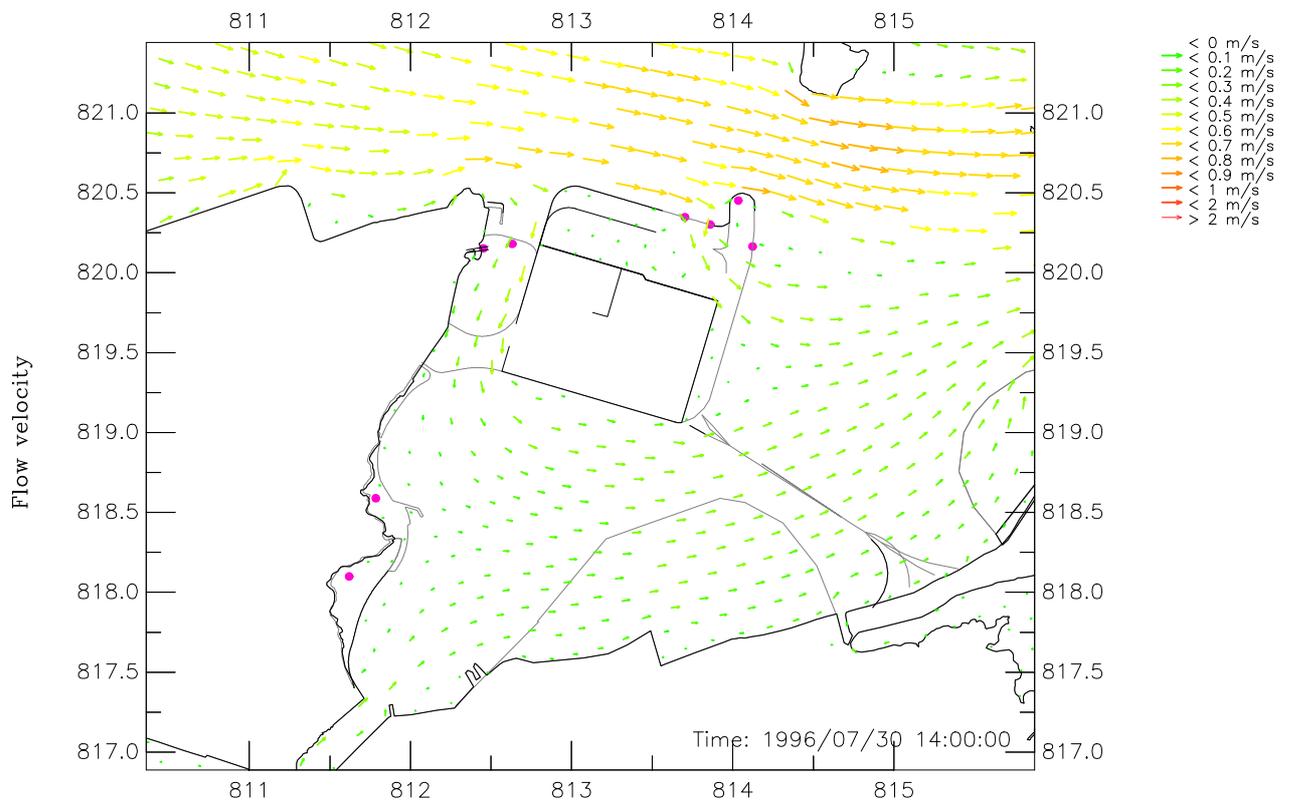
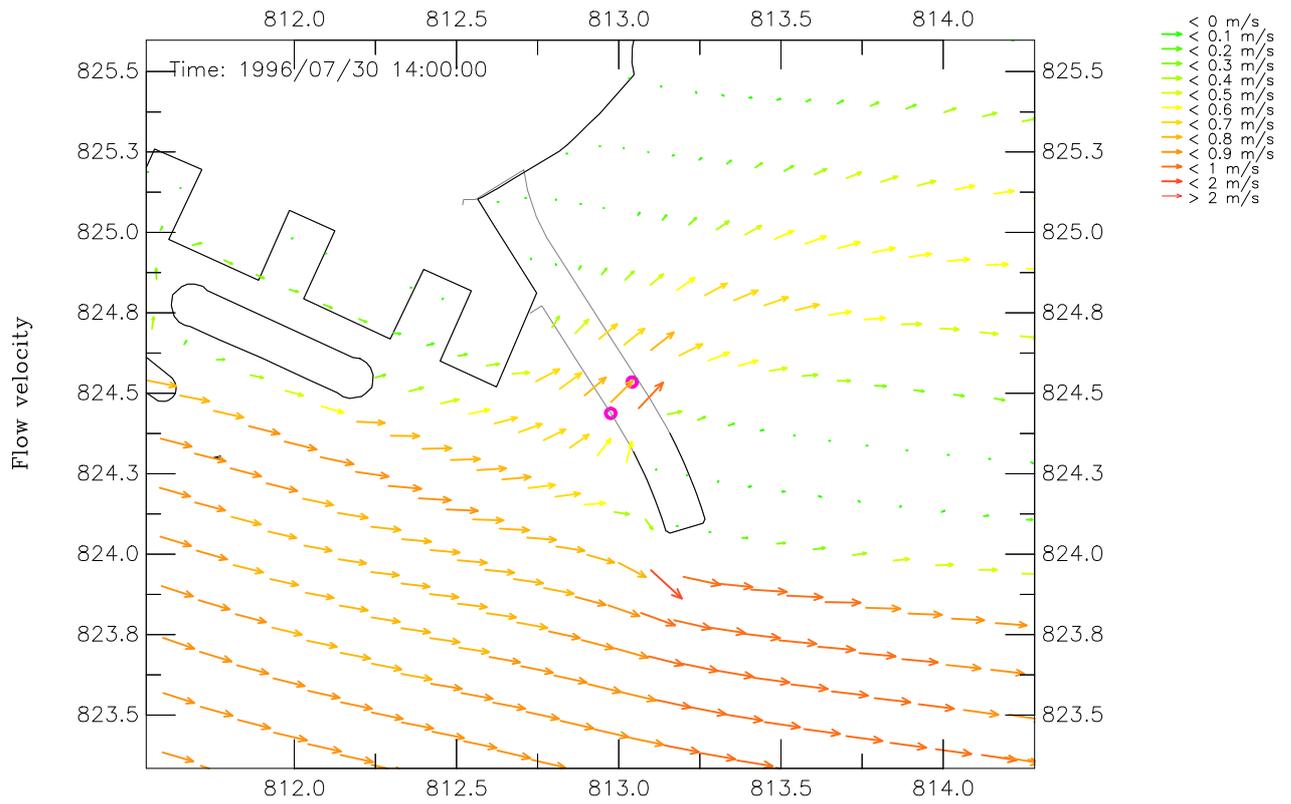
Apr 2009

Figure 020



Year 2012  
 Dry Season Velocity Vector Plot at Ebb Tide – Bottom Layer

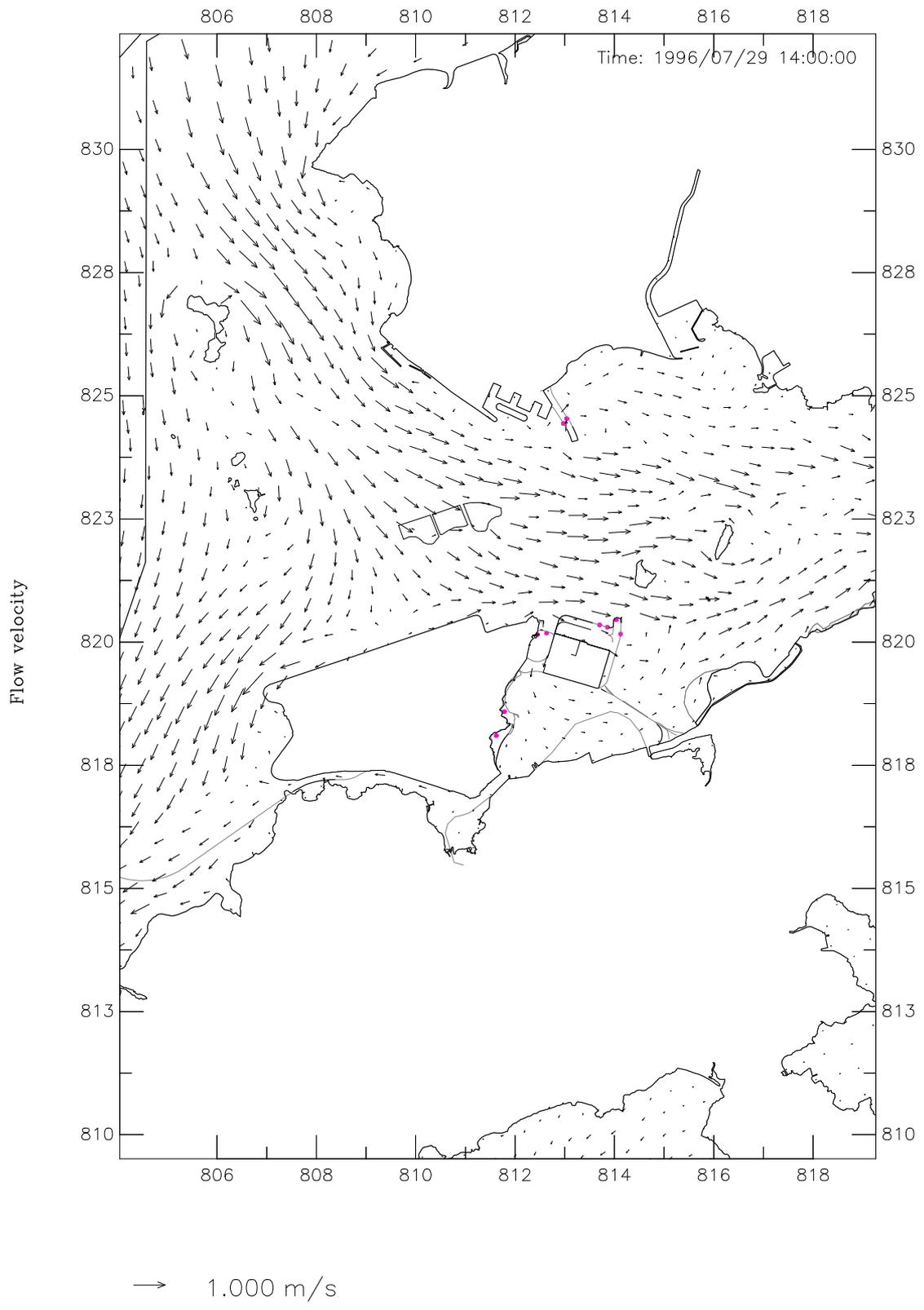
Apr 2009  
 Figure 021



Year 2012  
 Dry Season Velocity Vector Plot at Ebb Tide – Bottom Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

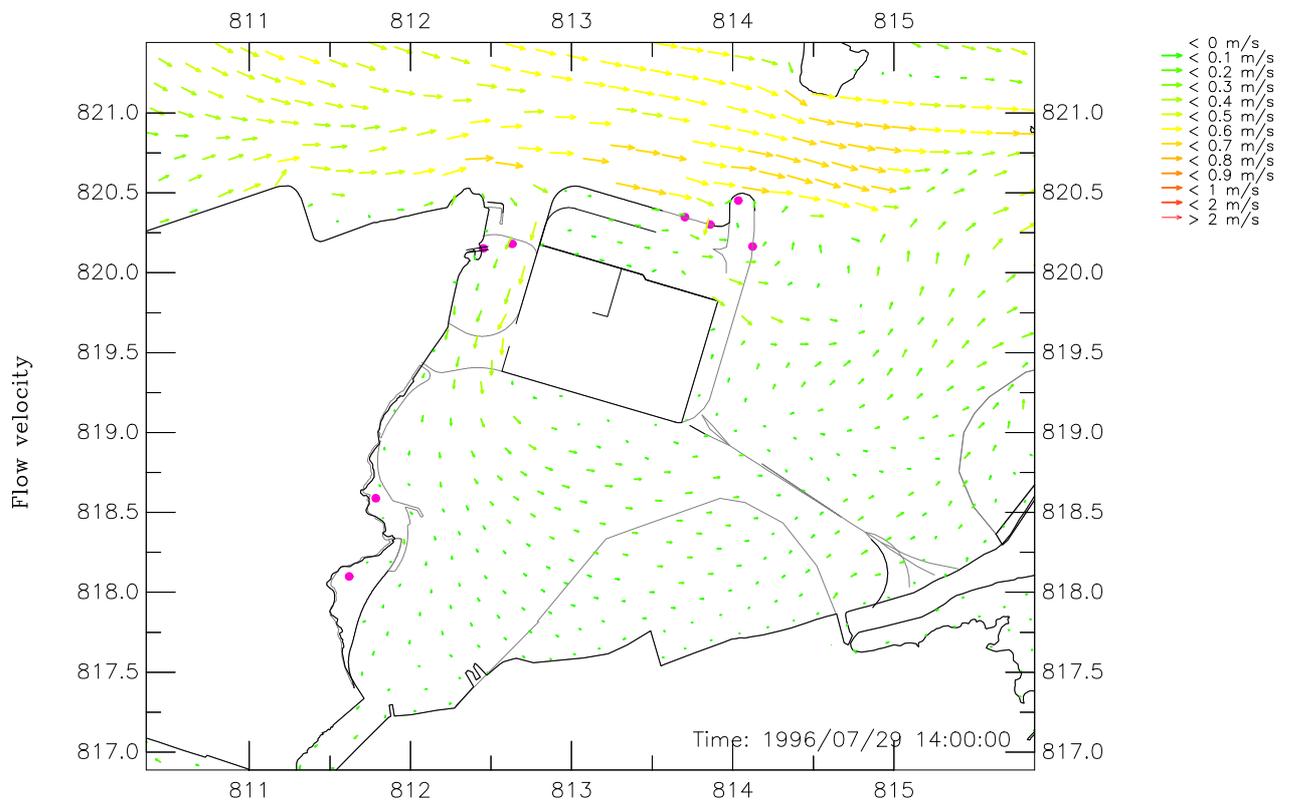
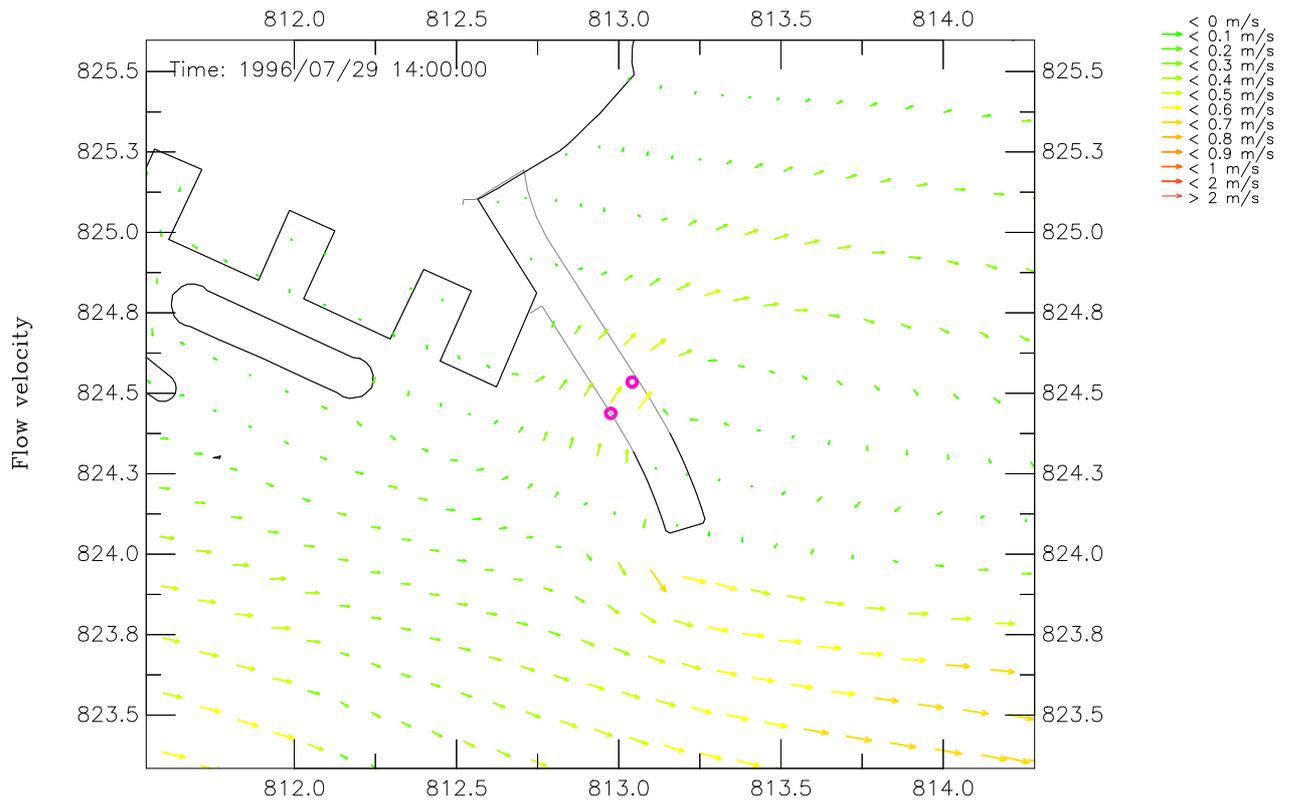
Apr 2009

Figure 022



Year 2012  
 Wet Season Velocity Vector Plot at Ebb Tide – Bottom Layer

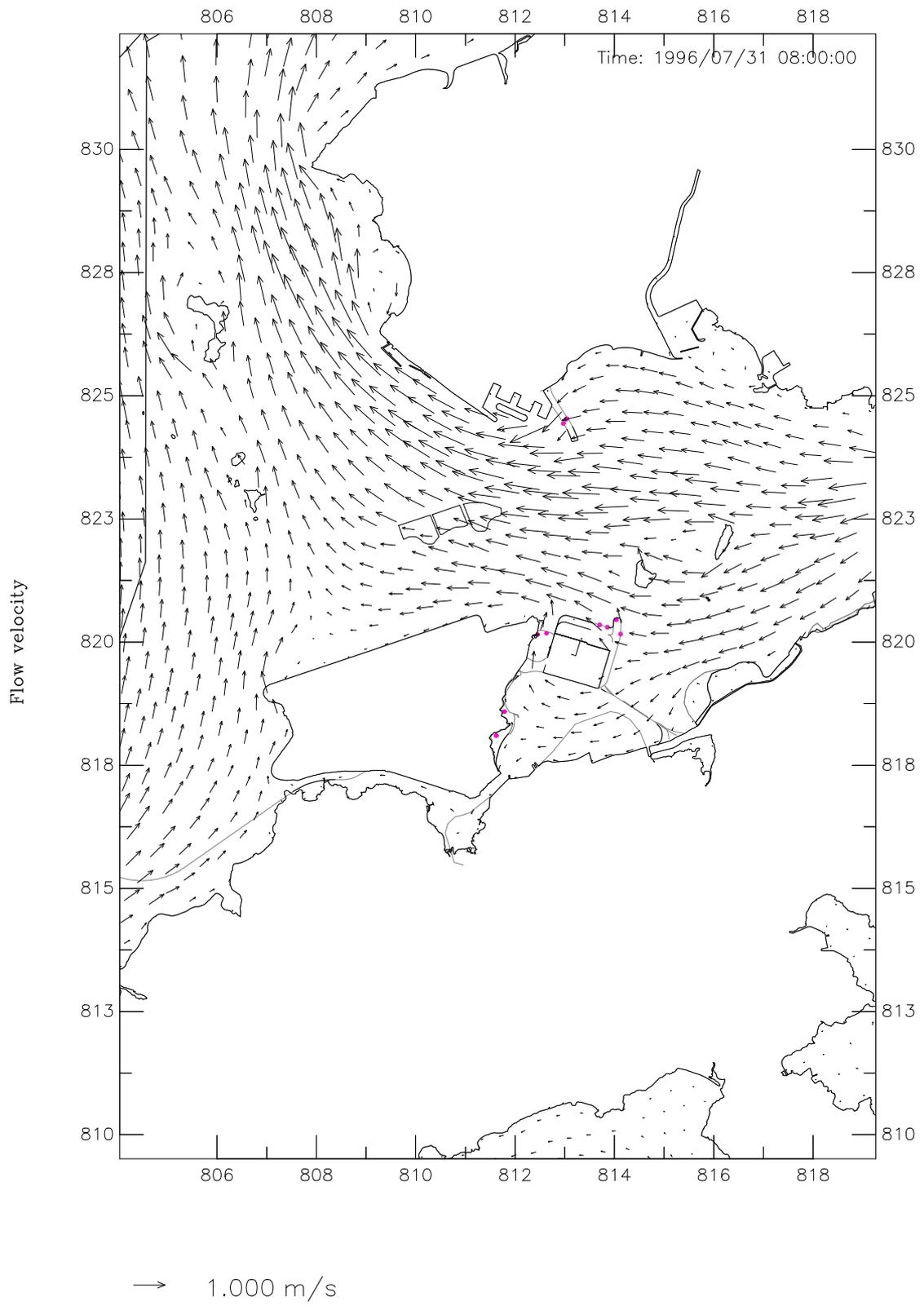
Apr 2009  
 Figure 023



Year 2012  
 Wet Season Velocity Vector Plot at Ebb Tide – Bottom Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

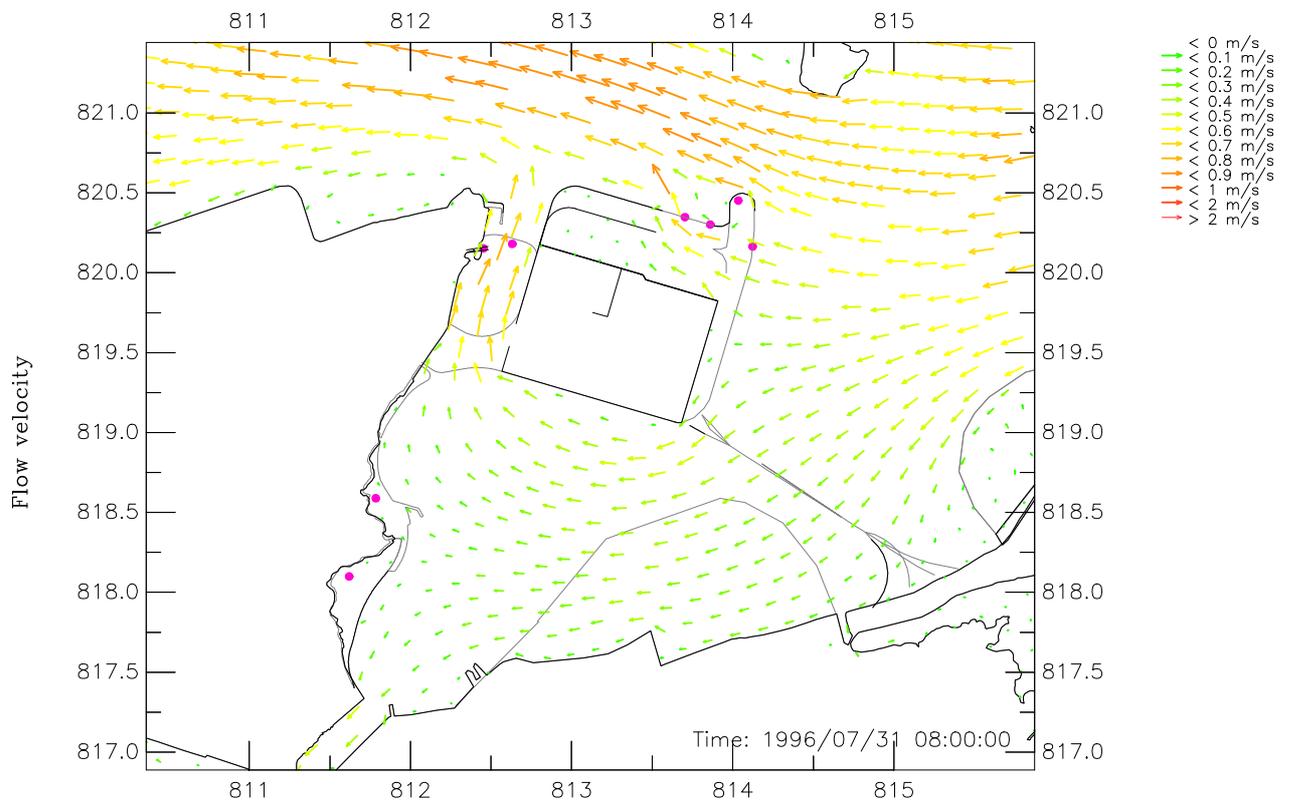
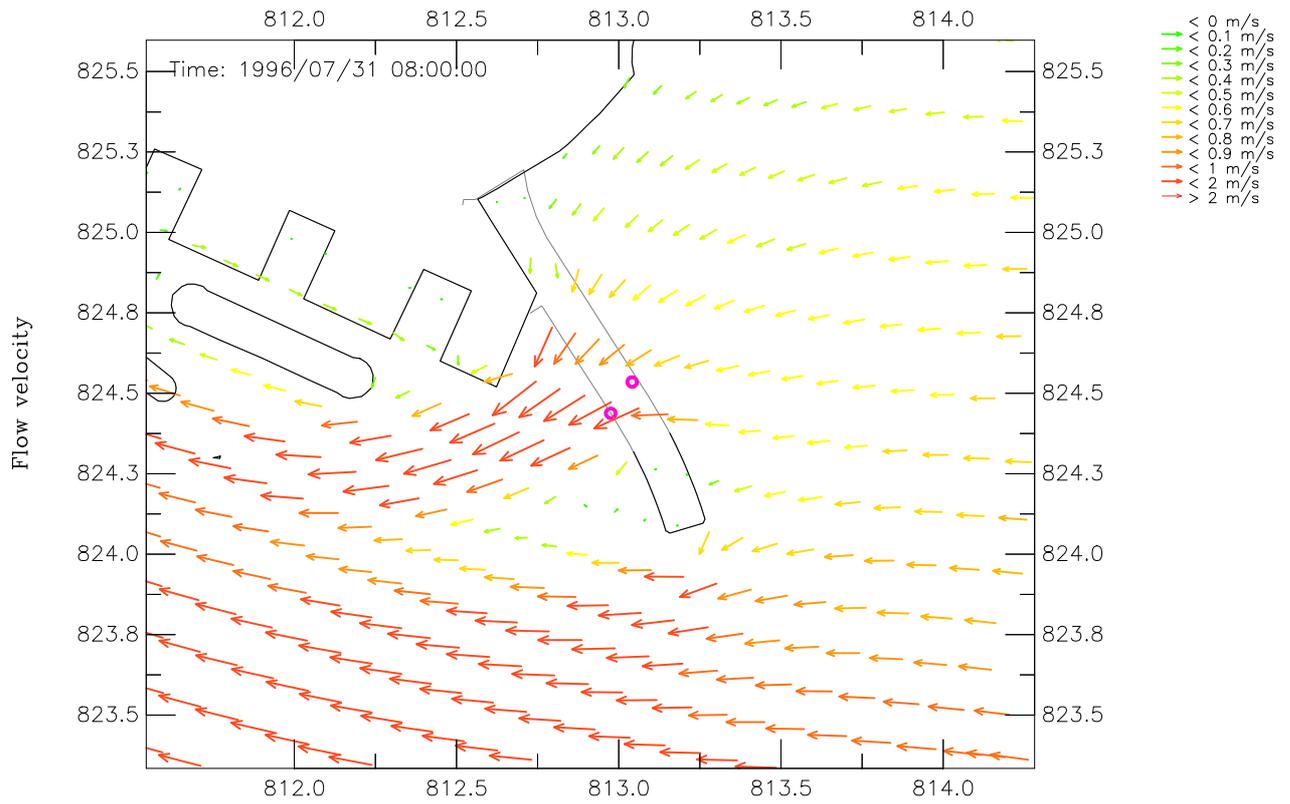
Apr 2009

Figure 024



Year 2012  
 Dry Season Velocity Vector Plot at Flood Tide – Surface Layer

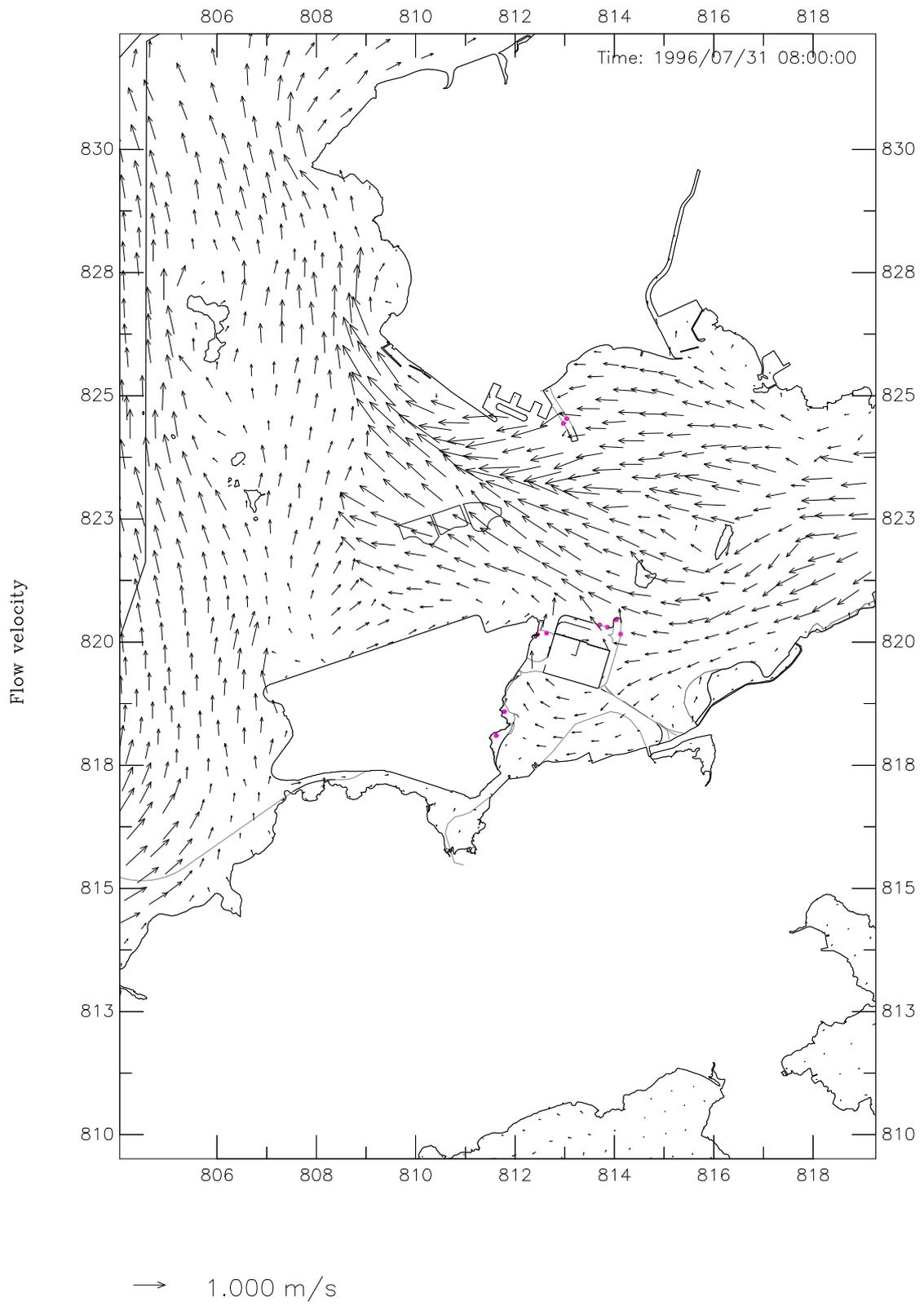
Apr 2009      Figure 025



Year 2012  
 Dry Season Velocity Vector Plot at Flood Tide – Surface Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

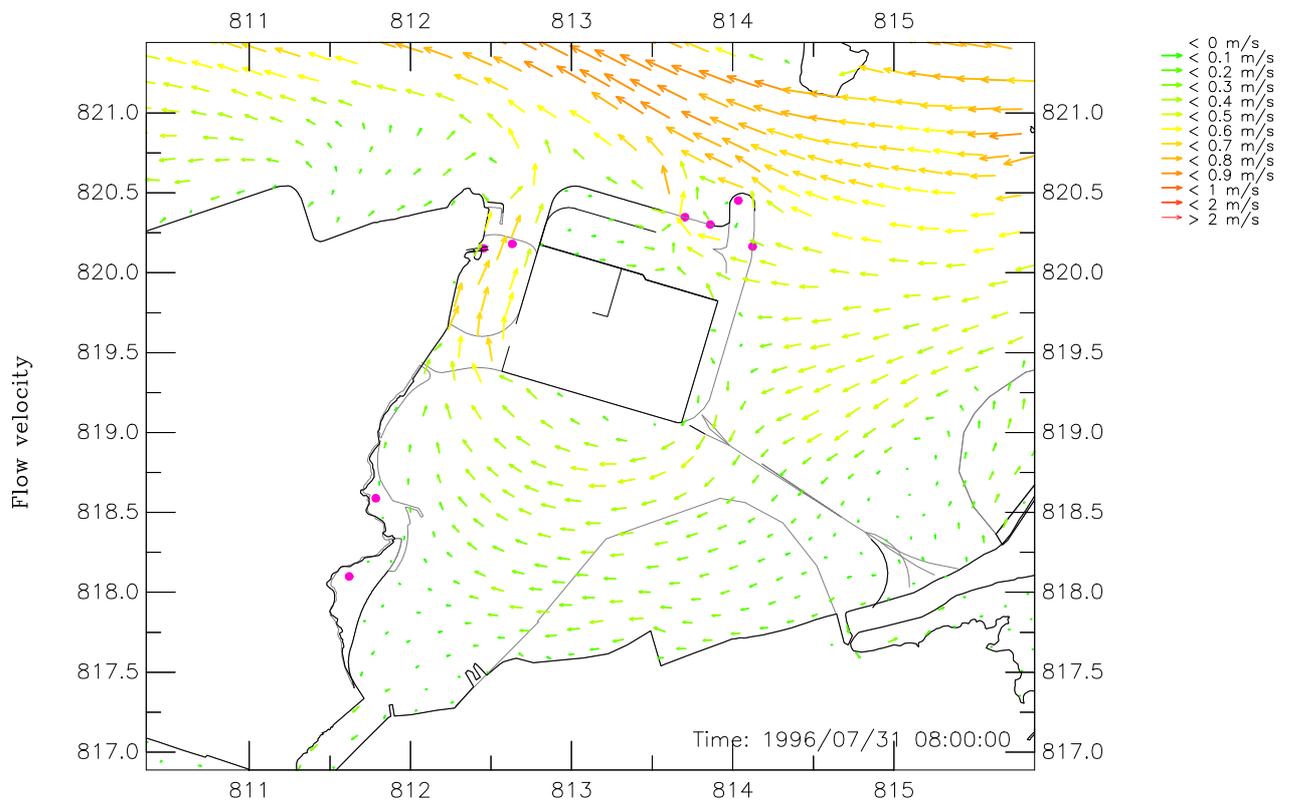
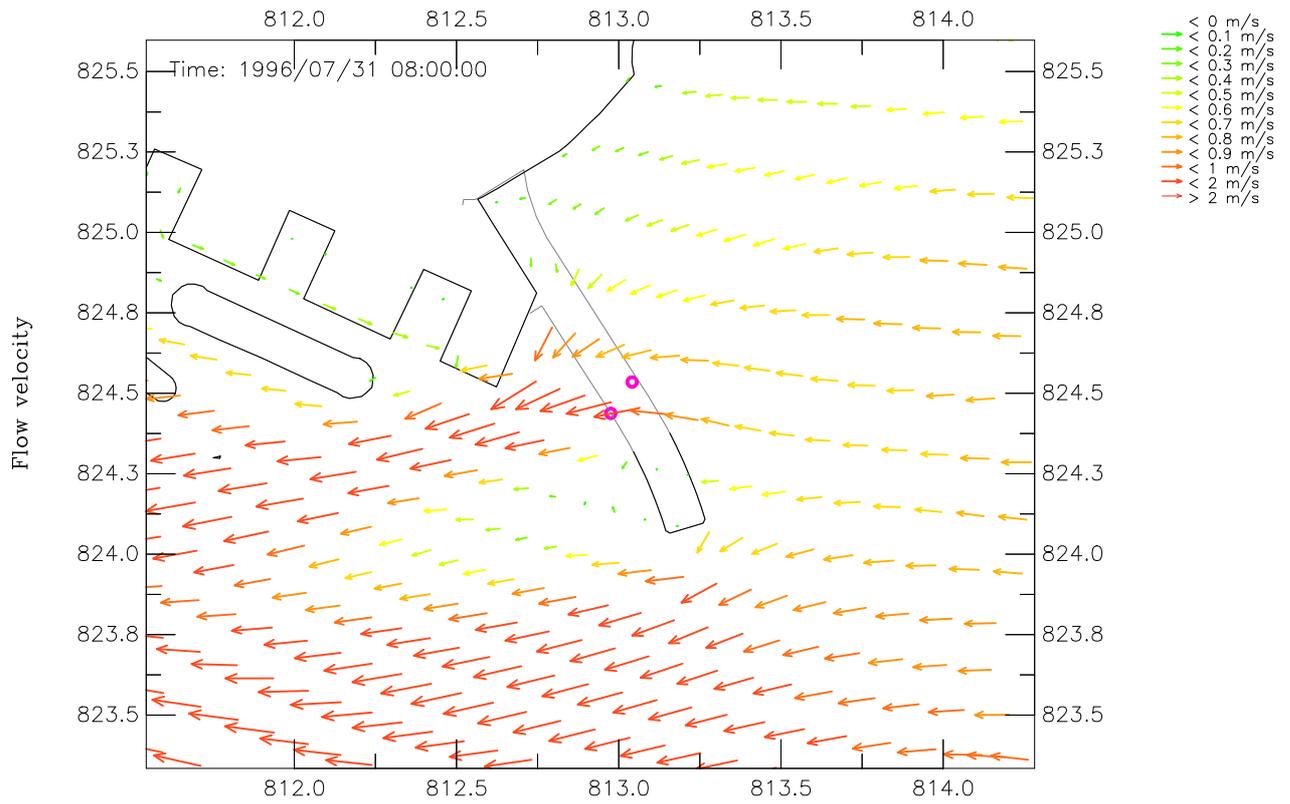
Apr 2009

Figure 026



Year 2012  
 Wet Season Velocity Vector Plot at Flood Tide – Surface Layer

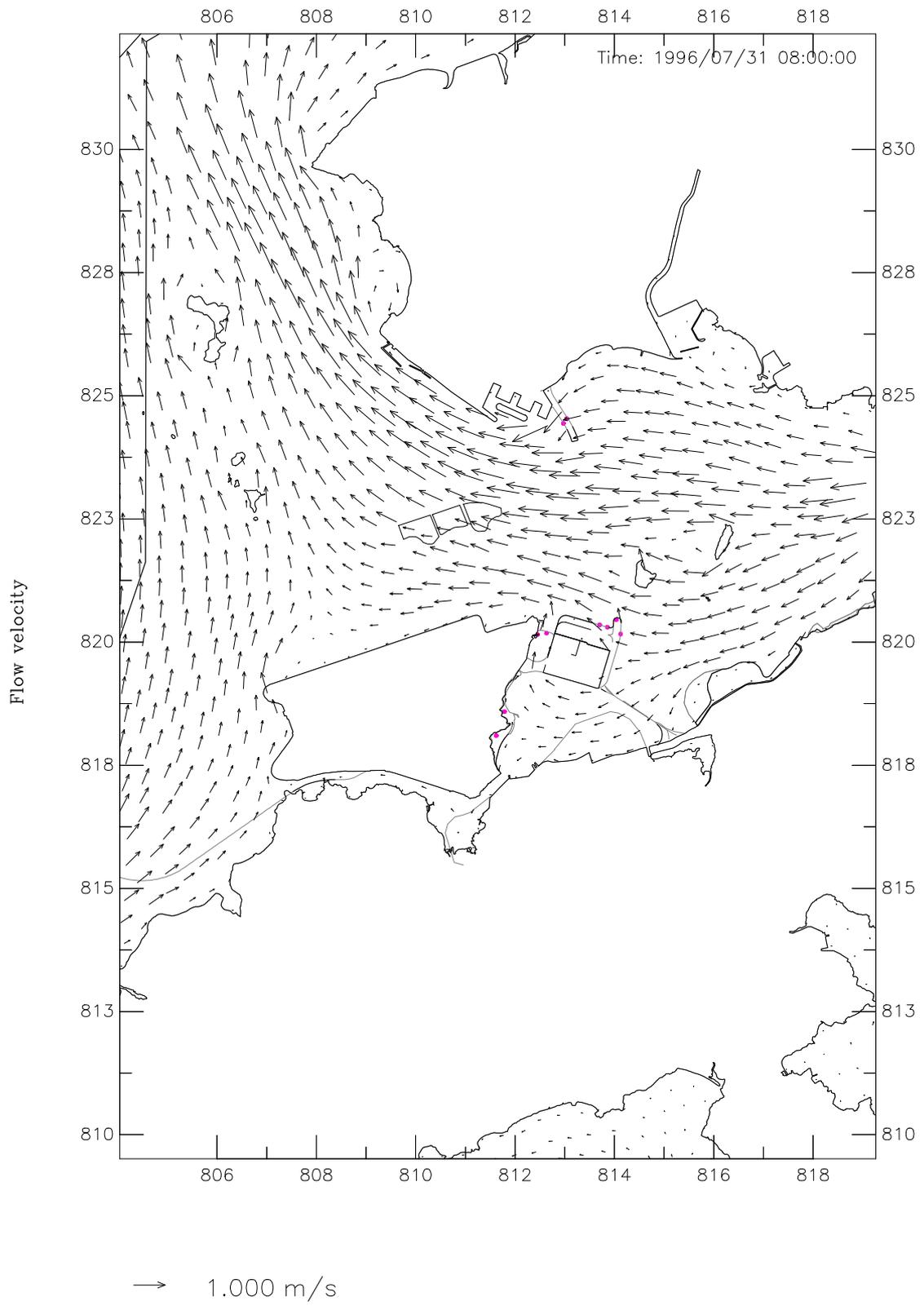
Apr 2009  
 Figure 027



Year 2012  
 Wet Season Velocity Vector Plot at Flood Tide – Surface Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

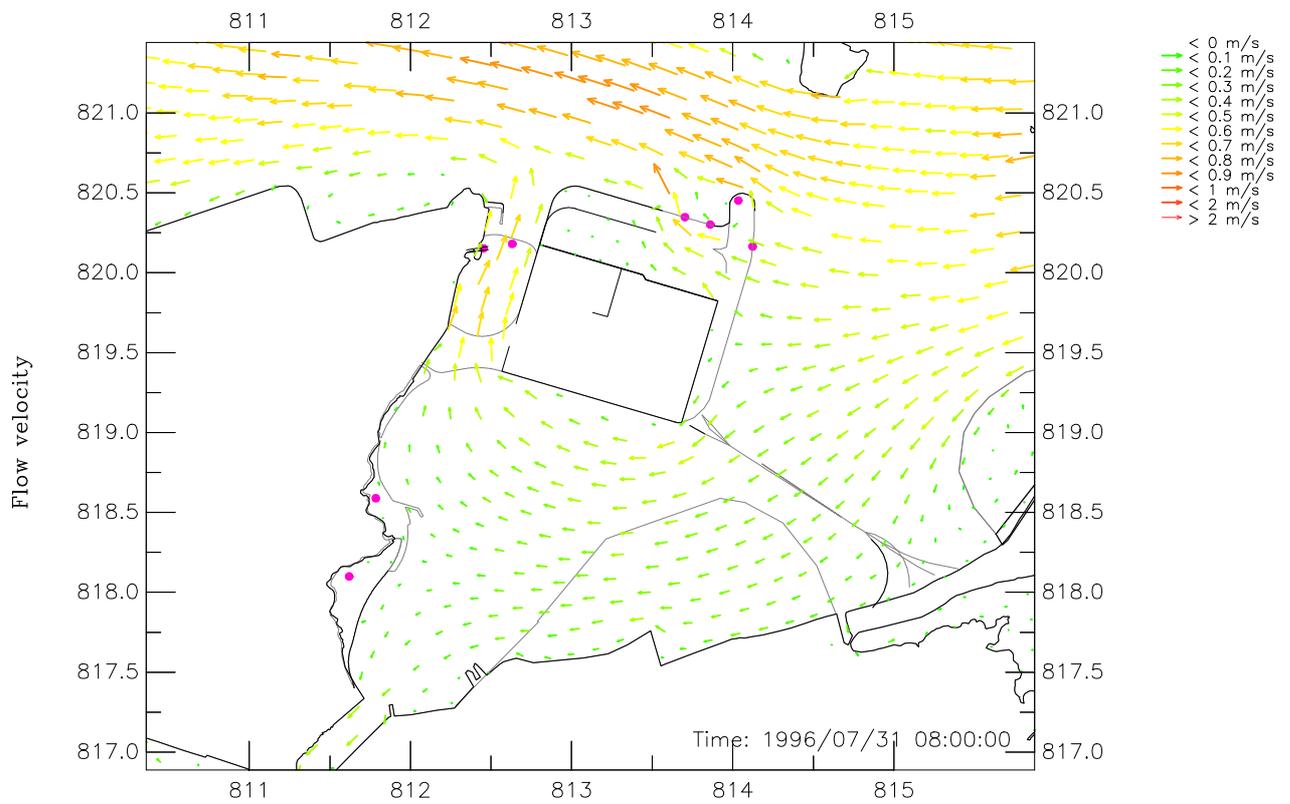
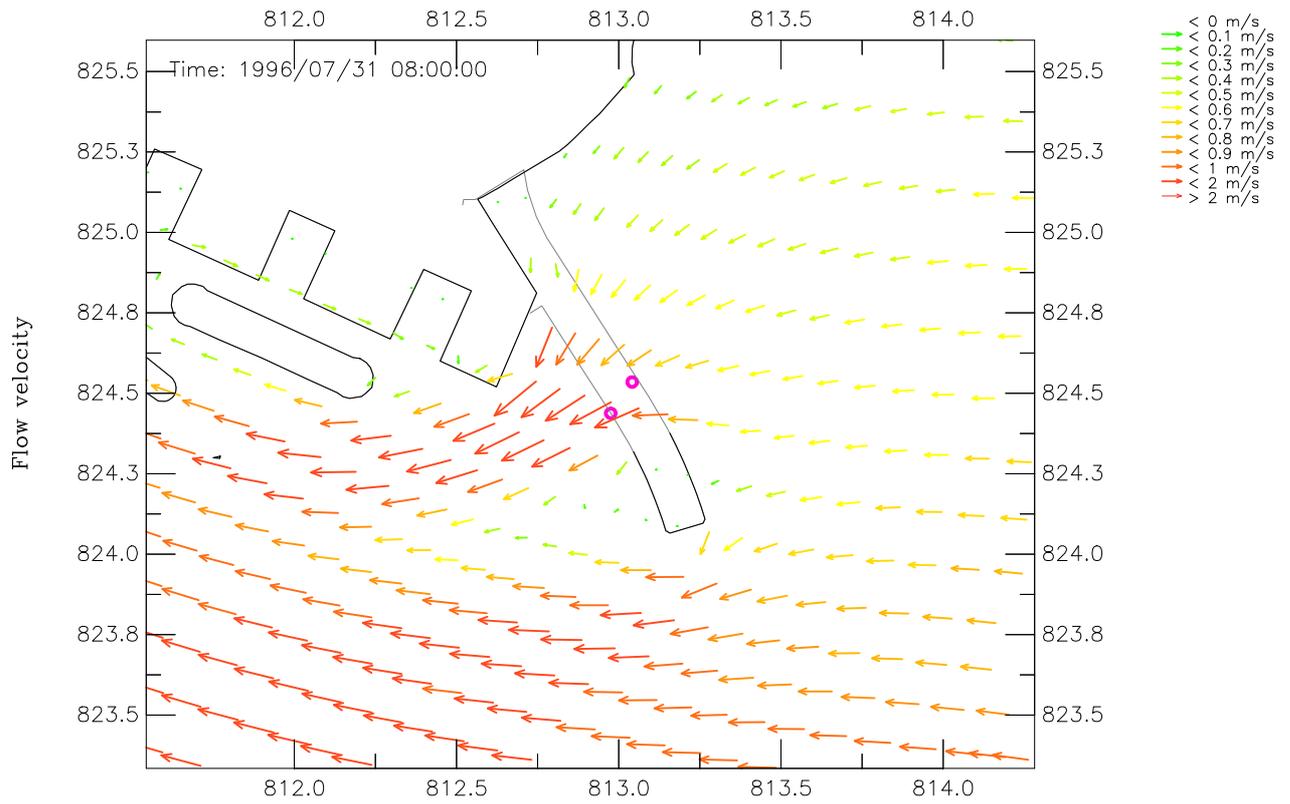
Apr 2009

Figure 028



Year 2012  
 Dry Season Velocity Vector Plot at Flood Tide – Mid-Depth

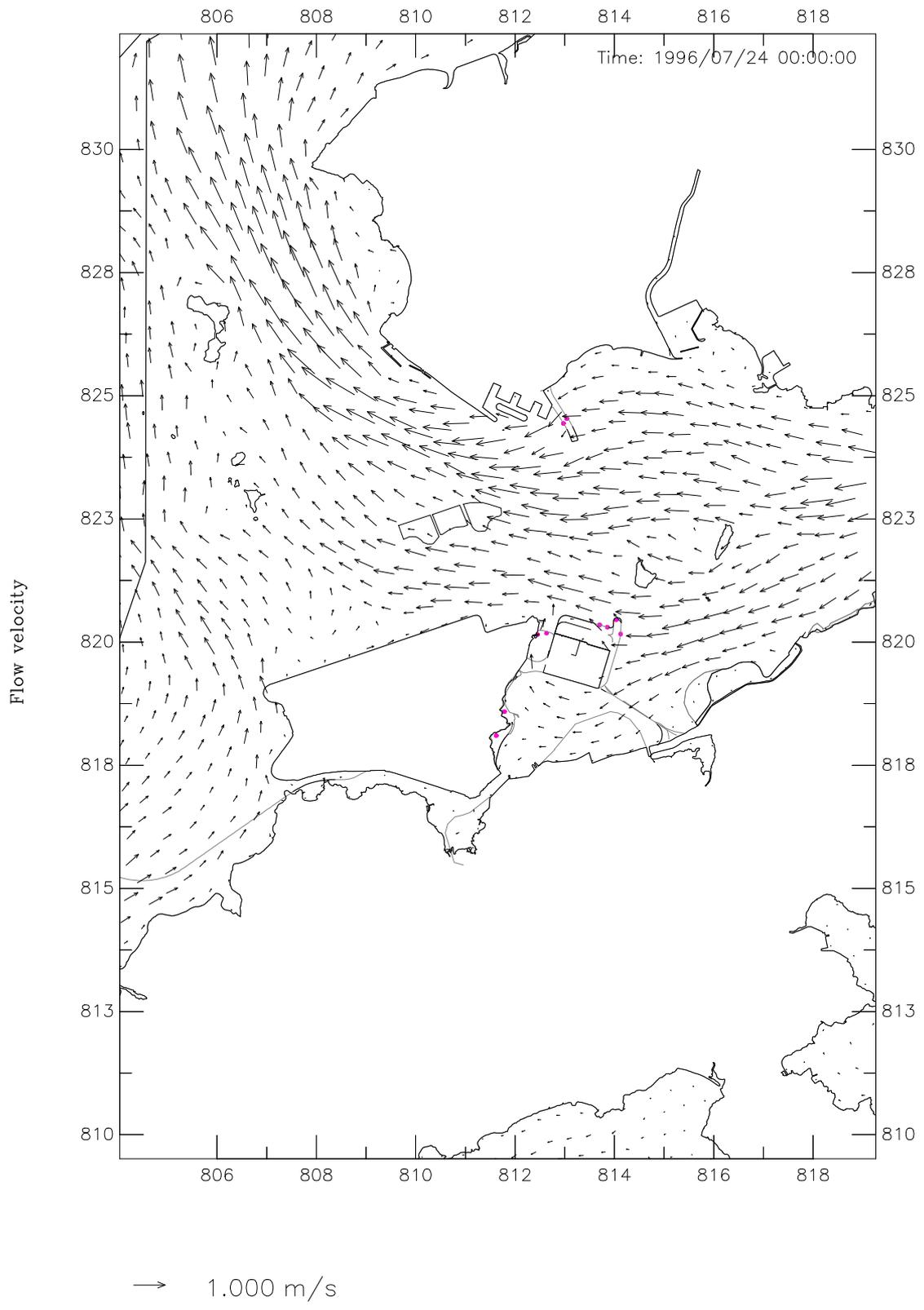
Apr 2009      Figure 029



Year 2012  
 Dry Season Velocity Vector Plot at Flood Tide – Mid-Depth  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

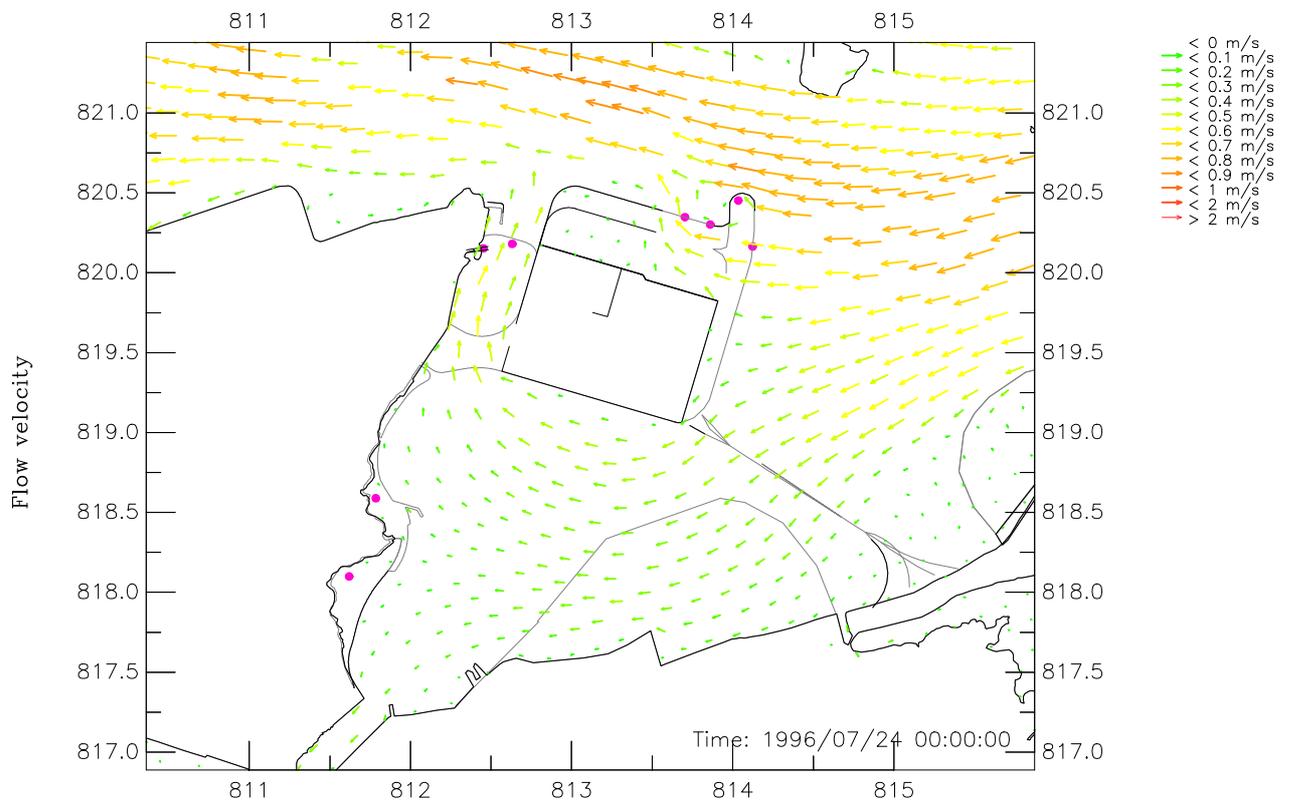
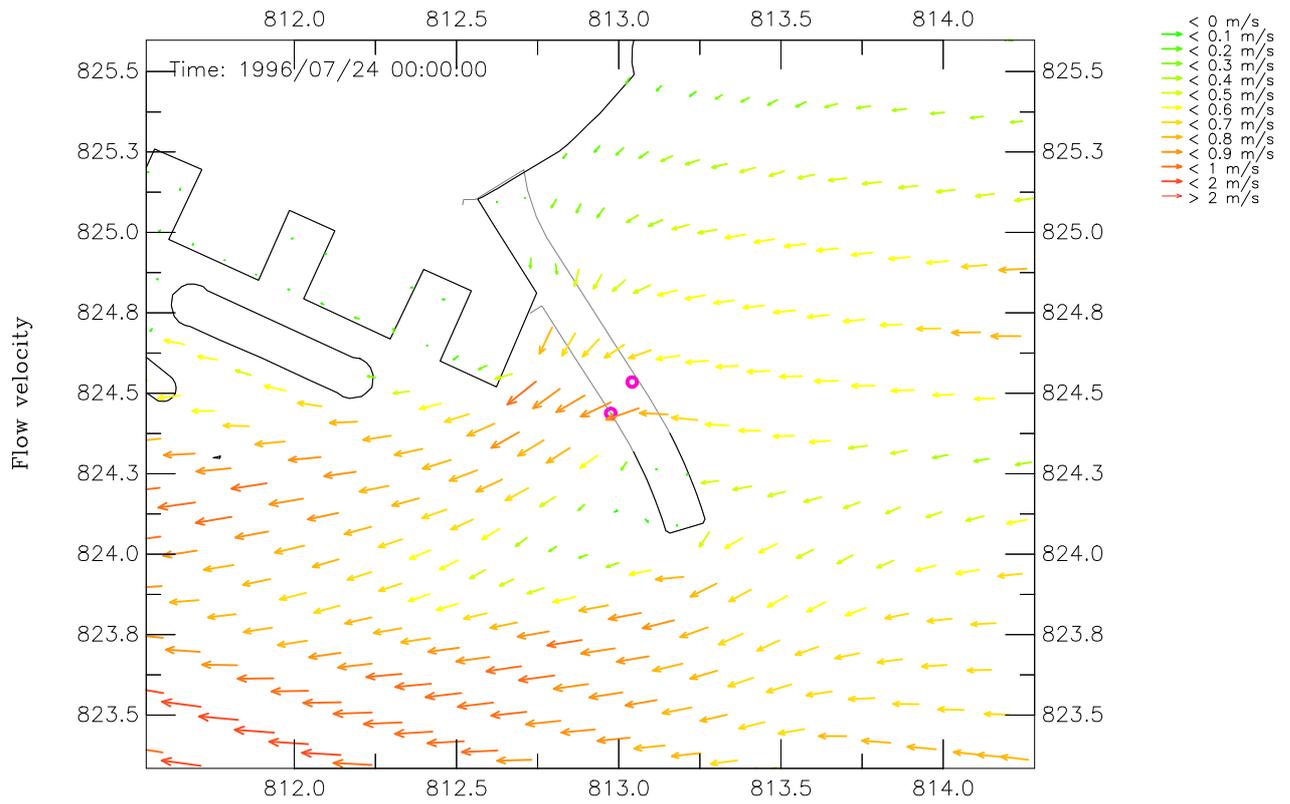
Apr 2009

Figure 030



Year 2012  
 Wet Season Velocity Vector Plot at Flood Tide – Mid-Depth

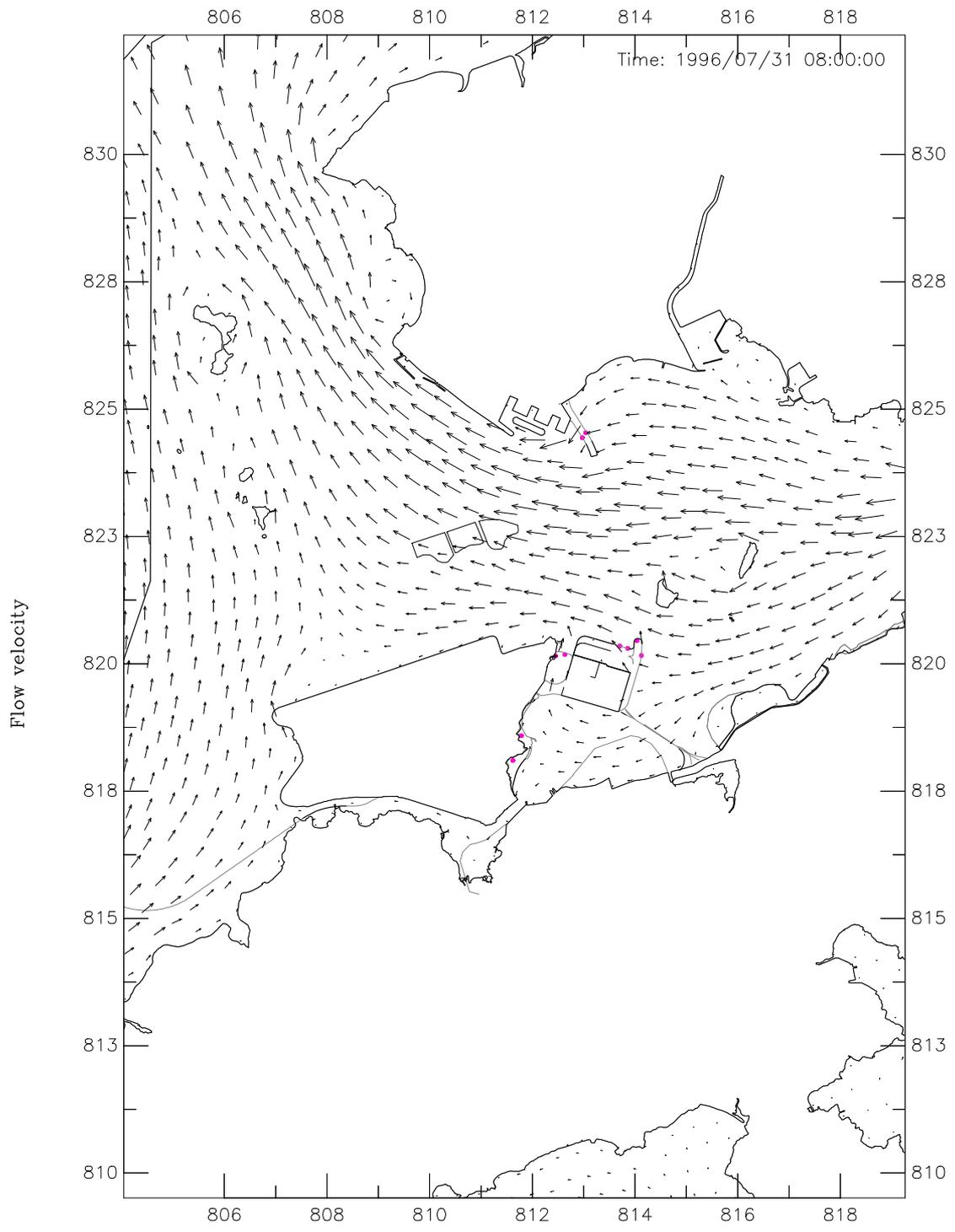
Apr 2009  
 Figure 031



Year 2012  
 Wet Season Velocity Vector Plot at Flood Tide – Mid-Depth  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

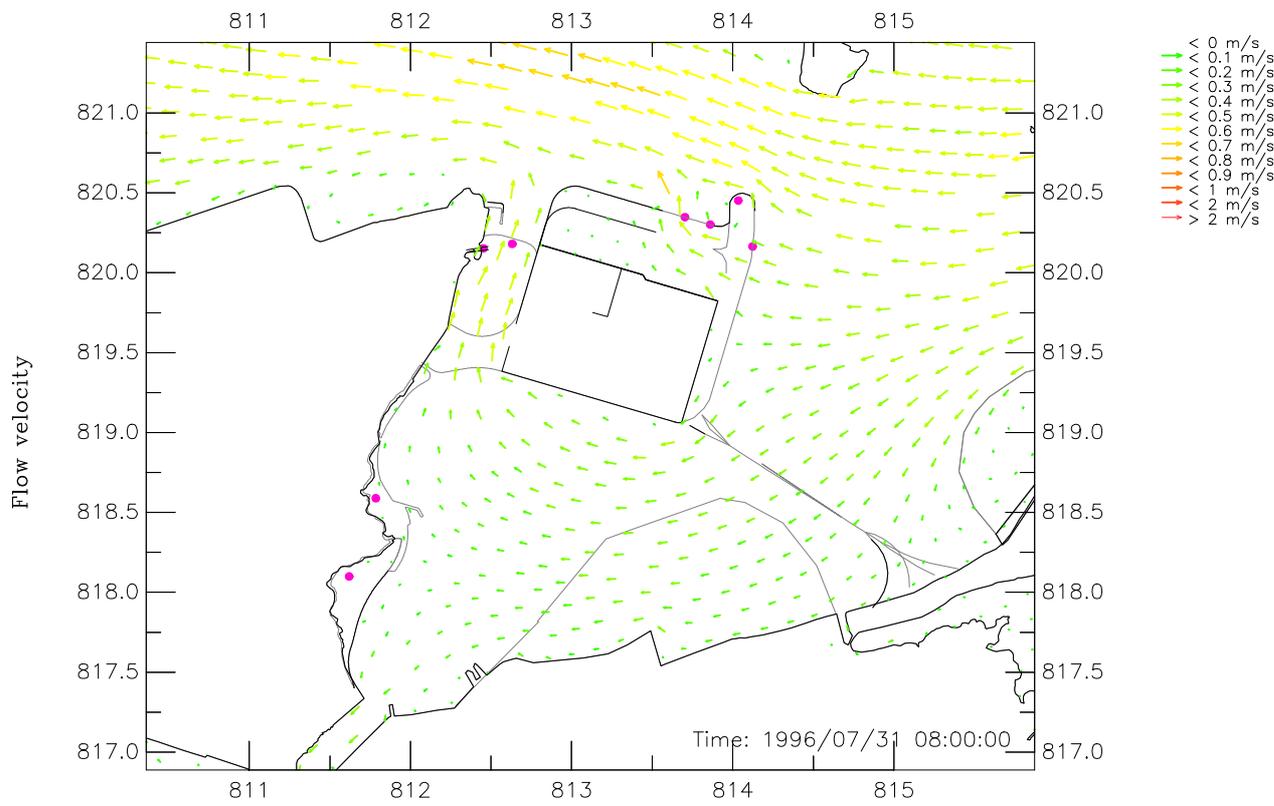
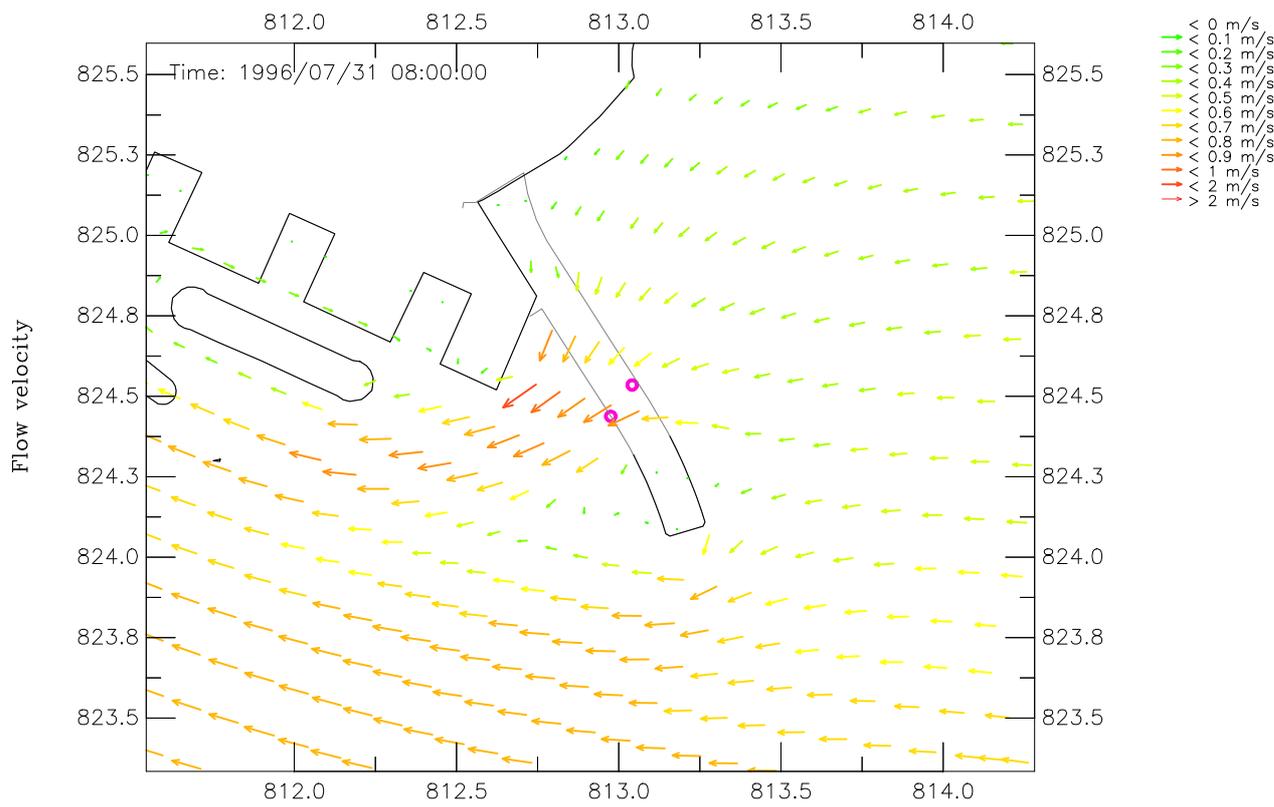
Apr 2009

Figure 032



Year 2012  
 Dry Season Velocity Vector Plot at Flood Tide – Bottom Layer

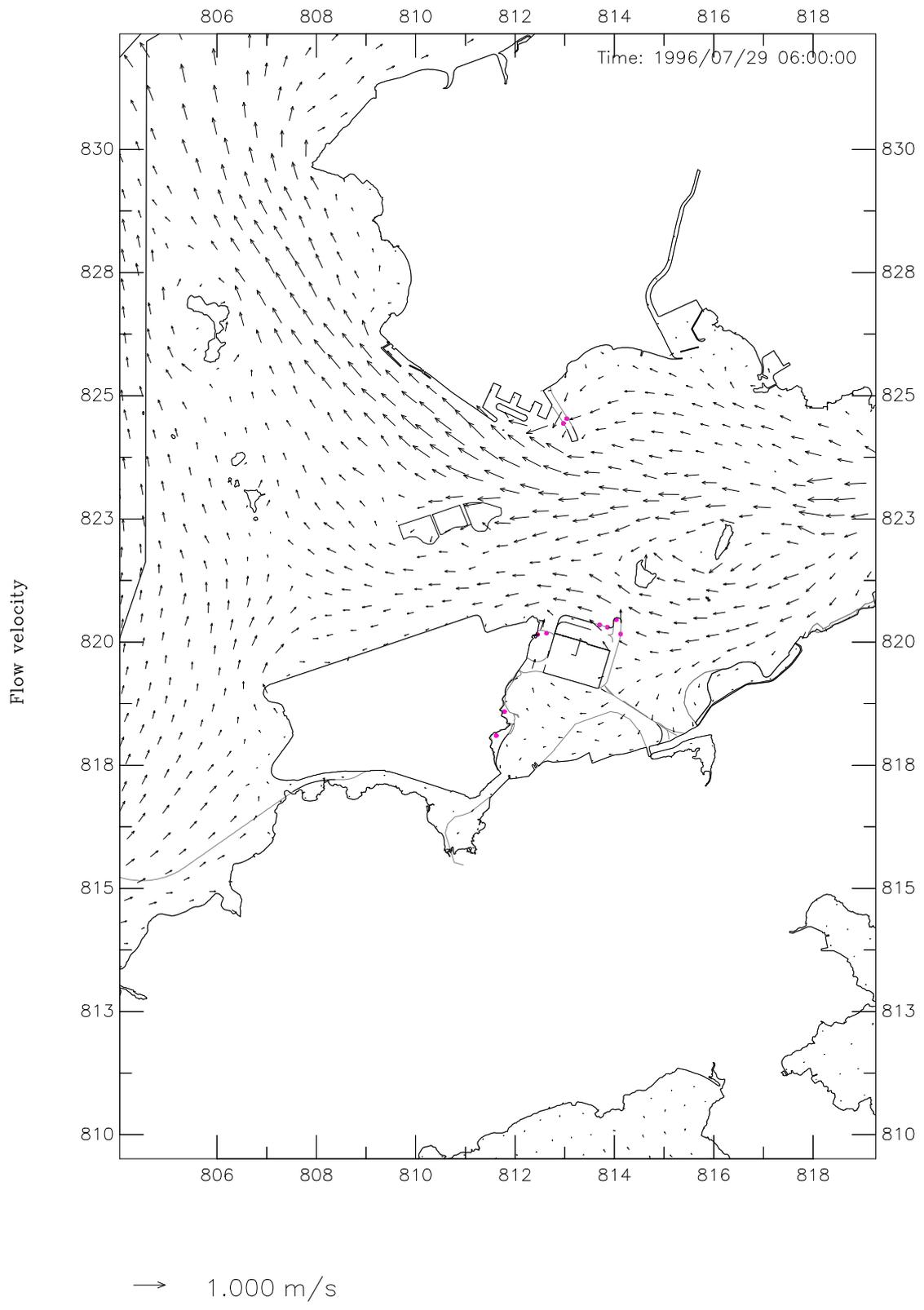
Apr 2009      Figure 033



Year 2012  
 Dry Season Velocity Vector Plot at Flood Tide – Bottom Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

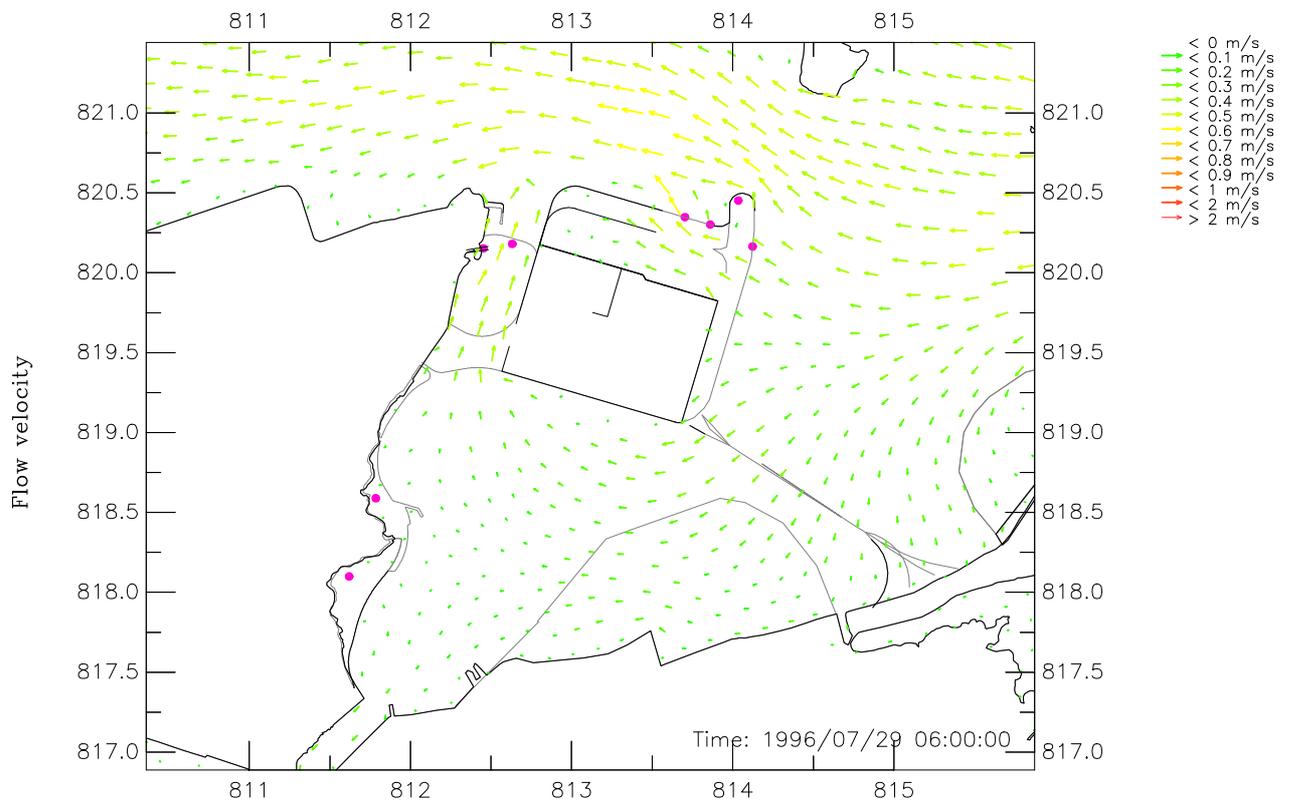
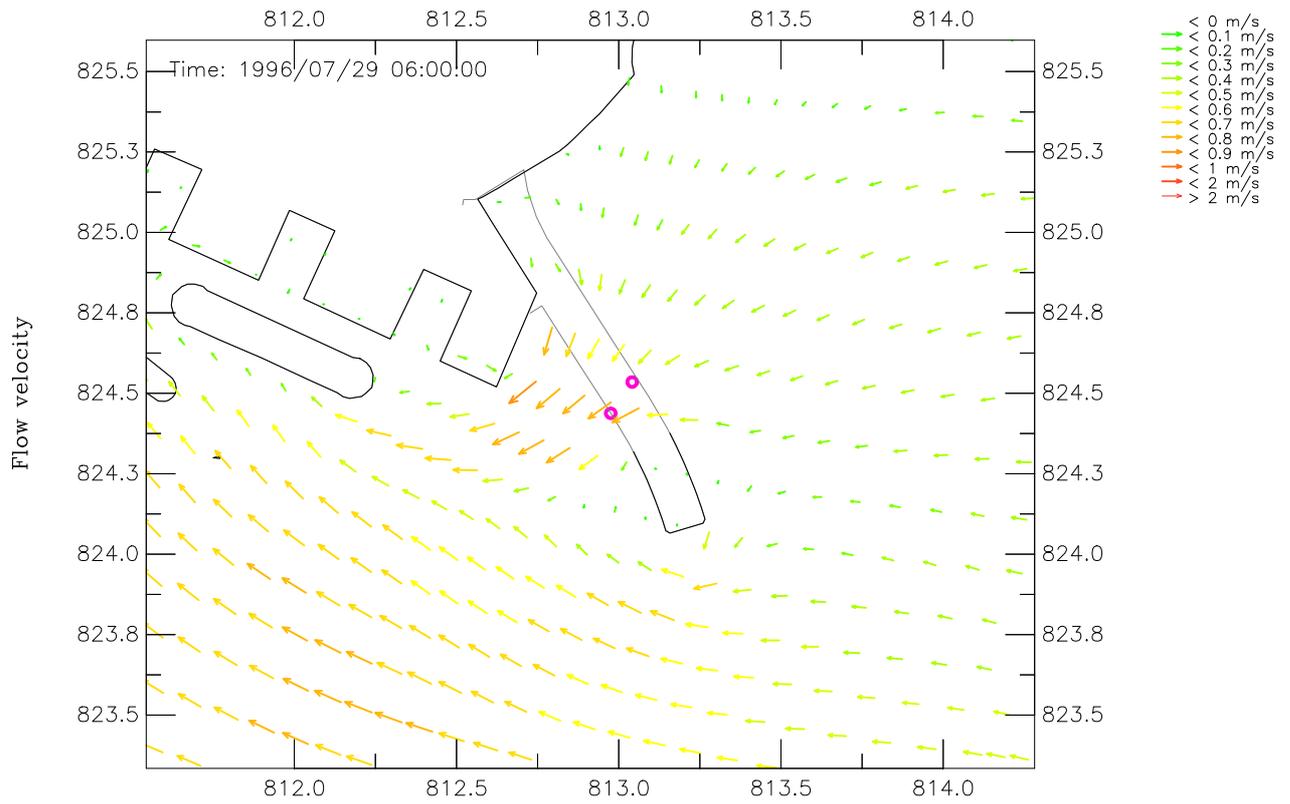
Apr 2009

Figure 034



Year 2012  
 Wet Season Velocity Vector Plot at Flood Tide – Bottom Layer

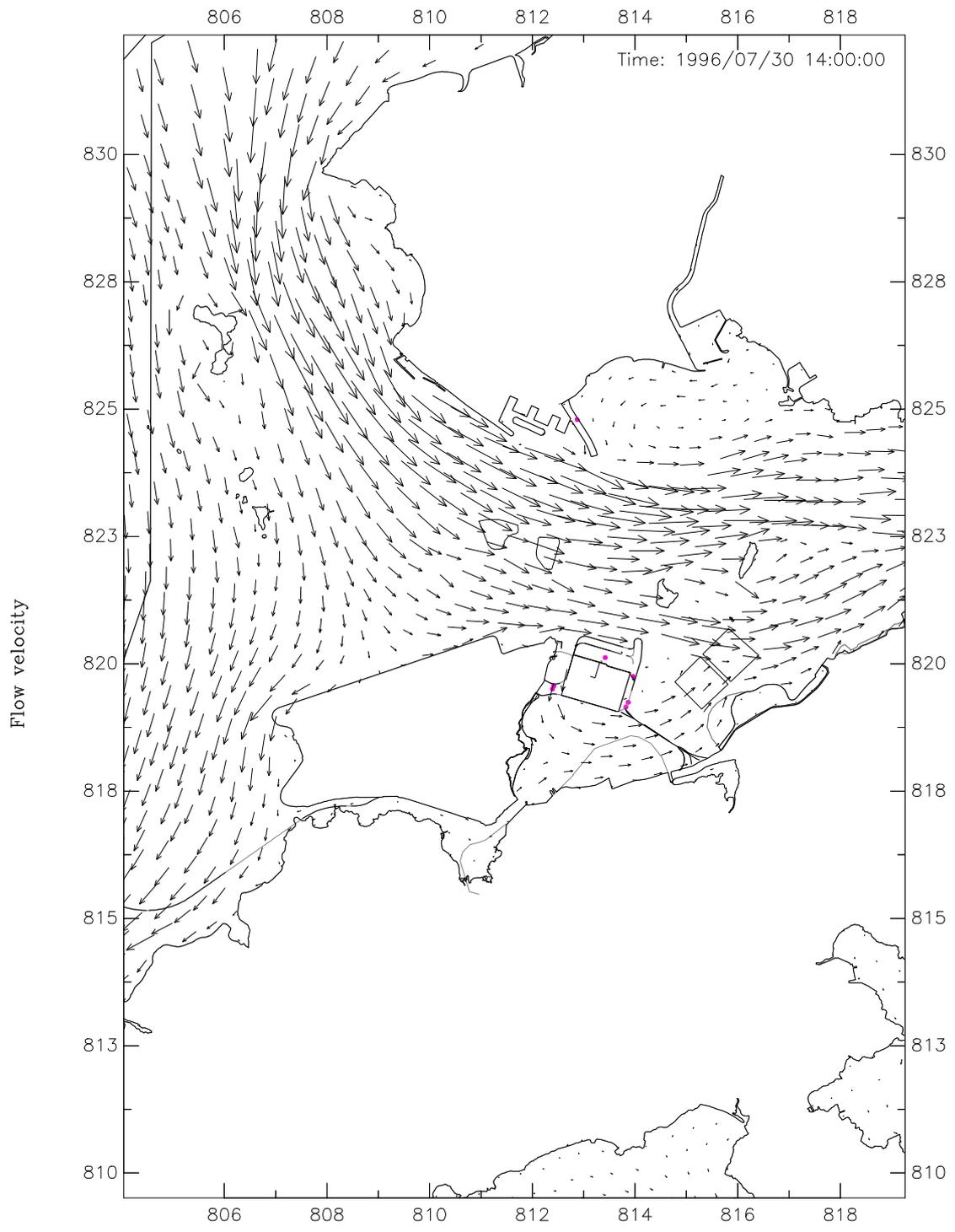
Apr 2009      Figure 035



Year 2012  
 Wet Season Velocity Vector Plot at Flood Tide – Bottom Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

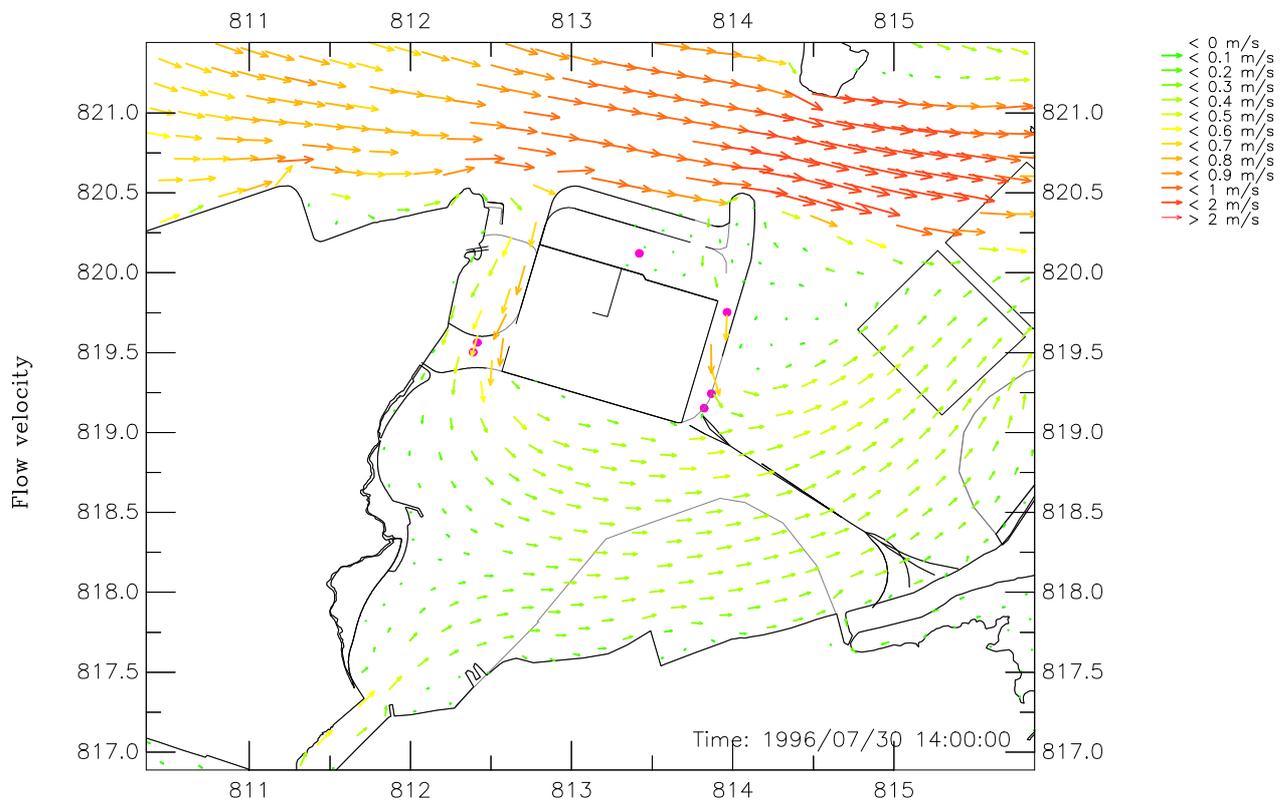
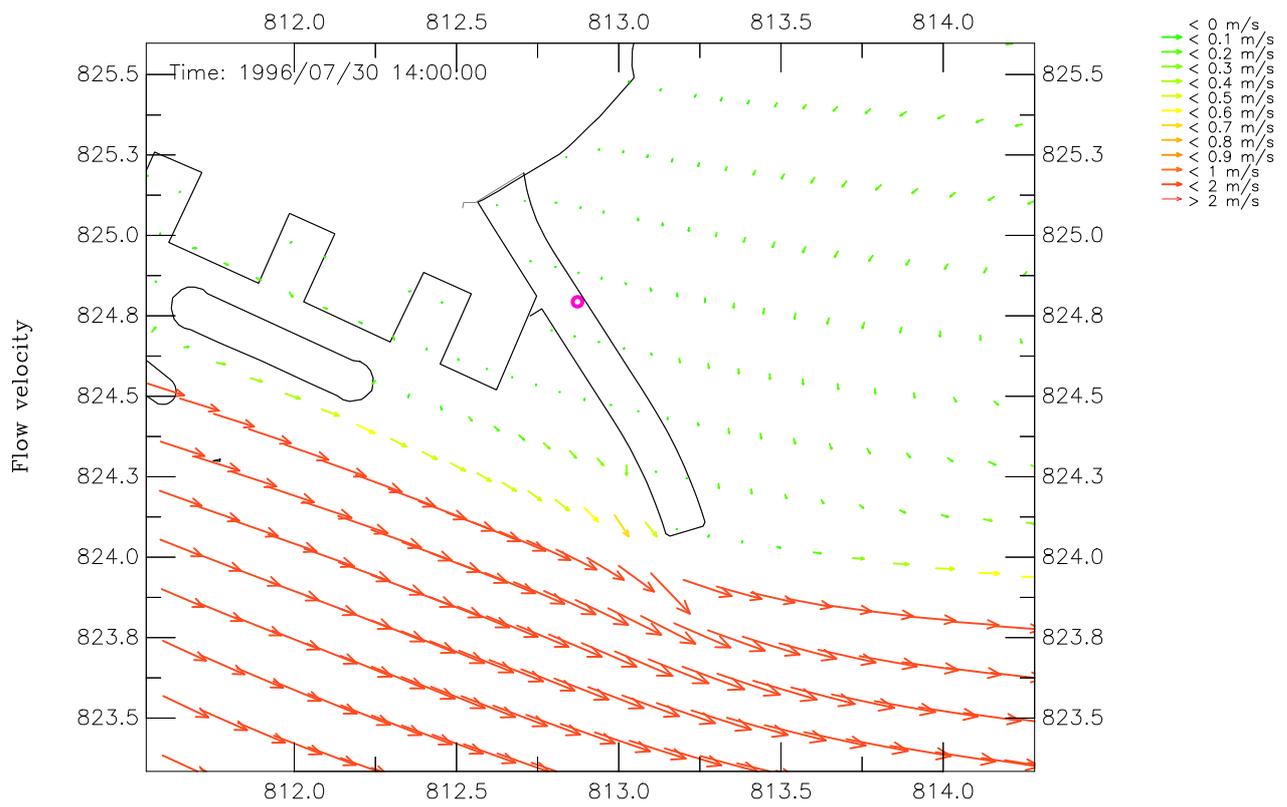
Apr 2009

Figure 036



Year 2013  
 Dry Season Velocity Vector Plot at Ebb Tide – Surface Layer

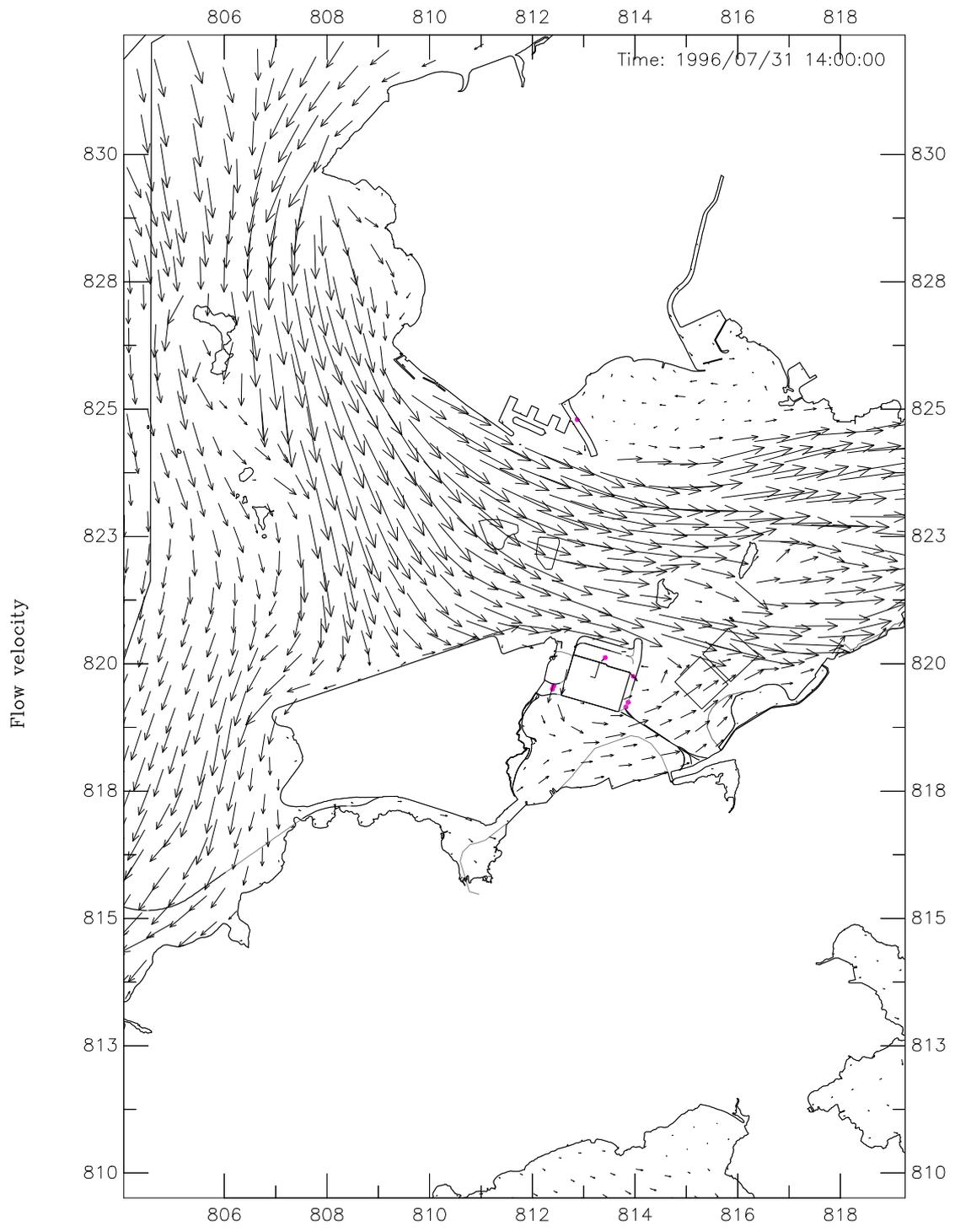
Apr 2009  
 Figure 013



Year 2013  
 Dry Season Velocity Vector Plot at Ebb Tide – Surface Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

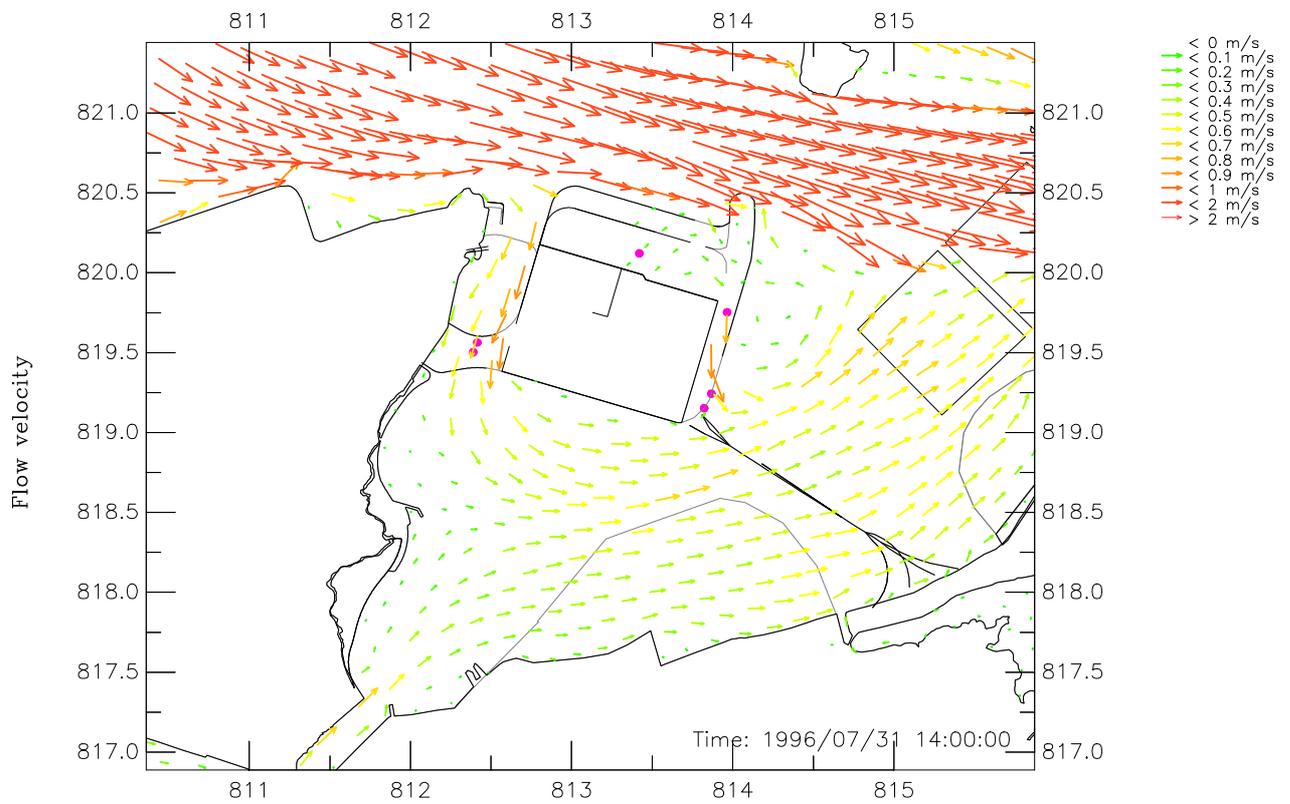
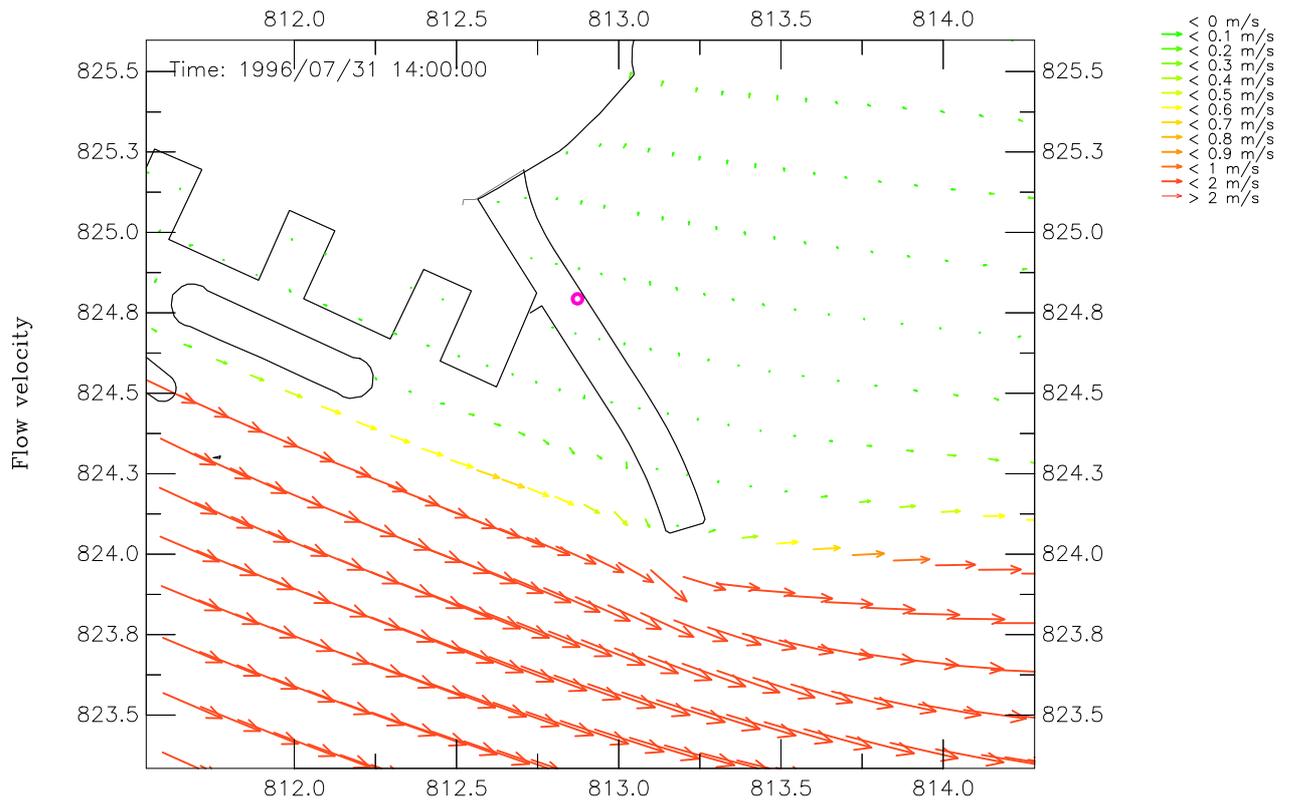
Apr 2009

Figure 014



Year 2013  
 Wet Season Velocity Vector Plot at Ebb Tide – Surface Layer

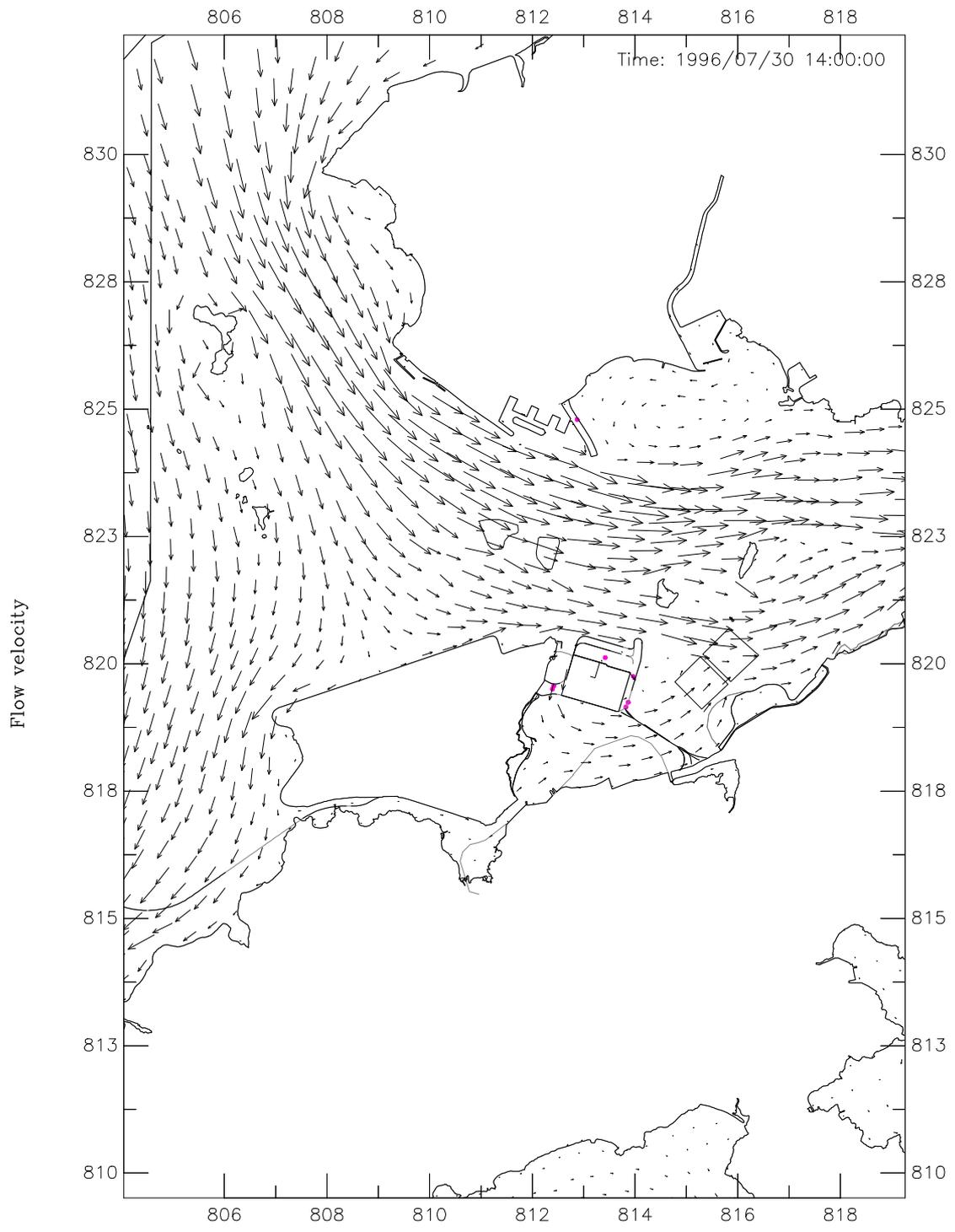
Apr 2009  
 Figure 015



Year 2013  
 Wet Season Velocity Vector Plot at Ebb Tide – Surface Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

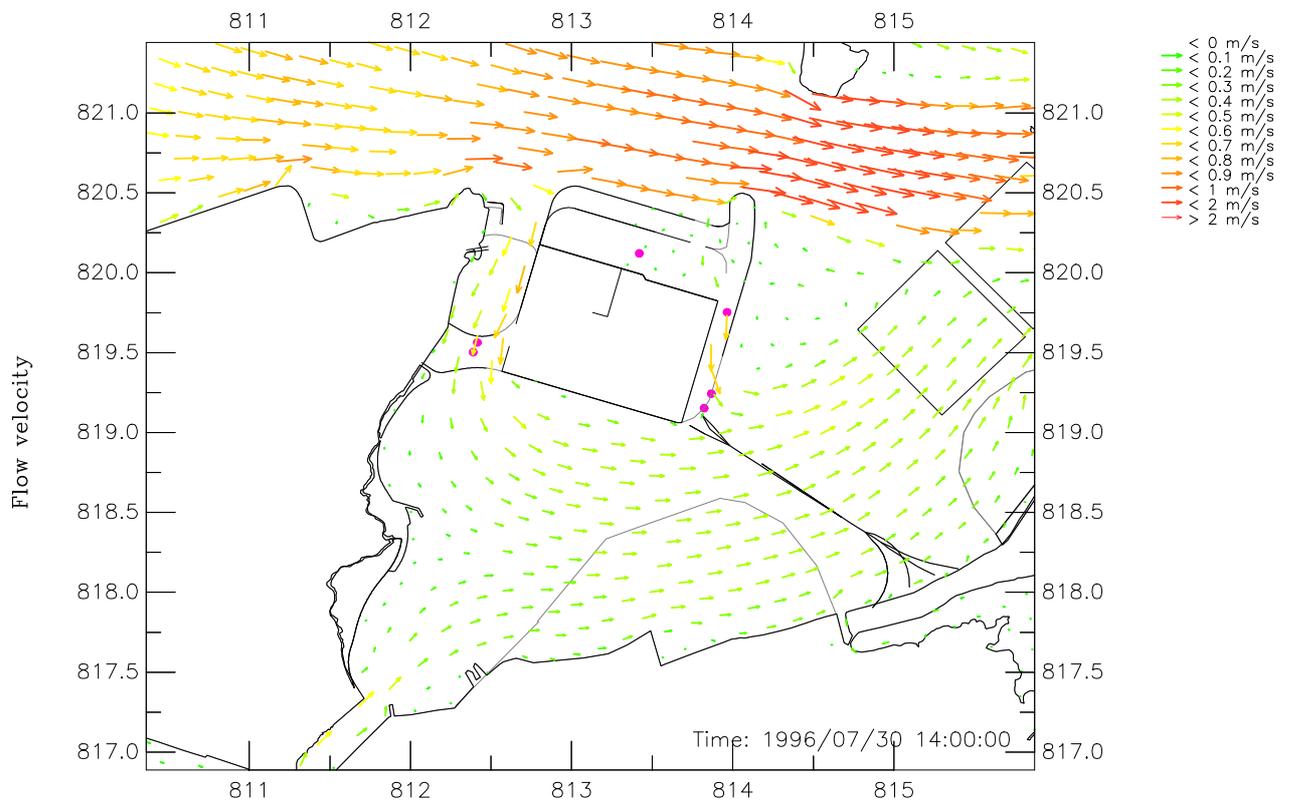
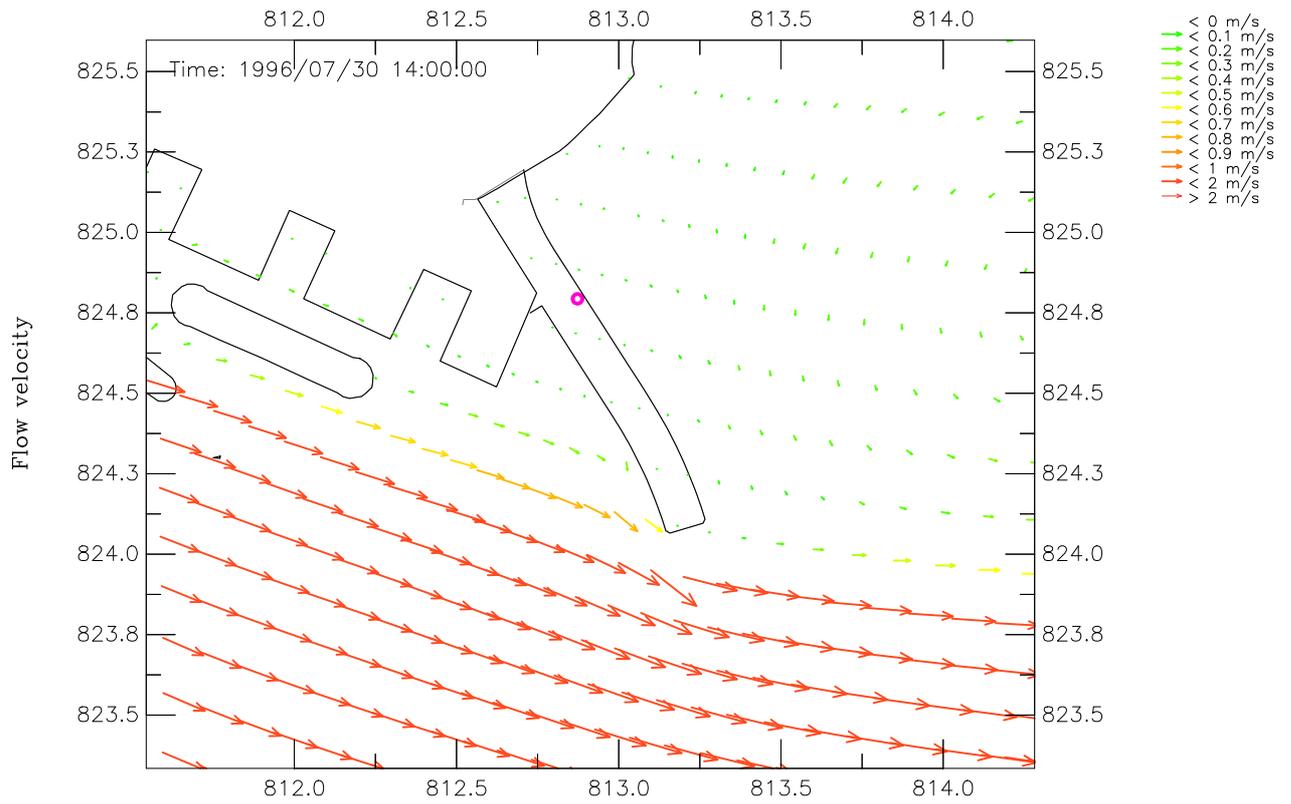
Apr 2009

Figure 016



Year 2013  
 Dry Season Velocity Vector Plot at Ebb Tide – Mid-Depth

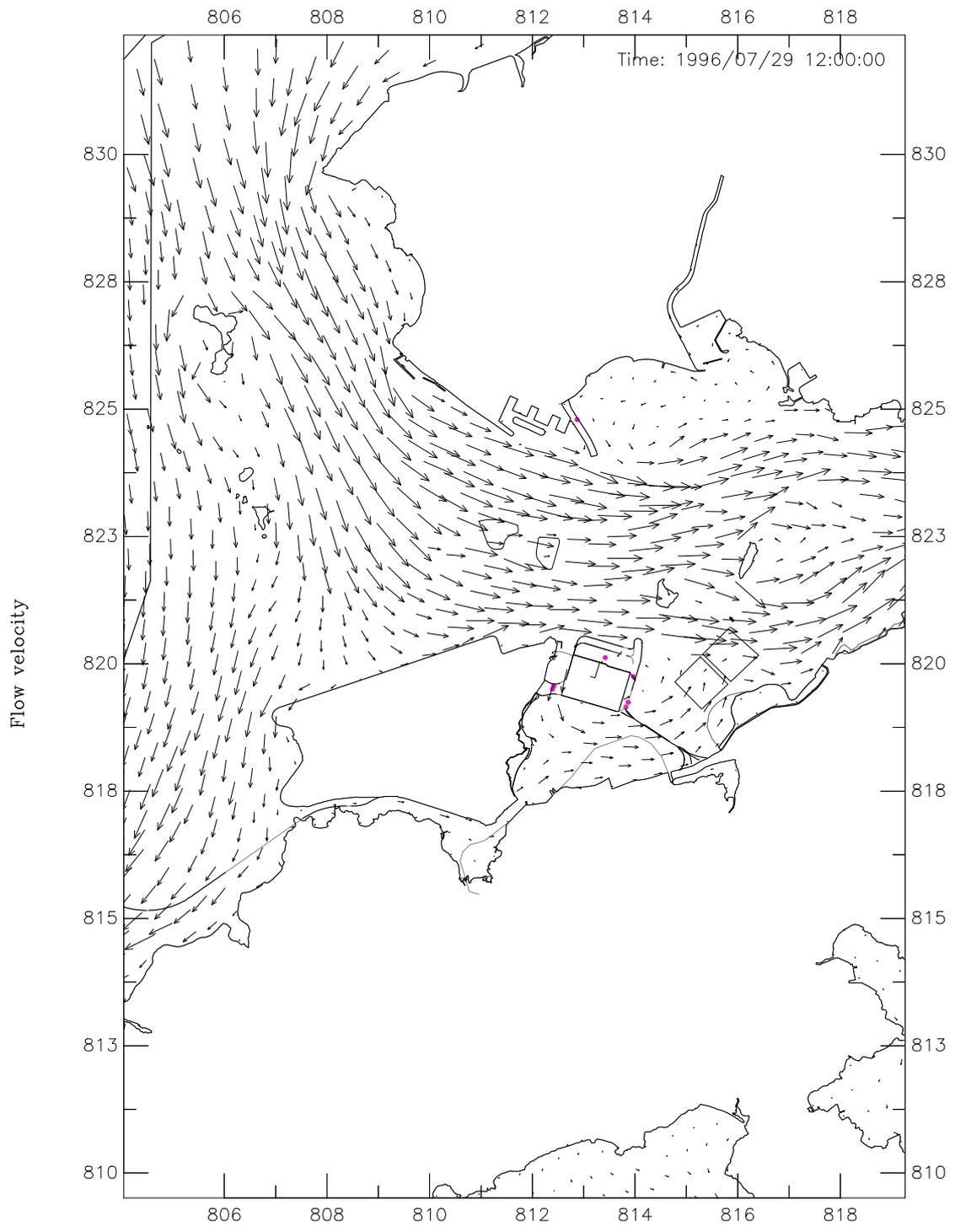
Apr 2009  
 Figure 017



Year 2013  
 Dry Season Velocity Vector Plot at Ebb Tide – Mid-Depth  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

Apr 2009

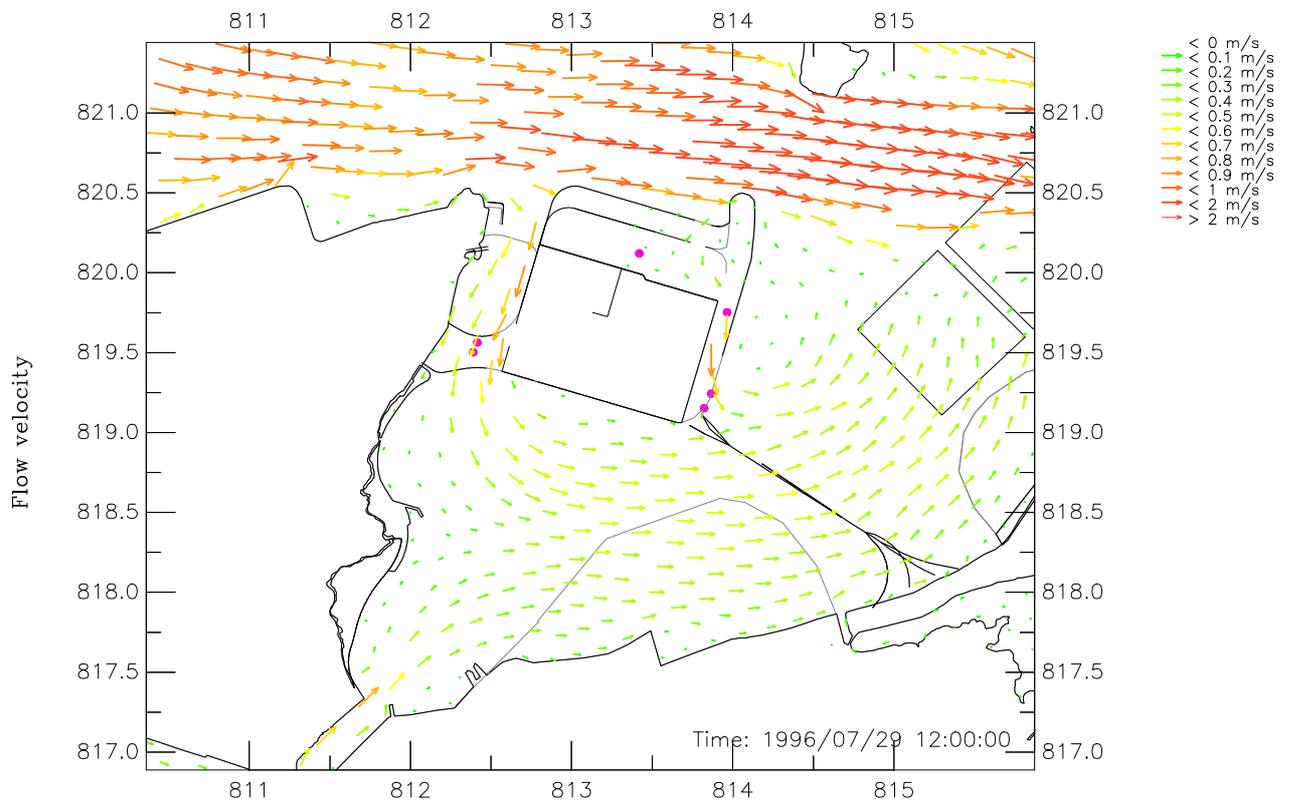
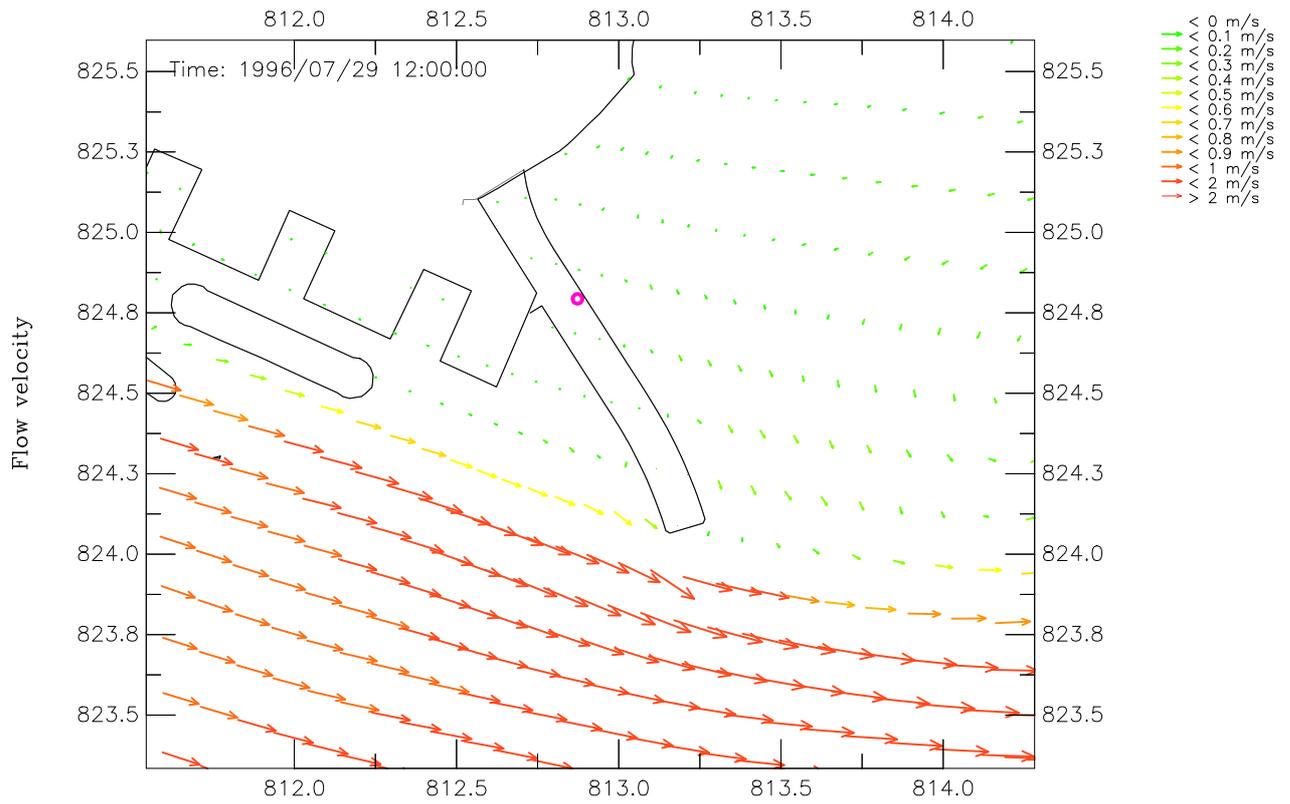
Figure 018



Year 2013  
 Wet Season Velocity Vector Plot at Ebb Tide – Mid-Depth

Apr 2009

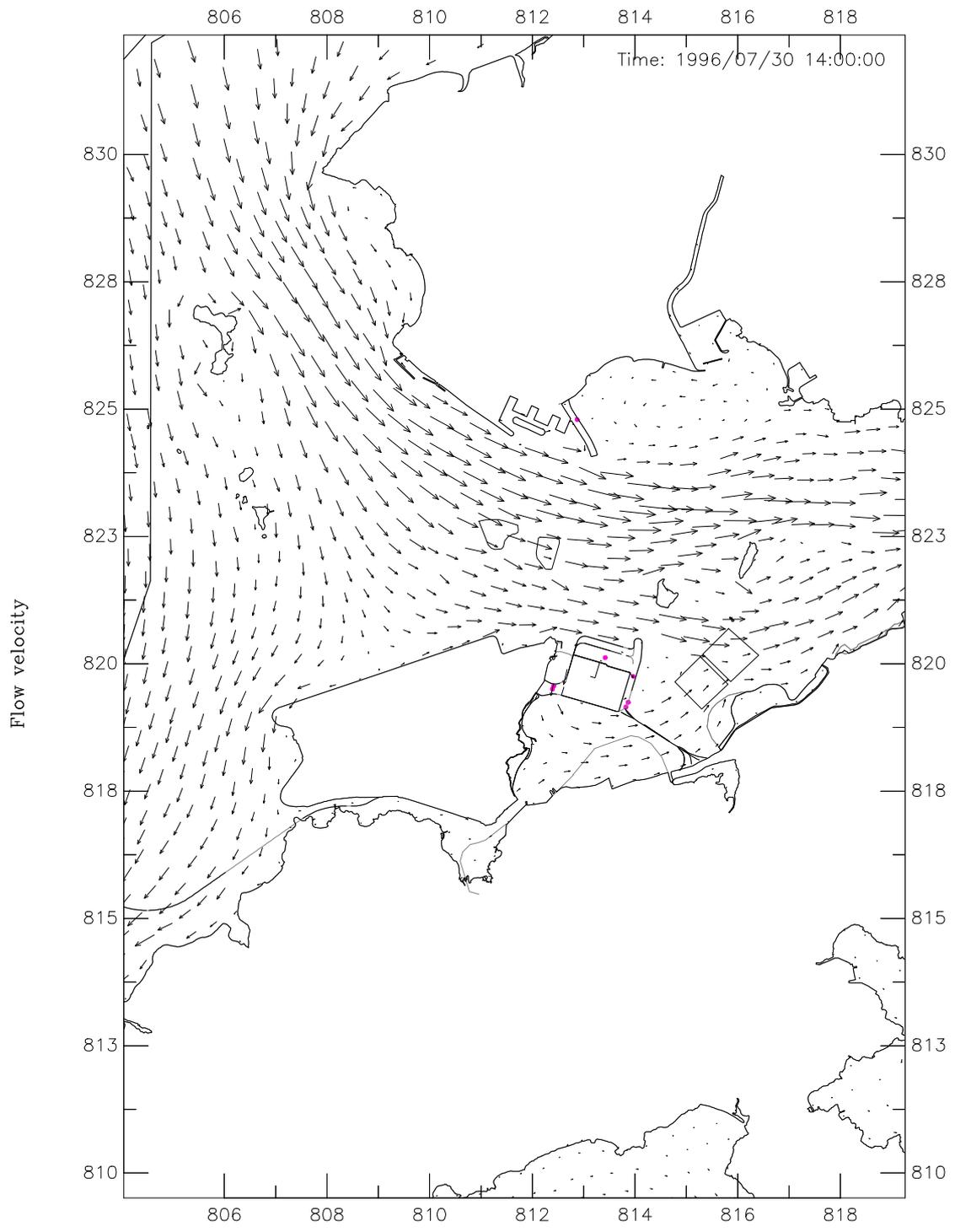
Figure 019



Year 2013  
 Wet Season Velocity Vector Plot at Ebb Tide – Mid-Depth  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

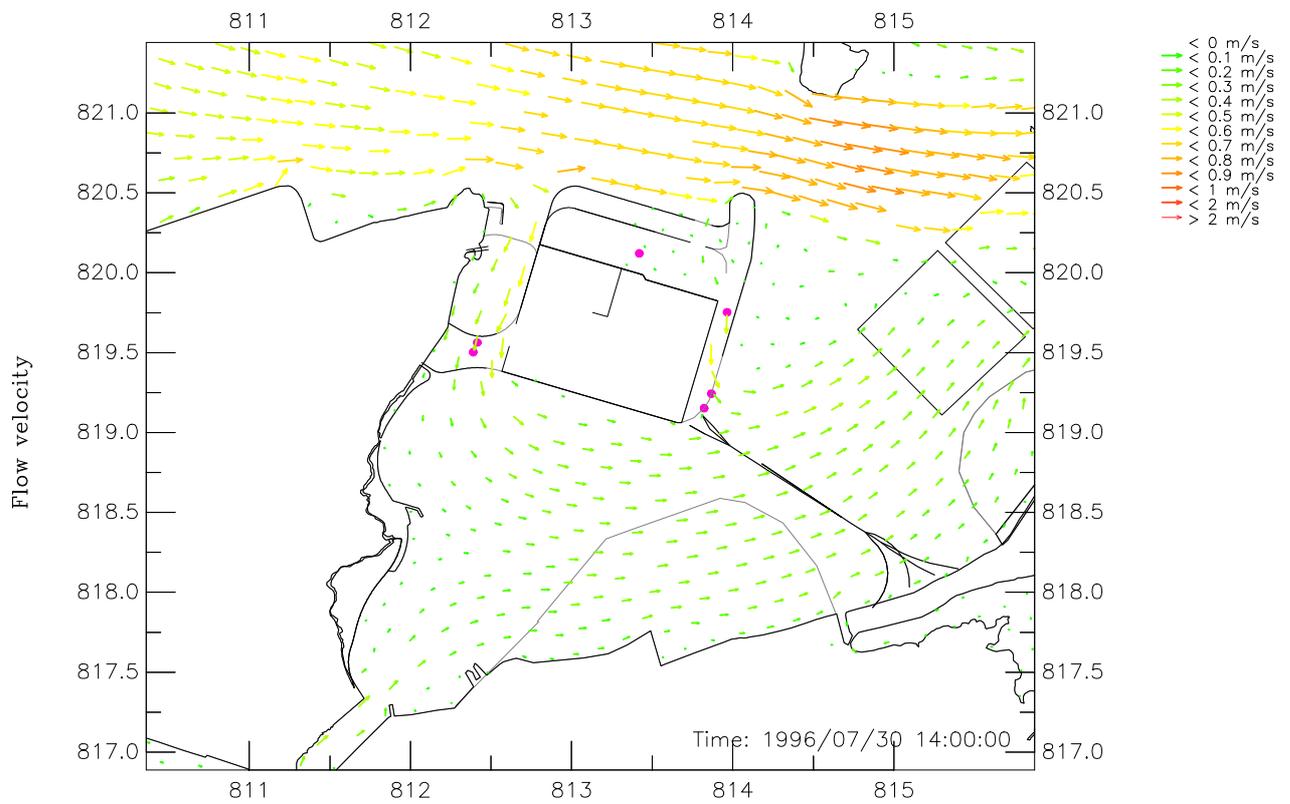
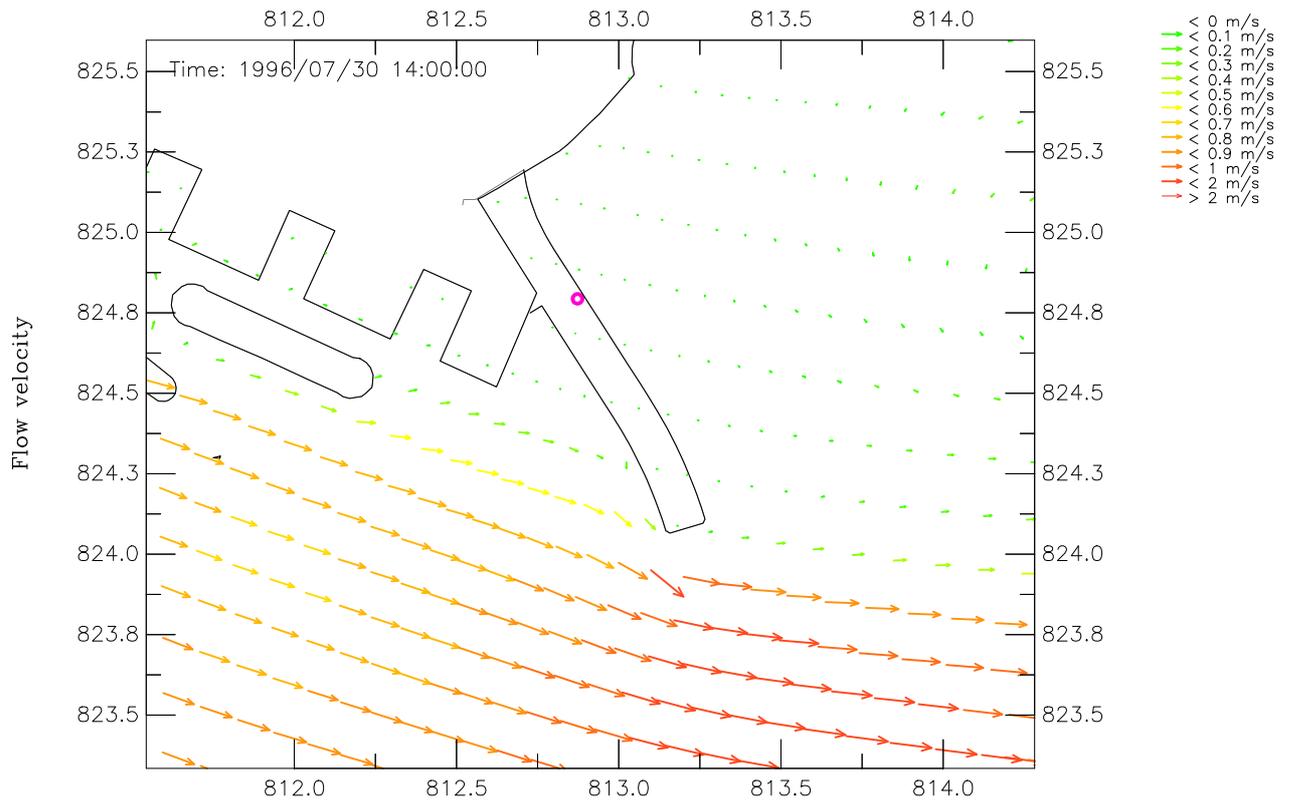
Apr 2009

Figure 020



Year 2013  
 Dry Season Velocity Vector Plot at Ebb Tide – Bottom Layer

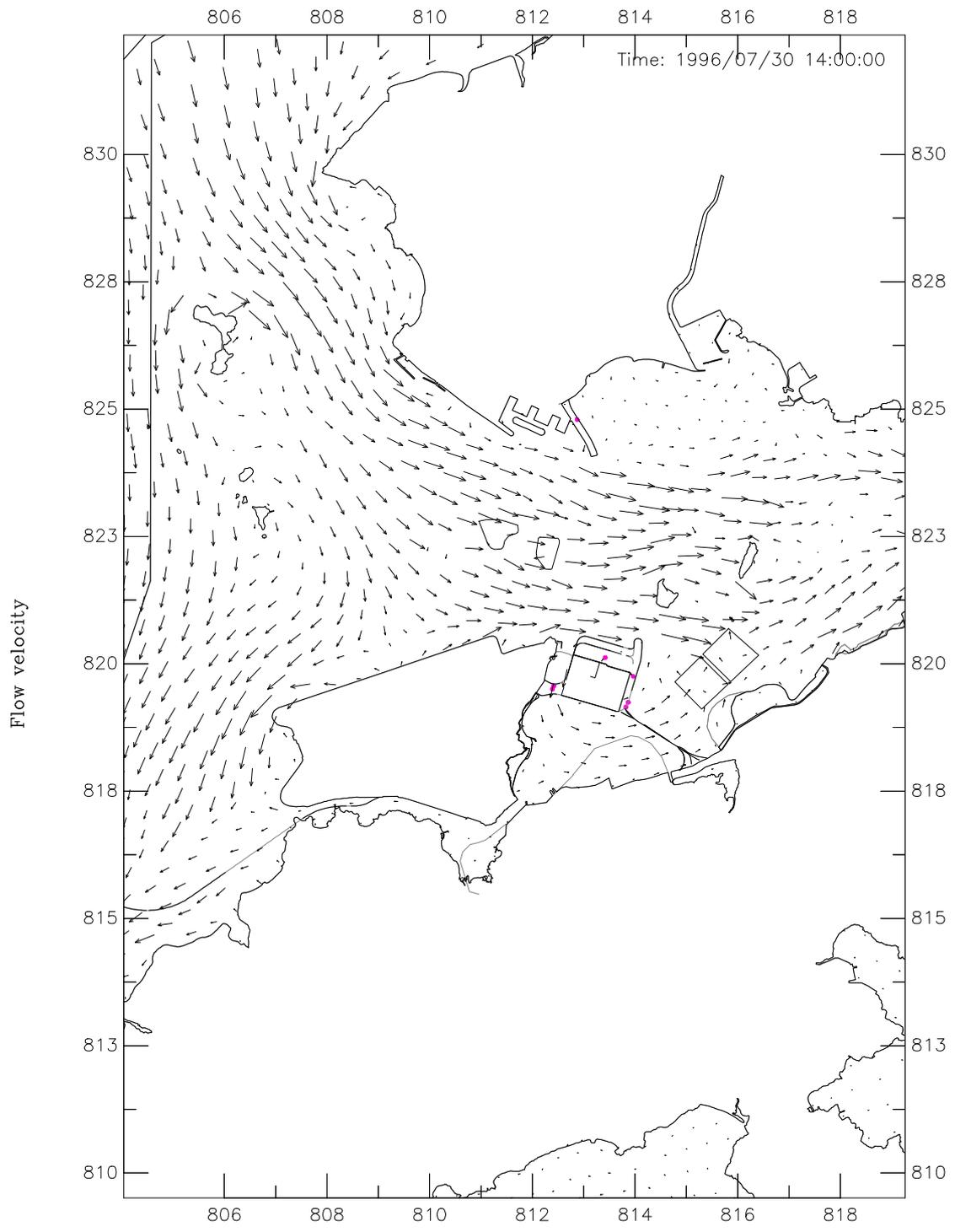
Apr 2009  
 Figure 021



Year 2013  
 Dry Season Velocity Vector Plot at Ebb Tide – Bottom Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

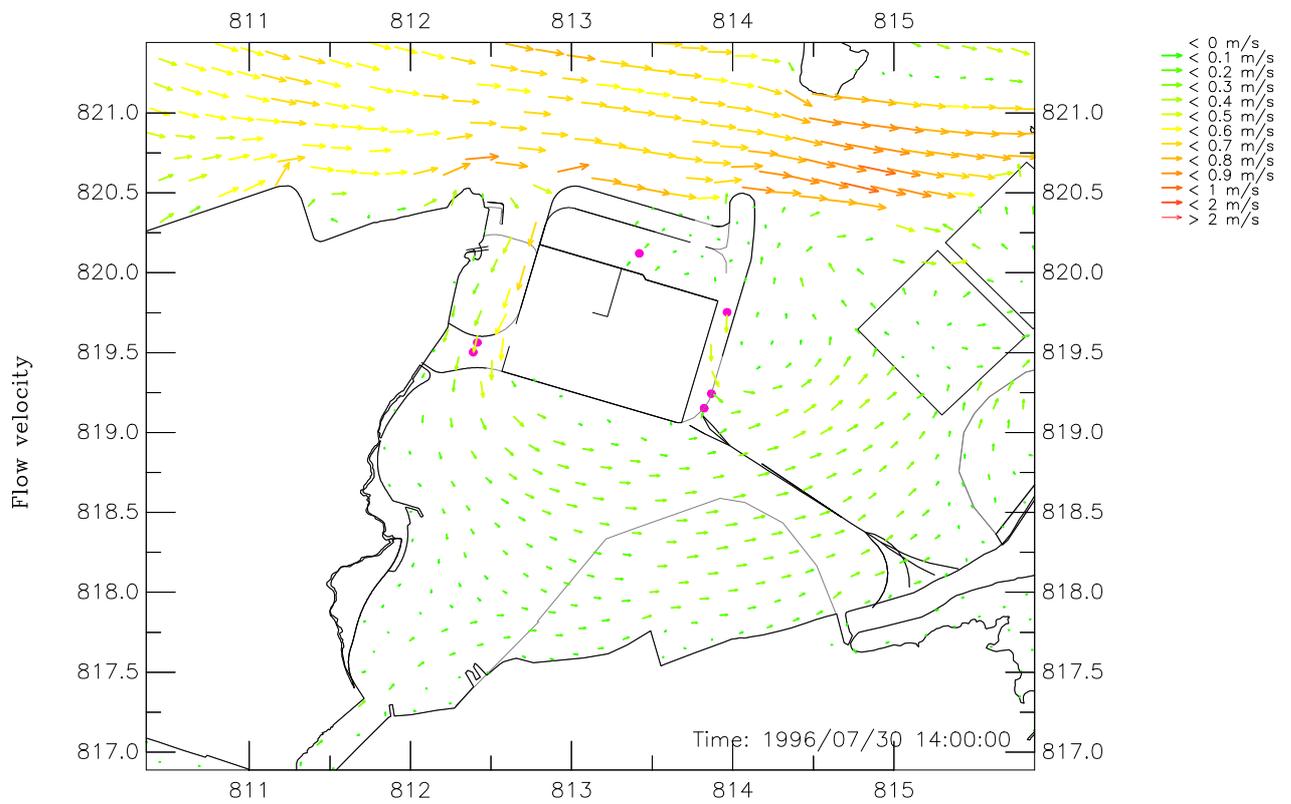
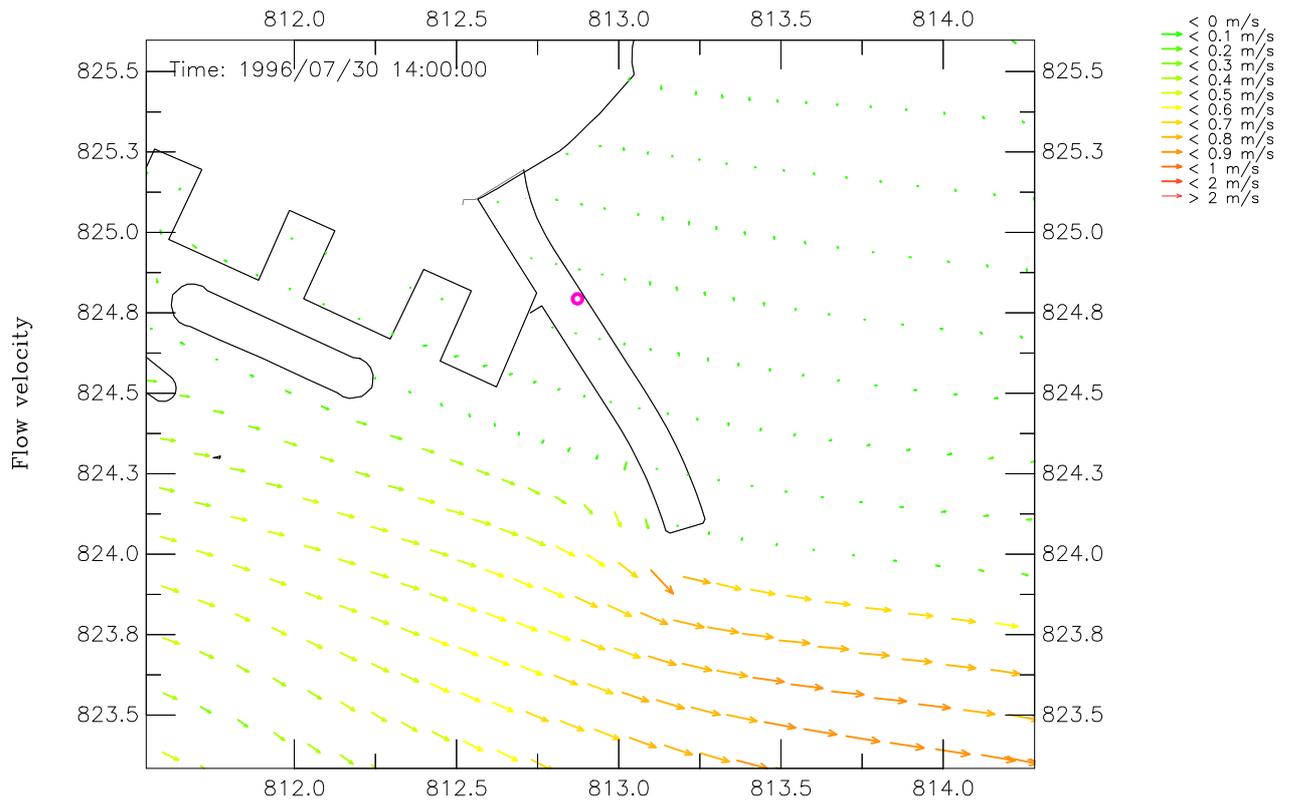
Apr 2009

Figure 022



Year 2013  
 Wet Season Velocity Vector Plot at Ebb Tide – Bottom Layer

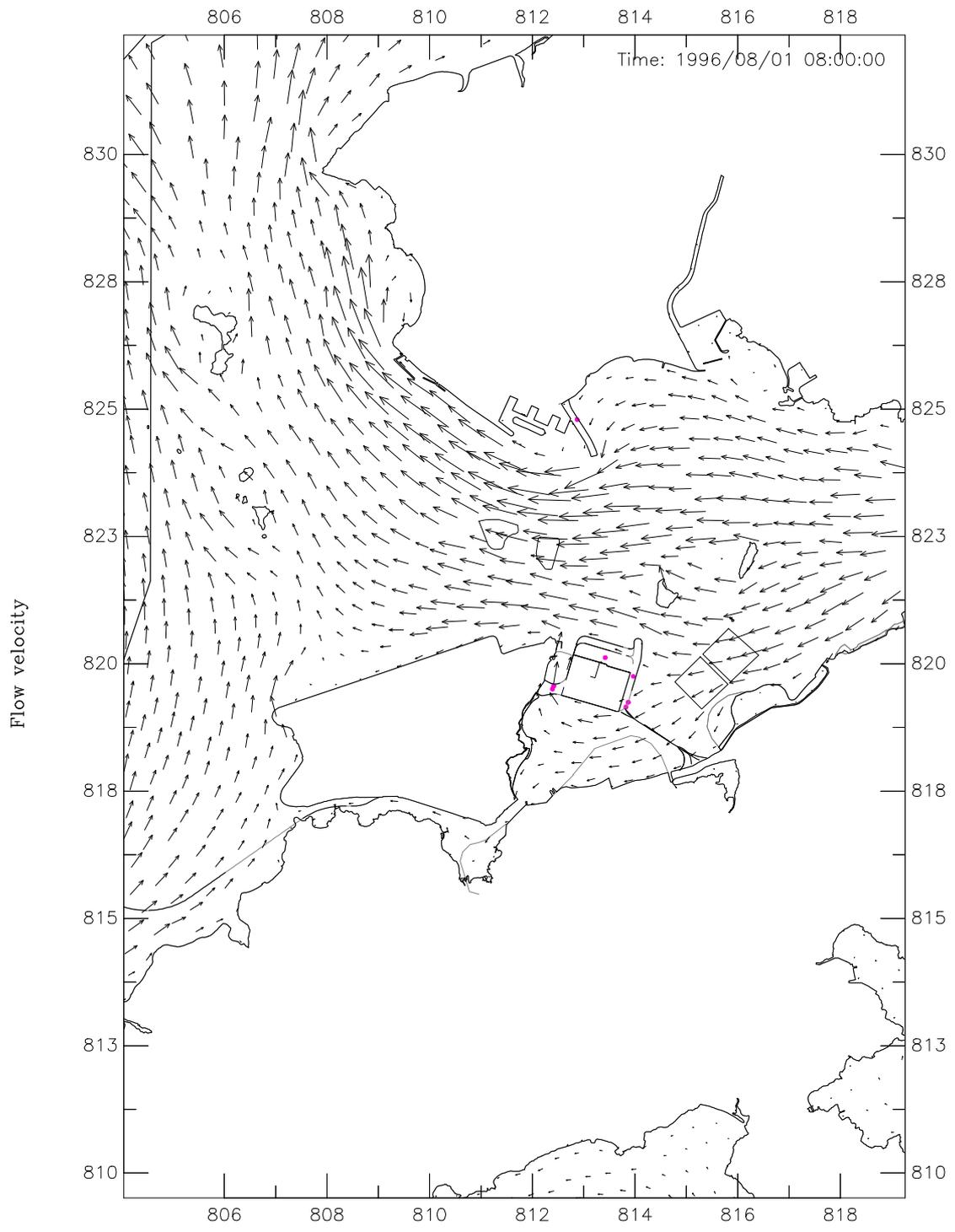
Apr 2009  
 Figure 023



Year 2013  
 Wet Season Velocity Vector Plot at Ebb Tide – Bottom Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

Apr 2009

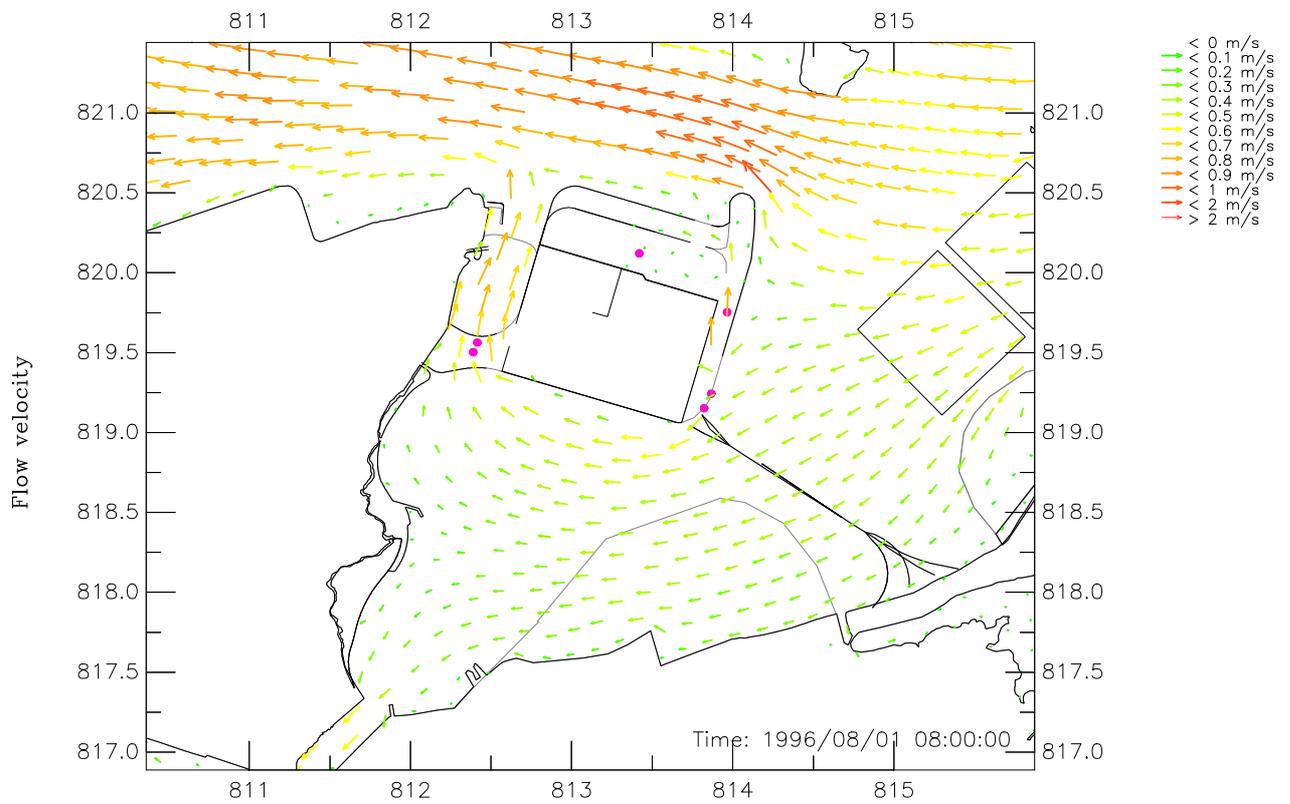
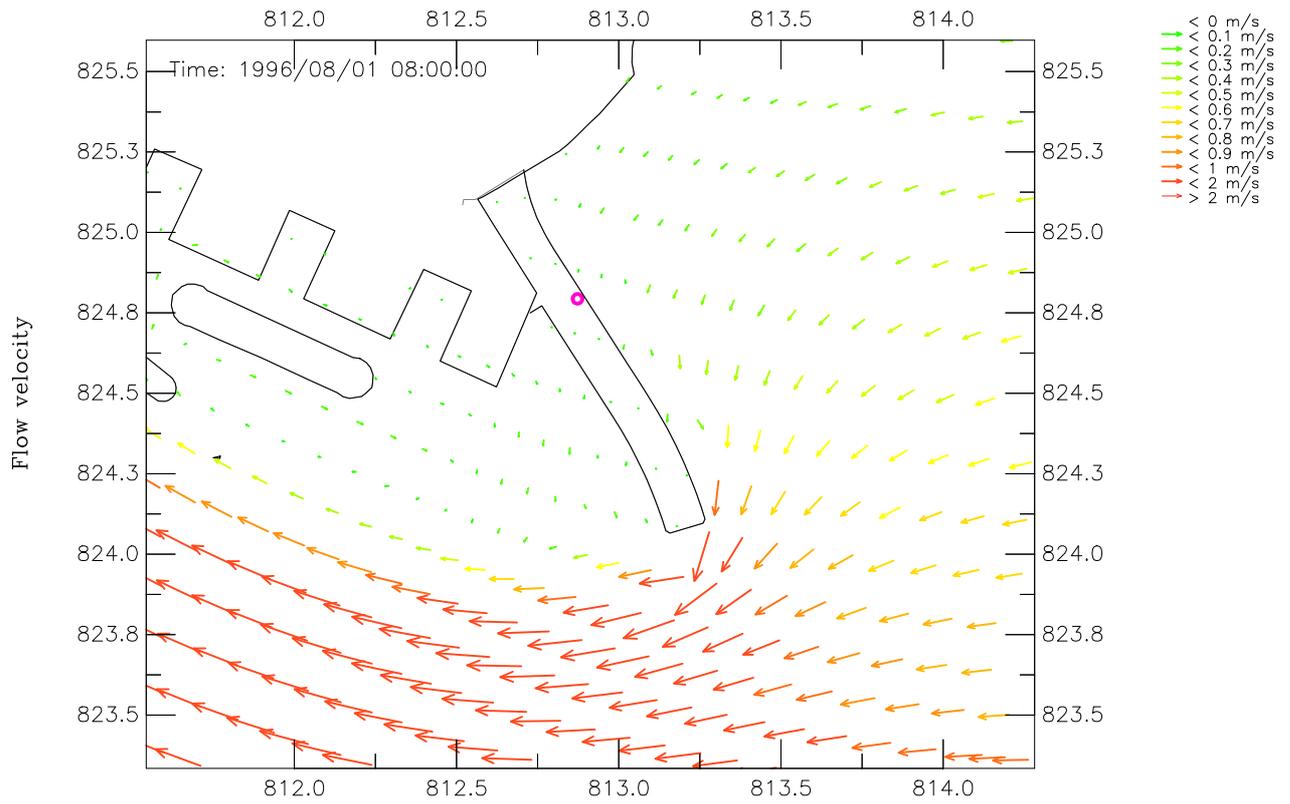
Figure 024



Year 2013  
 Dry Season Velocity Vector Plot at Flood Tide – Surface Layer

Apr 2009

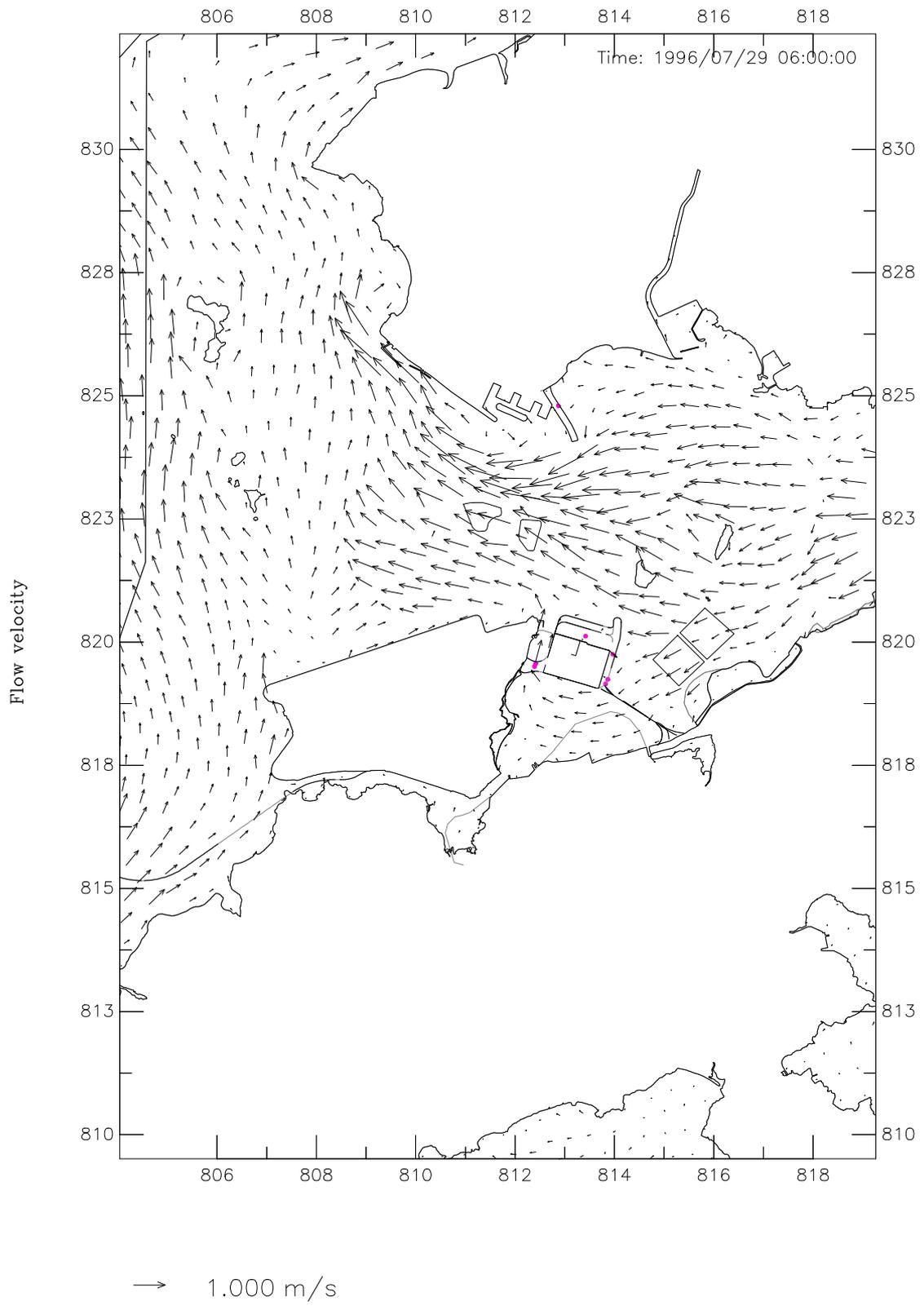
Figure 025



Year 2013  
 Dry Season Velocity Vector Plot at Flood Tide – Surface Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

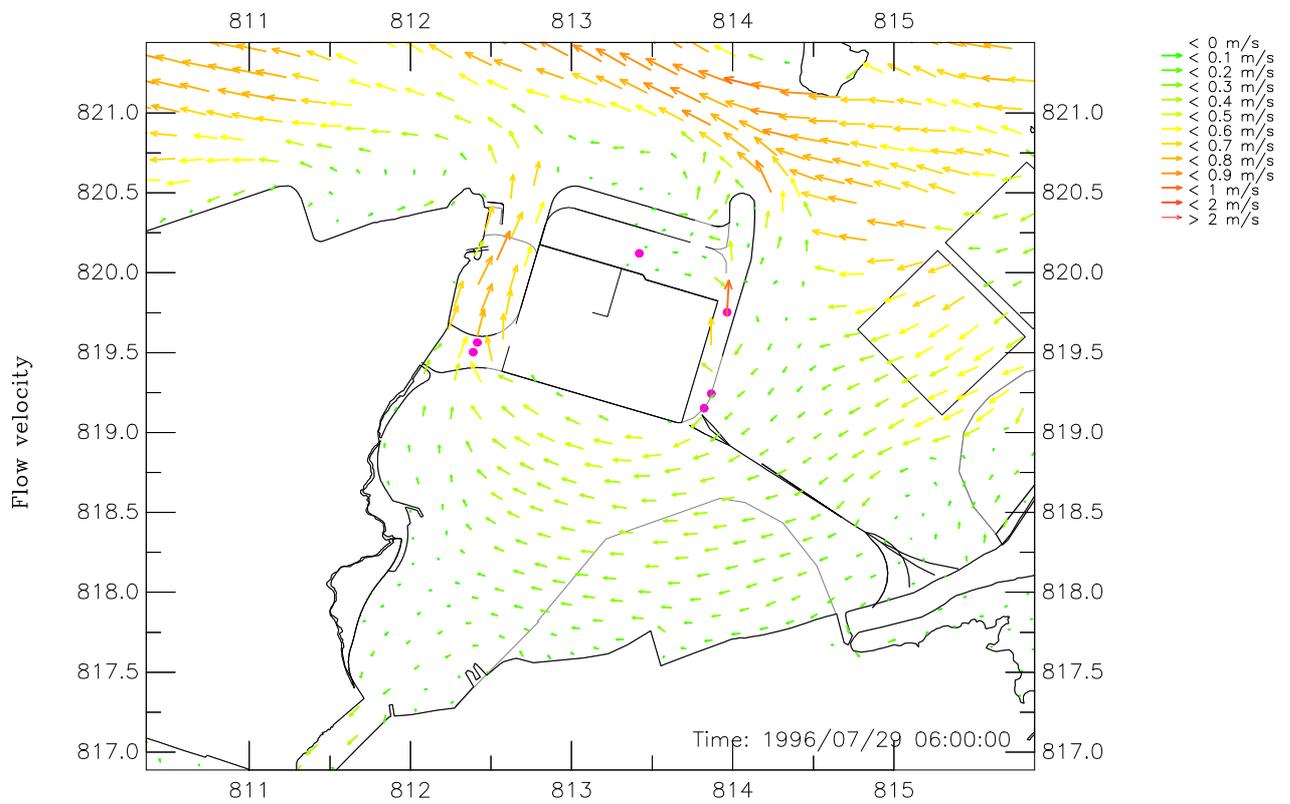
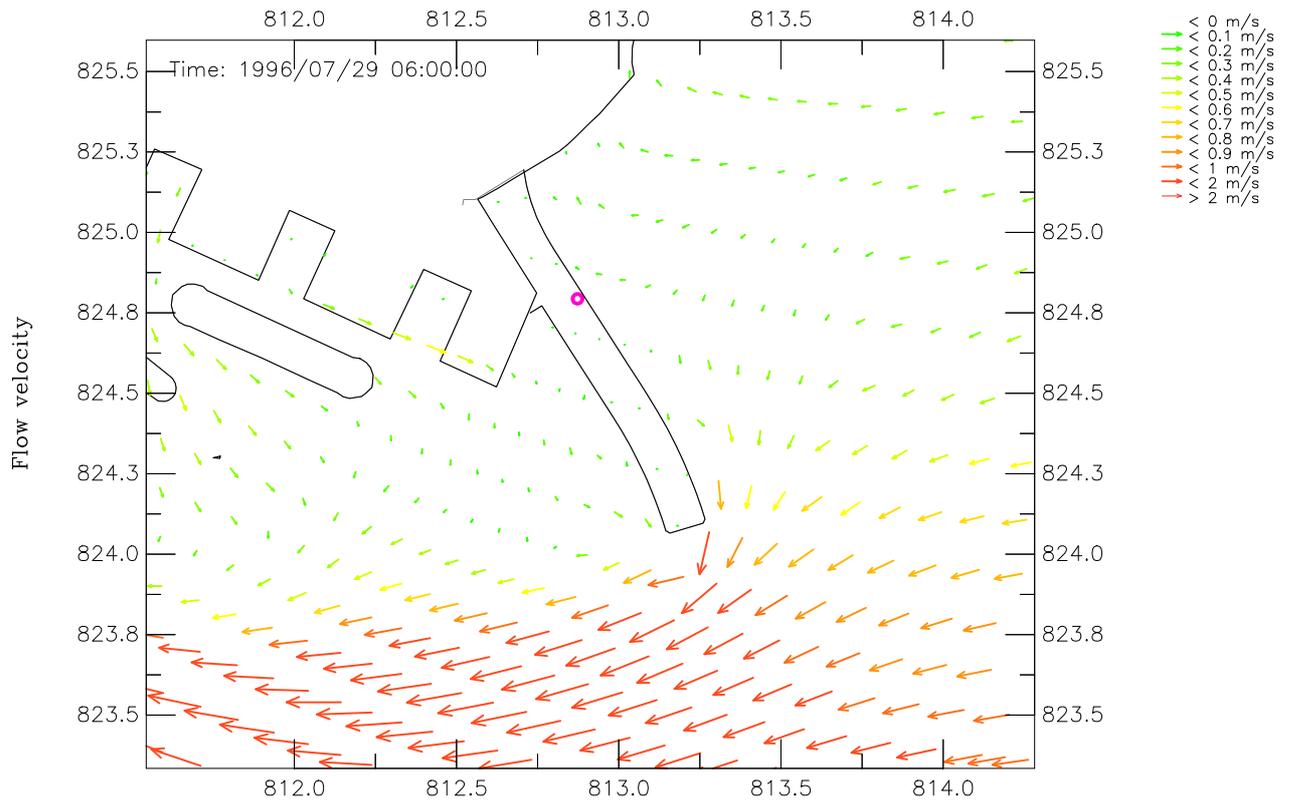
Apr 2009

Figure 026



Year 2013  
 Wet Season Velocity Vector Plot at Flood Tide – Surface Layer

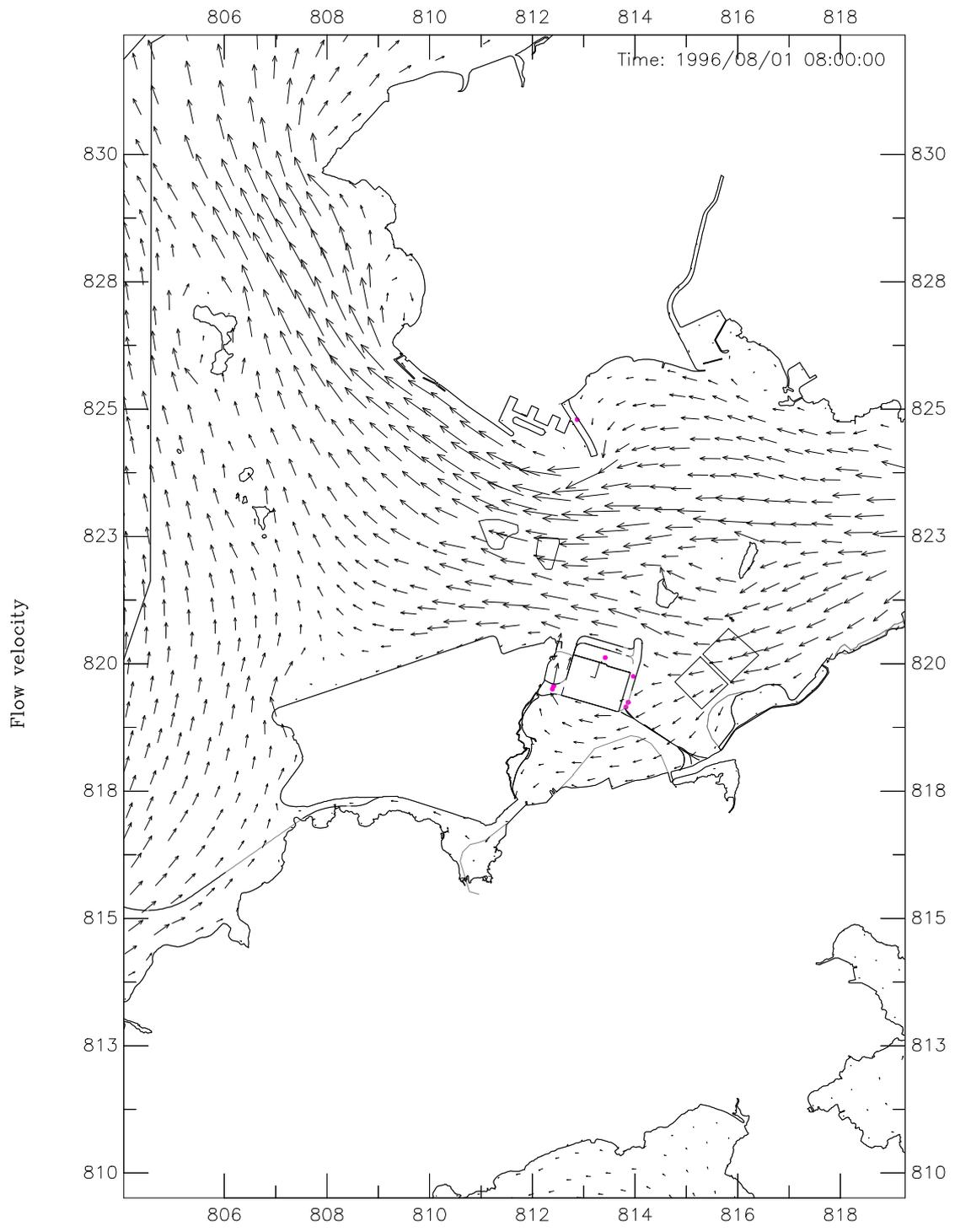
Apr 2009  
 Figure 027



Year 2013  
 Wet Season Velocity Vector Plot at Flood Tide – Surface Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

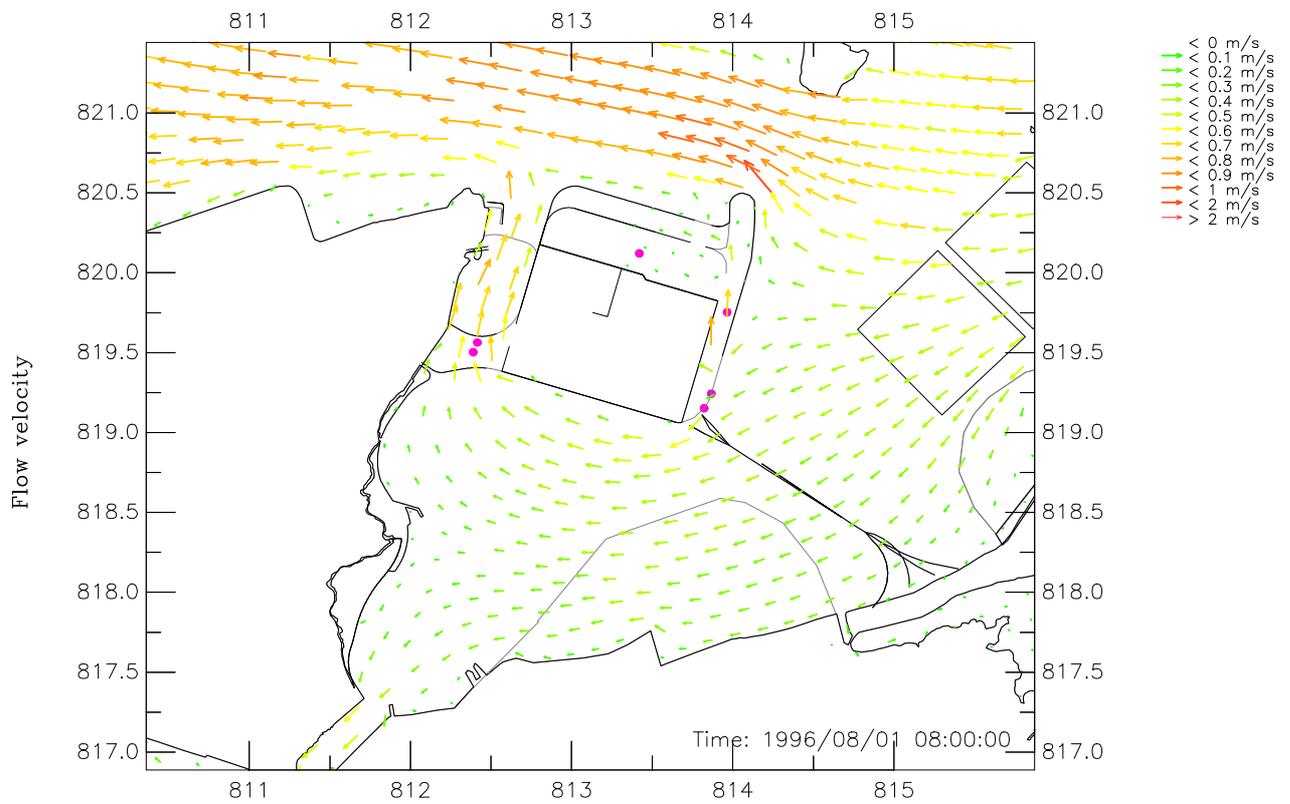
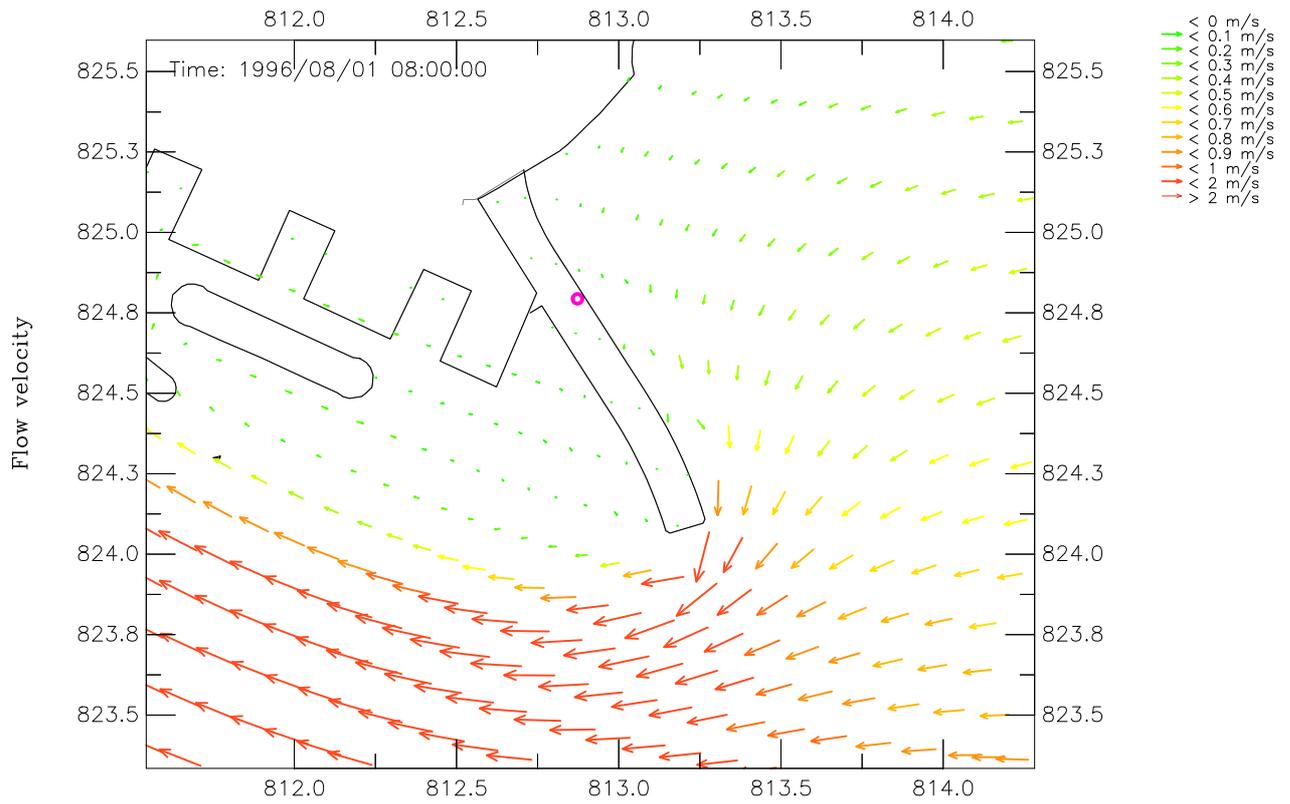
Apr 2009

Figure 028



Year 2013  
 Dry Season Velocity Vector Plot at Flood Tide – Mid-Depth

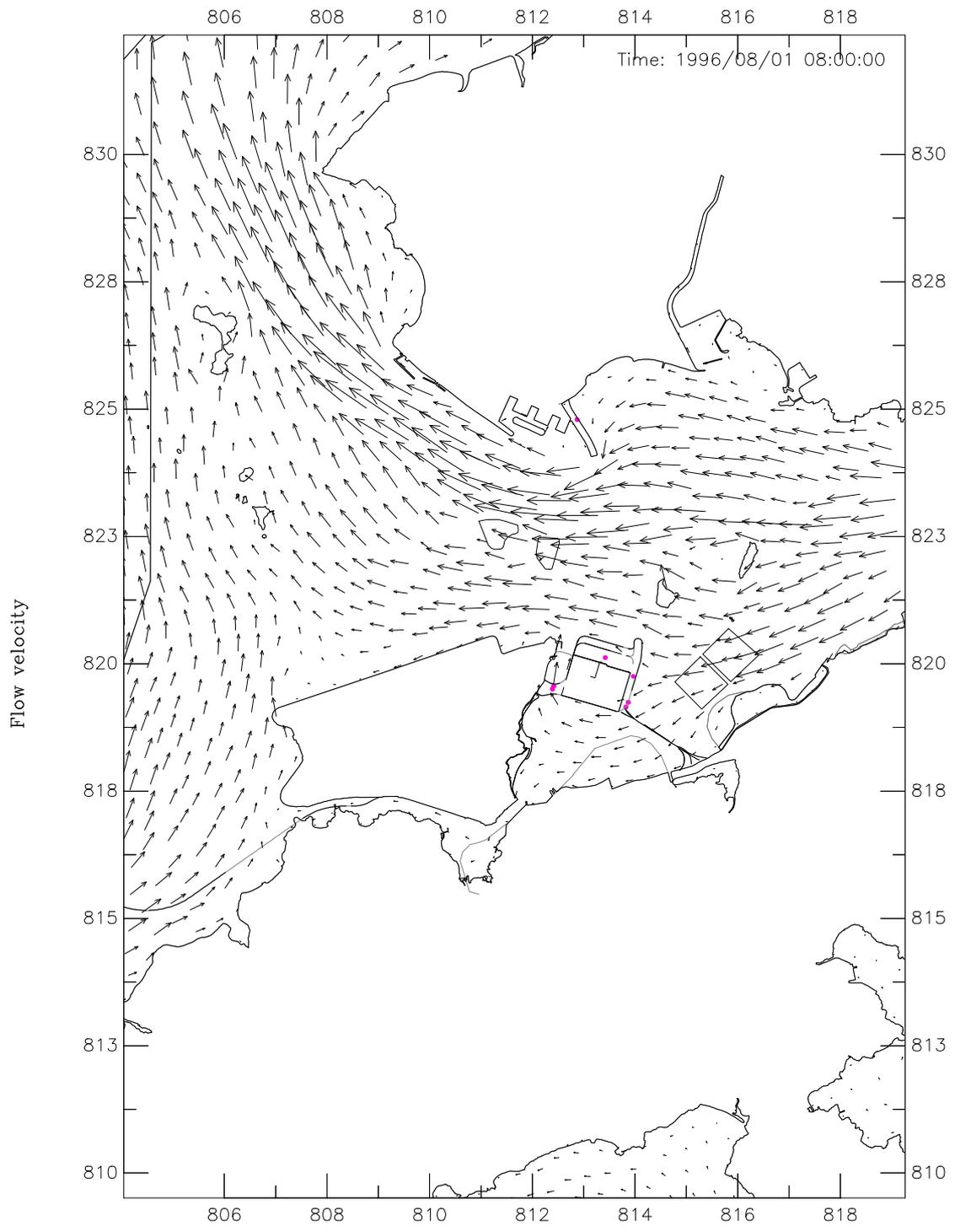
Apr 2009  
 Figure 029



Year 2013  
 Dry Season Velocity Vector Plot at Flood Tide – Mid-Depth  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

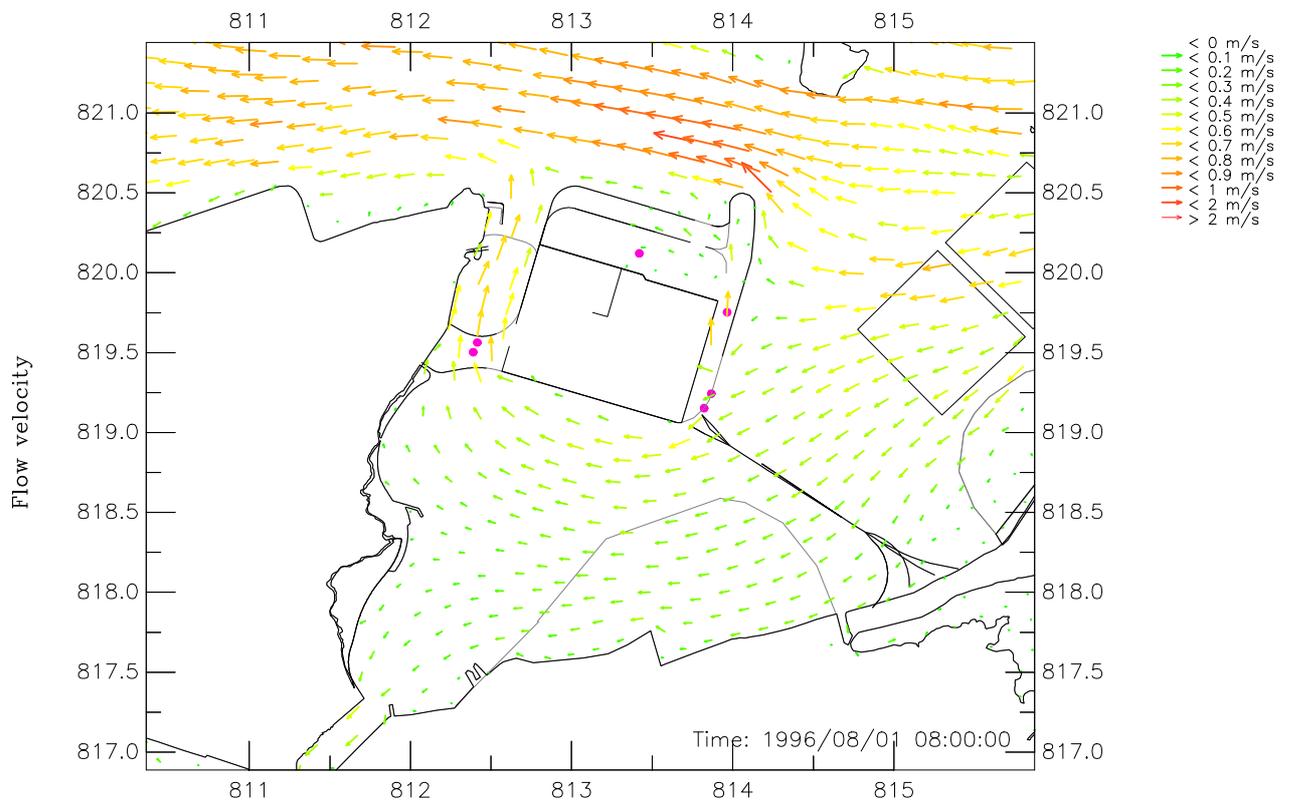
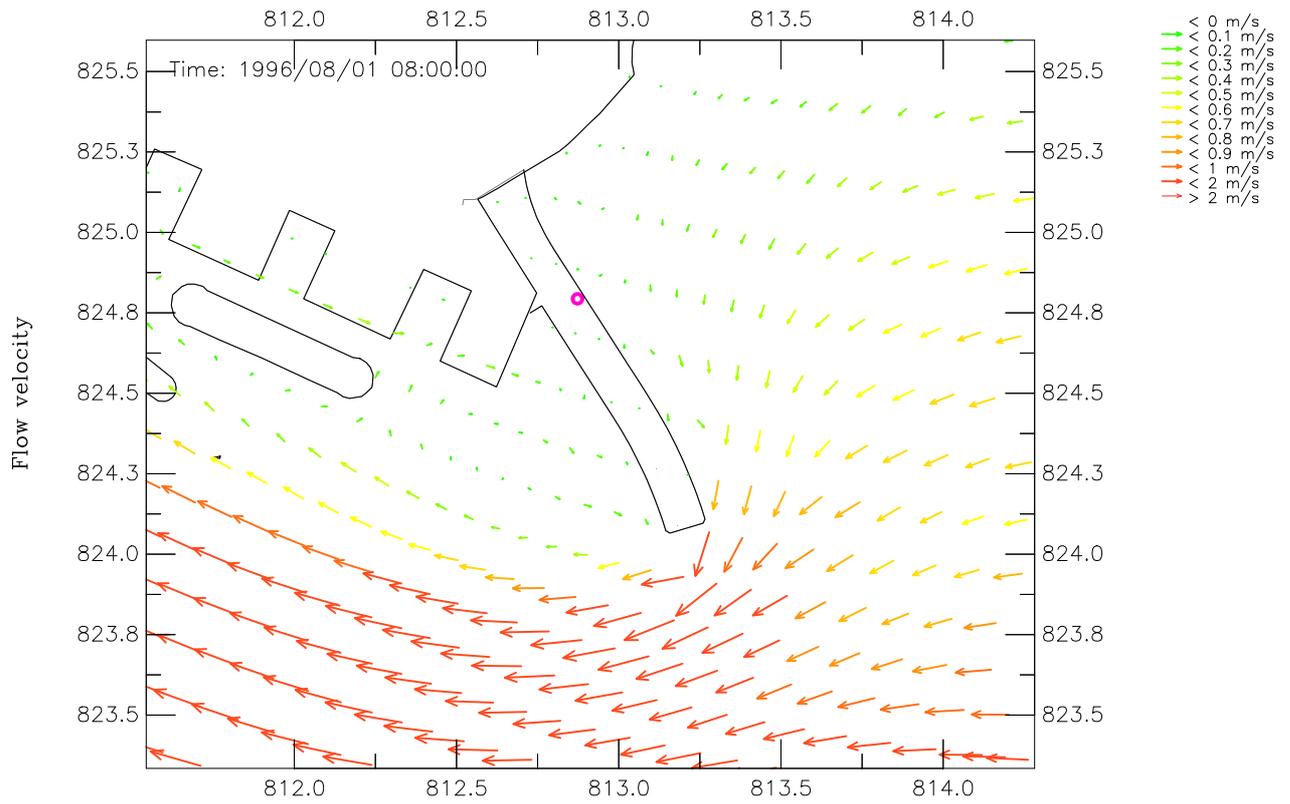
Apr 2009

Figure 030



Year 2013  
 Wet Season Velocity Vector Plot at Flood Tide – Mid-Depth

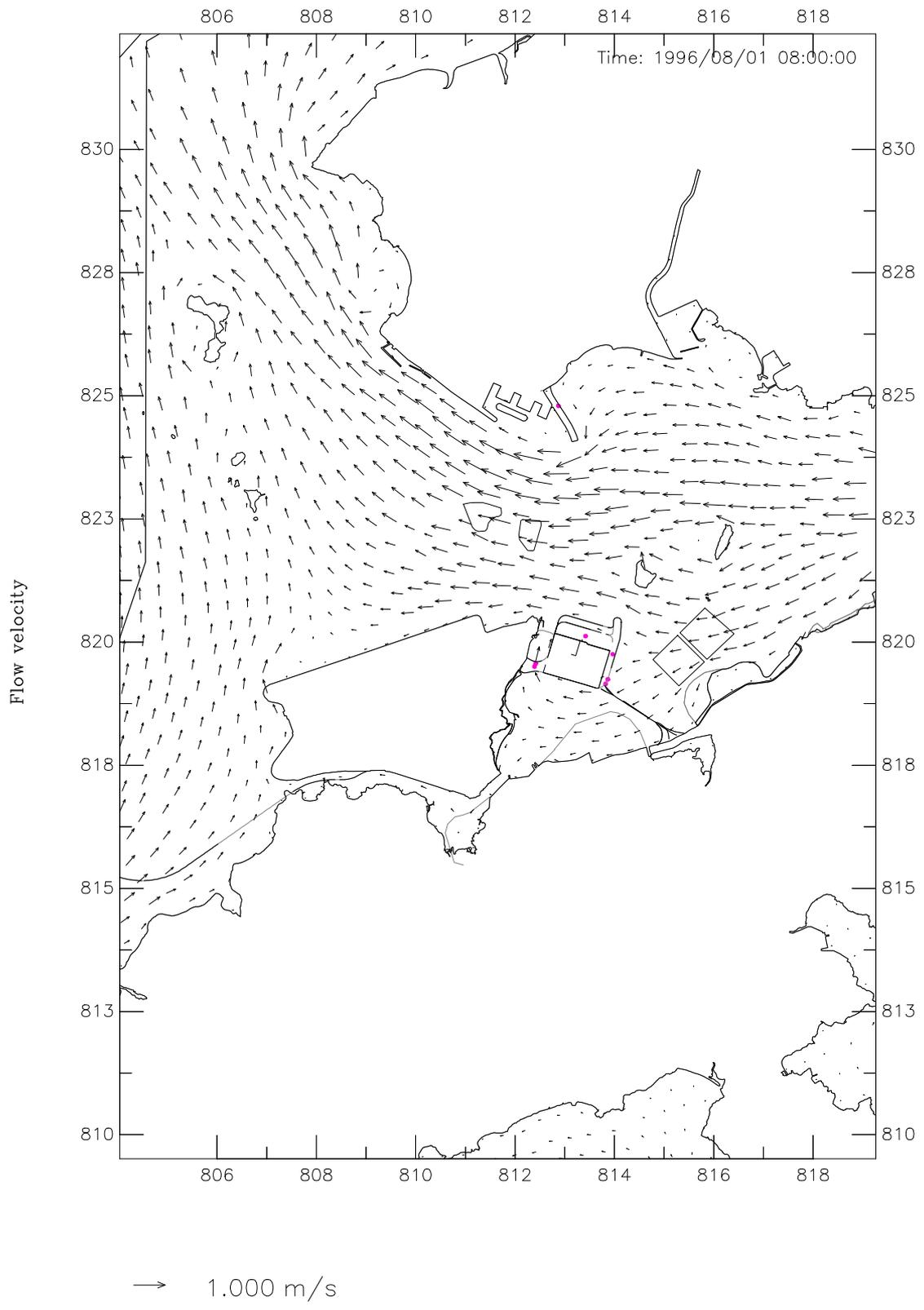
Apr 2009  
 Figure 031



Year 2013  
 Wet Season Velocity Vector Plot at Flood Tide – Mid-Depth  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

Apr 2009

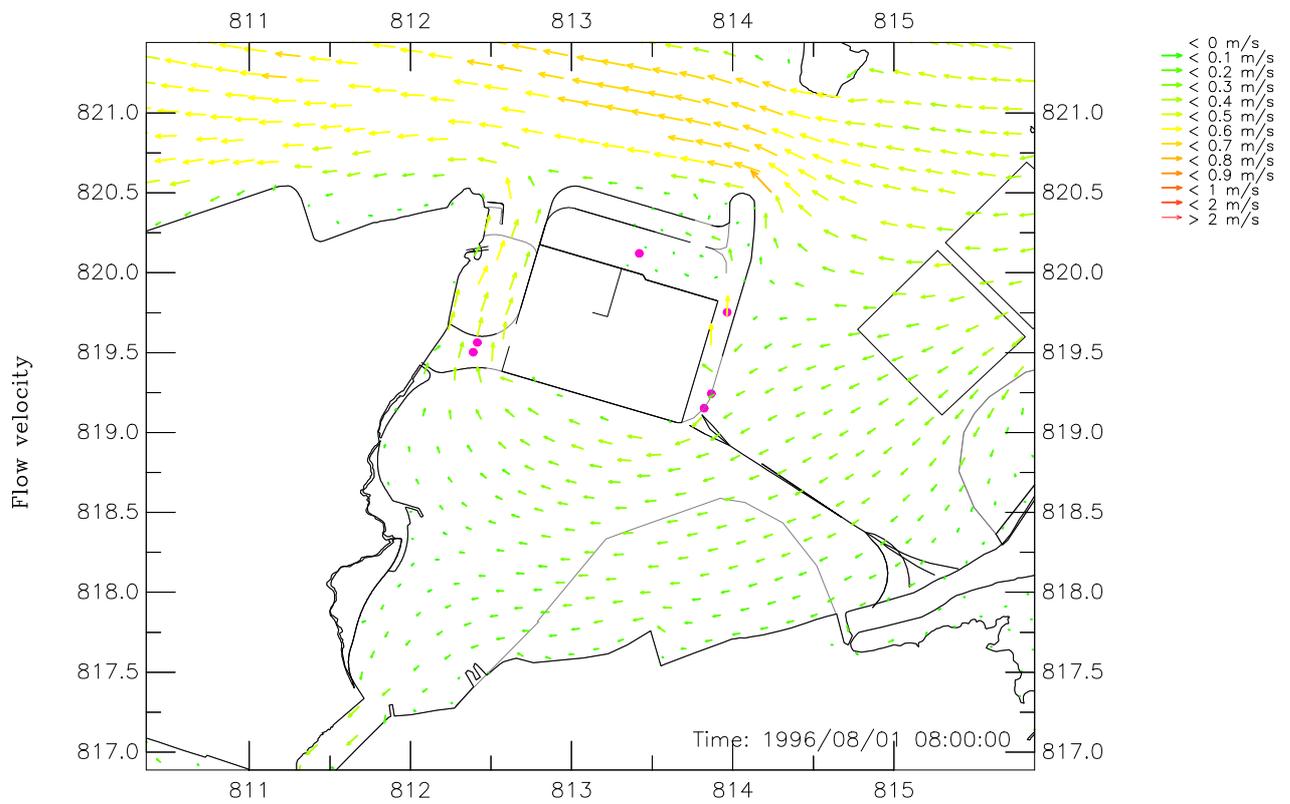
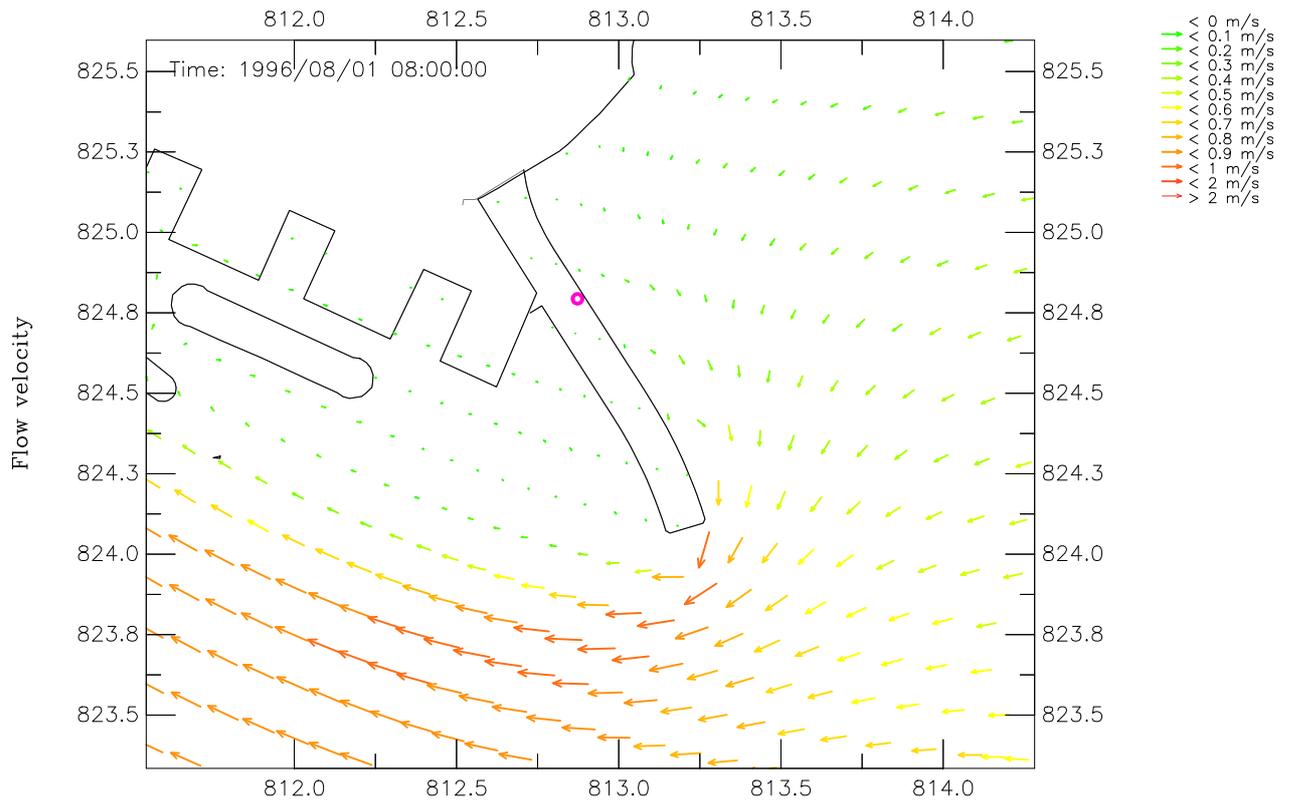
Figure 032



Year 2013  
 Dry Season Velocity Vector Plot at Flood Tide – Bottom Layer

Apr 2009

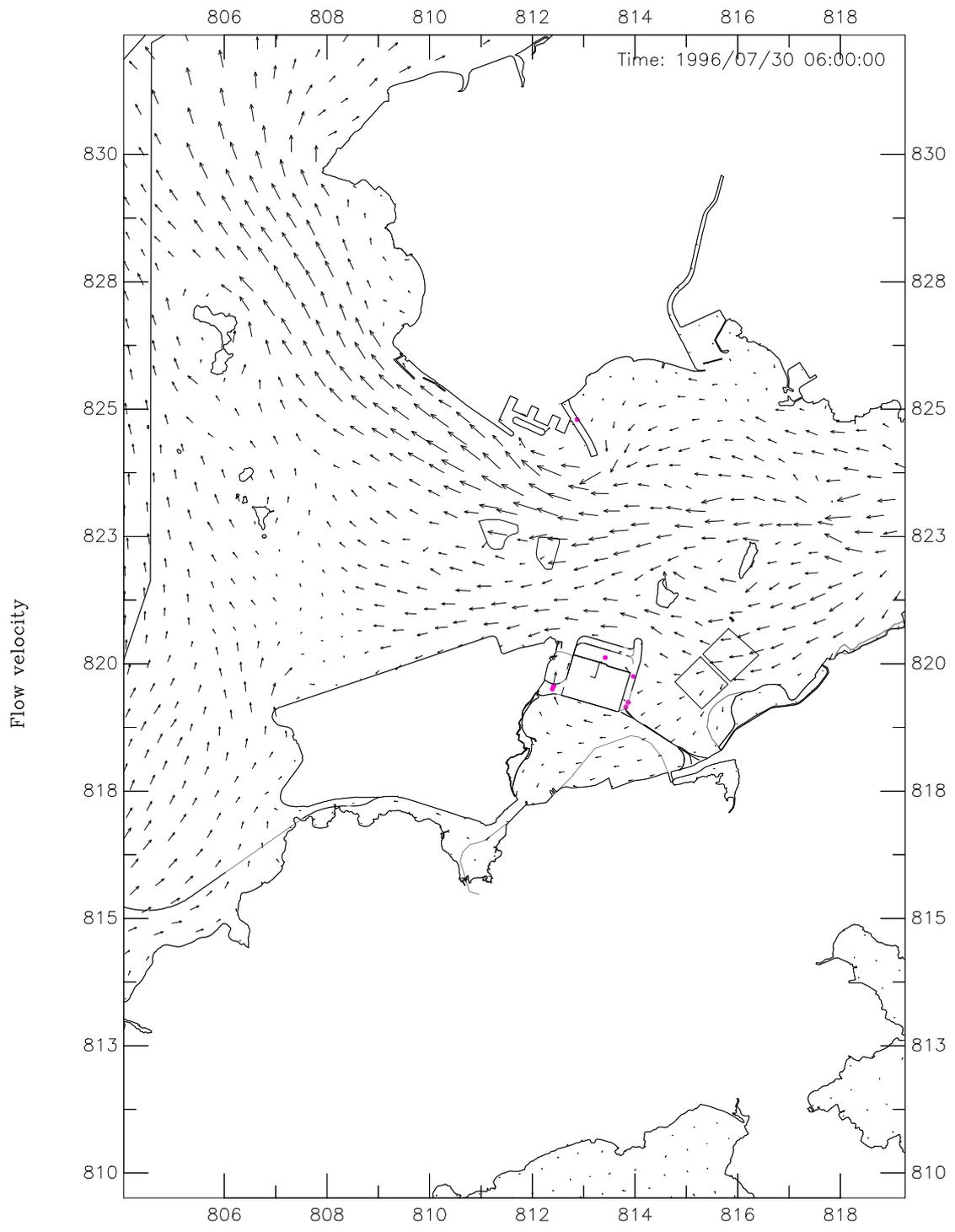
Figure 033



Year 2013  
 Dry Season Velocity Vector Plot at Flood Tide – Bottom Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

Apr 2009

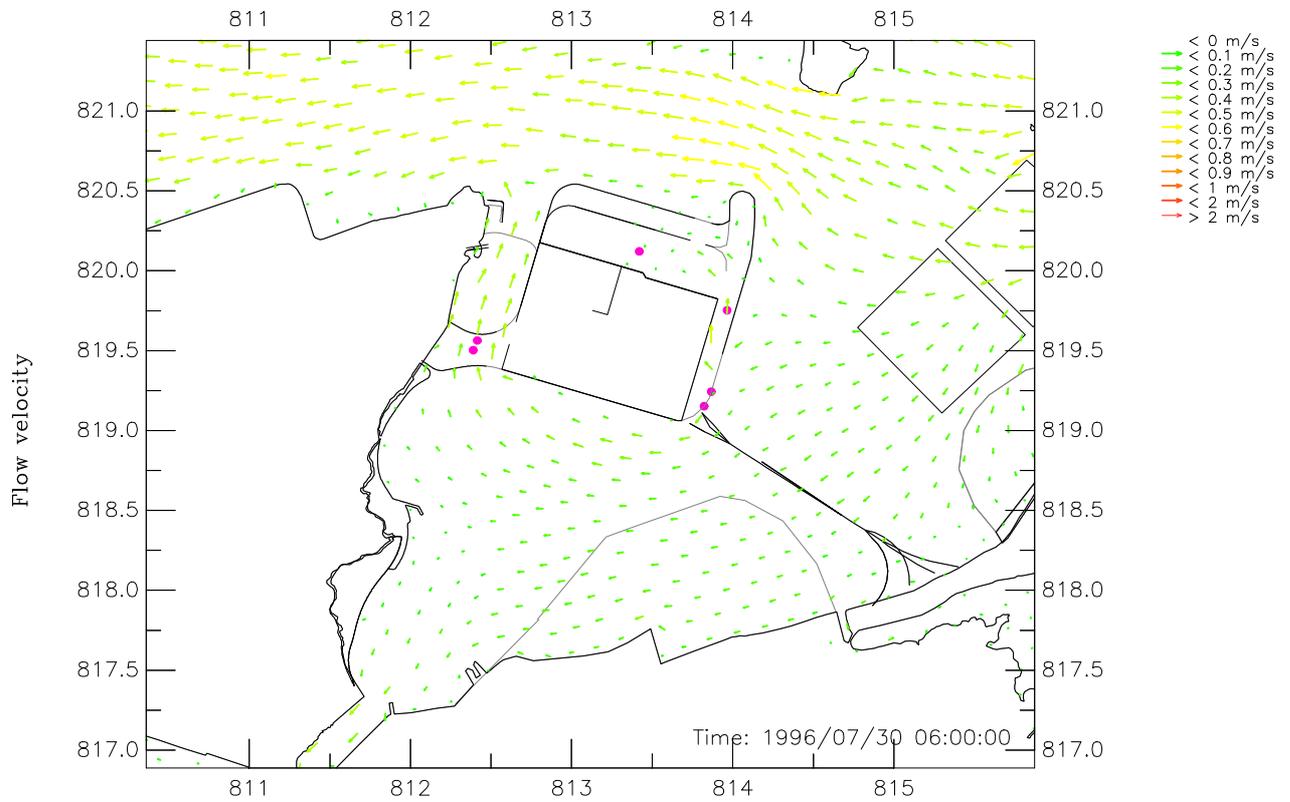
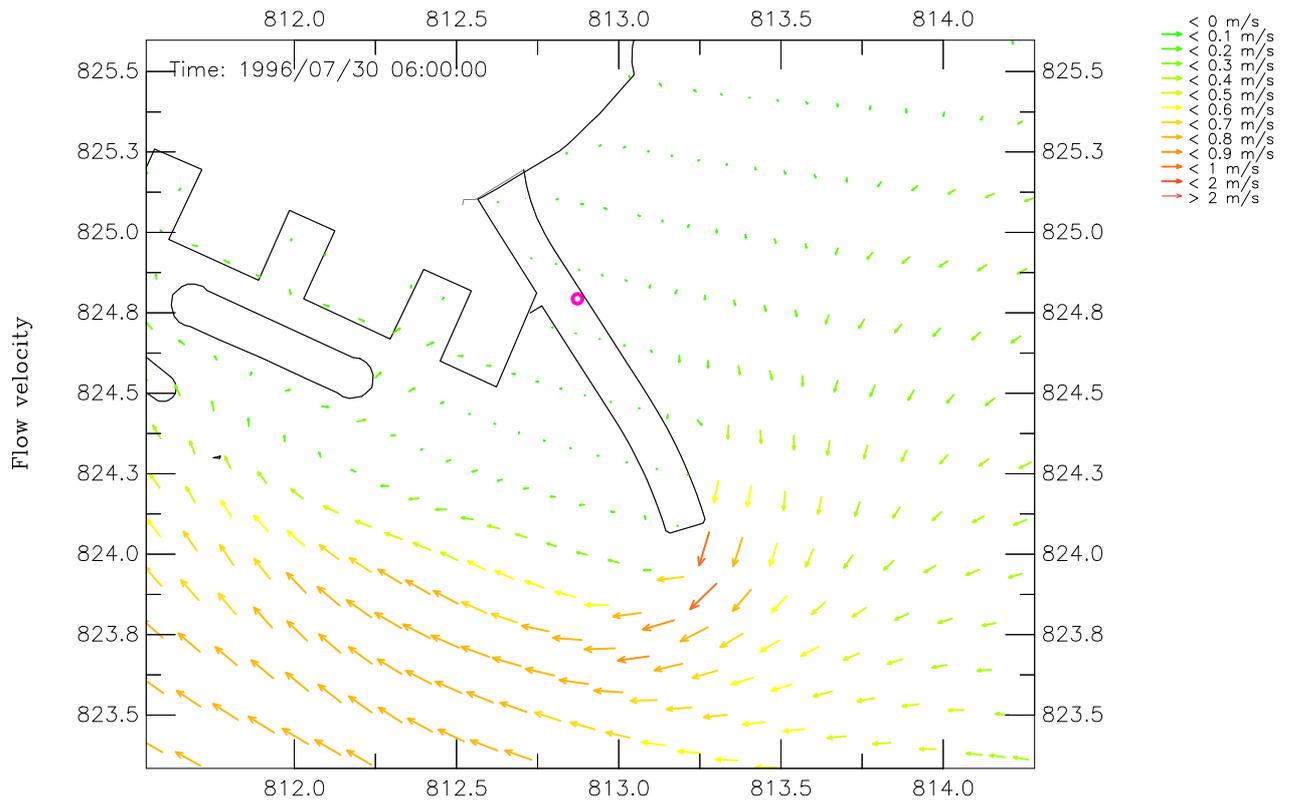
Figure 034



Year 2013  
 Wet Season Velocity Vector Plot at Flood Tide – Bottom Layer

Apr 2009

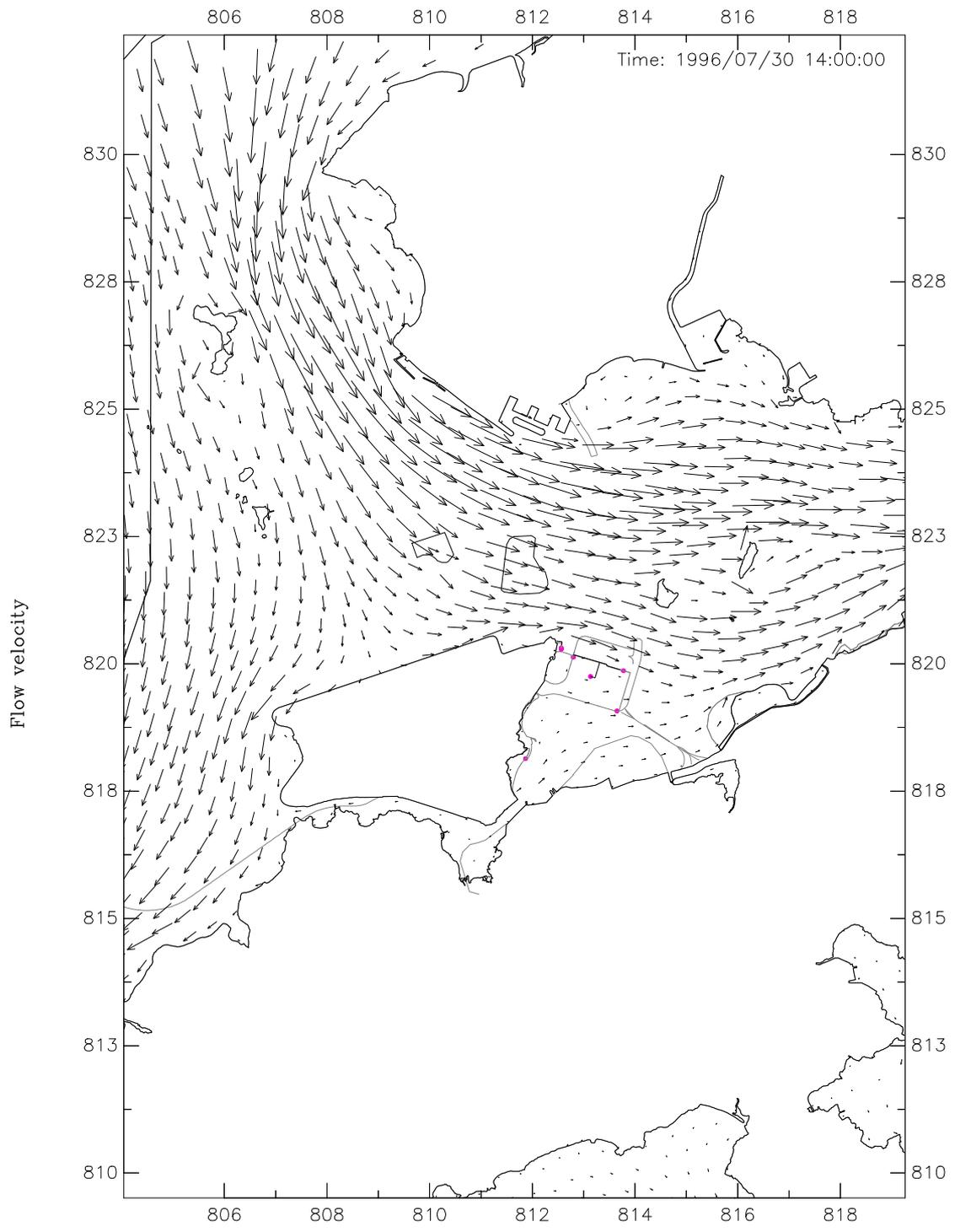
Figure 035



Year 2013  
 Wet Season Velocity Vector Plot at Flood Tide – Bottom Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

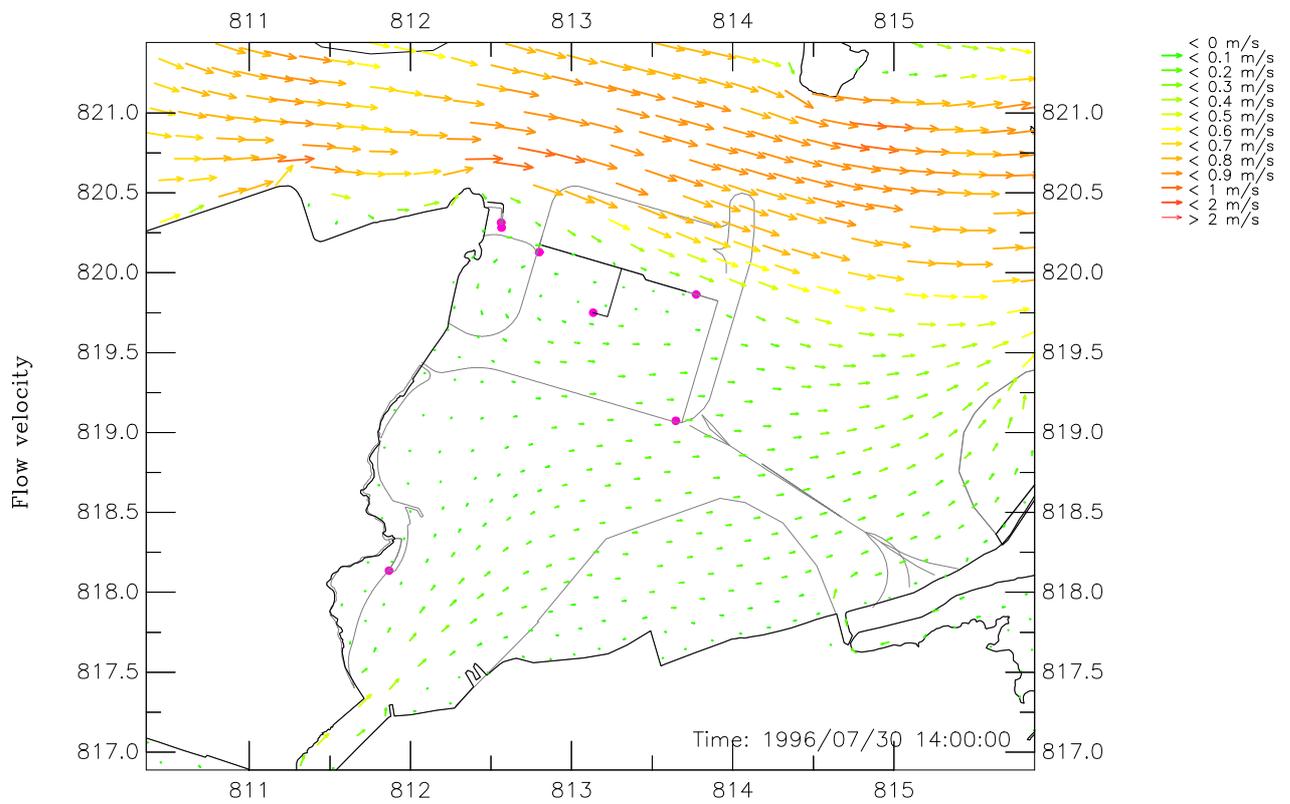
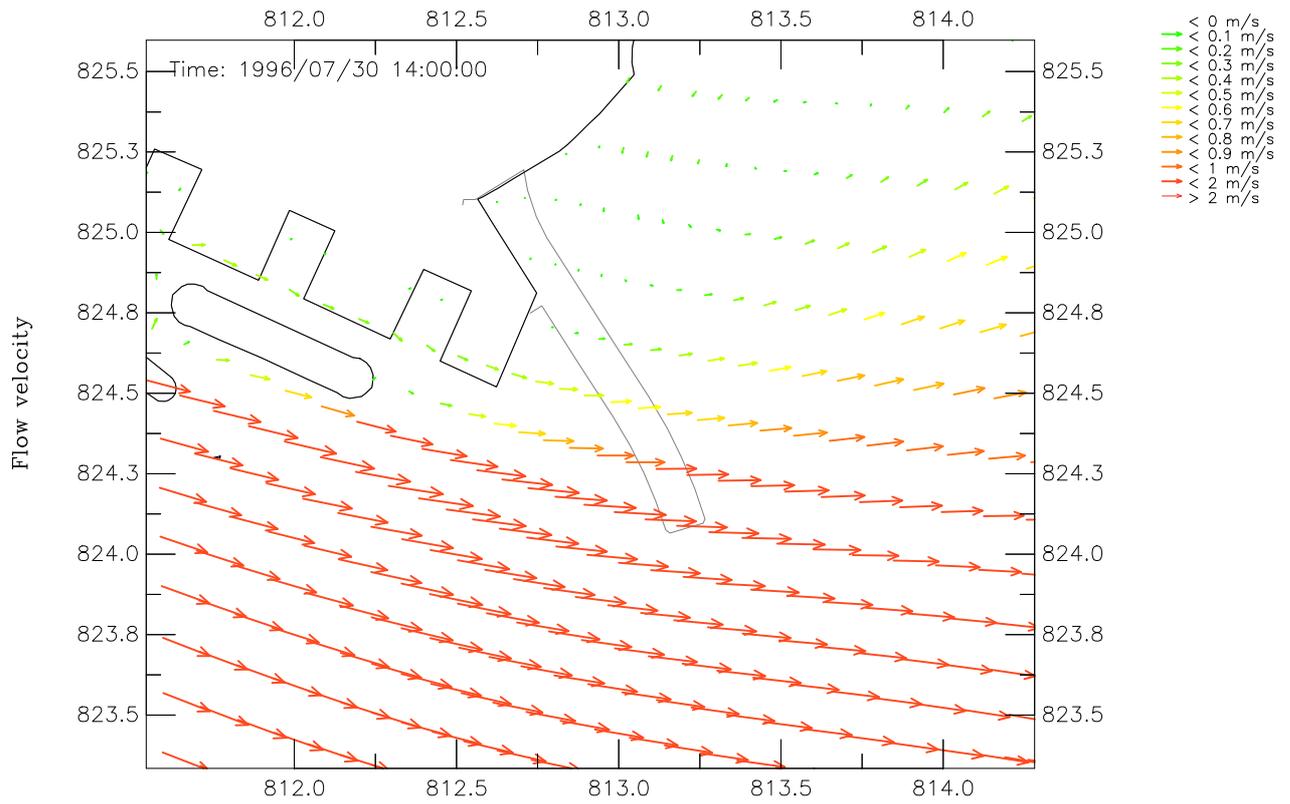
Apr 2009

Figure 036



Year 2011  
 Dry Season Velocity Vector Plot at Ebb Tide – Surface Layer

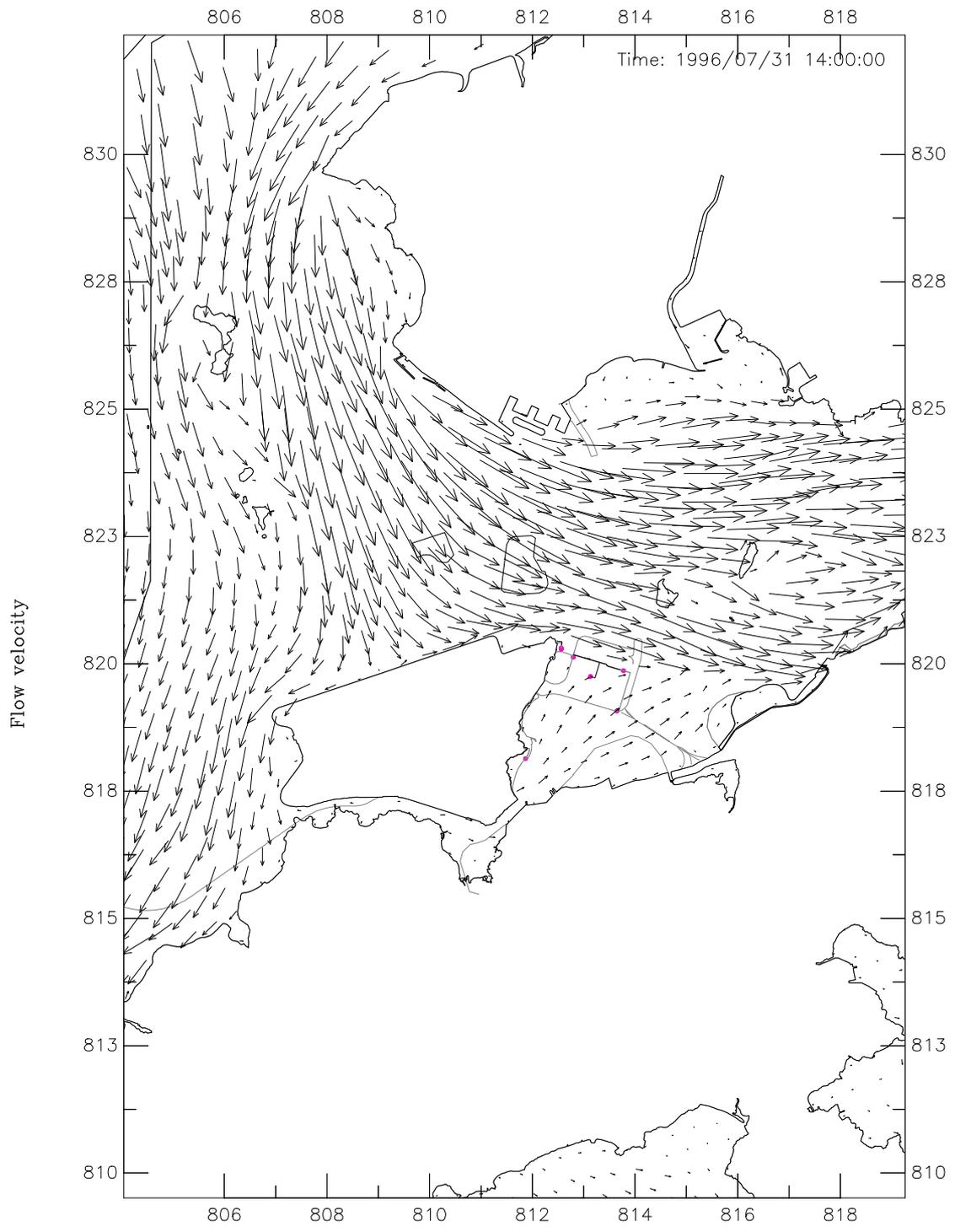
Apr 2009  
 Figure 013



Year 2011  
 Dry Season Velocity Vector Plot at Ebb Tide – Surface Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

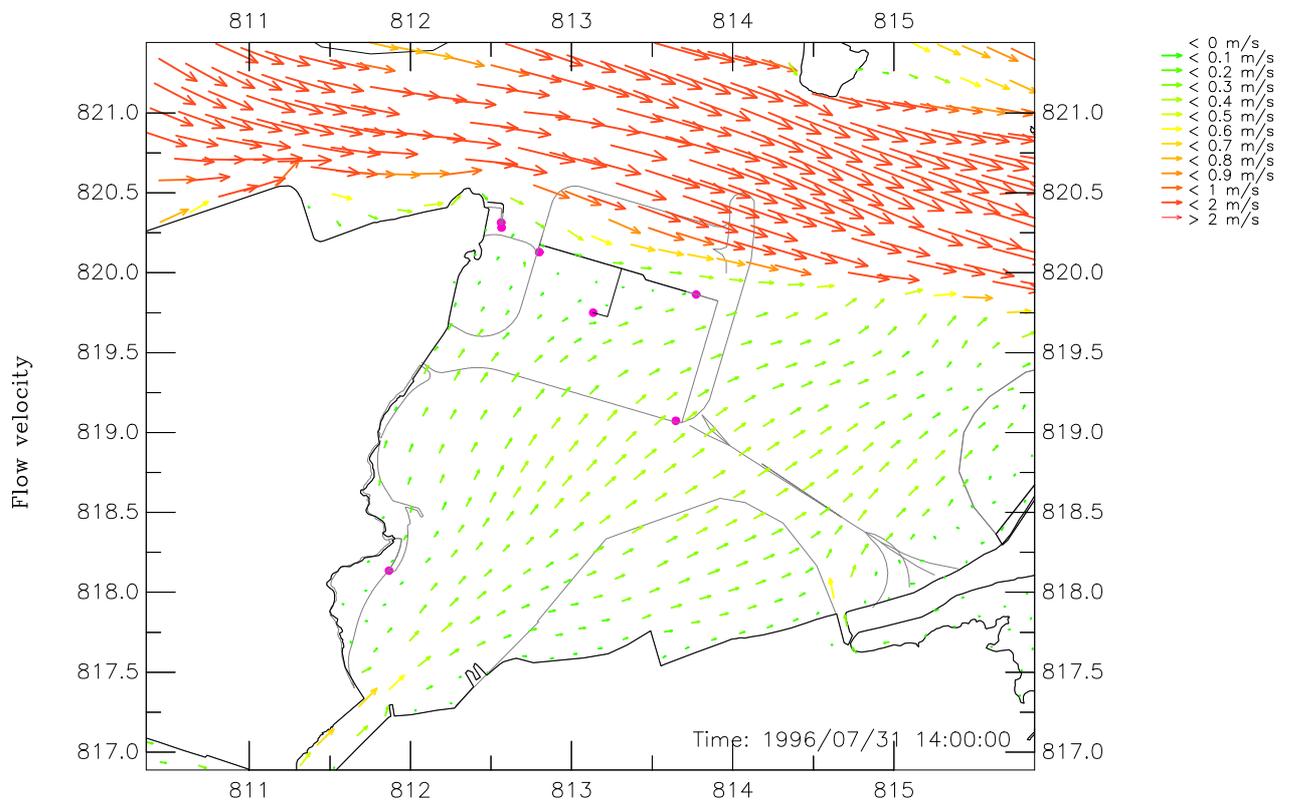
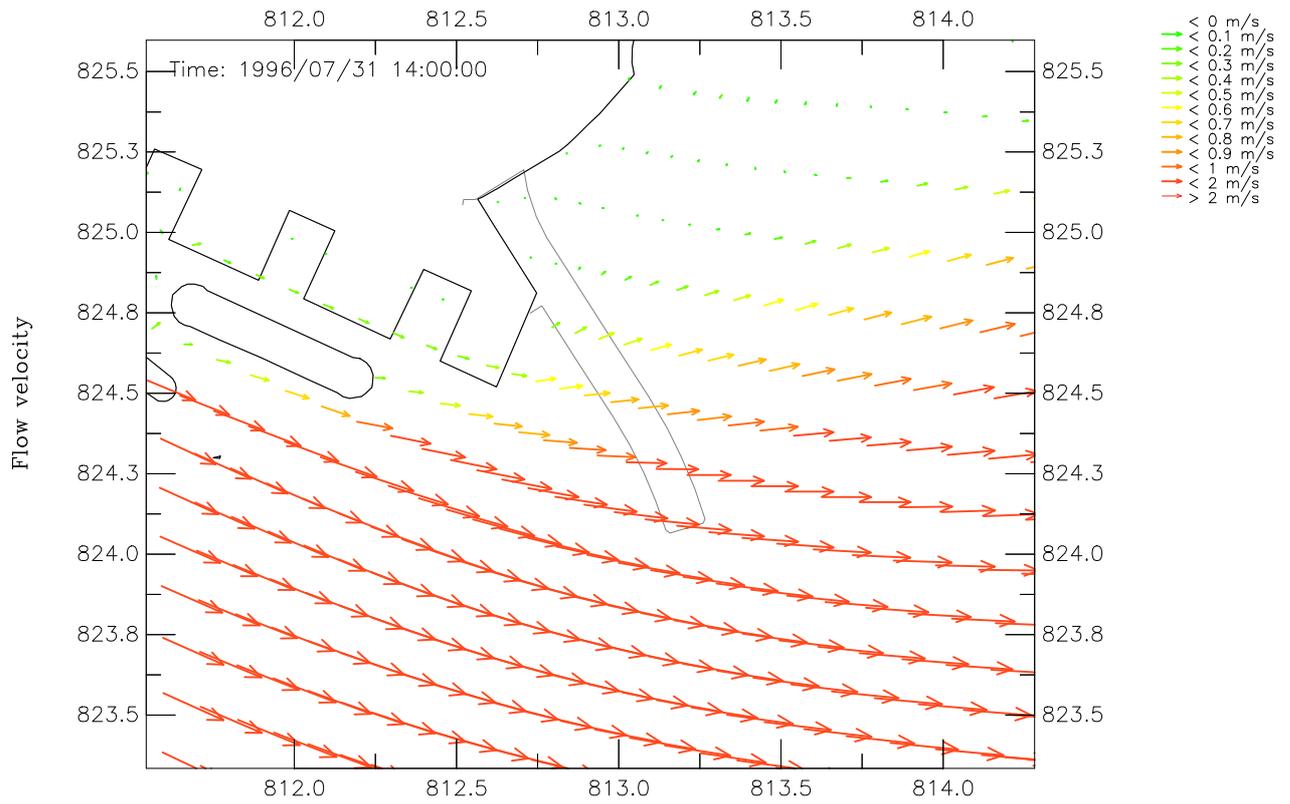
Apr 2009

Figure 014



Year 2011  
 Wet Season Velocity Vector Plot at Ebb Tide – Surface Layer

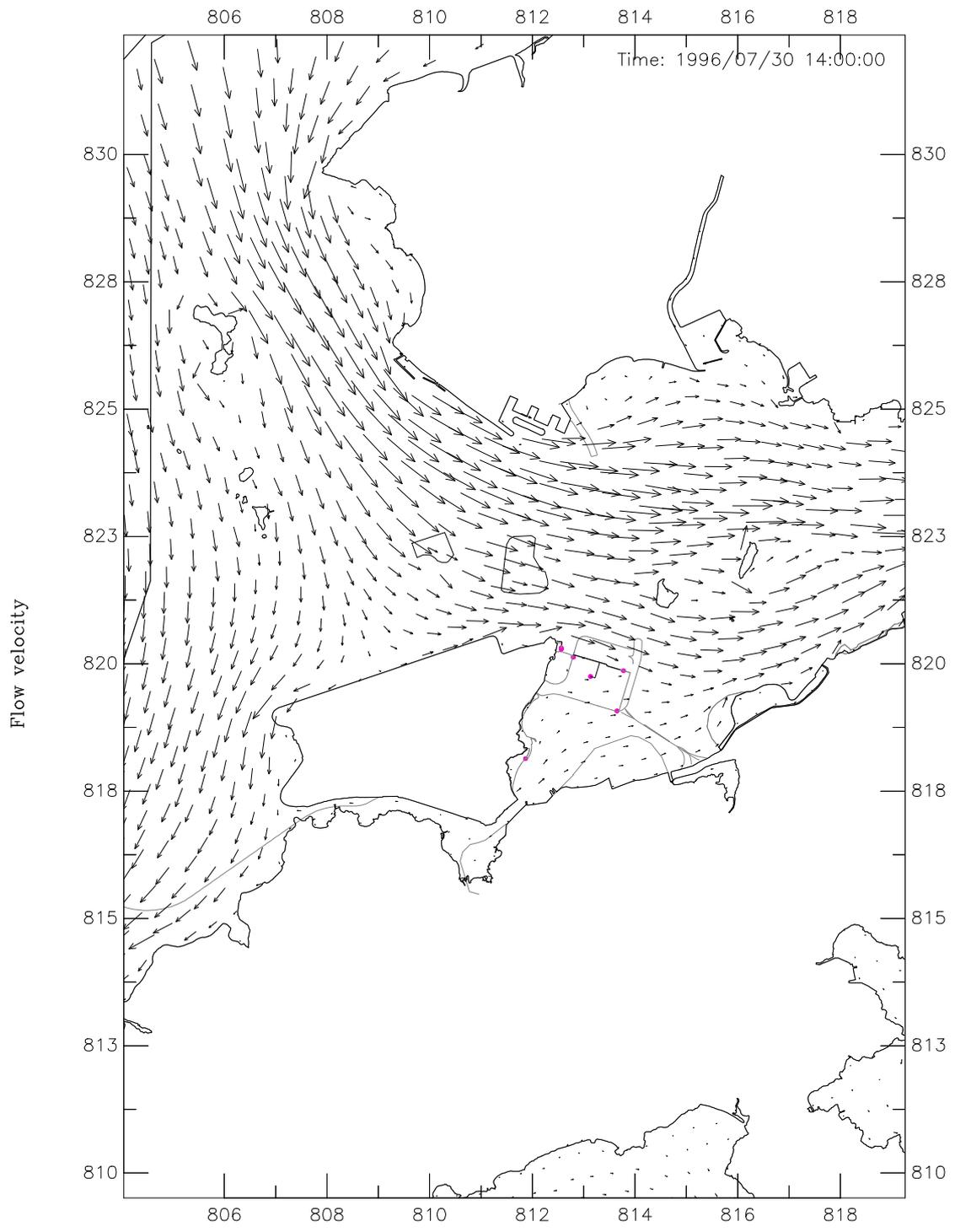
Apr 2009  
 Figure 015



Year 2011  
 Wet Season Velocity Vector Plot at Ebb Tide – Surface Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

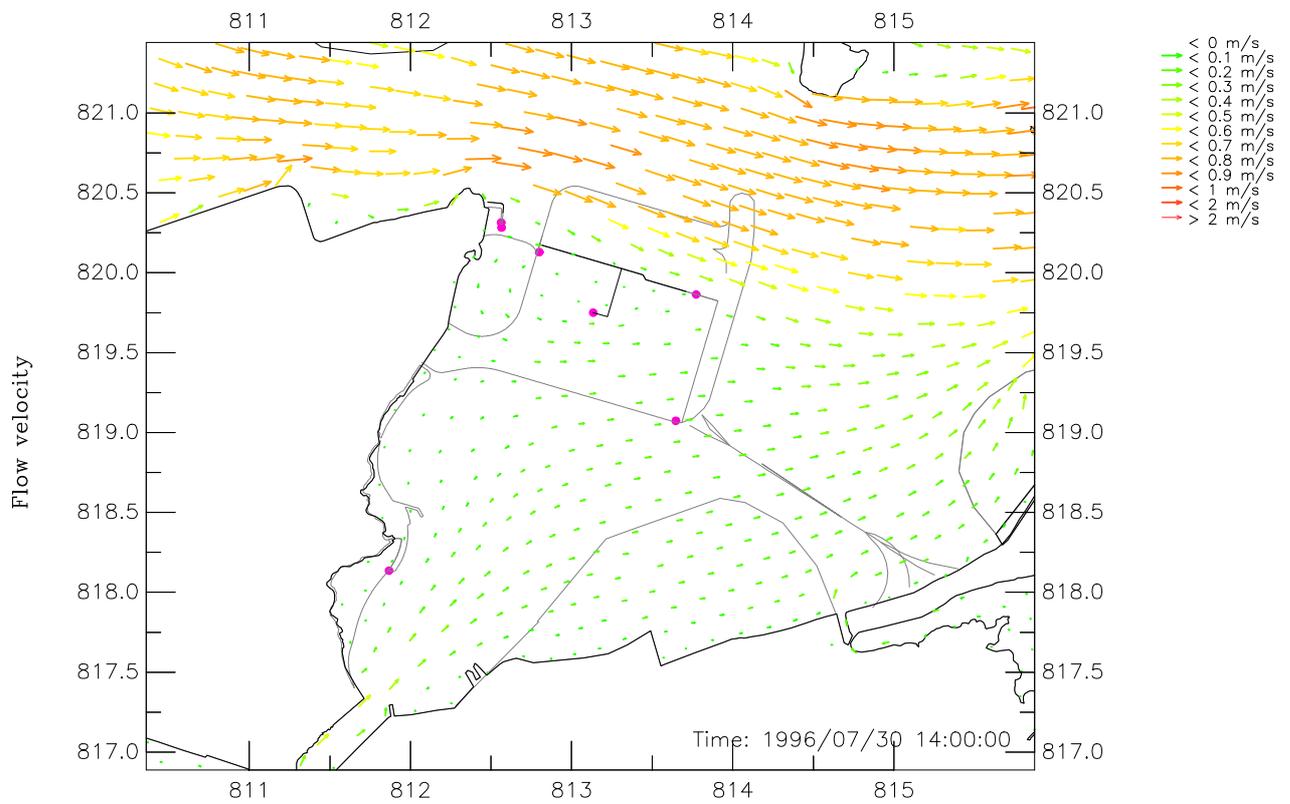
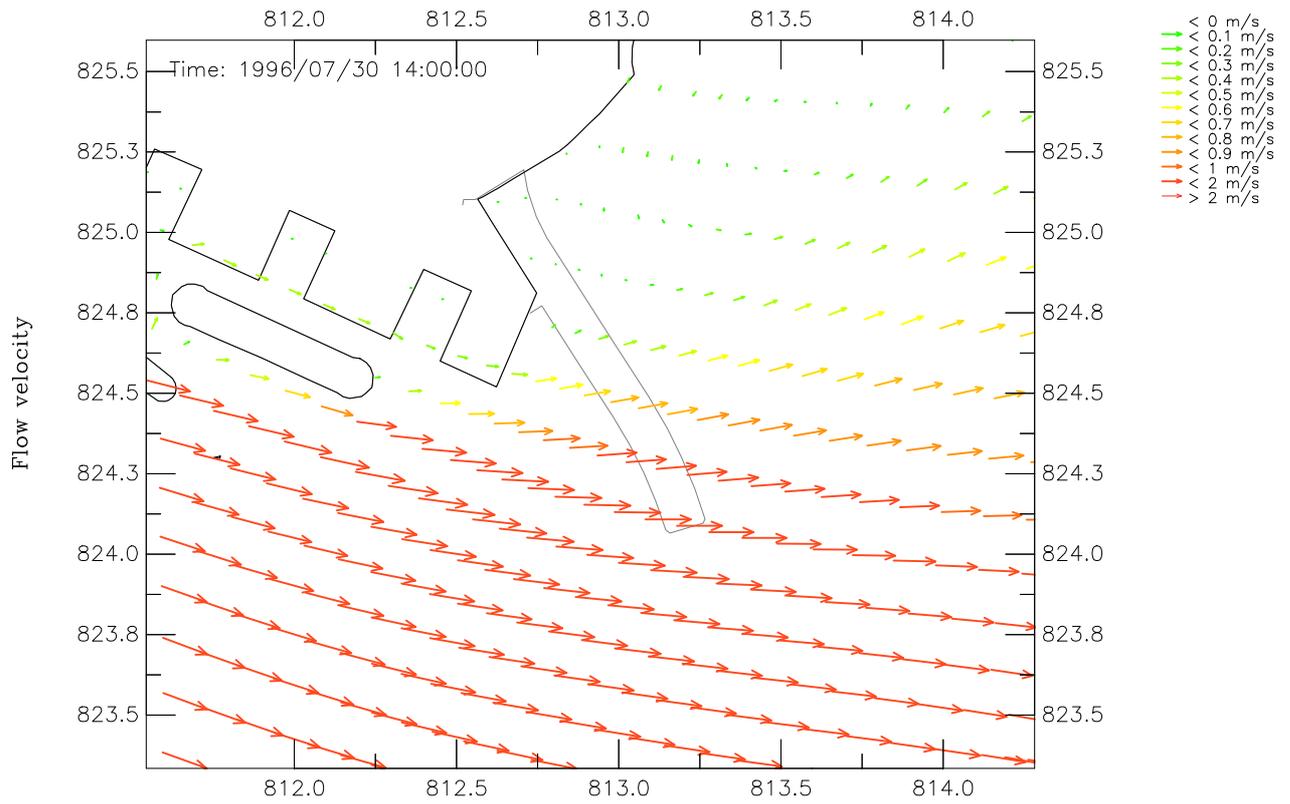
Apr 2009

Figure 016



Year 2011  
 Dry Season Velocity Vector Plot at Ebb Tide – Mid-Depth

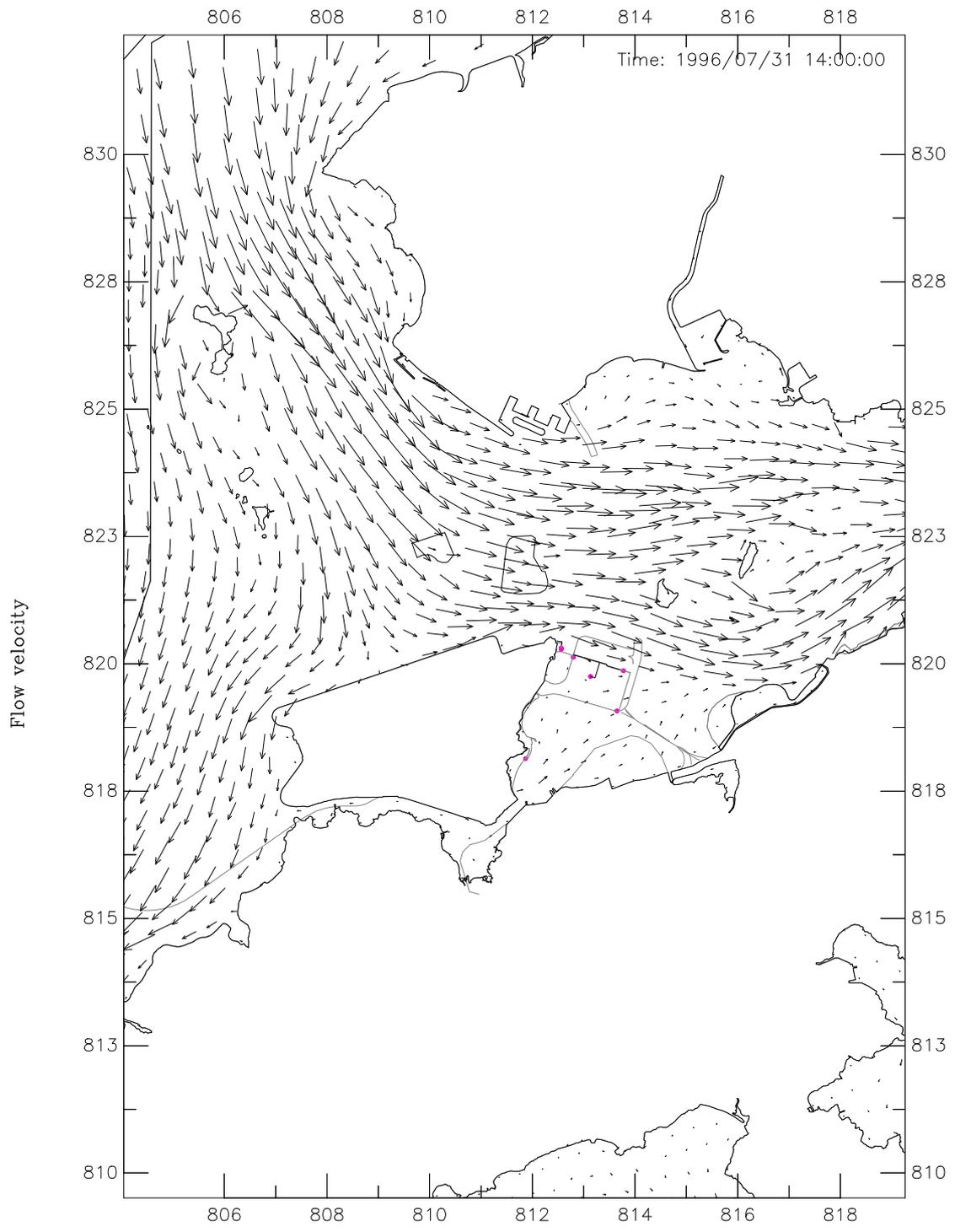
Apr 2009  
 Figure 017



Year 2011  
 Dry Season Velocity Vector Plot at Ebb Tide – Mid-Depth  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

Apr 2009

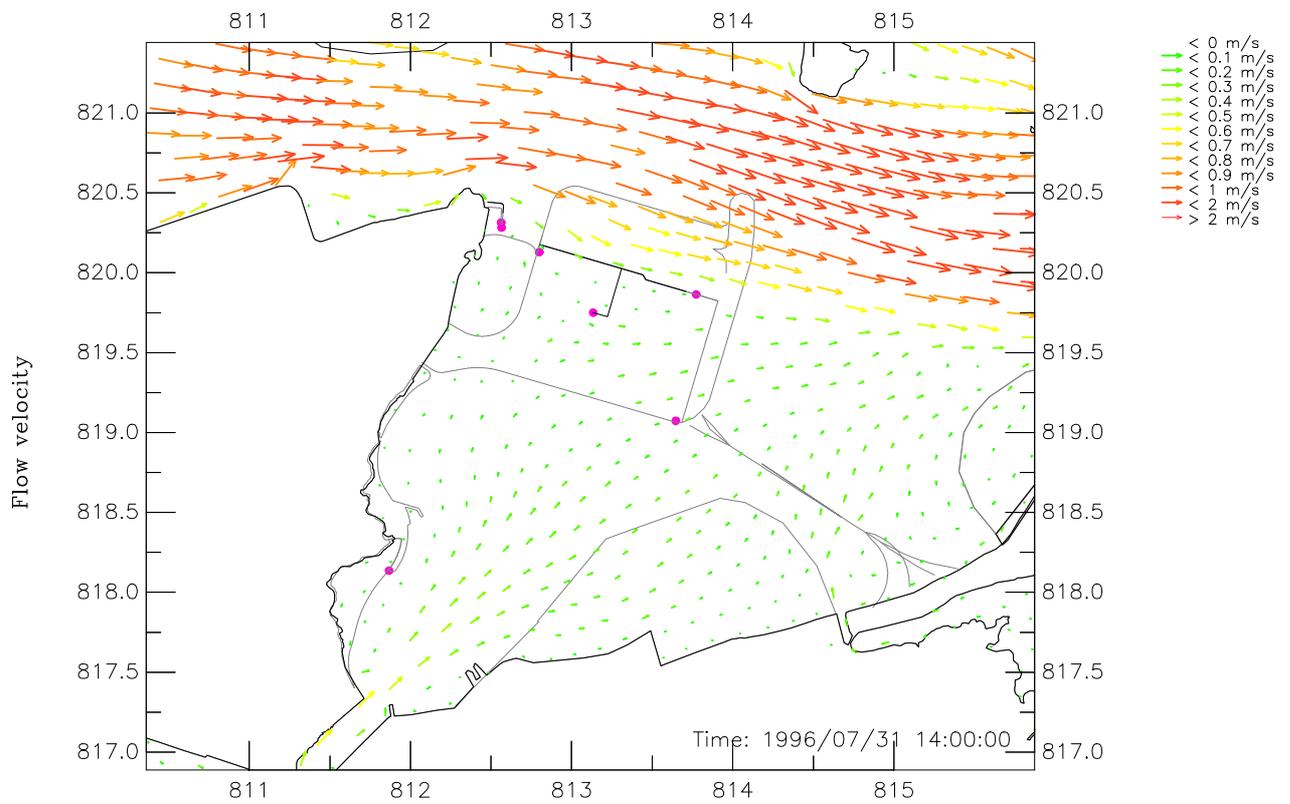
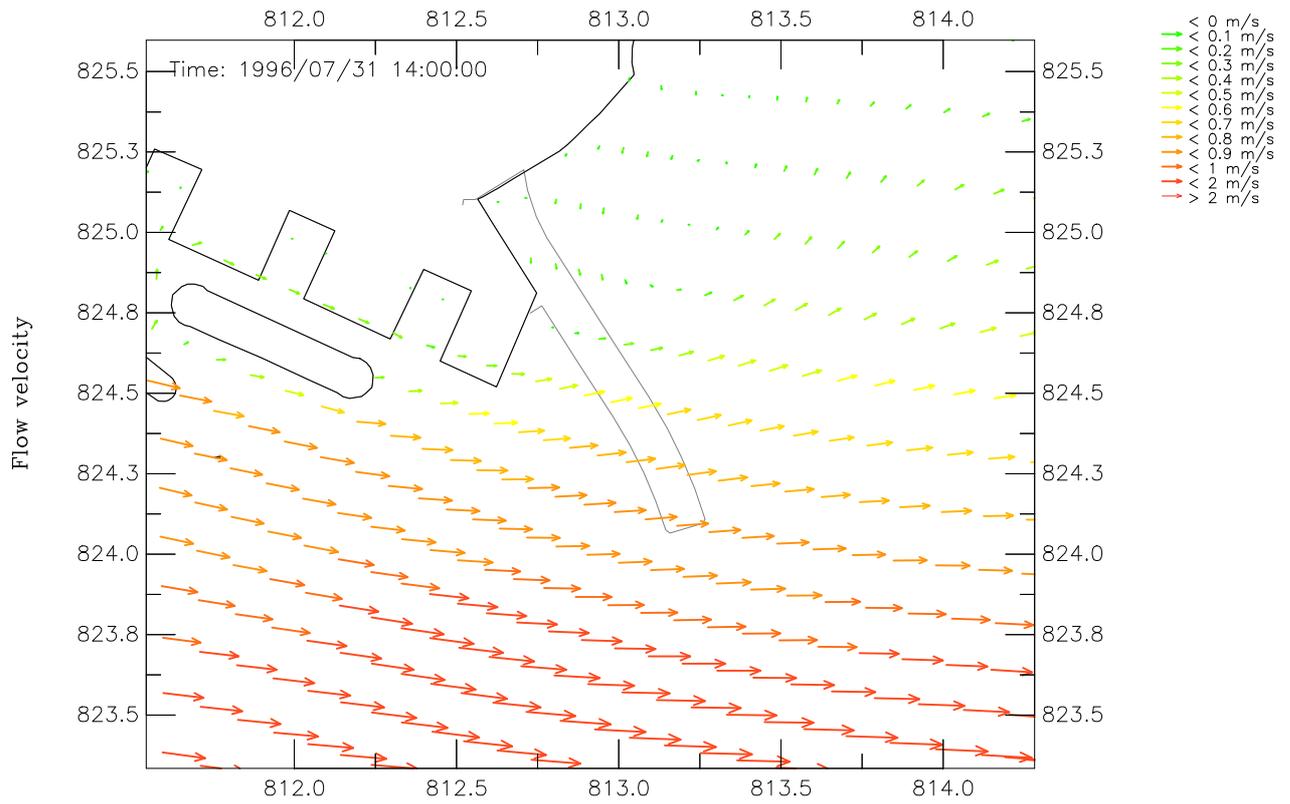
Figure 018



Year 2011  
 Wet Season Velocity Vector Plot at Ebb Tide – Mid-Depth

Apr 2009

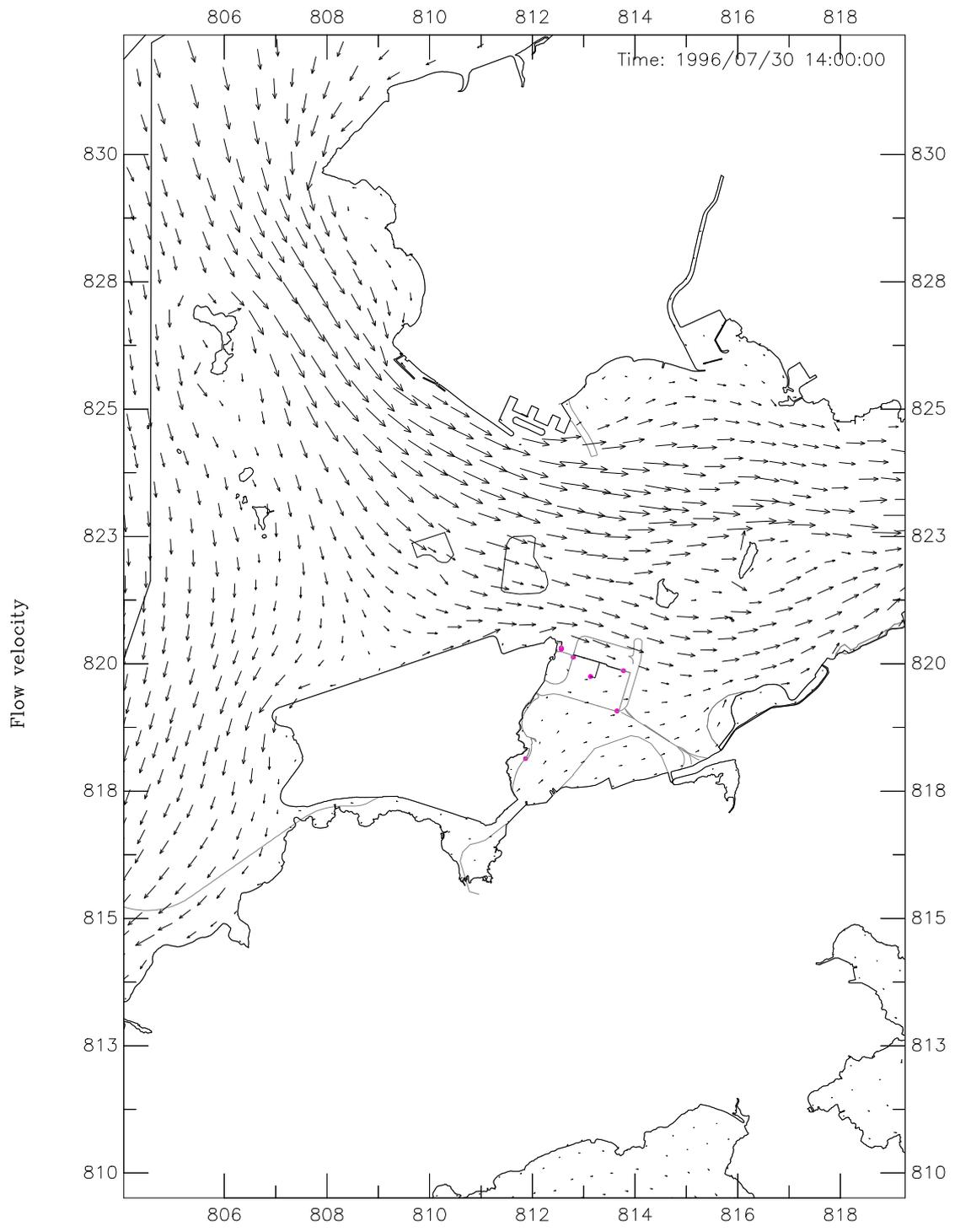
Figure 019



Year 2011  
 Wet Season Velocity Vector Plot at Ebb Tide – Mid-Depth  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

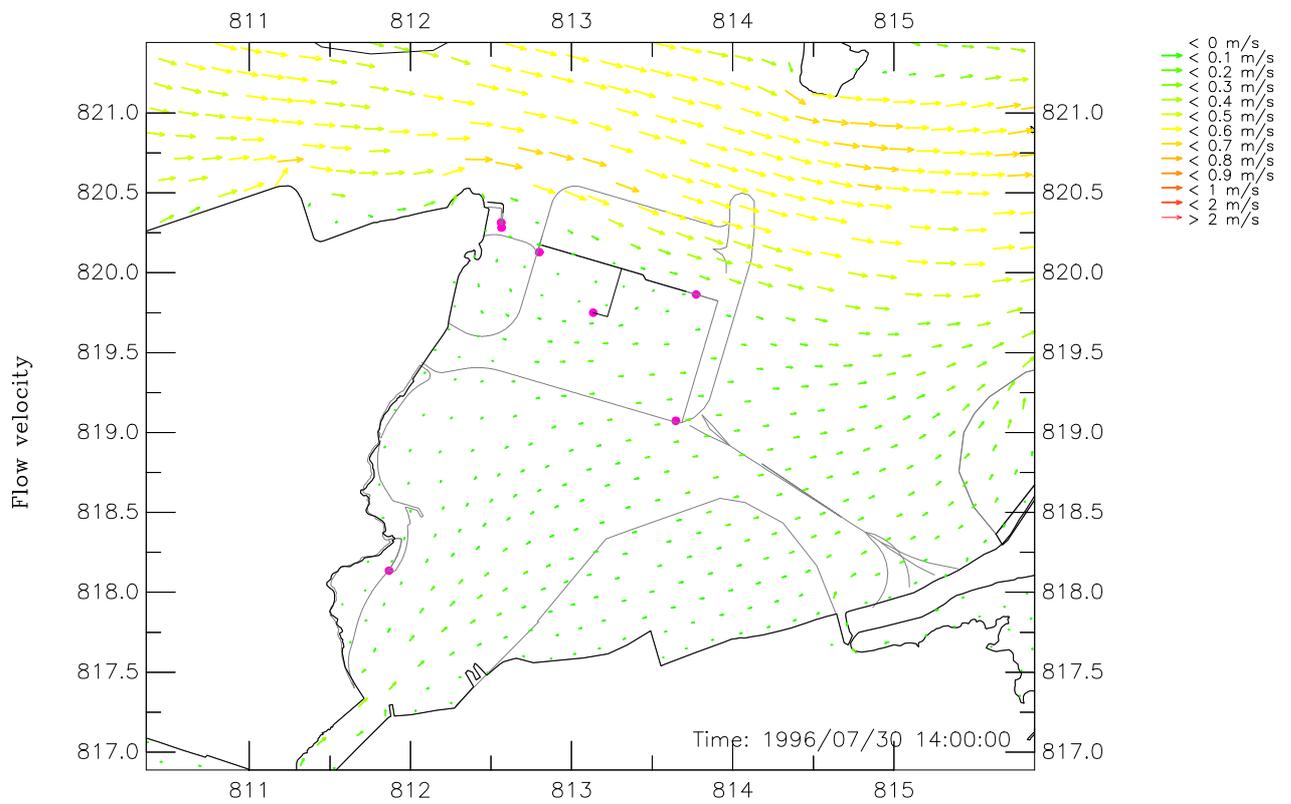
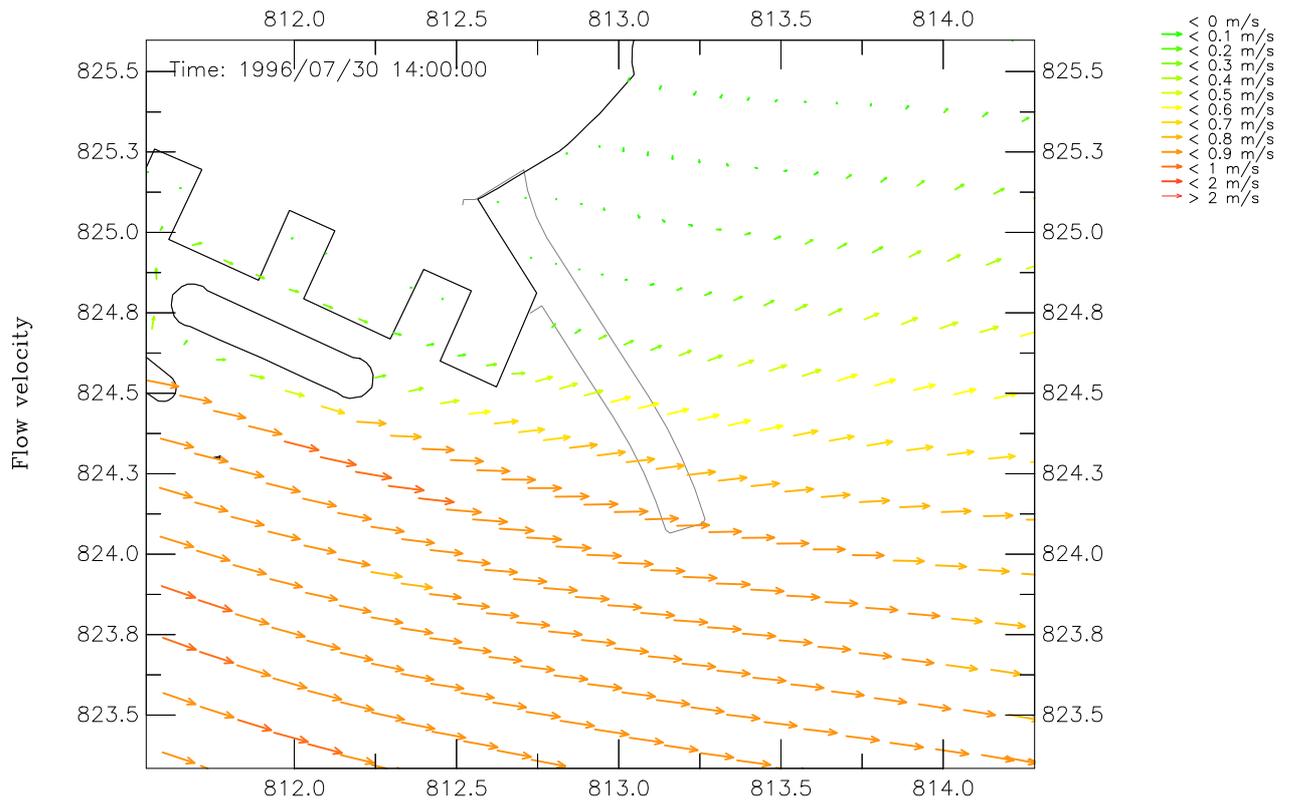
Apr 2009

Figure 020



Year 2011  
 Dry Season Velocity Vector Plot at Ebb Tide – Bottom Layer

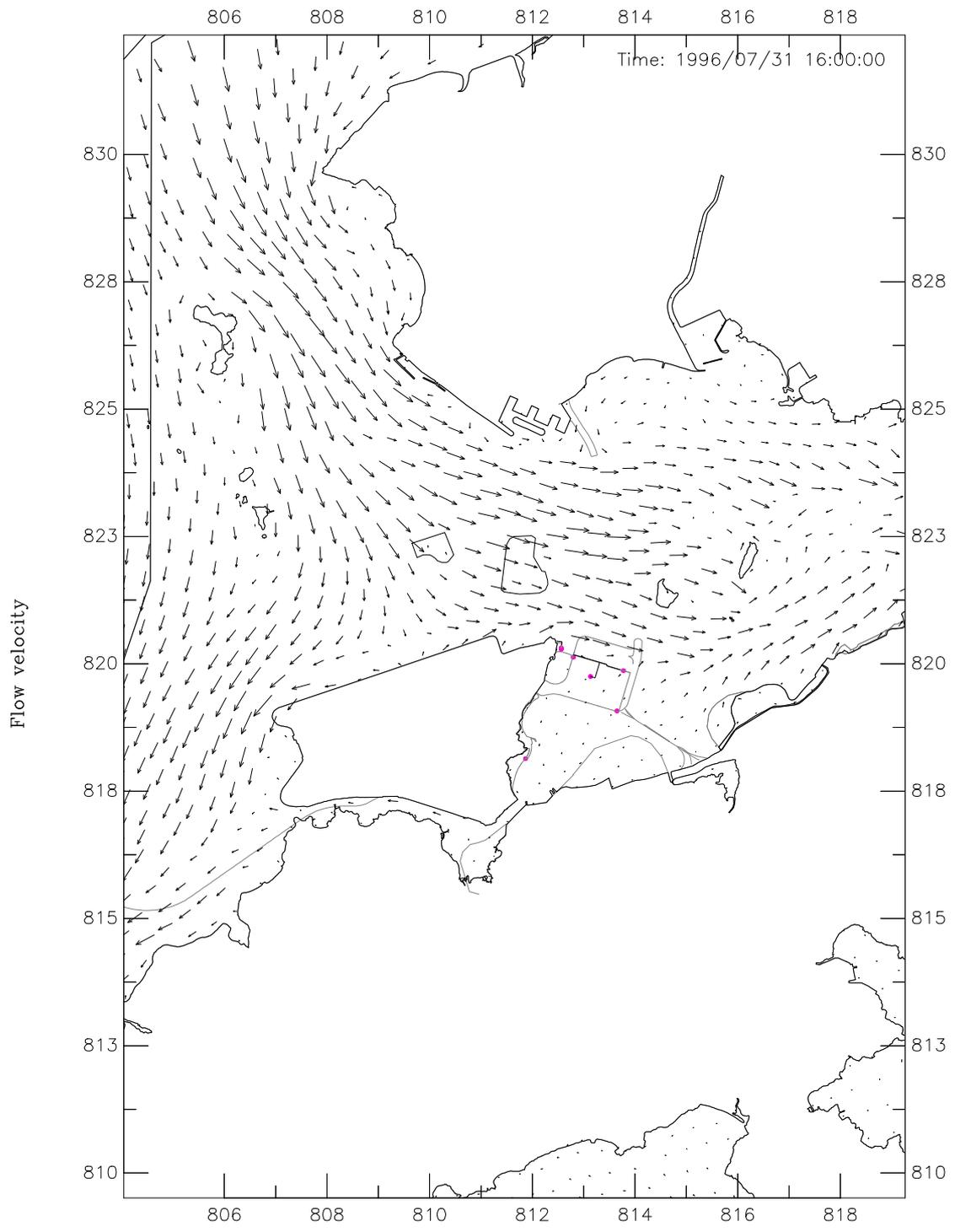
Apr 2009  
 Figure 021



Year 2011  
 Dry Season Velocity Vector Plot at Ebb Tide – Bottom Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

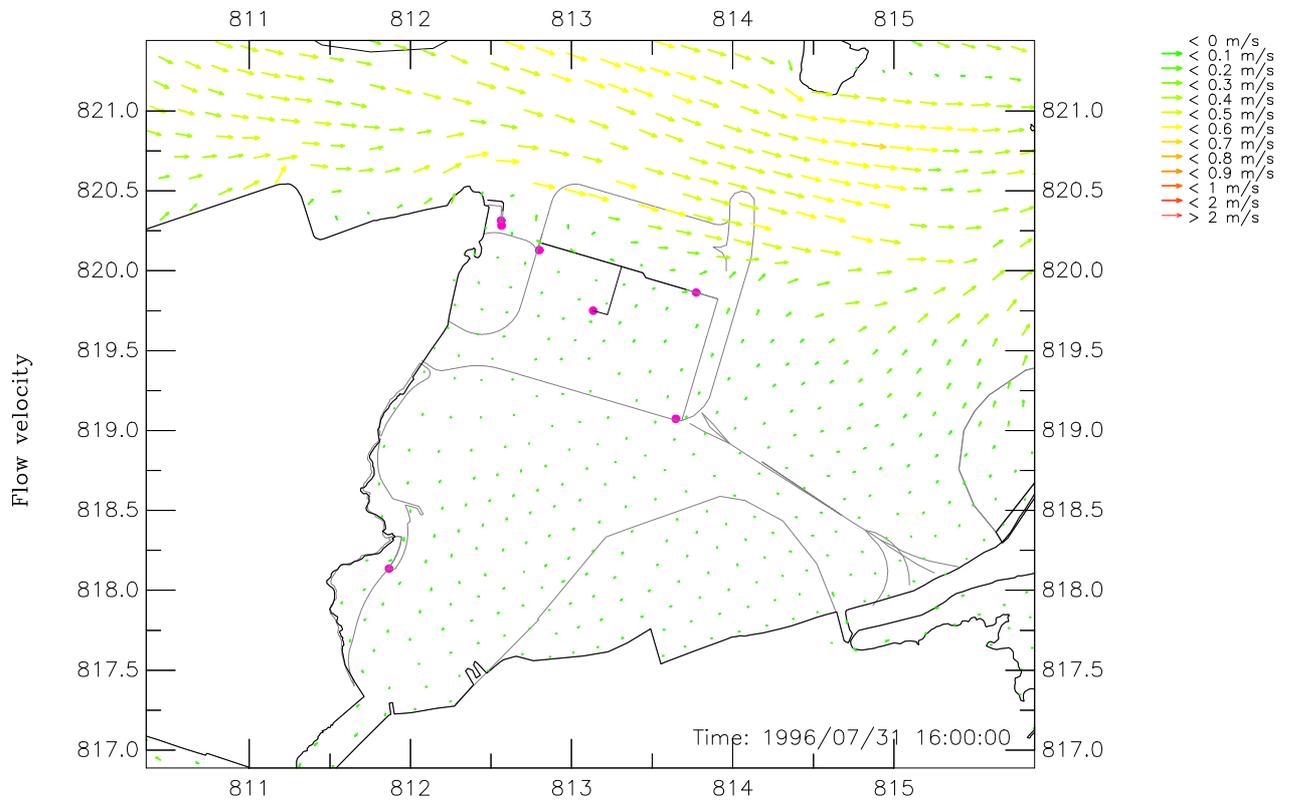
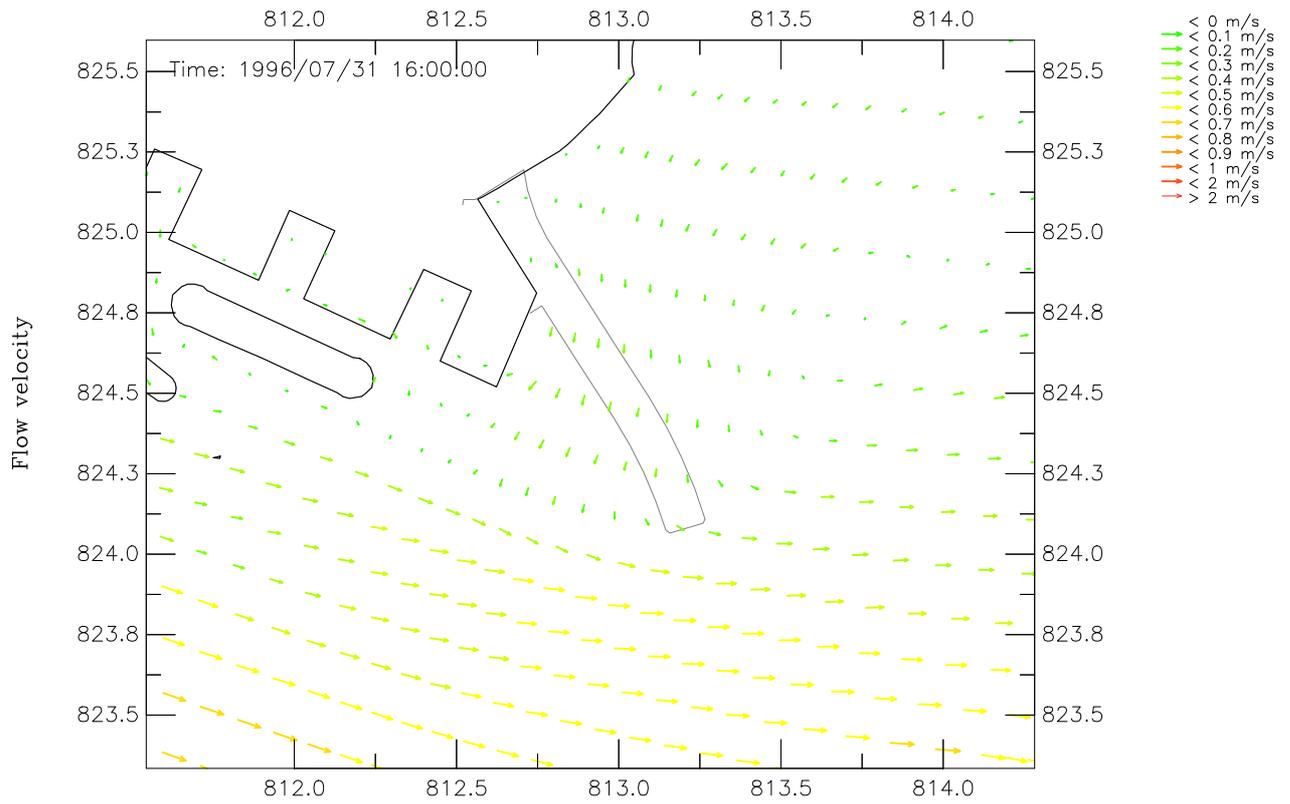
Apr 2009

Figure 022



Year 2011  
 Wet Season Velocity Vector Plot at Ebb Tide – Bottom Layer

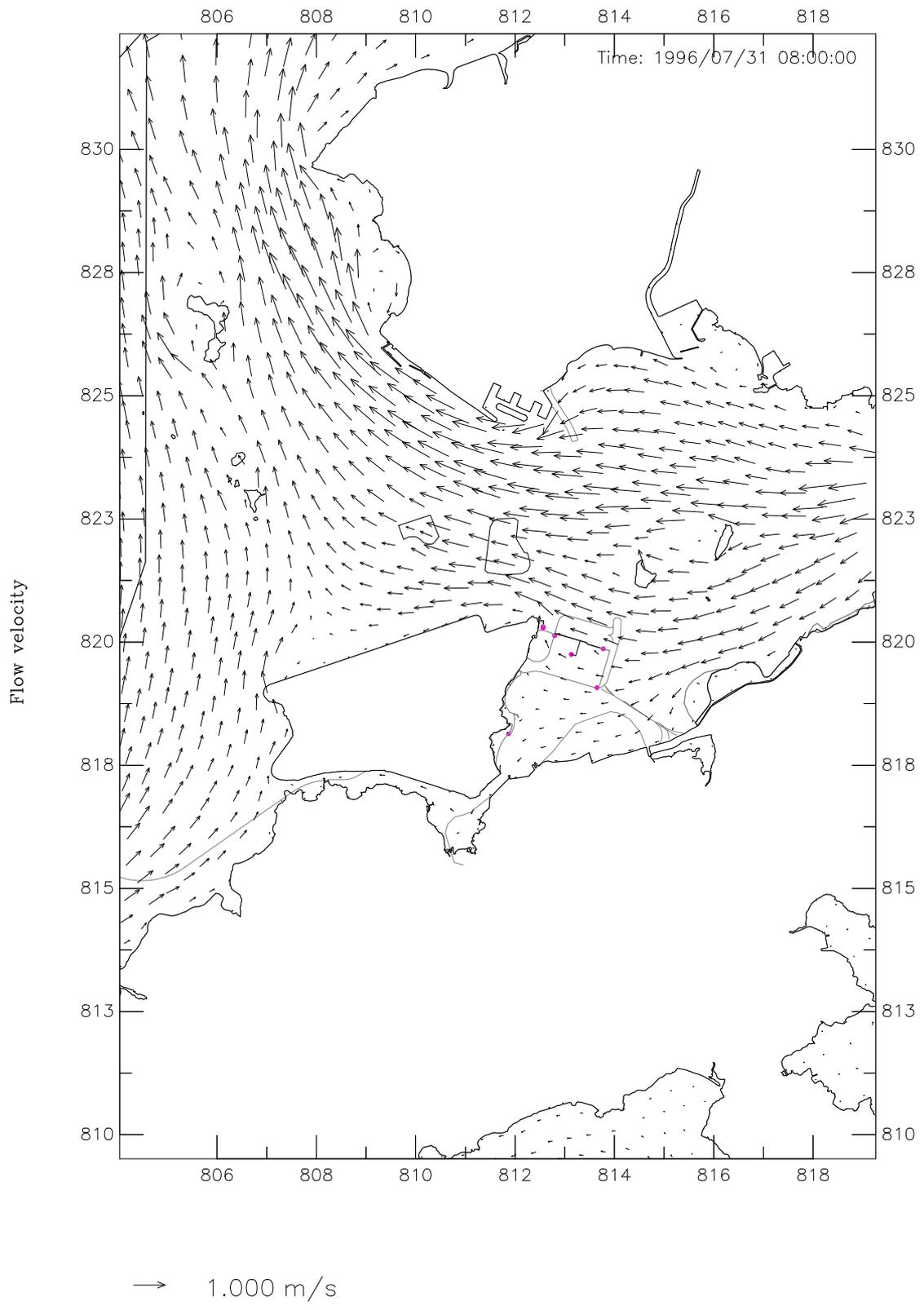
Apr 2009  
 Figure 023



Year 2011  
 Wet Season Velocity Vector Plot at Ebb Tide – Bottom Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

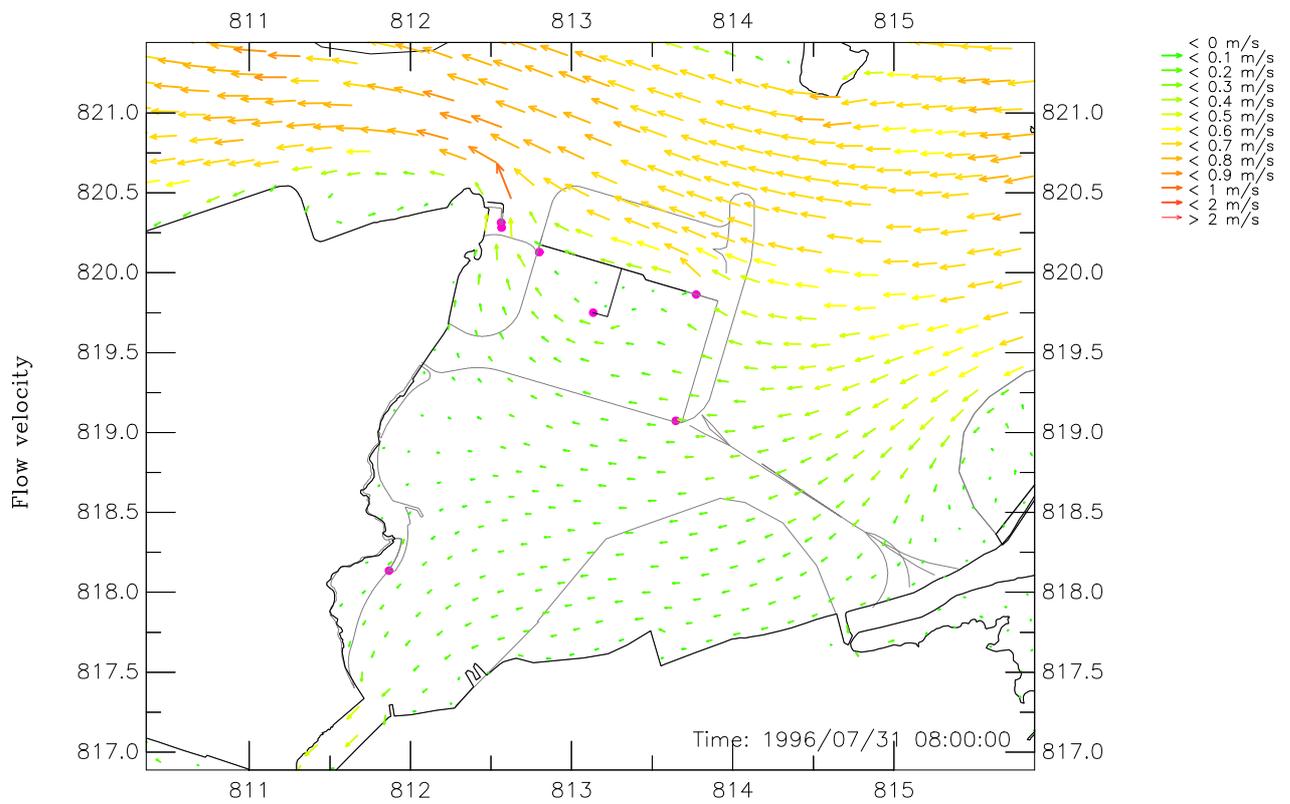
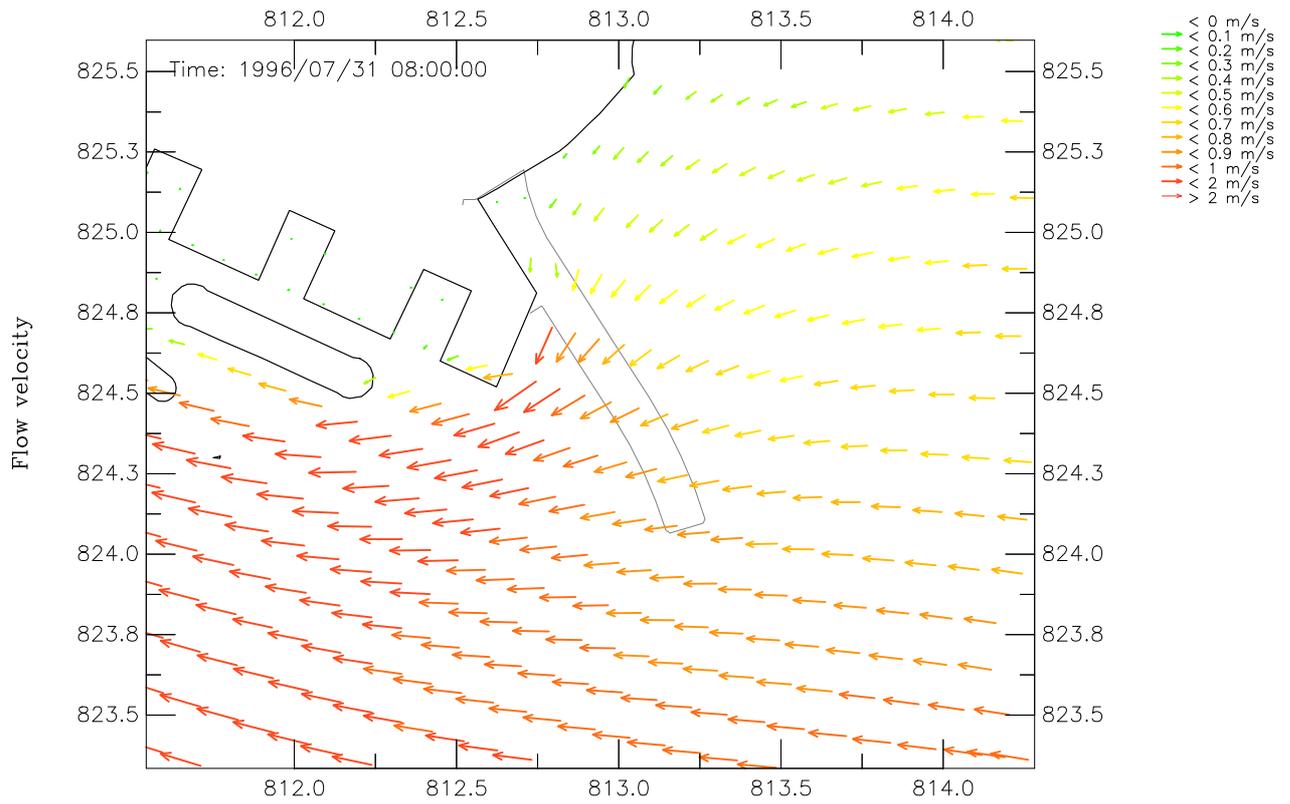
Apr 2009

Figure 024



Year 2011  
 Dry Season Velocity Vector Plot at Flood Tide – Surface Layer

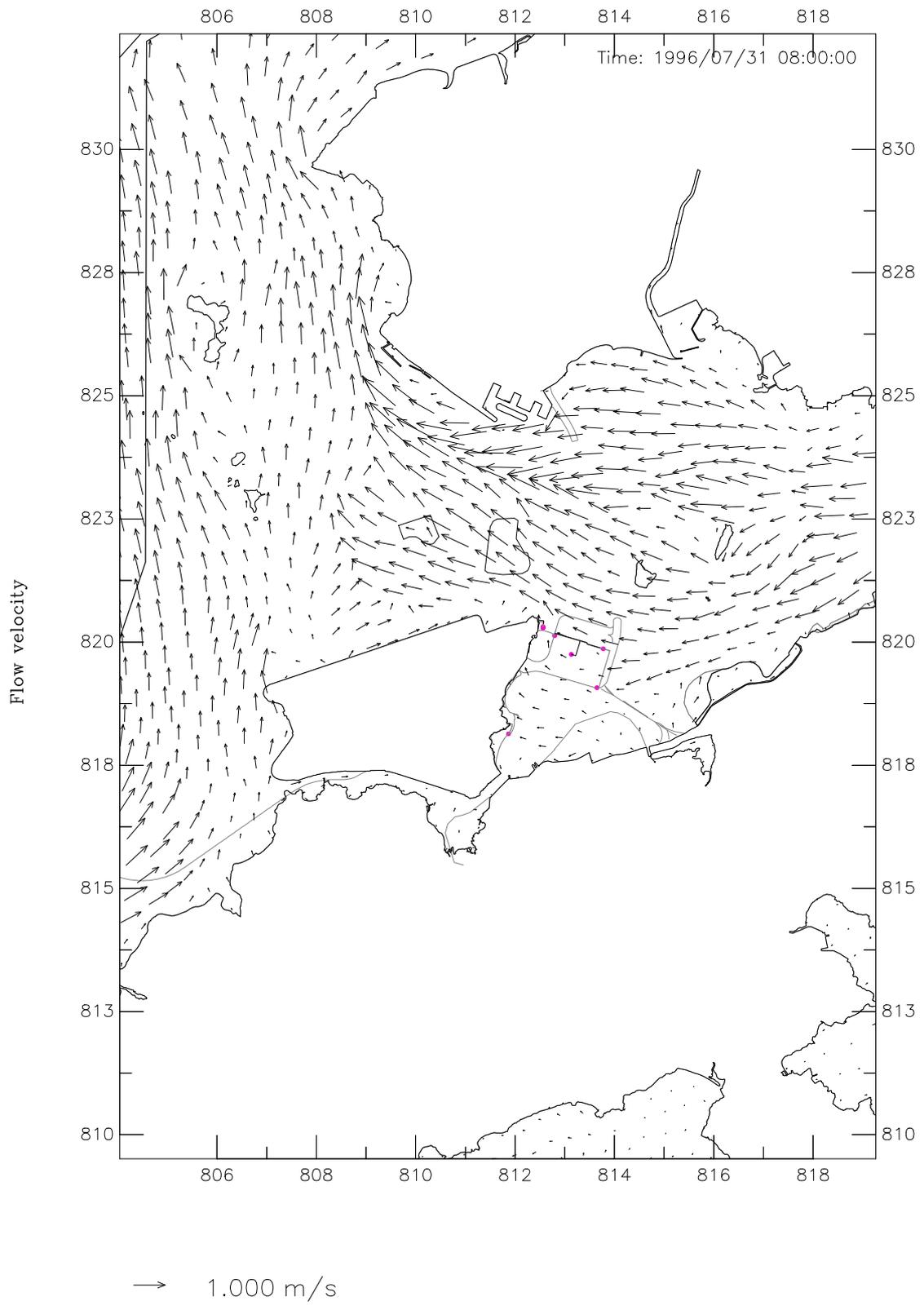
Apr 2009      Figure 025



Year 2011  
 Dry Season Velocity Vector Plot at Flood Tide – Surface Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

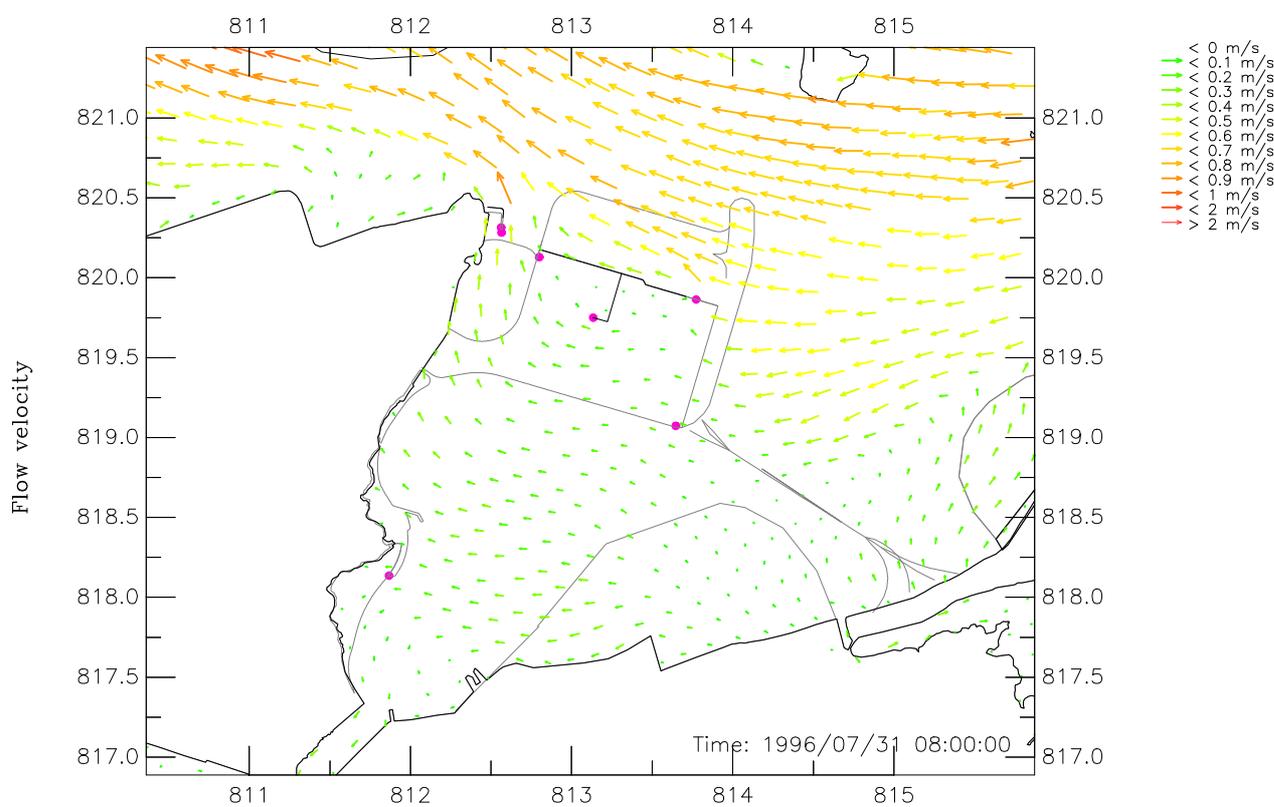
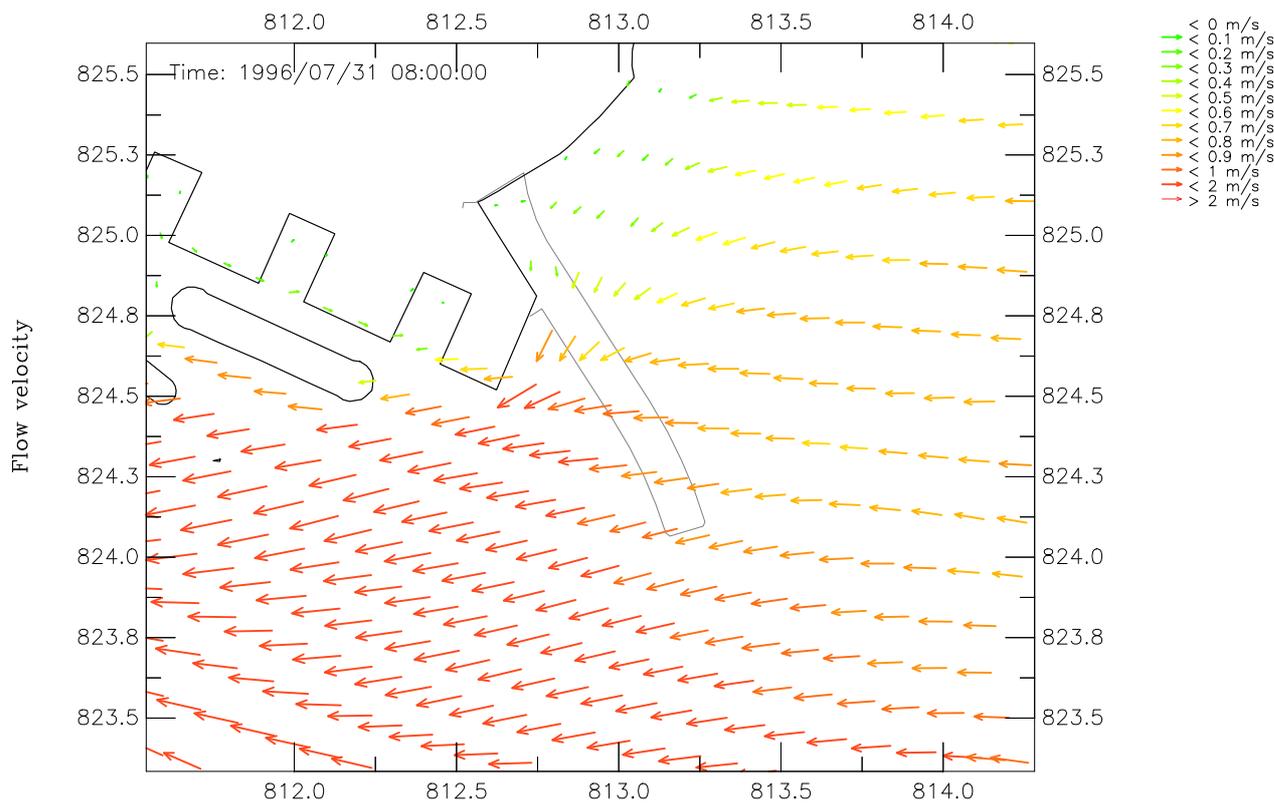
Apr 2009

Figure 026



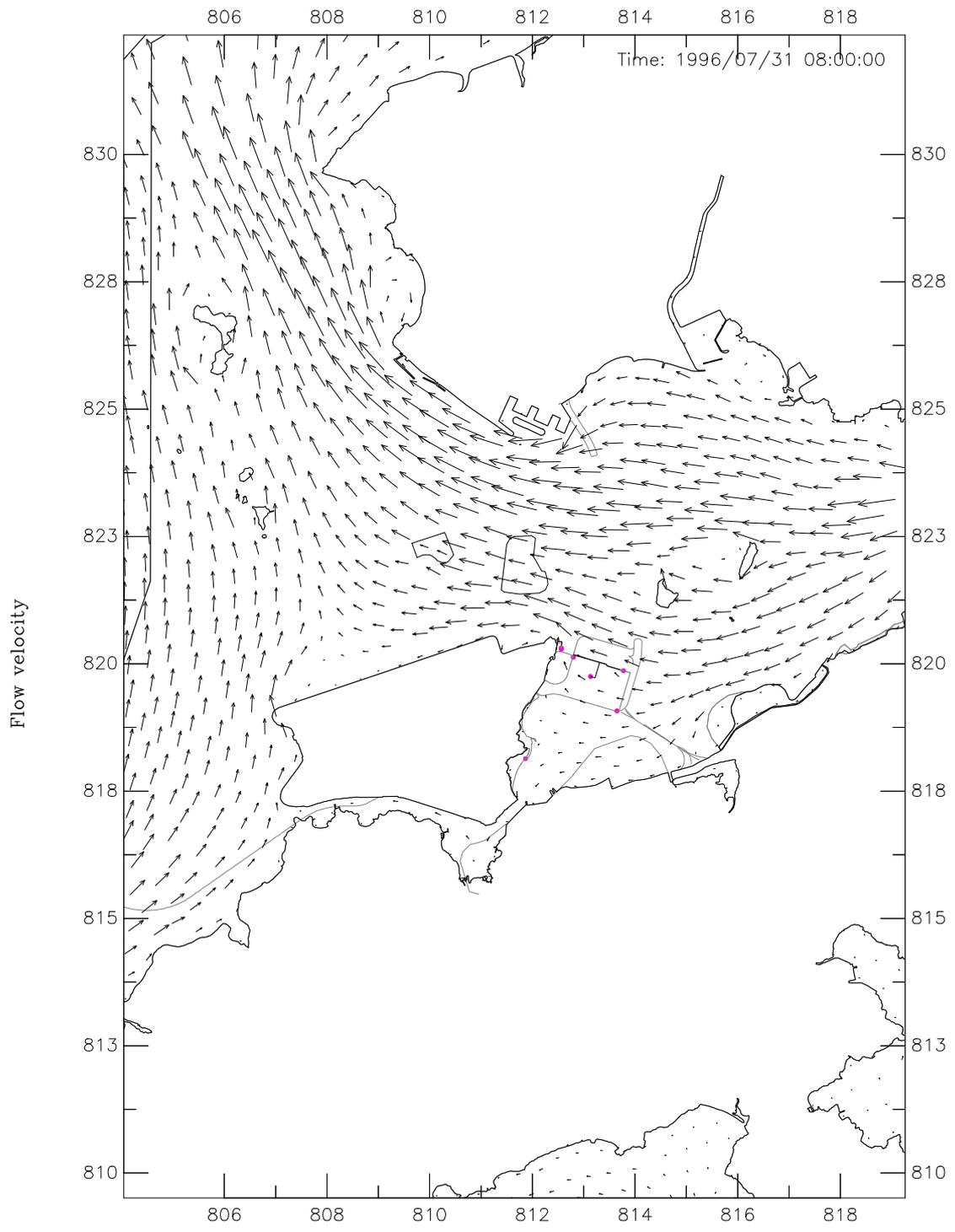
Year 2011  
 Wet Season Velocity Vector Plot at Flood Tide – Surface Layer

Apr 2009  
 Figure 027



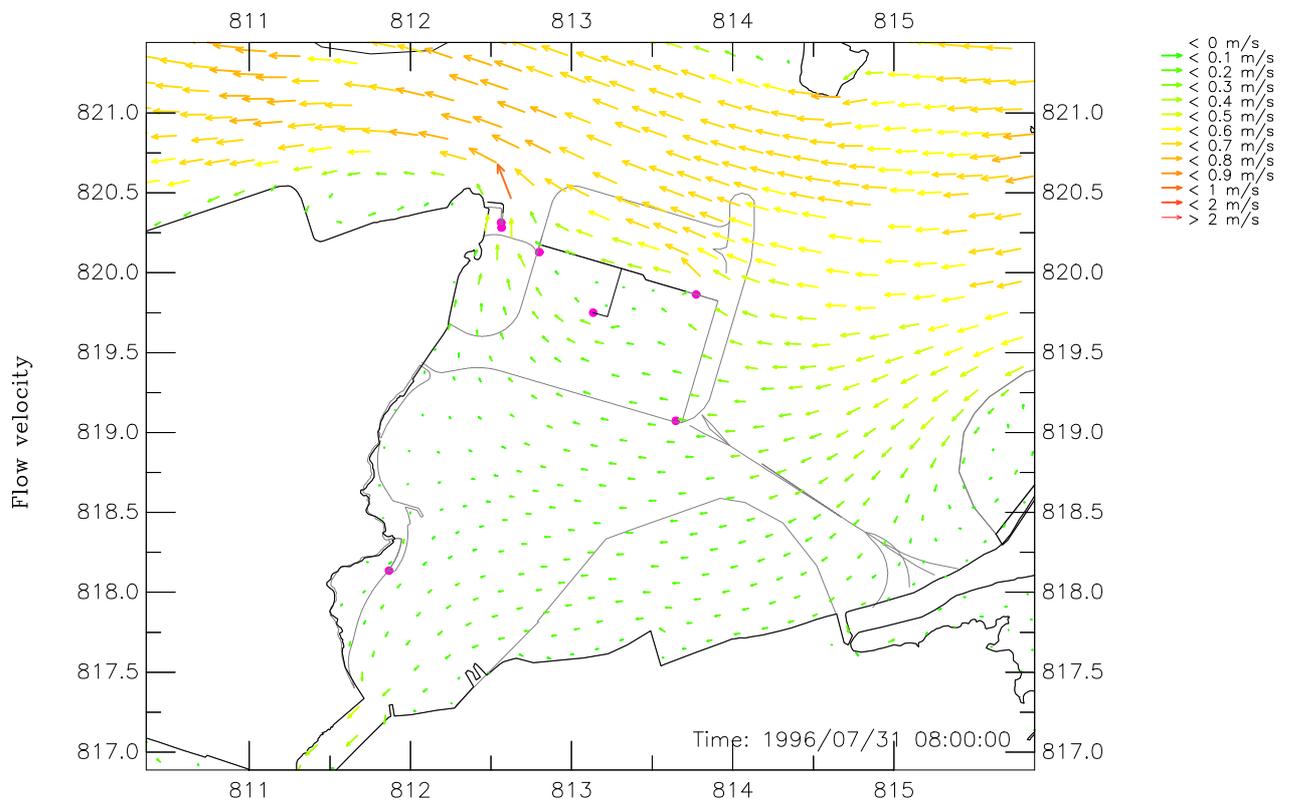
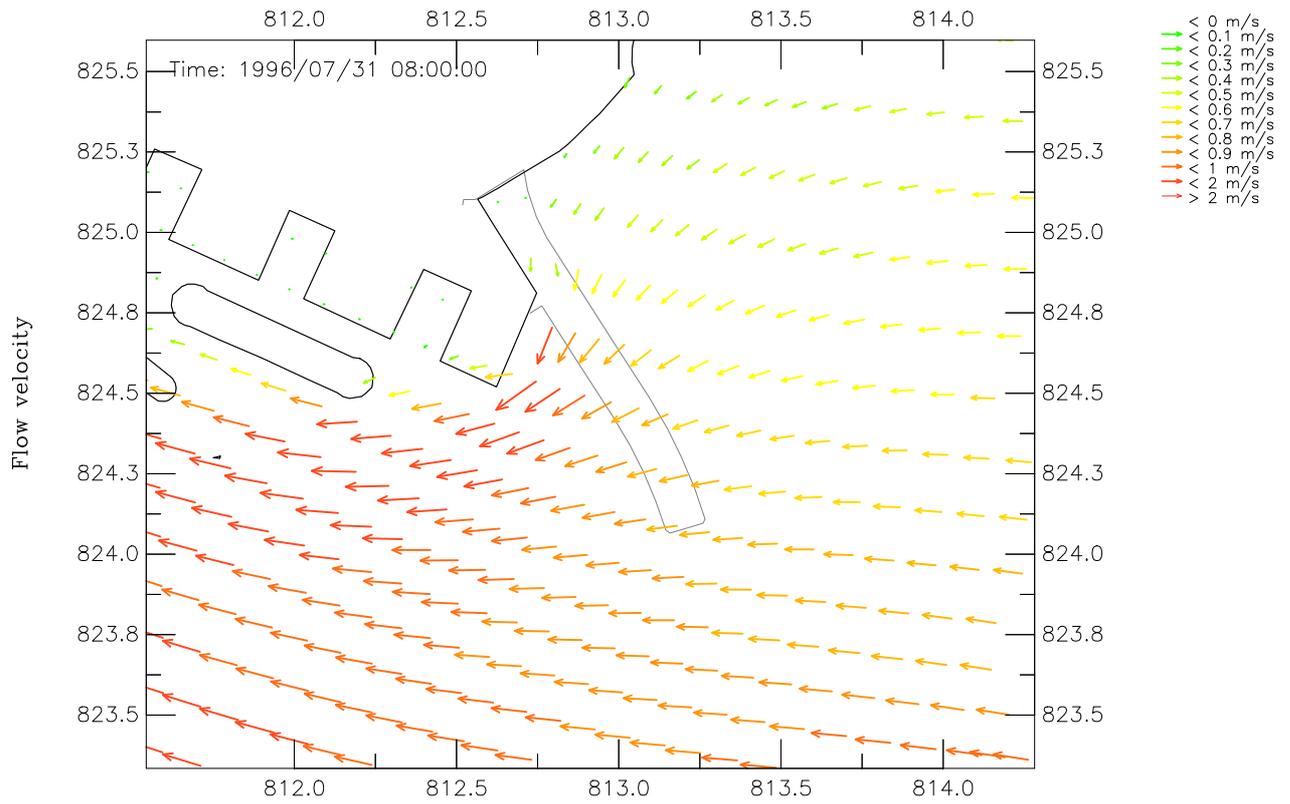
Year 2011  
 Wet Season Velocity Vector Plot at Flood Tide – Surface Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

Apr 2009 Figure 028



Year 2011  
 Dry Season Velocity Vector Plot at Flood Tide – Mid-Depth

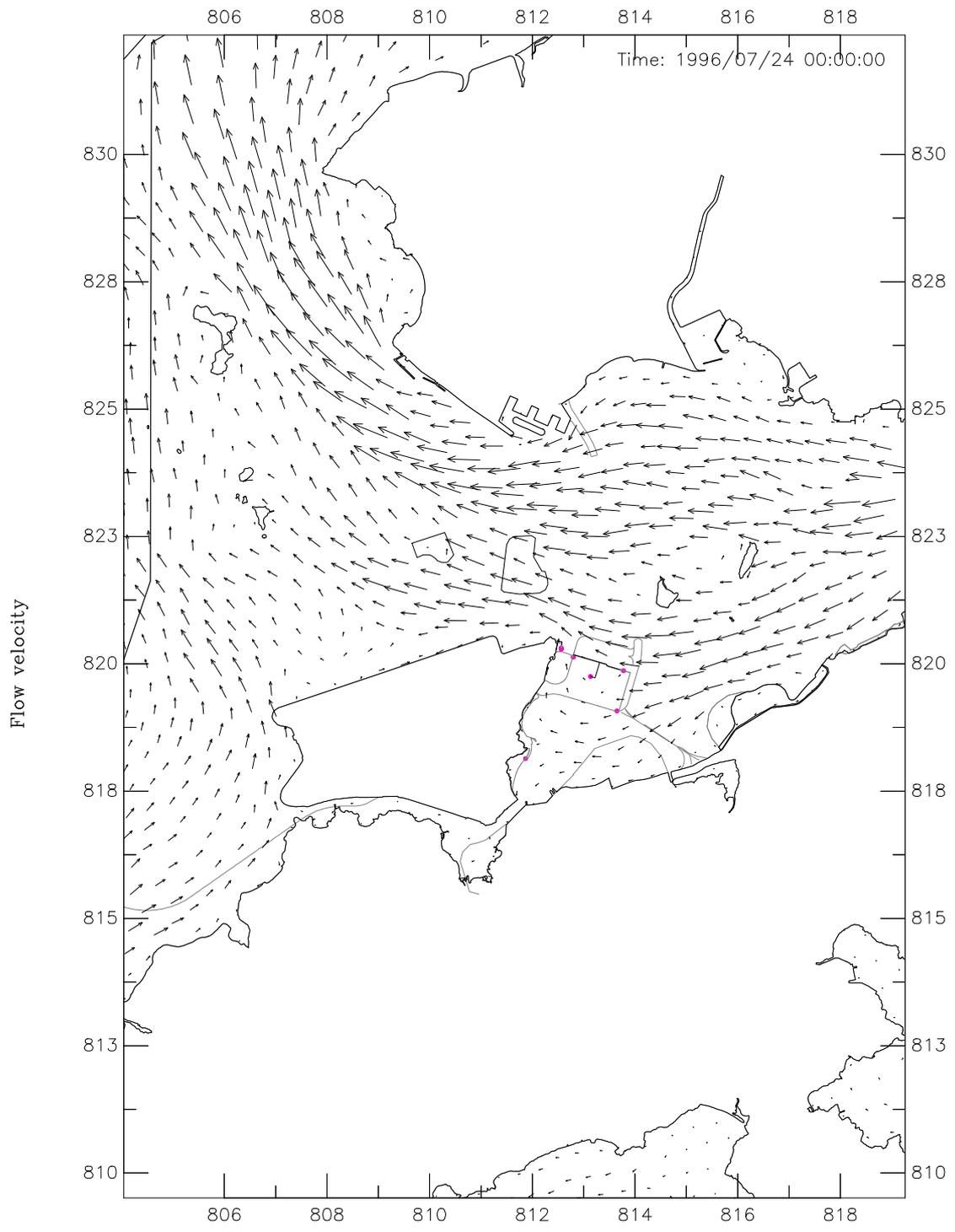
Apr 2009  
 Figure 029



Year 2011  
 Dry Season Velocity Vector Plot at Flood Tide – Mid-Depth  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

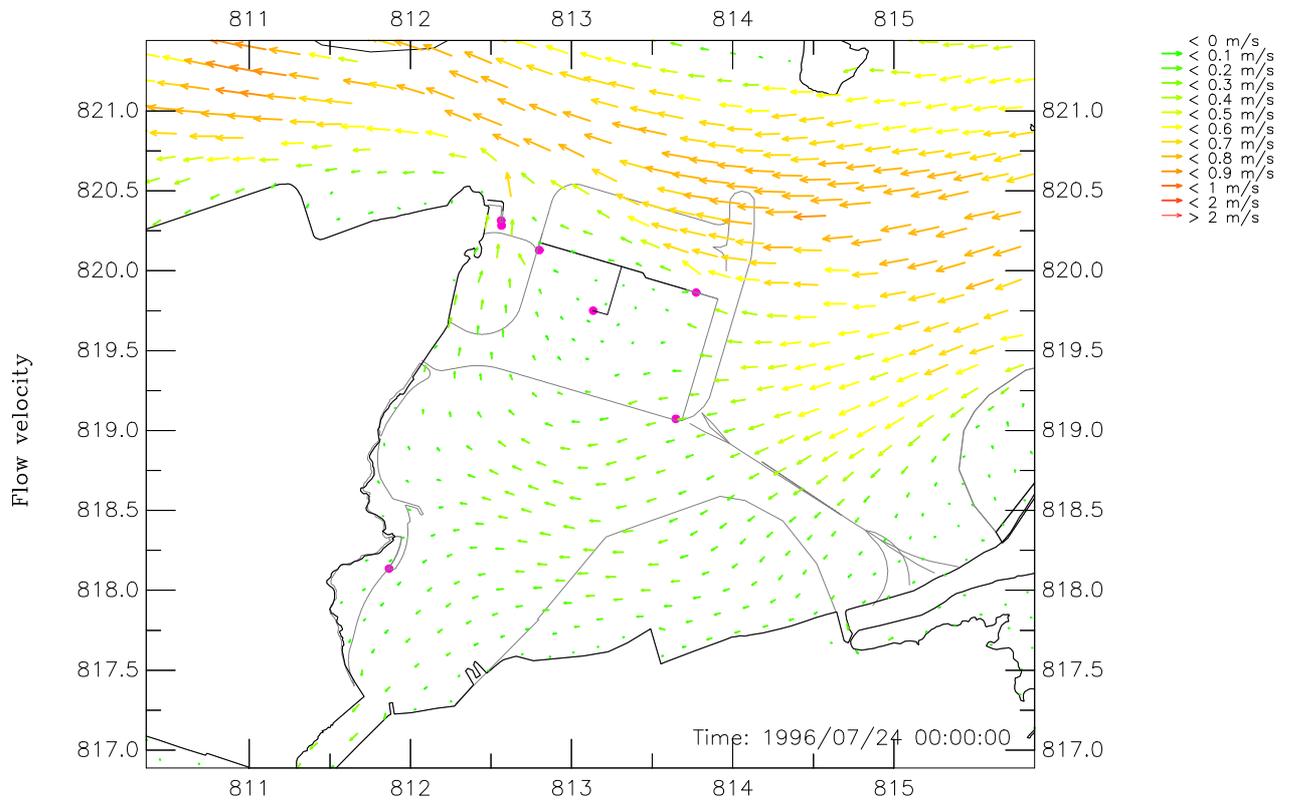
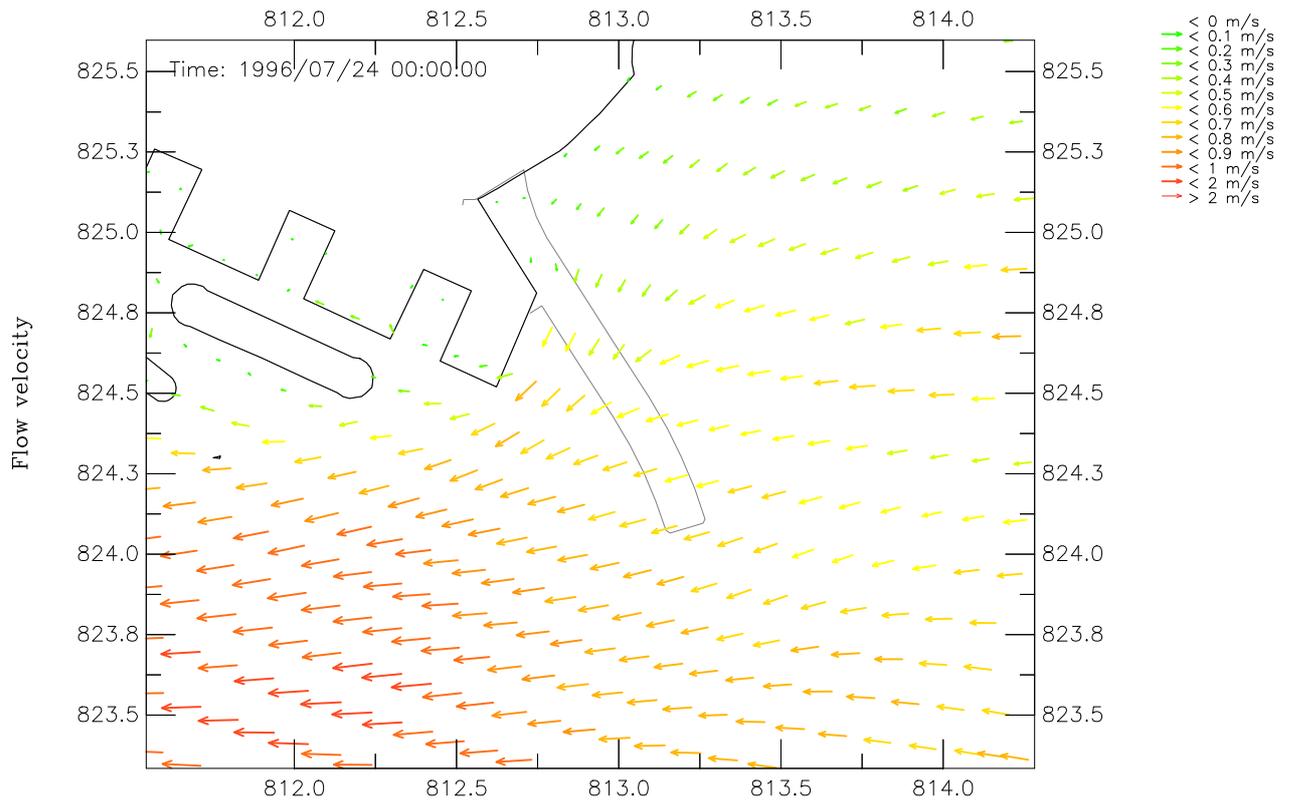
Apr 2009

Figure 030



Year 2011  
 Wet Season Velocity Vector Plot at Flood Tide – Mid-Depth

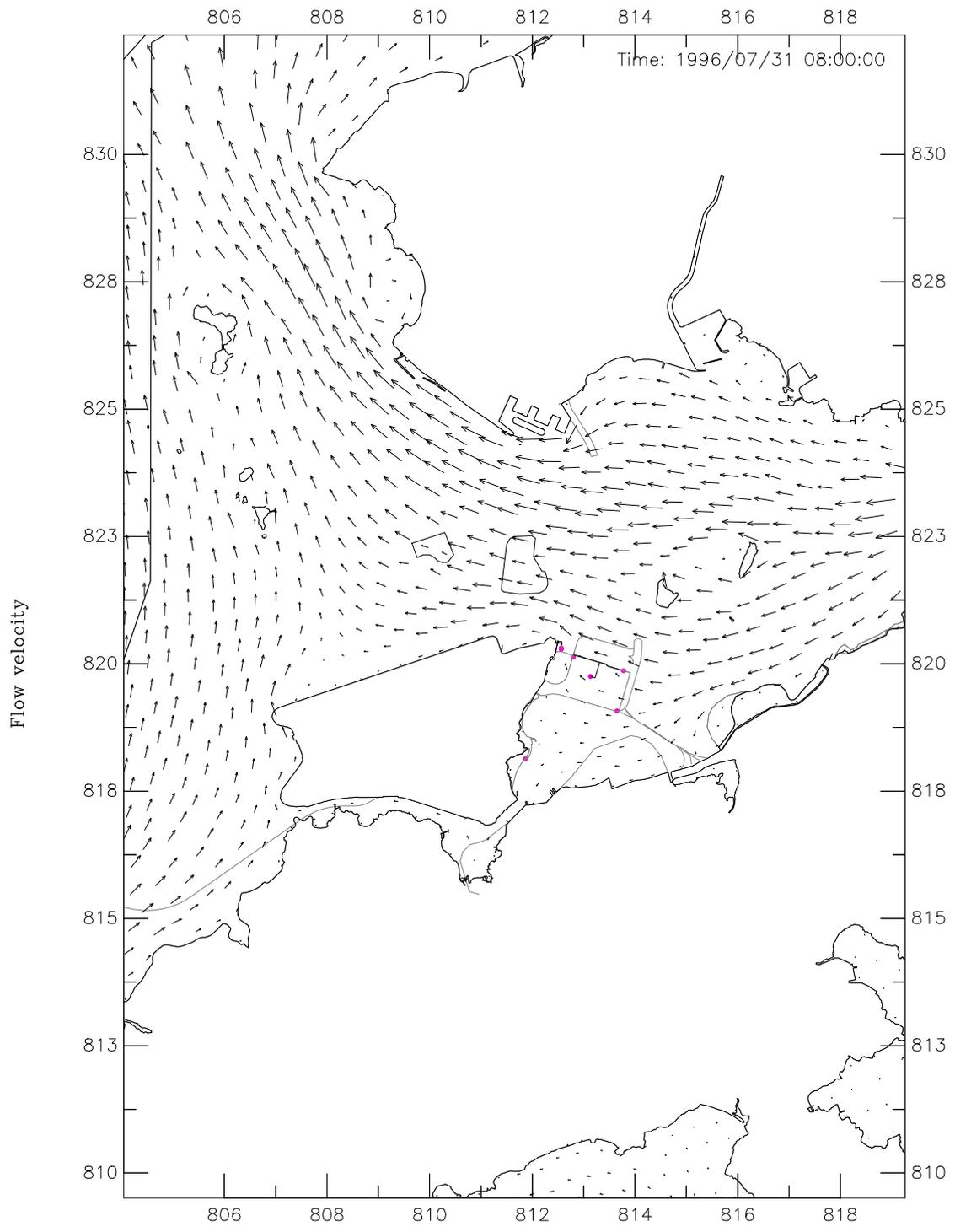
Apr 2009      Figure 031



Year 2011  
 Wet Season Velocity Vector Plot at Flood Tide – Mid-Depth  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

Apr 2009

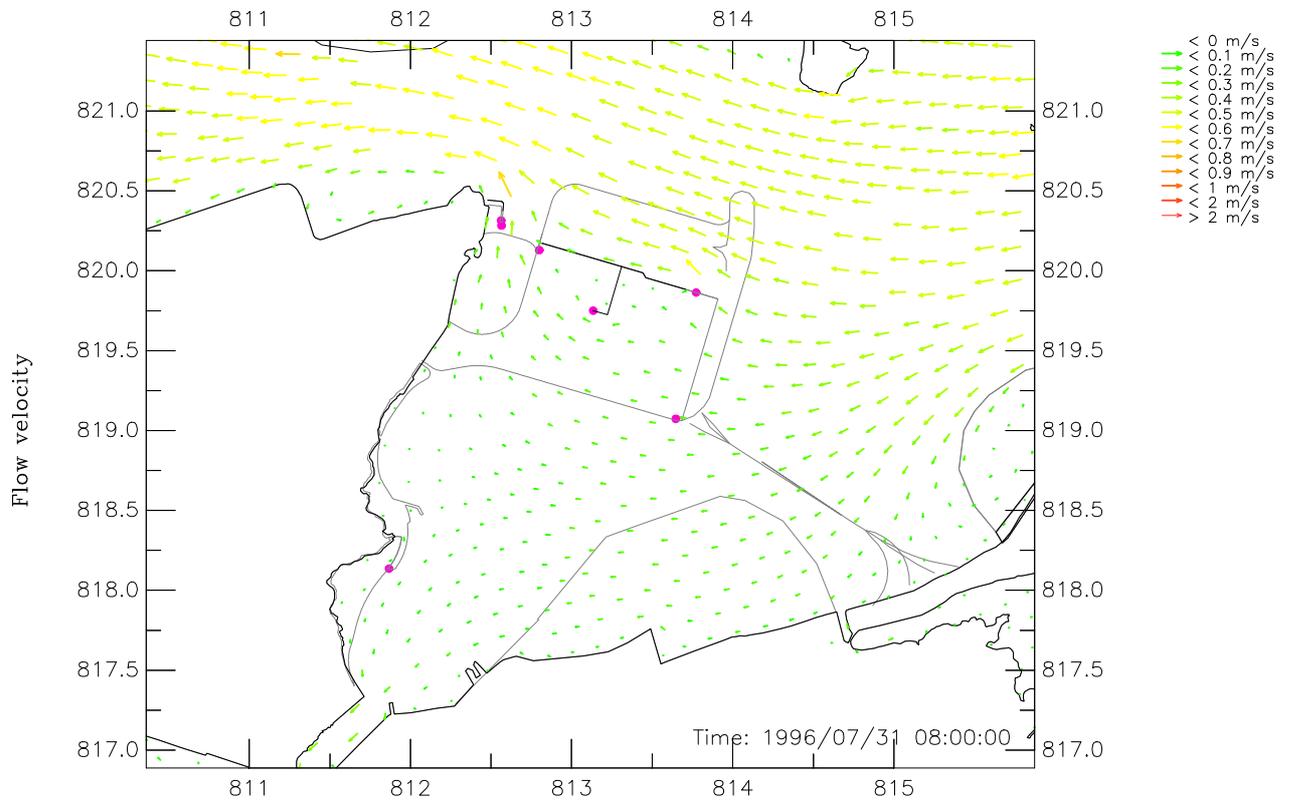
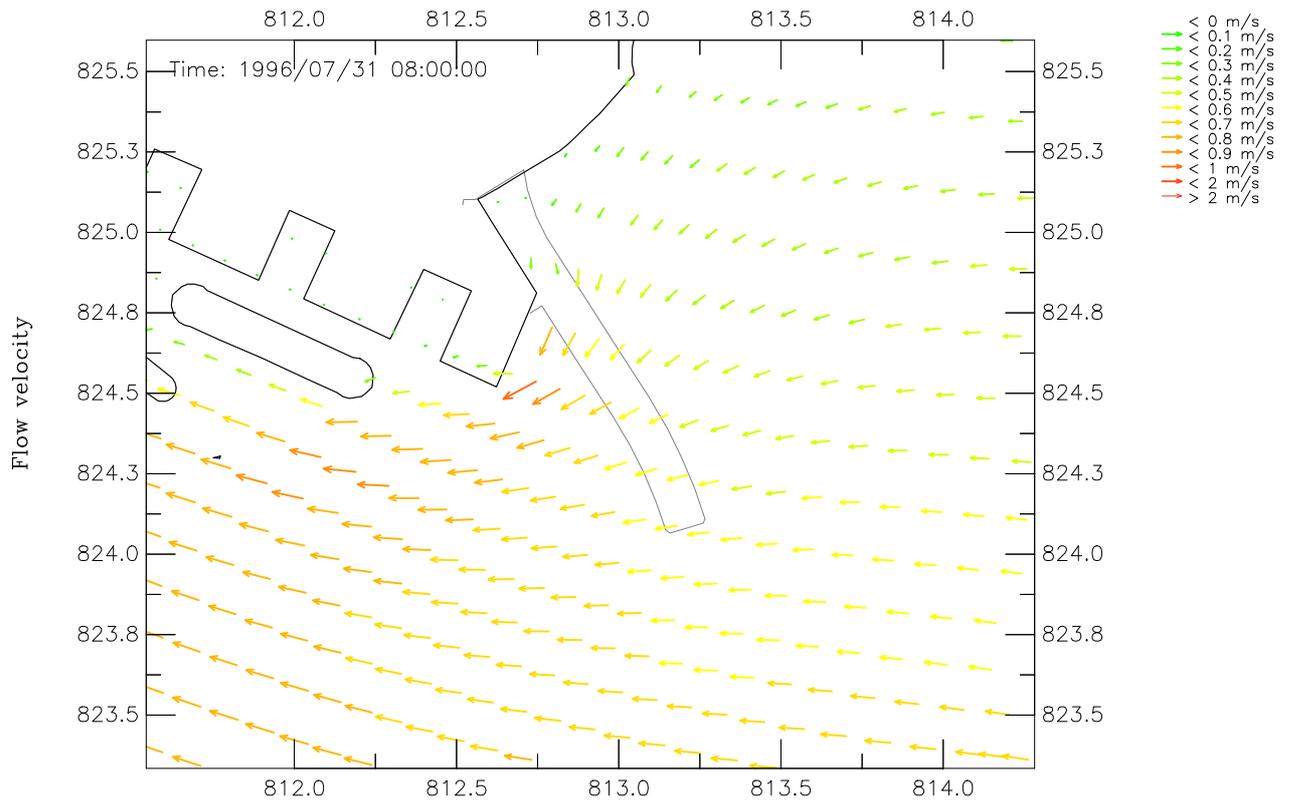
Figure 032



Year 2011  
 Dry Season Velocity Vector Plot at Flood Tide – Bottom Layer

Apr 2009

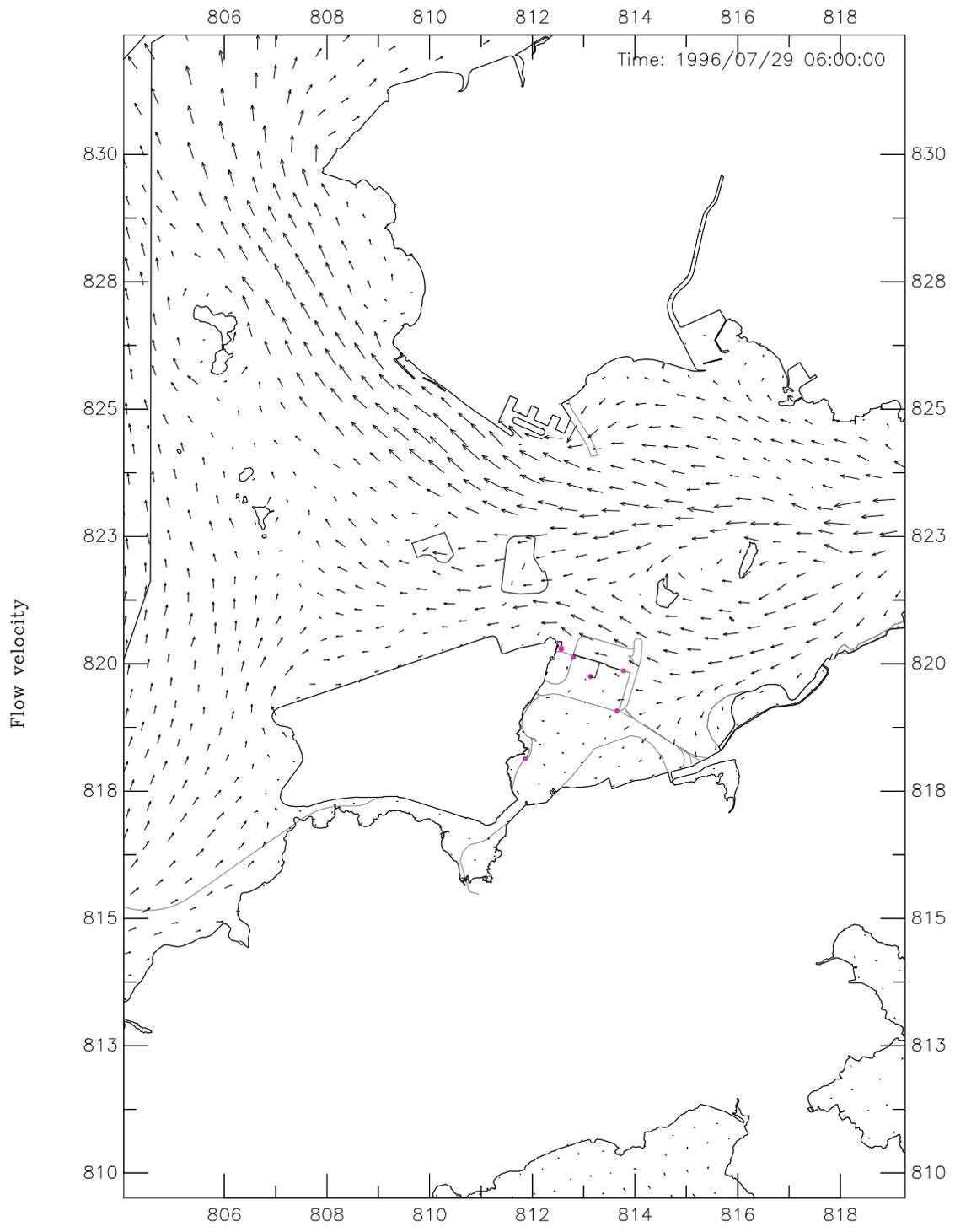
Figure 033



Year 2011  
 Dry Season Velocity Vector Plot at Flood Tide – Bottom Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

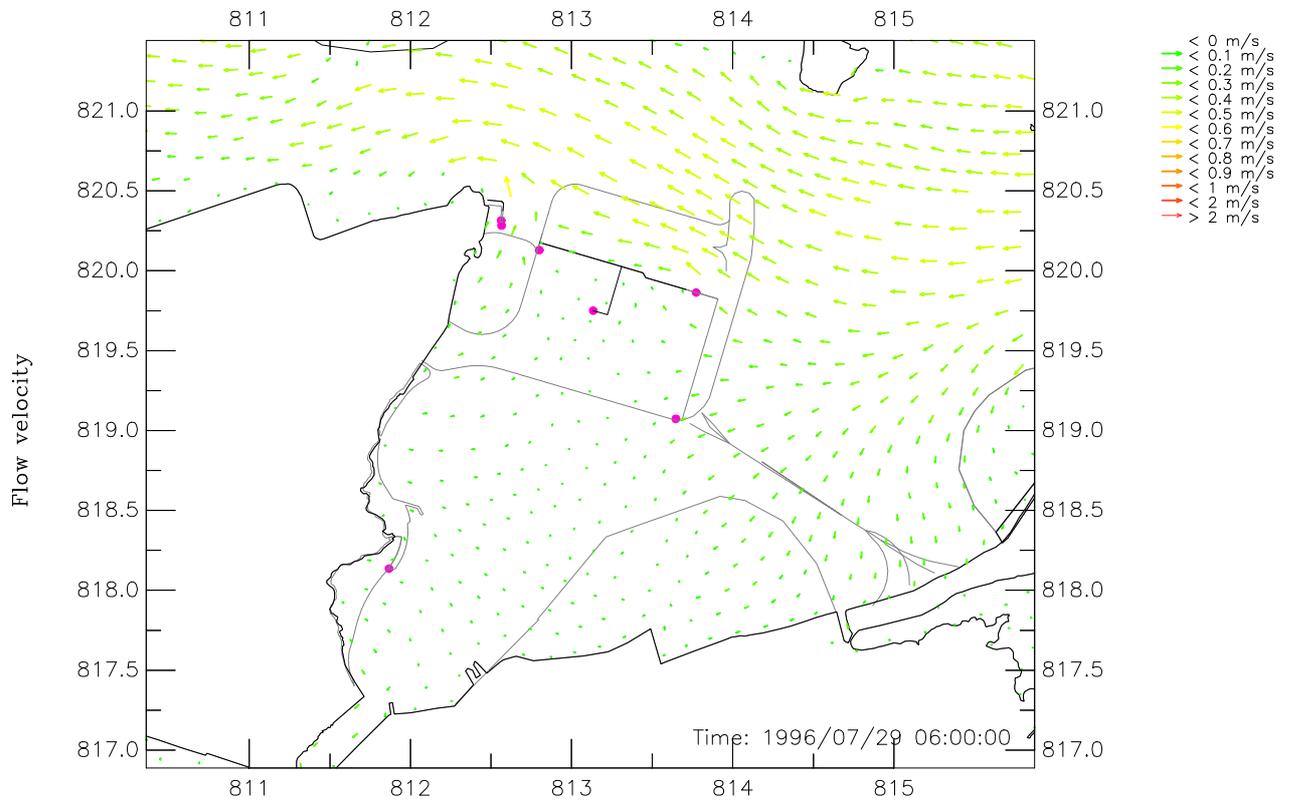
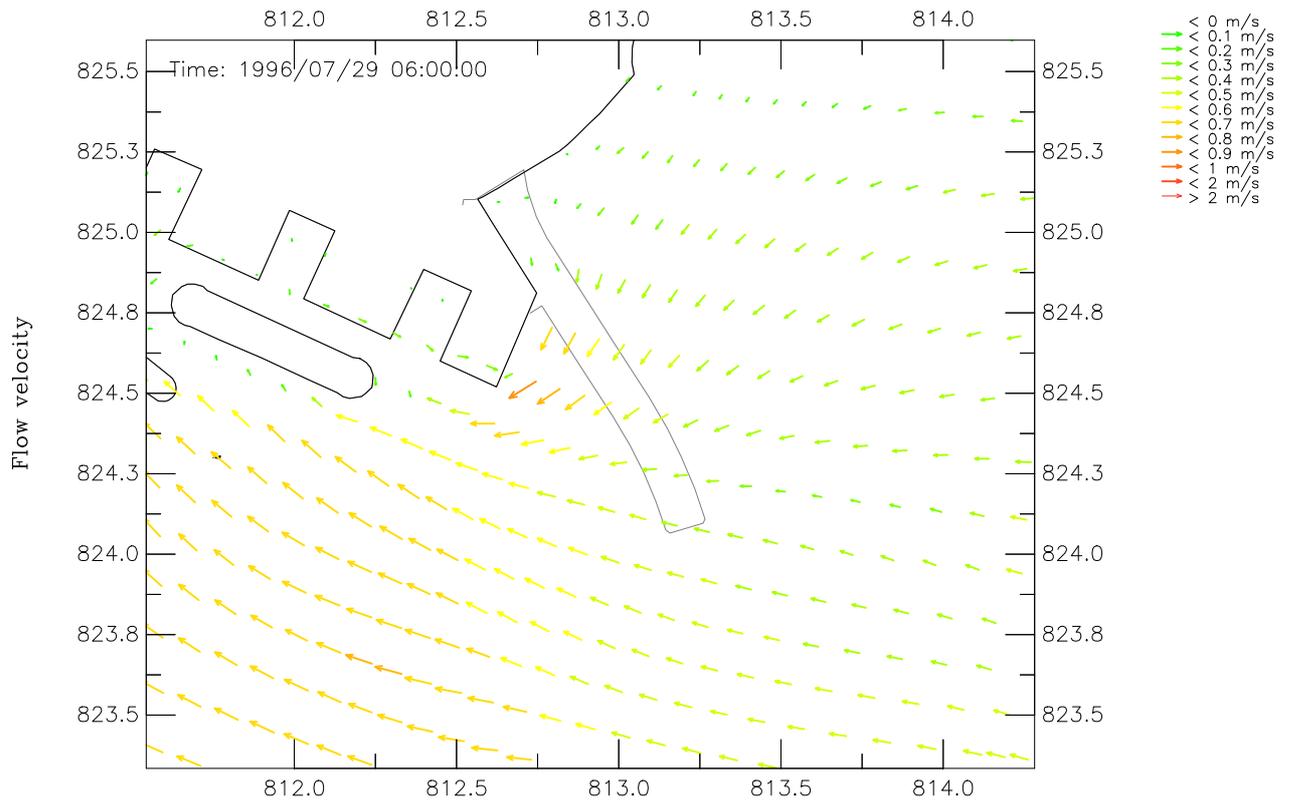
Apr 2009

Figure 034



Year 2011  
 Wet Season Velocity Vector Plot at Flood Tide – Bottom Layer

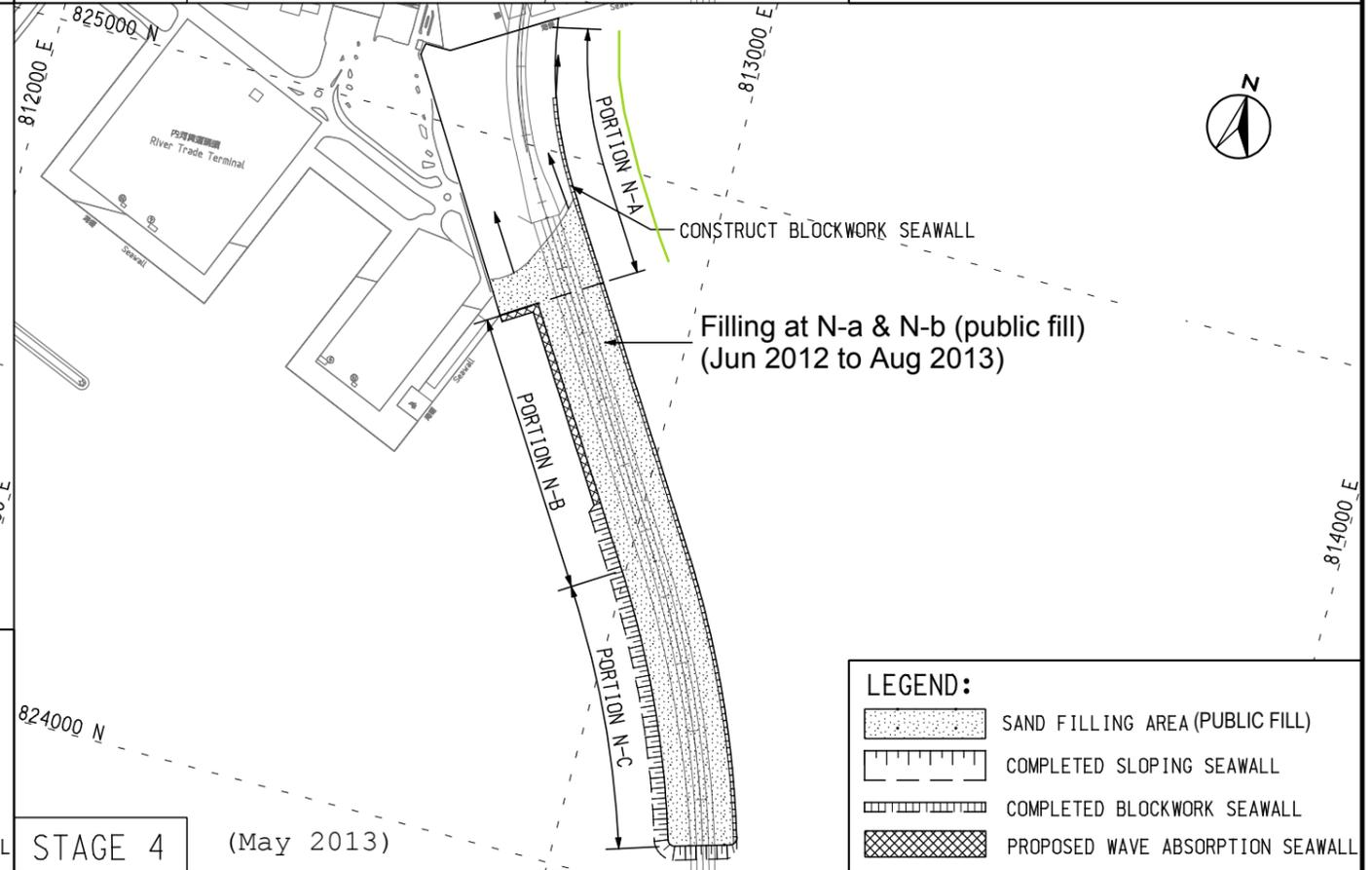
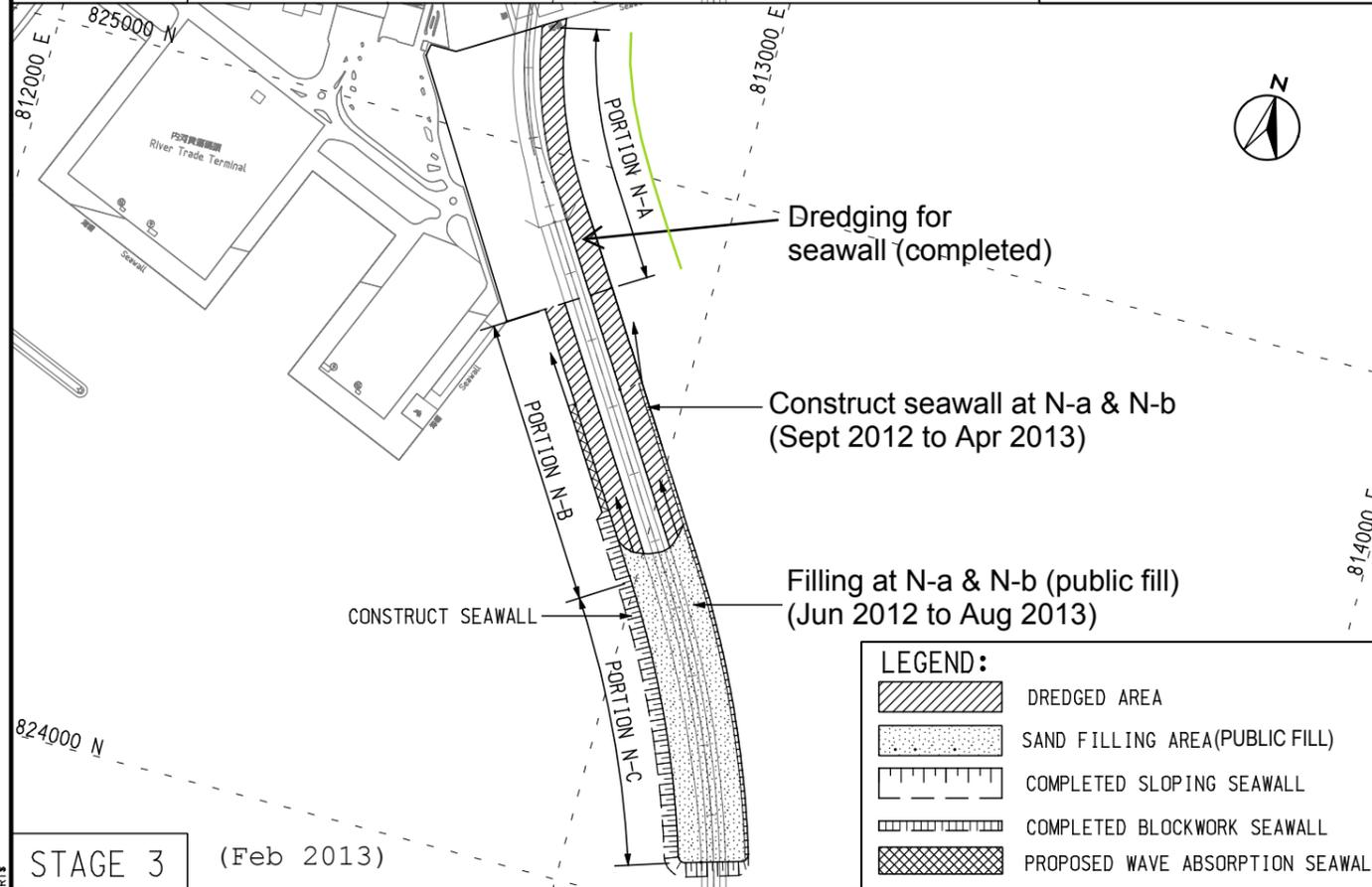
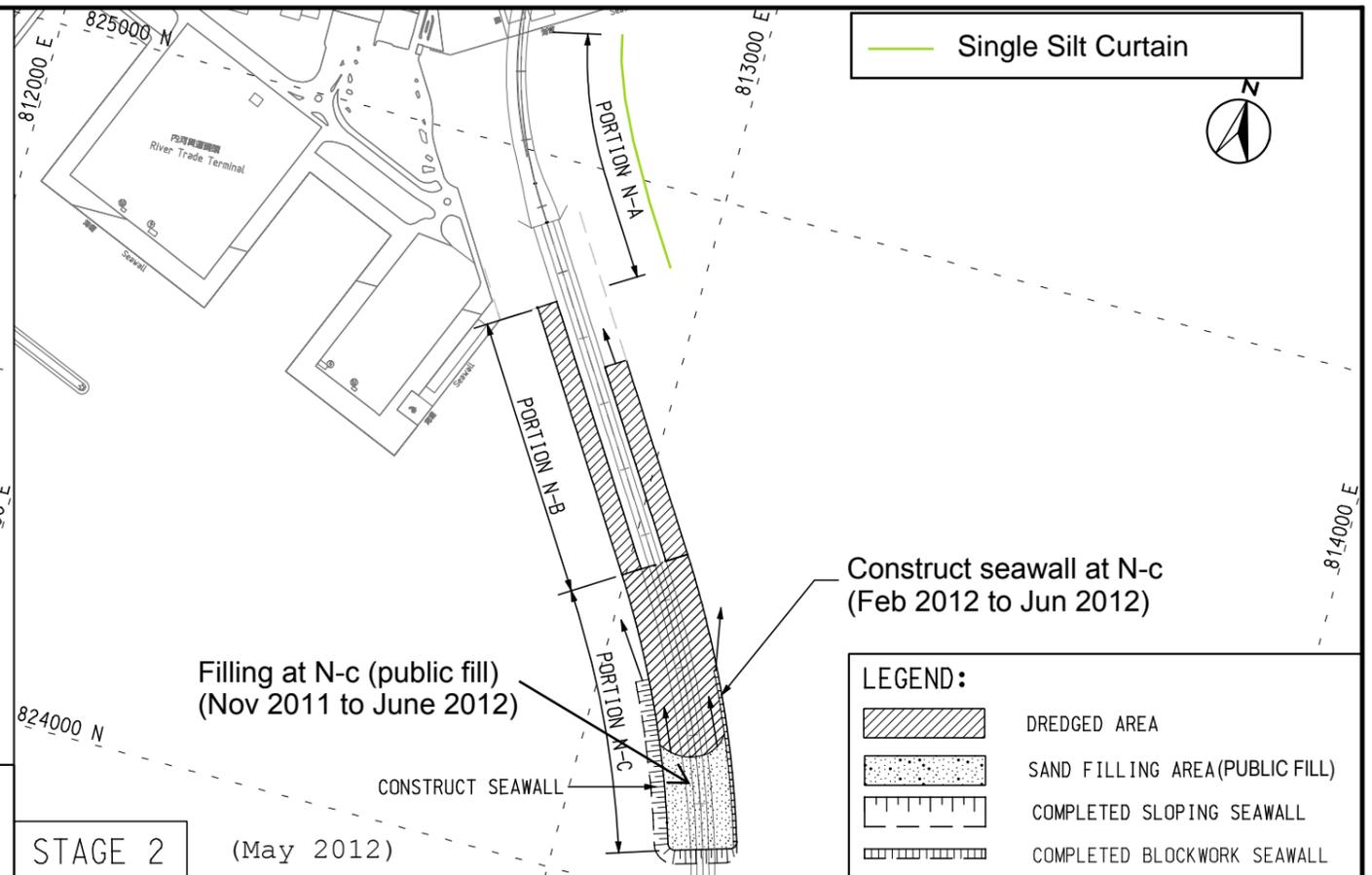
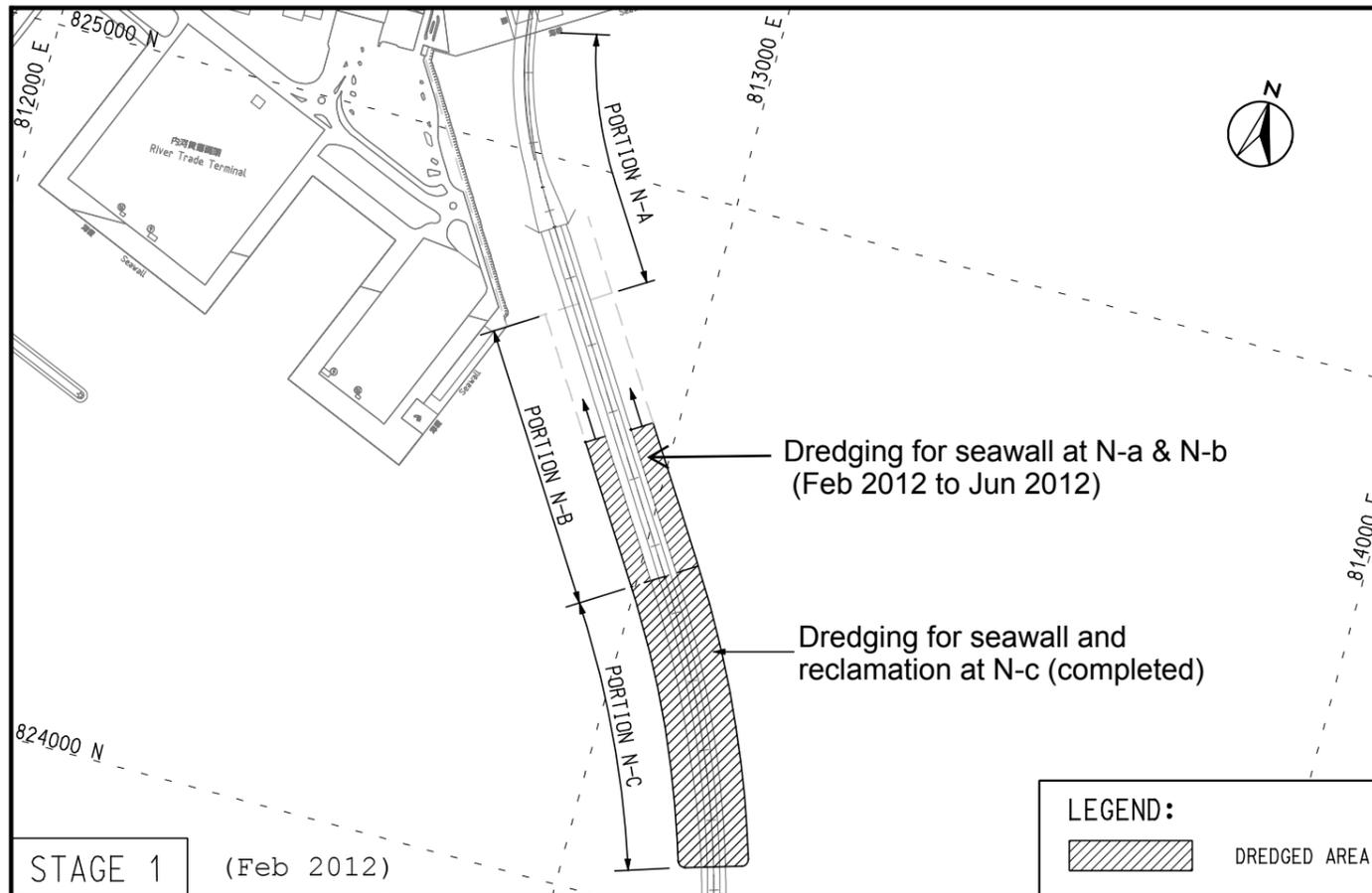
Apr 2009  
 Figure 035



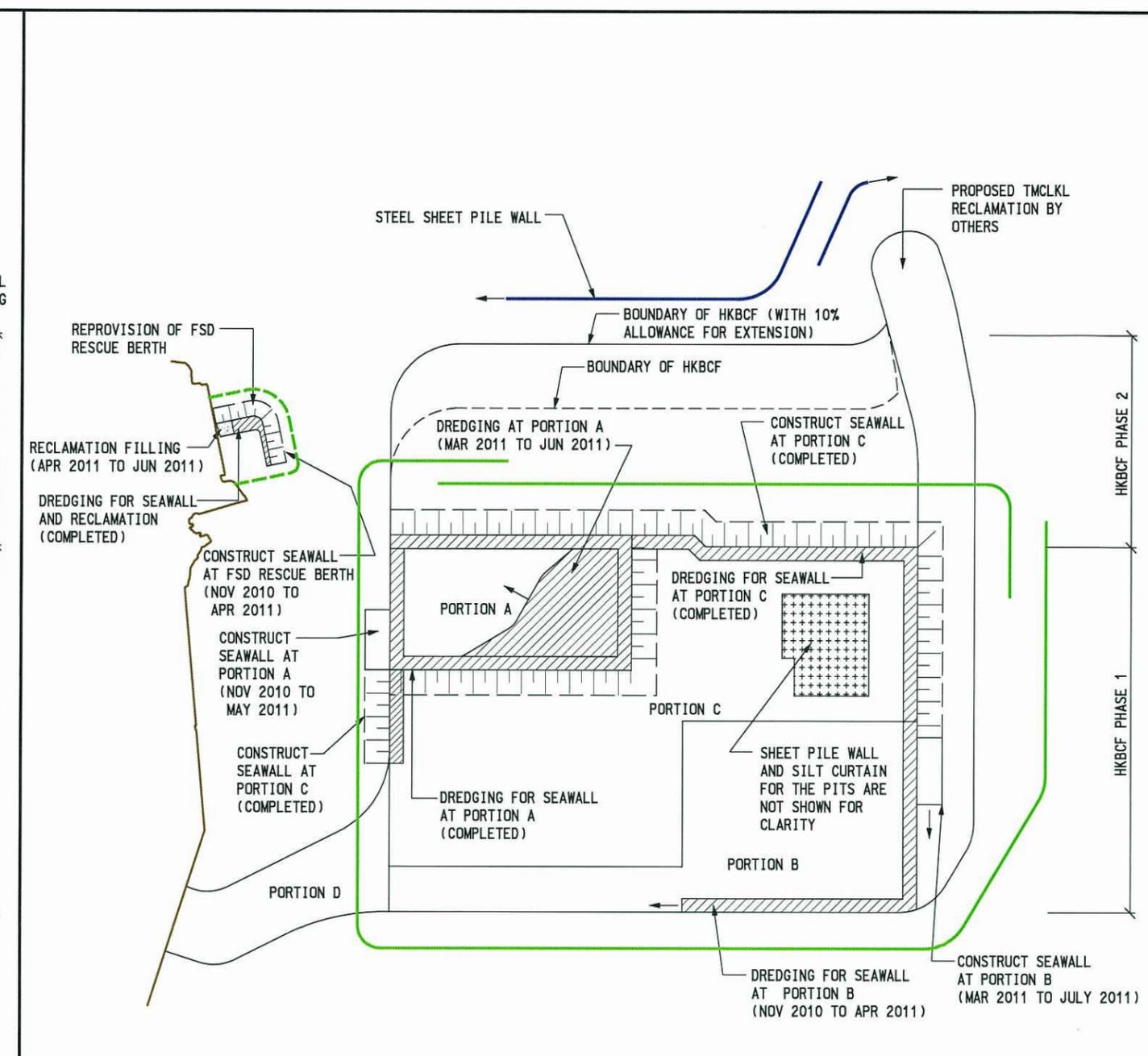
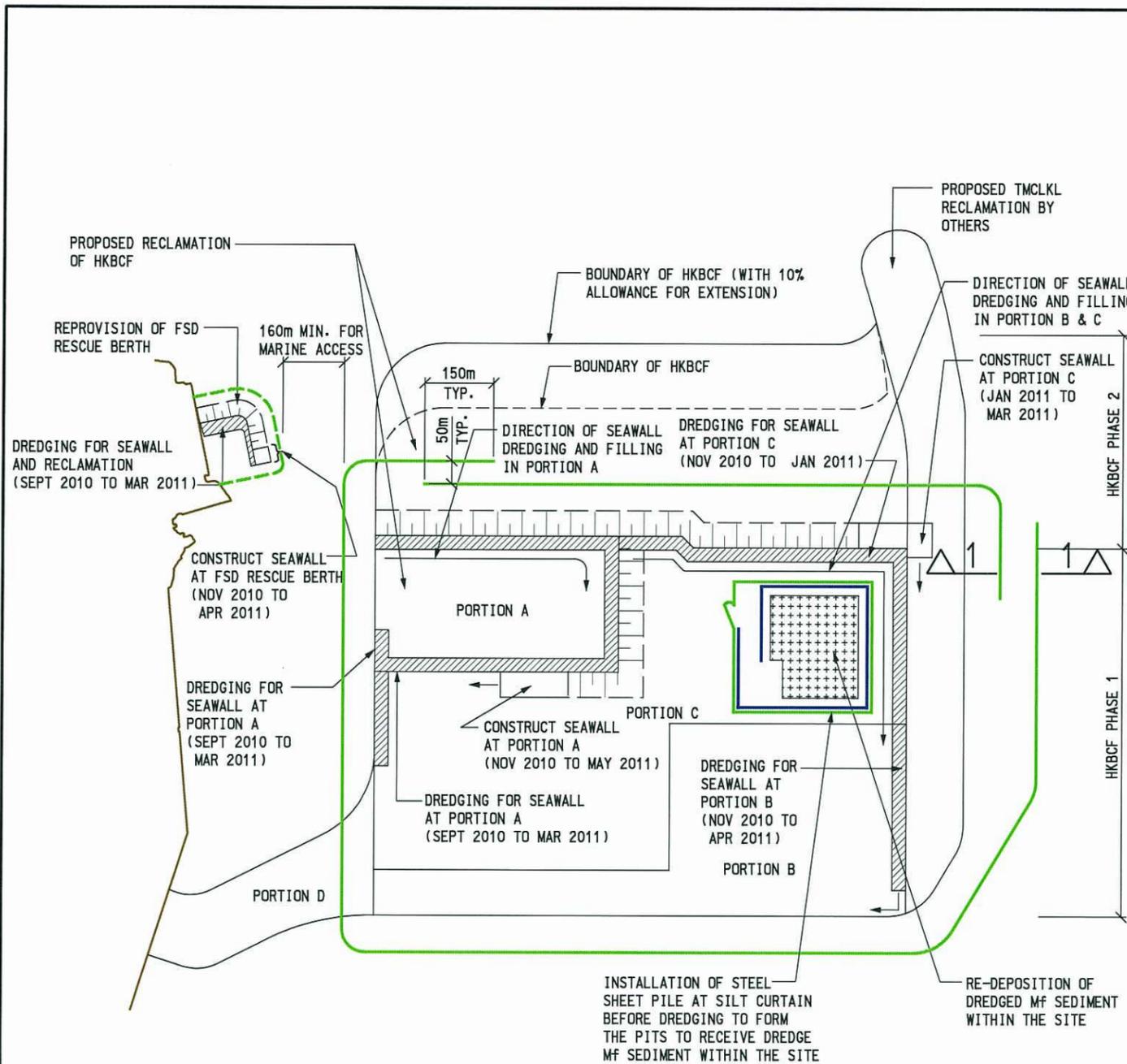
Year 2011  
 Wet Season Velocity Vector Plot at Flood Tide – Bottom Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

Apr 2009

Figure 036



SCALE	A3 1:5000	DATE	APR. 2009
CHECK	--	DRAWN	LCG
JOB No.	60044963	DRAWING No.	9a
		REV	--



**NOTE:**  
 FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)  
 SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

- LEGEND:**
- STEEL SHEET PILE WALL
  - SINGLE SILT CURTAIN
  - DREDGED AREA
  - COMPLETED SLOPING SEAWALL
  - RE-DEPOSITION OF DREDGED MF SEDIMENT

STAGE 1 (ON FEB 2011)

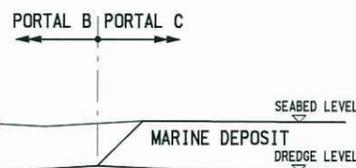
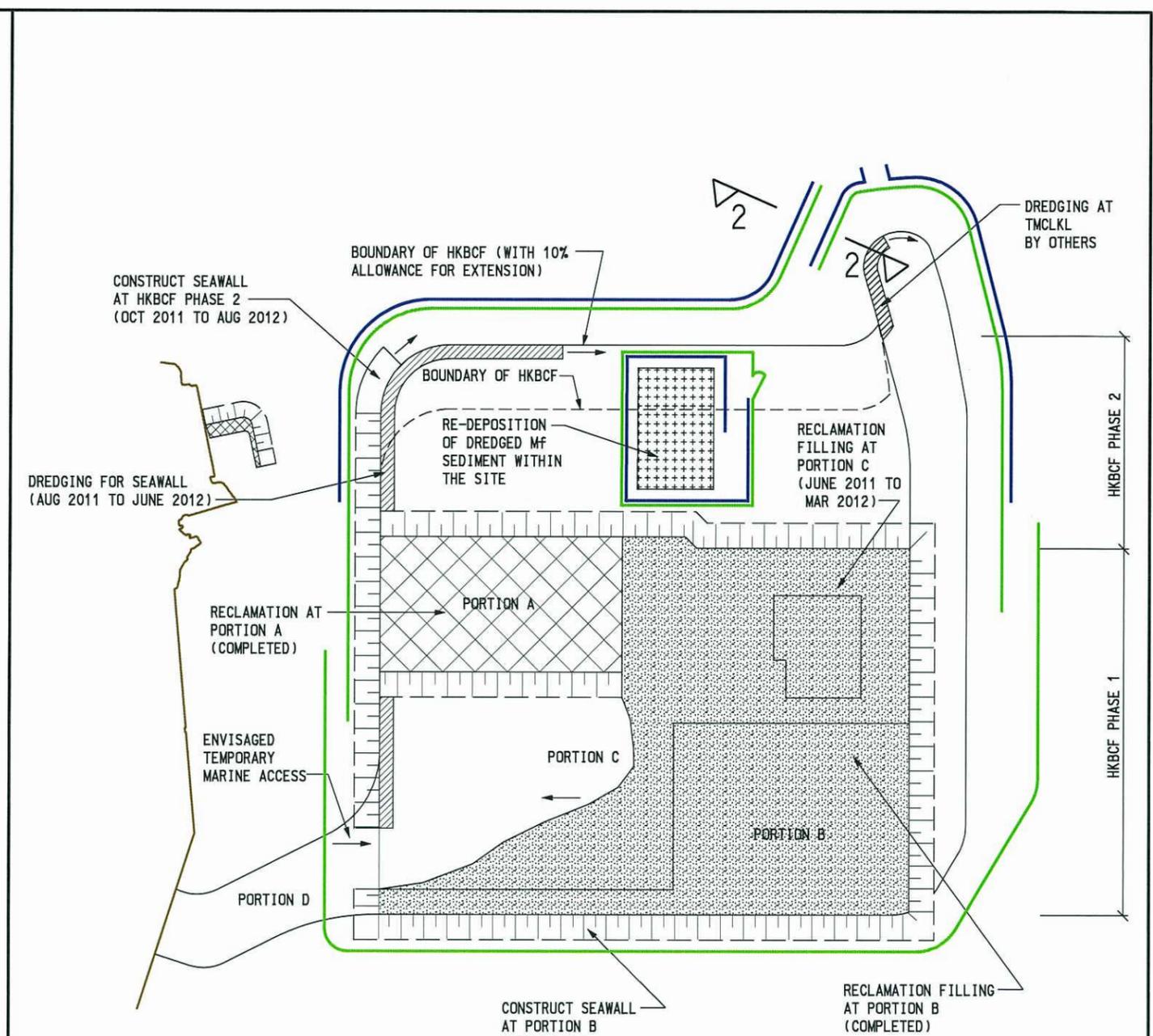
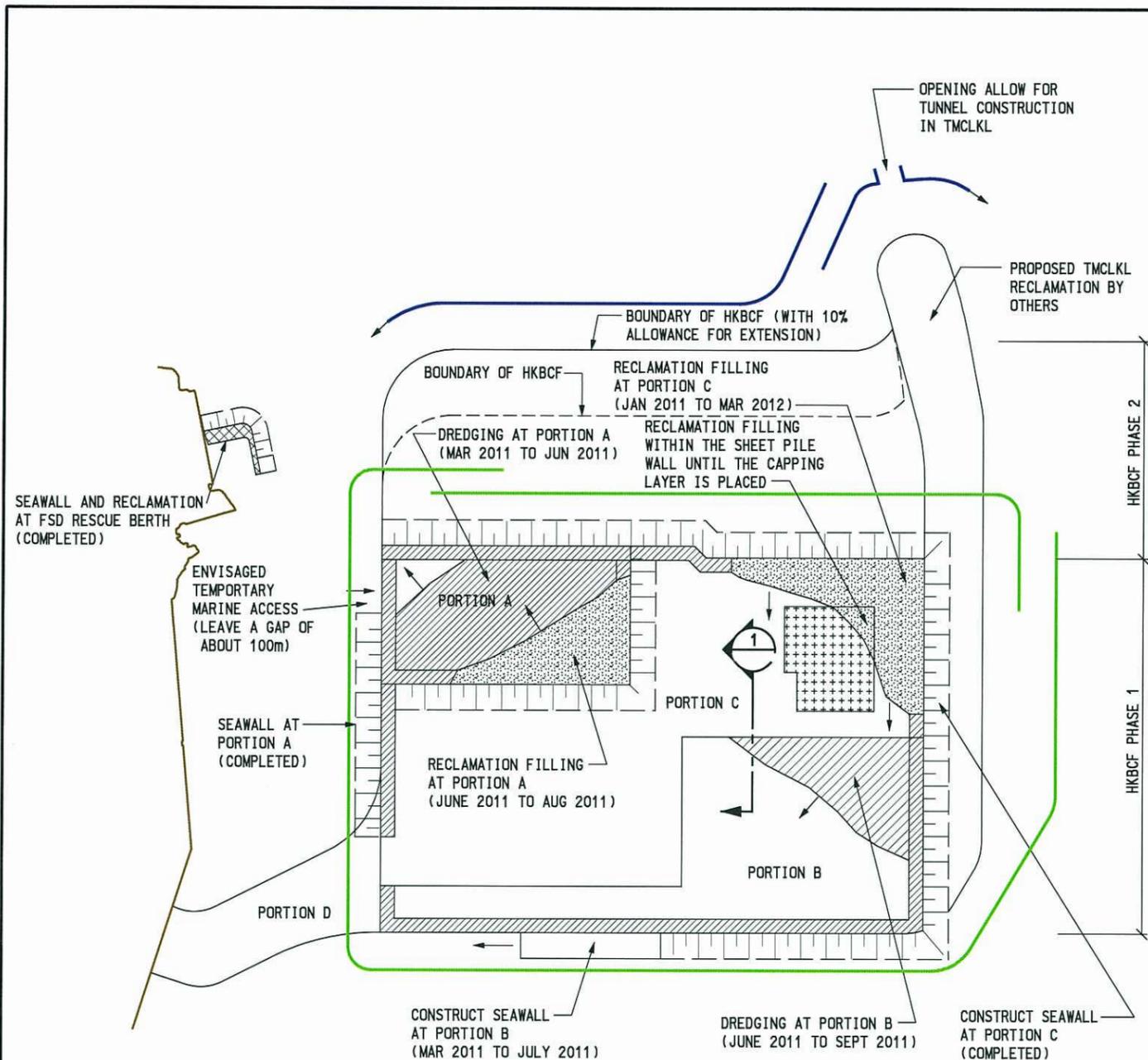
**NOTE:**  
 FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)  
 SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

- LEGEND:**
- STEEL SHEET PILE WALL
  - SINGLE SILT CURTAIN
  - DREDGED AREA
  - COMPLETED SLOPING SEAWALL
  - RE-DEPOSITION OF DREDGED MF SEDIMENT

STAGE 2 (ON APRIL 2011)

Printed by : \*o\*  
 J:\25308\ARUP\CTV\IL\SKET\CH\Reclam\01\025308-SK-41-301.dgn  
 29/7/2009

<p><b>路政署</b>  <b>HIGHWAYS DEPARTMENT</b>          港珠澳大橋香港工程管理處          Hong Kong - Zhuhai - Macao Bridge          Hong Kong Project Management Office</p>	<p><b>ARUP</b> One Arup &amp; Partners          Hong Kong Limited</p>	Job Title <b>Agreement No. CE 14/2008 (CE)</b> <b>Hong Kong-Zhuhai-Macao Bridge Hong Kong</b> <b>Boundary Crossing Facilities - Investigation</b>	Drawing Title <b>ANTICIPATED CONSTRUCTION</b> <b>SEQUENCE OF HKBCF (SEQUENCE A)</b>	Drawn CN	Date 02/09	Drawing No. <b>25308/041/301</b>	
				Checked SK	Approved AK		
Rev. A FIRST ISSUE				Date 02/09	Scale 1:12500 on A3	Status <b>PRELIMINARY</b>	Rev. A



- LEGEND:**
- STEEL SHEET PILE WALL
  - SINGLE SILT CURTAIN
  - DREDGED AREA
  - COMPLETED SLOPING SEAWALL
  - RECLAMATION WORKS COMPLETED
  - RECLAMATION FILLING AREA
  - RE-DEPOSITION OF DREDGED MF SEDIMENT

**NOTE:**

FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

**NOTE:**

FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

- LEGEND:**
- STEEL SHEET PILE WALL
  - SINGLE SILT CURTAIN
  - DREDGED AREA
  - COMPLETED SLOPING SEAWALL
  - RECLAMATION WORKS COMPLETED
  - RECLAMATION FILLING AREA
  - RE-DEPOSITION OF DREDGED MF SEDIMENT

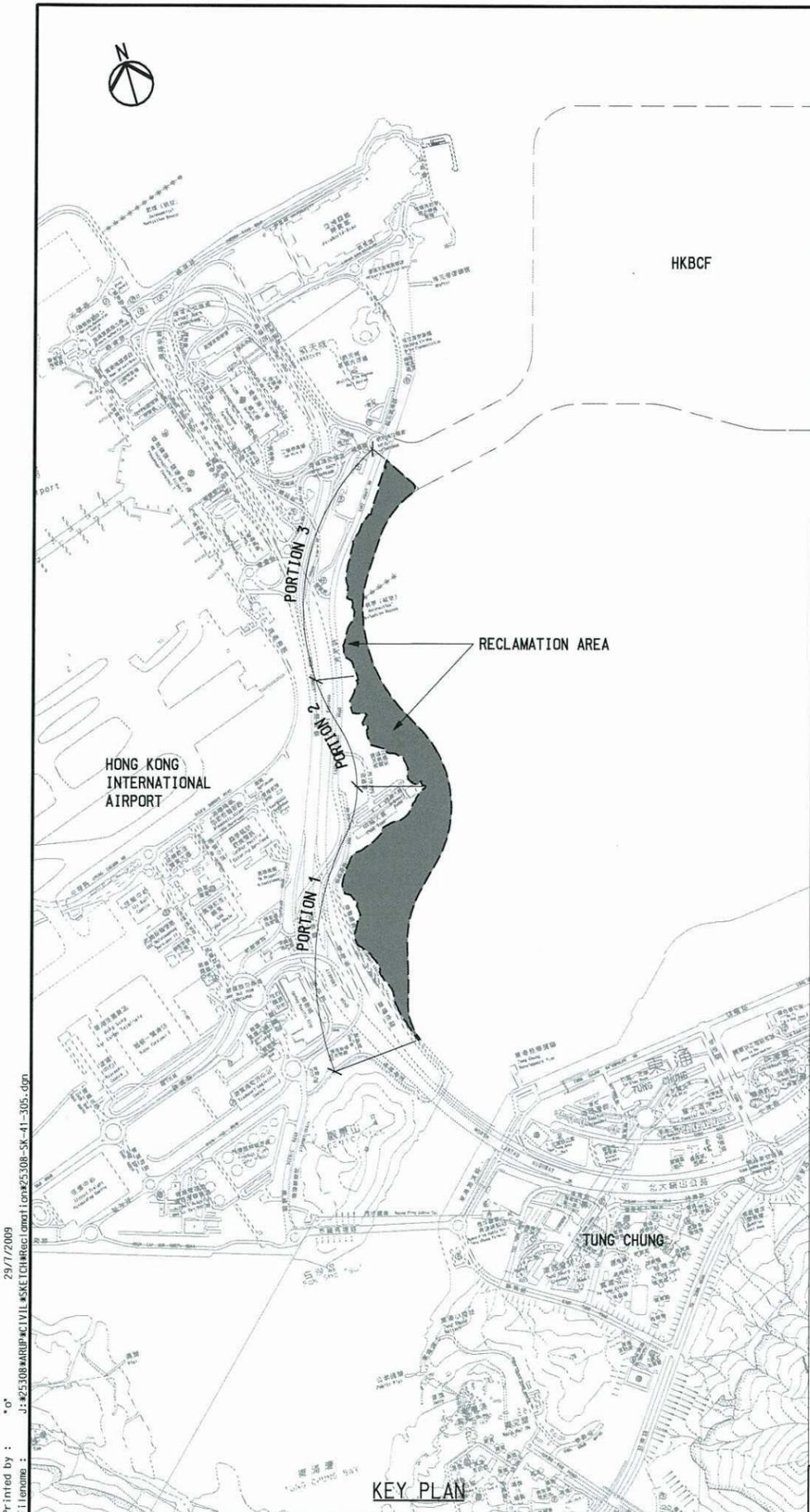
STAGE 3 (ON JUNE 2011)

STAGE 4 (ON DEC 2011)

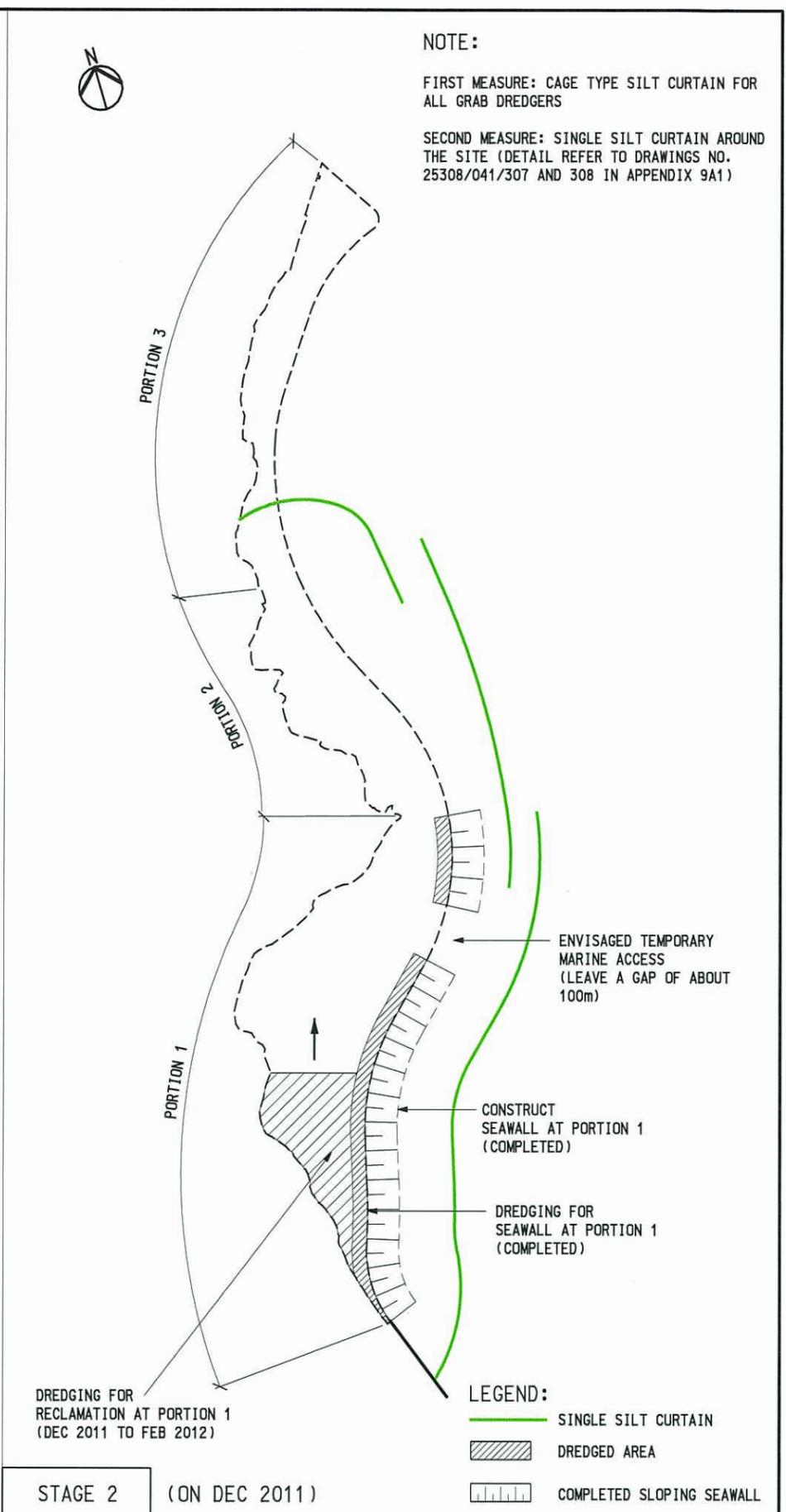
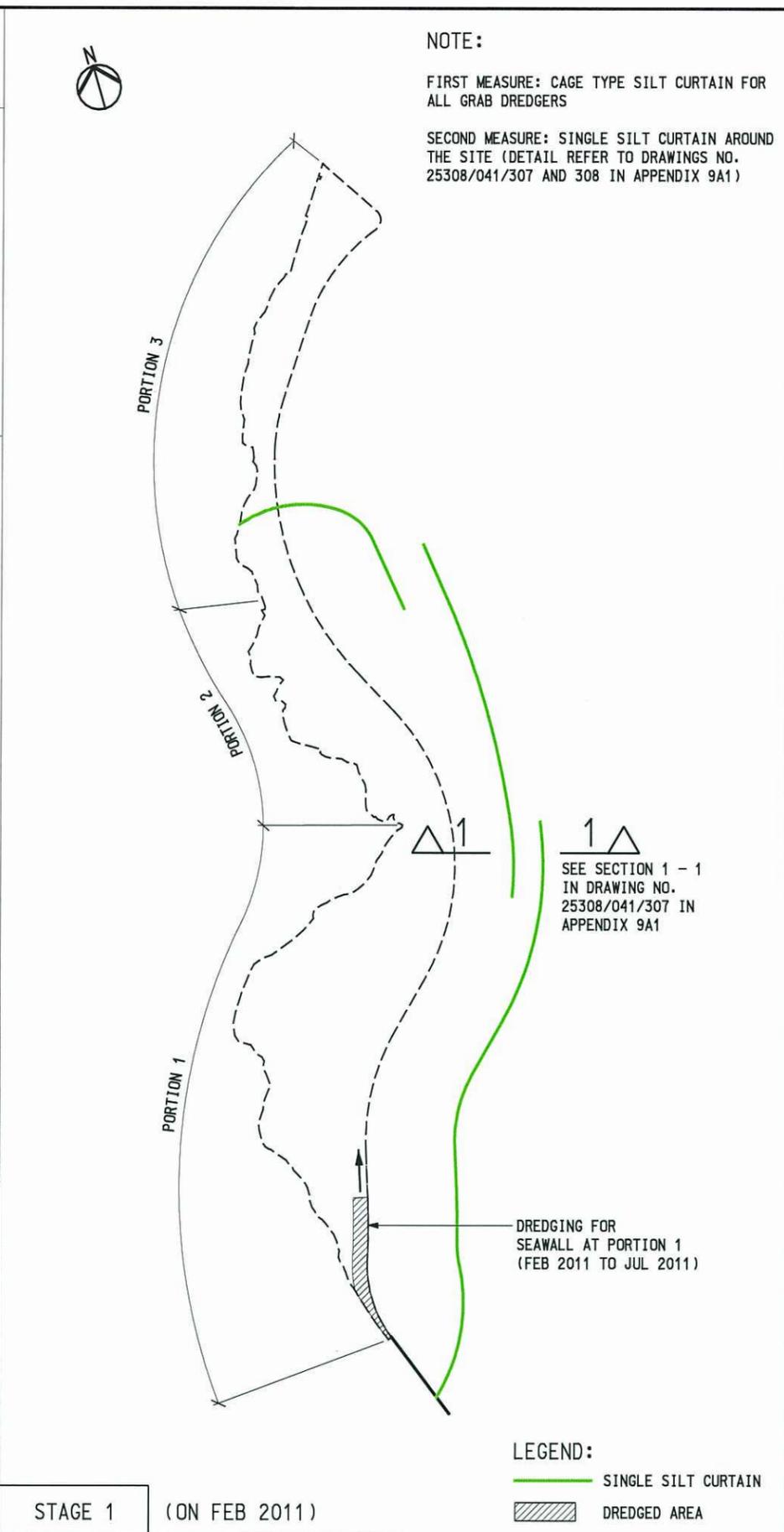
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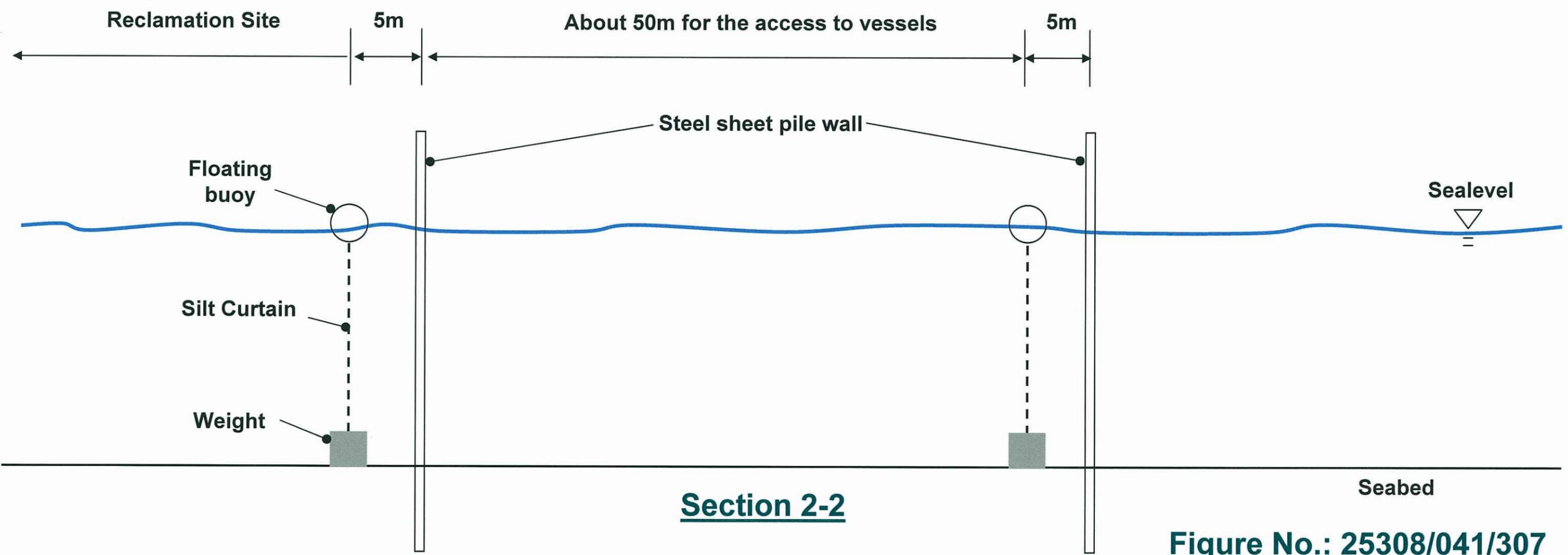
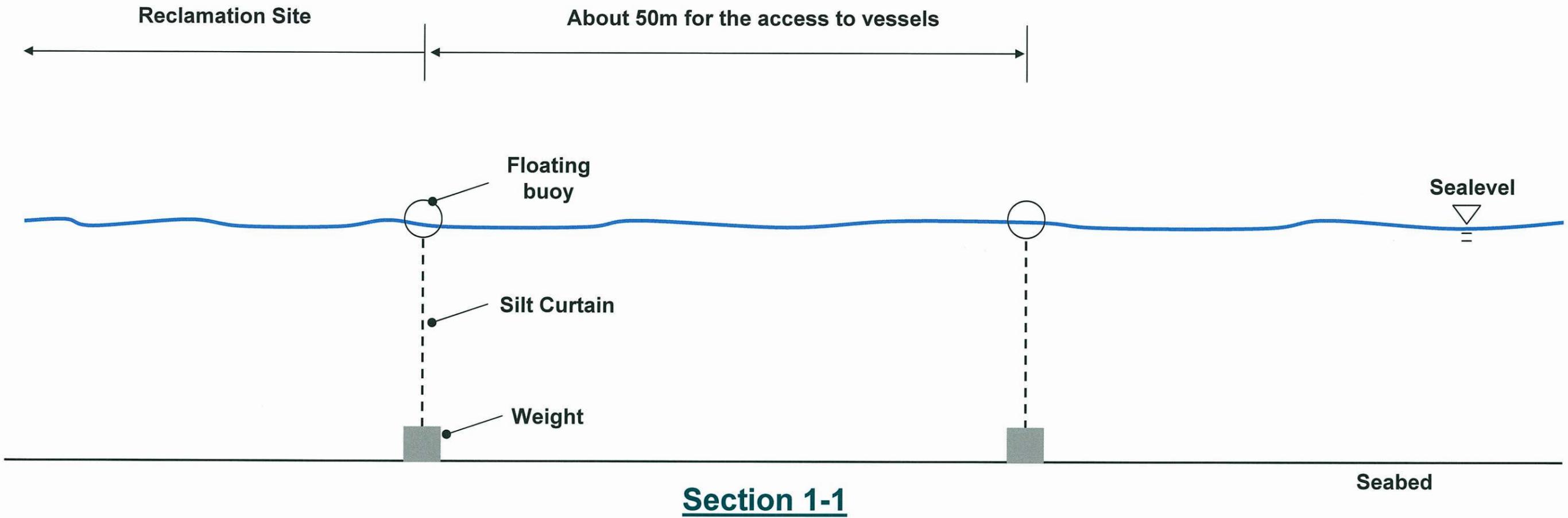


KEY PLAN

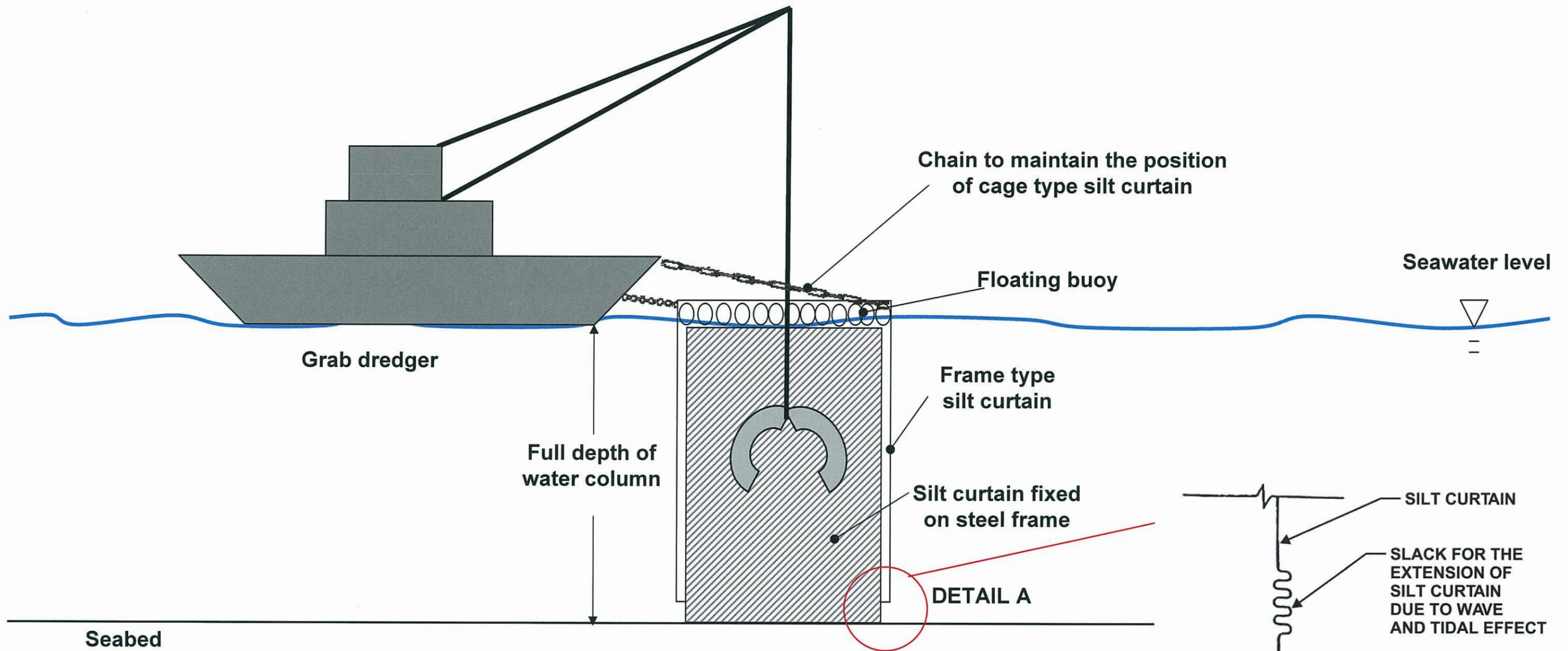


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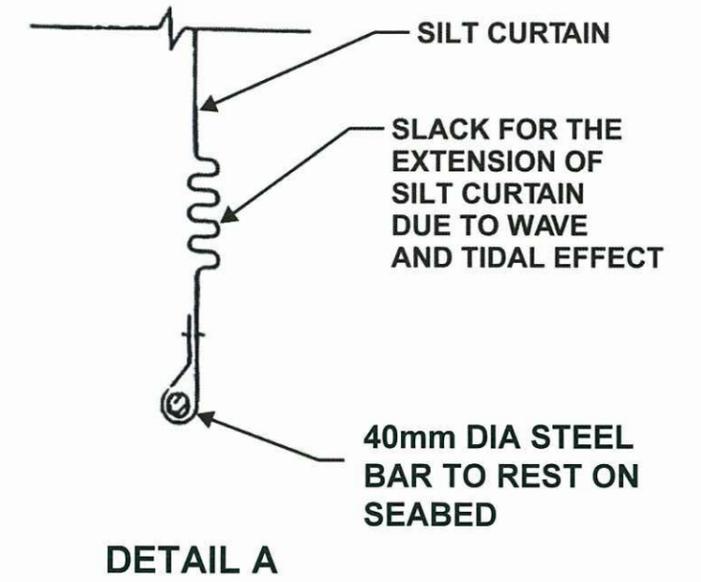




**Figure No.: 25308/041/307**



**Additional Cage Type Silt Curtain for Grab Dredgers**



**Figure No.: 25308/041/308**

# SILT PROTECTOR®



**PREVENT DIFFUSION  
OF SILT IN WATER**



**G AND E COMPANY LTD**  
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# Models and Features

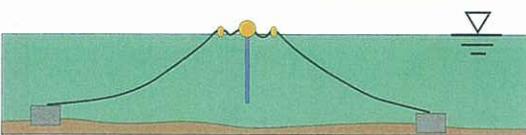
The Silt Protector consists of several types that are individually subdivided into some ranks so that the user is able to select units best suited to specific site conditions and work items. The Silt Protector can be used individually or separately, or by combining the units.

## ● Fixed Hanging Type Silt Protector

This type is used the most frequently. It basically consists of floats on the surface and curtain and weight chain below the surface. One span of this product is 20m long. It is moored to the bottom through anchor ropes and anchors at every 19.5m point. The anchor ropes are steel wire type or synthetic fiber type, and anchors are concrete blocks, usually.

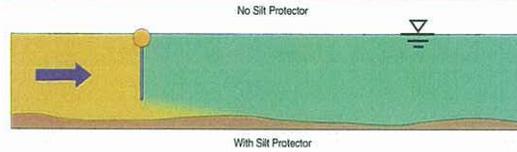
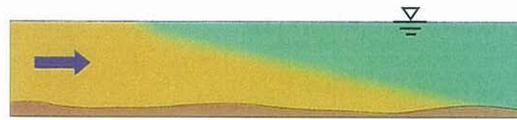
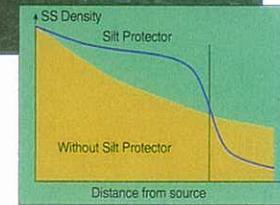
When this product is used under high wave conditions, the curtain with the vertical length of 10m or less is used and standing type is used together in many cases. When wave is low, the curtain of 20m long or more may be used.

The fixed hanging type Silt Protector is classified into four ranks, A, B, C and D so that a type best suited to a specific application can be identified.



Rank	Suitable site conditions	Standard specifications			
		Float dia (mm)	Float type	Curtain tensile strength (kgf/3cm)	Chain weight (kg/m)
A	Area outside of breakwater ◆Wave height : 1.5m or less ◆Velocity of current : 0.5m/sec or less	600	Unspaced	800 or 500	10
B	Wide area inside of breakwater, or inside of inlet that is sheltered by the natural submarine topography ◆Wave height : 1.0m or less ◆Velocity of current : 0.2m/sec or less	400	Unspaced	500 or 300	5
C	Area with medium extent inside of breakwater ◆Wave height : 0.8m or less ◆Velocity of current : 0.1m/sec or less	300	Unspaced	500 or 300	5
D	Lakes, or well sheltered area as calm as lakes ◆Wave height : 0.5m or less ◆Velocity of current : 0.05m/sec or less	300	Spaced	300	3

● Remarks \*Standard unit length is 20m.  
\*Anchor is not included in the unit.



## ● General site condition for hanging fixed type

## EFFECT

Silt Protector generally provides the following effects on prevention of diffusion of pollution in the sea.

### ● Acceleration of settlement of silt by interference of particles

Installation of the Silt Protector suppresses diffusion of the pollution and make the soil particles interfere with each other to accelerate their settlement.

### ● Reduction of distance required to settle the silt

Installation of the Silt Protector as shown narrows the settlement range, resulting in minimizing the diffusion of pollution after the unit.

# SILT PROTECTOR®



PREVENT DIFFUSION  
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# Models and Features

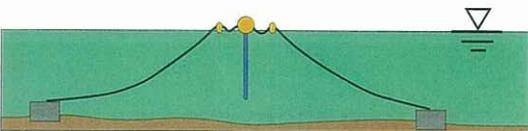
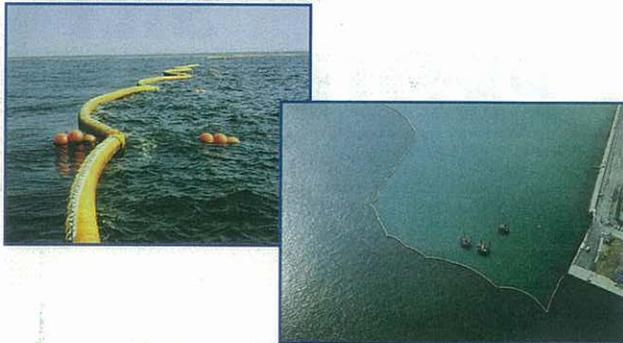
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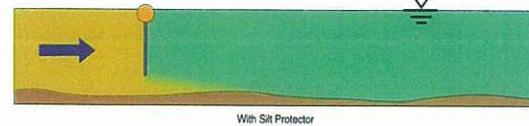
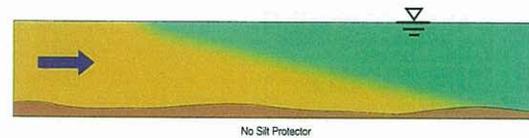
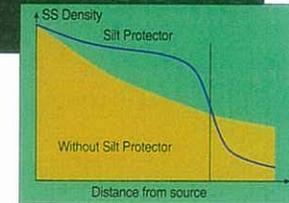
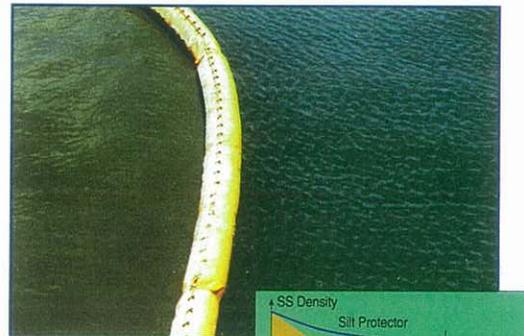
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Silt Protector generally provides the following effects on prevention of diffusion of pollution in the sea.

### ● Acceleration of settlement of silt by interference of particles

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### ● Reduction of distance required to settle the silt

Installation of the Silt Protector as shown narrows the settlement range, resulting in minimizing the diffusion of pollution after the unit.

**APPENDIX D6b**  
**WATER QUALITY MITIGATION -**  
**SILT CURTAIN APPLICATION**  
**SUPPLEMENTARY INFORMATION FOR SEQUENCE B**

## D6-1 INTRODUCTION

D6-1.1 For the Sequence B of the combined TM-CLKL+HKBCF+HKLR projects, scenario year 2011 has been selected for hydrodynamic and water quality modelling based on the worst case calculated sediment losses following the anticipated project programme. The anticipated programme is shown in Figure 1 of **Appendix D5b**. All the construction works sequence and works items were same as Sequence A except the works for HKBCF and the southern Landfill works of TM-CLKL. This appendix, therefore, provided supplementary information specific to Sequence B and the reader shall refer to **Appendix D6a** for general information.

D6-1.2 The results of the construction phase water quality modelling for Sequence A has shown that, even with the integrated measures described in Section 6 of the main text, exceedances of the water quality objectives would occur and further mitigation would be required. Similar to Sequence A, the implementation of sheet piled wall and silt curtains have been proposed as the primary mitigation option of Sequence B. Indeed, the sheet piled wall has been evolved as an integrated protection measure and included in the flow modelling.

D6-1.3 As discussed in **Appendix D6a**, the application and effectiveness of silt curtains does depend on the aquatic conditions in which they are proposed and issues such as water depth and current speed can affect the viability and effectiveness of this measure, with speeds of about 0.5m/s generally being considered as allowing effective anchoring and use of silt curtains.

D6-1.4 In order to assess the viability of the use of silt curtains as mitigation for the works sites, the flow velocities in the study area have been reviewed for Sequence B. The modelled flow patterns indicating the peak ebb and flood at 3 depth (surface, mid-depth and bottom) are presented in the vector plots in Annex A (see Figures 001-024). The location of the construction plant at those times is, also, indicated. Review of the plots shows that the flows over most of the site area, where the HKBCF, TM-CLKL southern landfall and HKLR reclamation will be constructed, are, in general, below 0.5m/s and, therefore, suitable for silt curtain deployment.

D6-1.5 Based upon the review, which is consistent with the results of Sequence A, it was concluded that silt curtains could be deployed in the majority of the works site for the protection of the marine environment. Further details on the proposed silt curtain arrangement and suitability are provided below. Localised changes, however, are also predicted leading to adjustment on the potential reduction of silt curtains and also the use of special designed cage type silt curtain (with steel enclosure) on grab dredgers working in HKBCF and TM-CLKL southern landfall and these are further discussed below.

## D6-2 SILT CURTAINS ARRANGEMENT

D6-2.1 Under Sequence B, in order to minimise the water quality impacts during the construction stage, deployment of silt curtains has been proposed and the following systems have been recommended:

- Cage type silt curtain (with steel enclosure) to fully enclose the working area of each grab dredger while carrying out the dredging works in HKBCF and TM-CLKL southern landfall; and
- A floating type silt curtain (single layer) around or adjacent to the site while the dredging works and filling works are in progress.

D6-2.2 . Indicative layouts of the proposed silt curtain arrangements for sequence B are provided in Annex B, see Figures No. 25308/041/301A to 304A for HKBCF and TM-CLKL southern landfall. The arrangement of silt curtains system for TM-CLKL northern landfall and HKLR reclamations have not changed due to Sequence A and the details provided in **Appendix D6a** are still valid and shall be referred.

D6-2.3 As the first measure, the cage type silt curtain is designed to enclose local pollution caused by the grab dredger. The general description of the frame type silt curtain is presented in **Appendix D6a**. For works at HKBCF and TM-CLKL southern landfall in which the sheet pile walls is predicted to cause localised increase in flow speed, specially designed caged type silt curtain with steel enclosure shall be used and details are shown in Figure No. 25308/041/308a in Annex B.

D6-2.4 Apart from the cage type silt curtain (with steel enclosure), deployment of silt curtain (single layer) around the site is recommended. The indicative layout of silt curtains for HKBCF and TM-CLKL southern landfall at different stages of the construction process under Sequence B are shown in Figures No. 25308/041/301A to 304A in Annex B. The silt curtains would basically consist of a curtain membrane made by synthetic textile (see Annex C of **Appendix D6a**) or similar product, a float system that hangs the curtain in the water, and a weight at the bottom of curtain to fix it at the seabed. Sufficient length of the curtain membrane will be allowed such that there is an amount of slack for the extension of the silt curtain due to wave and tidal effects.

D6-2.5 The silt curtain should allow access of vessels that enter into or exit from the reclamation area. This could be achieved by the opening formed by two piece of silt curtain with overlapping length of 150m min and a separation distance of about 60m to allow the passage of vessels. The indicative position and details of the above openings are shown in Annex B. Local adjustment of the position of these openings is expected during construction stage to suit the actual site condition and the Contractor's working method.

D6-2.6 The silt curtain is suitable for use in the site condition where the current velocity of 0.5m/s or less. However, as noted above, the velocity of currents near the northern edge of reclamation site for HKBCF Phase 2 is higher due to its exposure to the area of main flows. In order to enable the deployment of silt curtain to mitigate the water quality impact due to the reclamation activities in HKBCF Phase 2, a sheet pile wall is proposed to protect the silt curtain along the northern edge of the reclamation (See Figures No. 25308/041/301A to 304A). With the implementation of the sheet piled wall, the silt curtain will not be subject to the influences of the strong currents and can be used. A separate distance of 5m between the silt curtain and sheet pile wall is allowed in this case. Details of

the steel sheet pile wall are shown in figure No. 25308/041/307 in Annex B.

D6-2.7 The sheet pile wall is a recommended mitigation measure under Sequence A and further developed as an integrated protection measure under Sequence B. Under the conservative worse case scenario for Sequence B, it is assumed that sheet pile wall near the northern side of the HKBCF reclamation is present while the seawalls at the eastern and western sides of the main HKBCF and TM-CLKL southern landfall are not present.

D6-2.8 Yellow marker buoys fitted with yellow flashing lights will be laid along the top surface of the silt curtains at a spacing of about 50m to mark the extent of the silt curtain. As the silt curtain will not be installed in the navigation channel and the flashing lights of the marker buoys of silt curtain will be small in size, it is not considered that there would be significant impacts to the marine traffic and aviation due to the installation of silt curtain.

### D6-3 LOSS REDUCTION ASSUMPTIONS

D6-3.1 The assumed effectiveness of the cage type silt curtain for grab dredgers and the single layer of silt curtains proposed for general works areas are presented in Table D6-1 of **Appendix D6a** and is not repeated here. However, it has predicted that the sheet pile wall could lead to localised increases in peak flows in the area further south of the sheet pile wall. The peak flow has been predicted to reach 0.5m/s at the eastern side of the main reclamation and over 0.5m/s at the western side. Under such a condition, to be conservative, the effectiveness of silt curtain for sediment reduction is assumed to be reduced. The assumed effectiveness of the cage type silt curtain (with steel enclosure) for grab dredgers and the single layer of silt curtains proposed are presented in Table D6-3 below.

**Table D6-3 Summary Table of Loss Reductions from Silt Curtain Configurations at HKBCF+TMCLKL (southern landfall) under Sequence B**

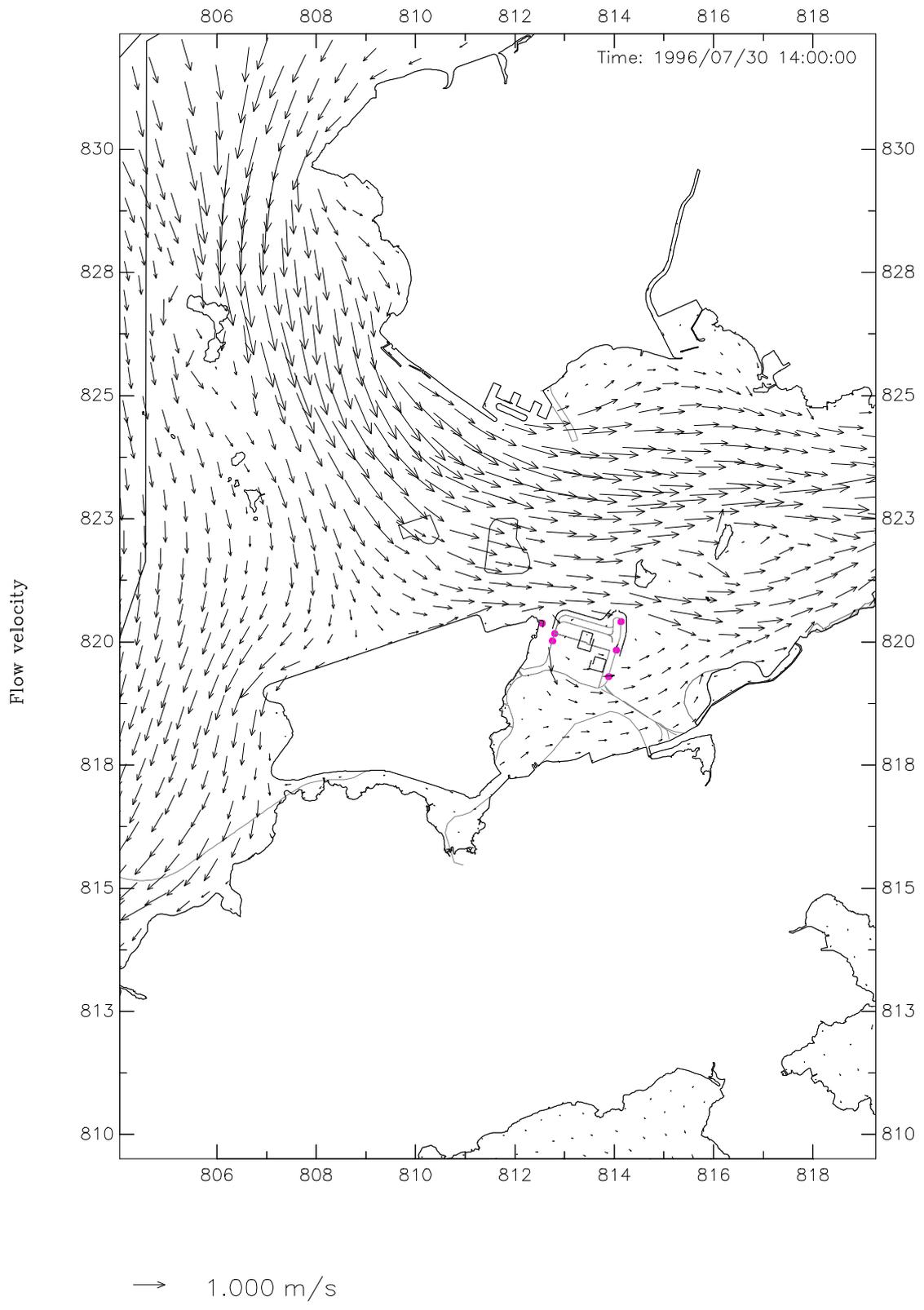
Silt Curtain Type	Loss Reduction Factor	Remark
<b><i>Seawall Dredging</i></b>		
Cage type (with steel enclosure) for Grab Dredger (1)	80%	Typical, also reviewed in LNG Terminal EIA
Floating Single Silt Curtain (2)	0%	Assumed no further reduction.
<b><i>Combined Reduction (1+2)</i></b>	80%	For grab dredger at HKBCF+TM-CLKL (southern landfall) only. Assumed for <b>Option 1</b> discussed in the main text.
<b><i>Filling at the Eastern Seawall</i></b>		
Floating Single Silt Curtain (3)	23%	For filling at HKBCF+TM-CLKL (southern landfall) eastern seawall only. Assumed for <b>Option 1</b> discussed in the main text.
<b><i>Filling at the Western Seawall</i></b>		
Floating Single Silt Curtain (4)	0%	For filling at HKBCF+TM-CLKL (southern landfall) western seawall only. Assumed for <b>Option 1</b> discussed in the main text.

Notes: For assumed silt curtain efficiency at other areas of reclamation, please refer to **Table D6-1** of **Appendix D6a**.

D6-3.2 The calculated overall reduction in sediment losses for the mitigation option are summarised in **Table D6-4** below.

**Table D6-4 Summary of Potential Daily Sediment Loss Rate under Sequence B**

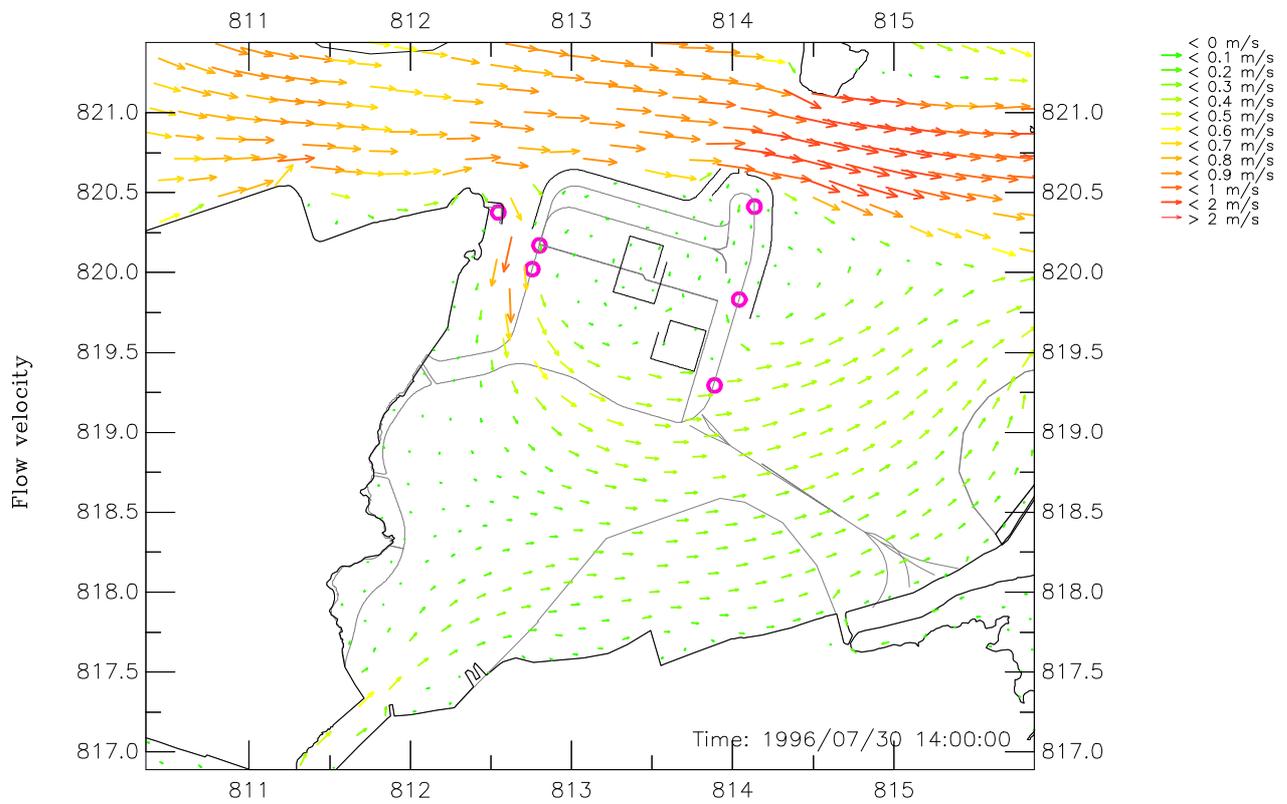
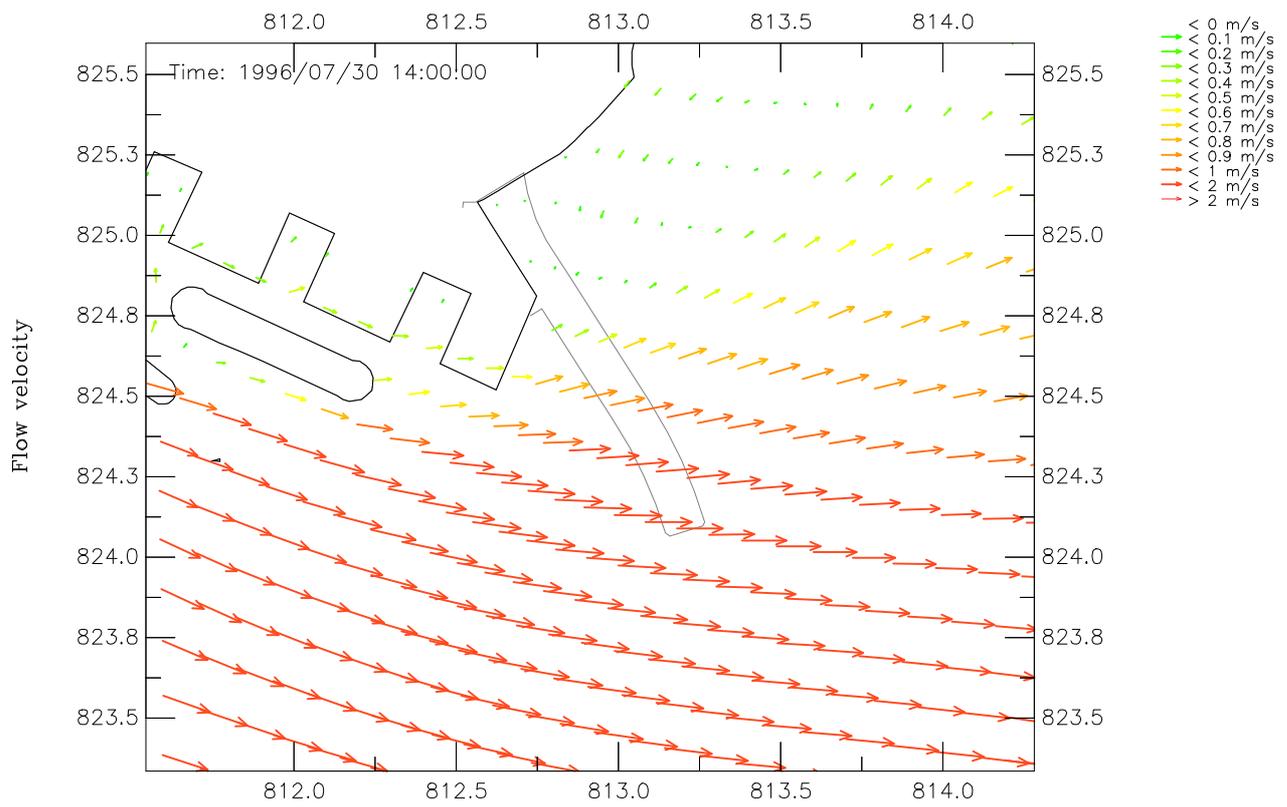
Option	Silt Curtain	2011 (kg/day)	Remark
0	0	1,778,000	Base case with integrated protection measures.
1	1+1	560,000 (69% reduction compared to Option 0)	Single layer (1) of silt curtain systems around the peripheral of proposed reclamation site for the southern reclamation of TM-CLKL, HKBCF and HKLR. For grab dredgers, an extra layer of cage type silt curtain (+1) is assumed. However, for the TM-CLKL northern reclamation, this is not assumed as the current could be too high for effective silt curtain application. For HKBCF+TM-CLKL (southern landfall), the cage type silt curtain shall has a steel enclosure and the overall effectiveness of the silt curtains system are assumed to be less than at other areas as presented in <b>Table D6-3</b> above.



Year 2011 (Sequence B)  
 Dry Season Velocity Vector Plot at Ebb Tide – Surface Layer

Jul 2009

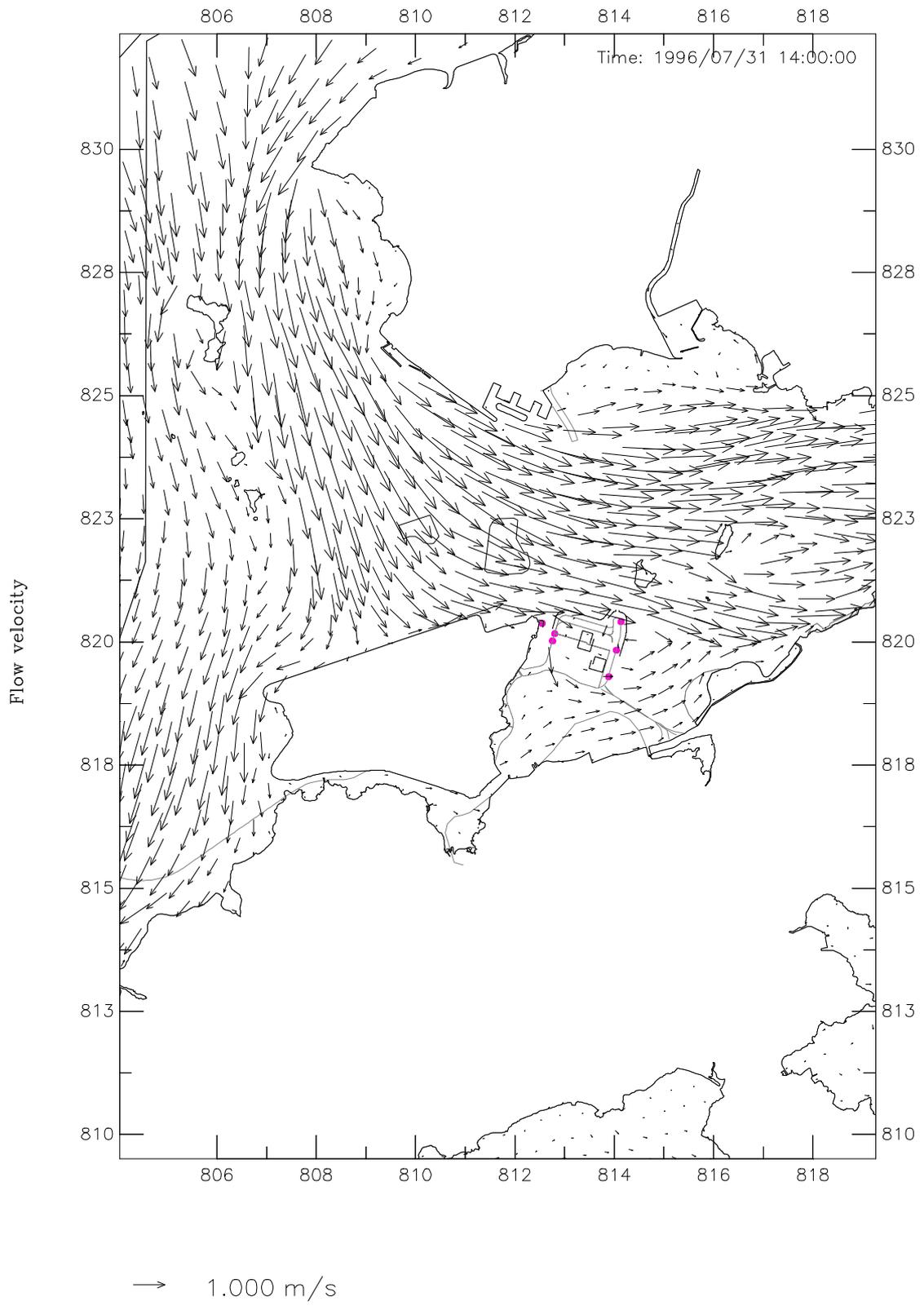
Figure 001



Year 2011 (Sequence B)  
 Dry Season Velocity Vector Plot at Ebb Tide – Surface Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

Jul 2009

Figure 002

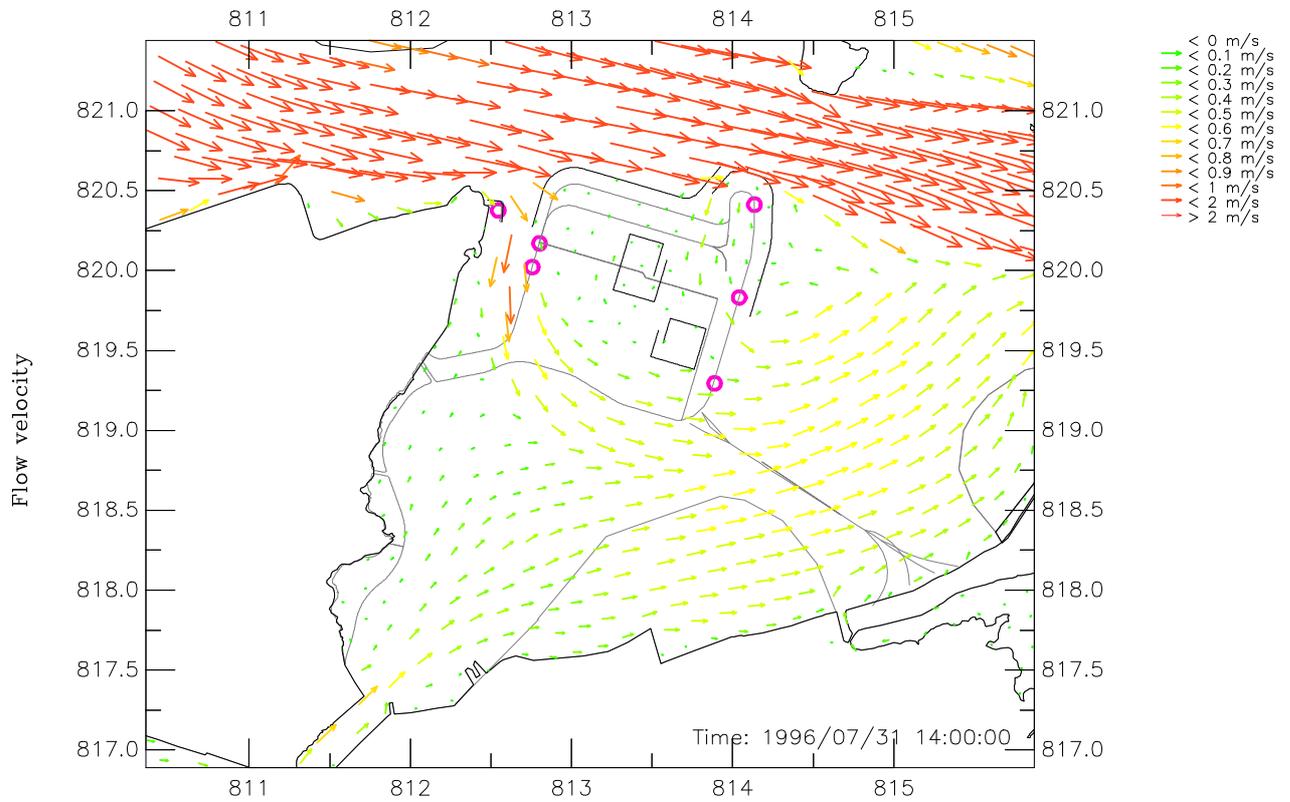
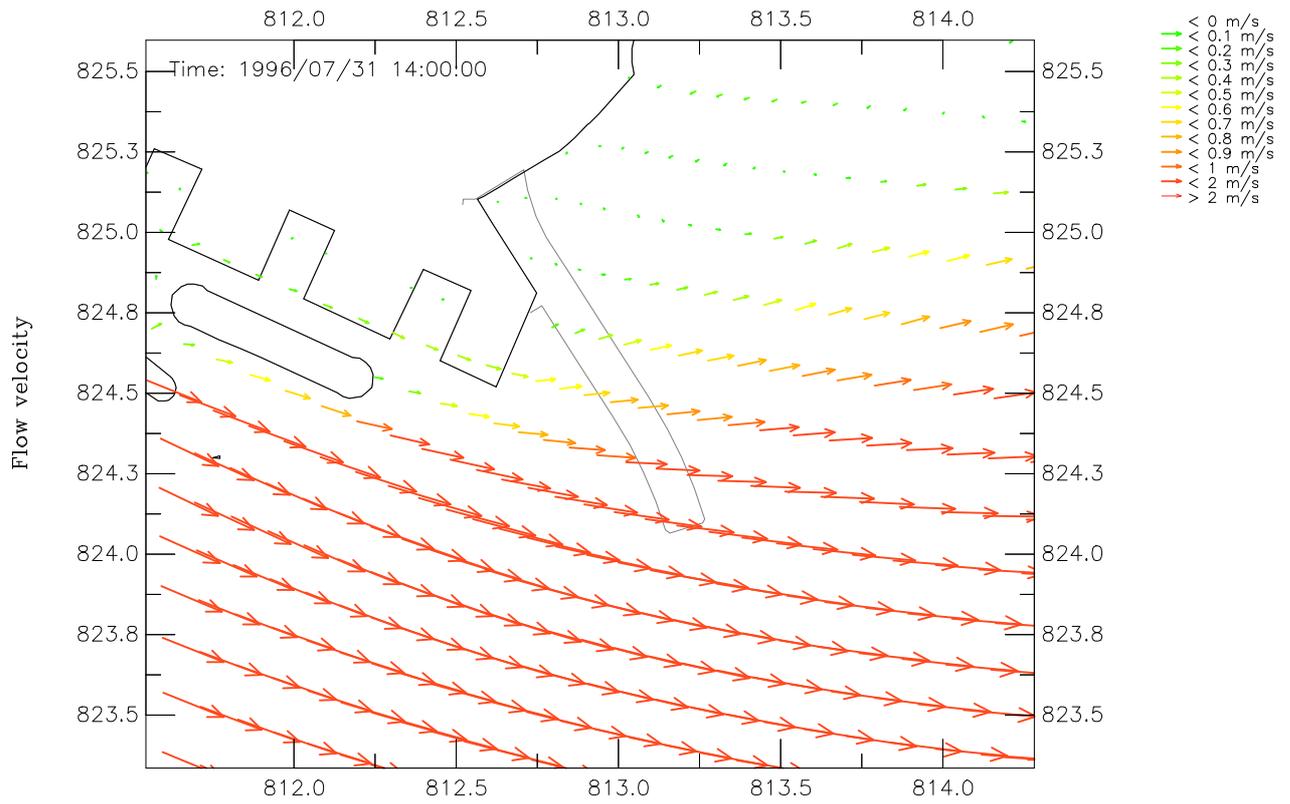


Year 2011 (Sequence B)  
 Wet Season Velocity Vector Plot at Ebb Tide – Surface Layer

Jul 2009

Figure 003

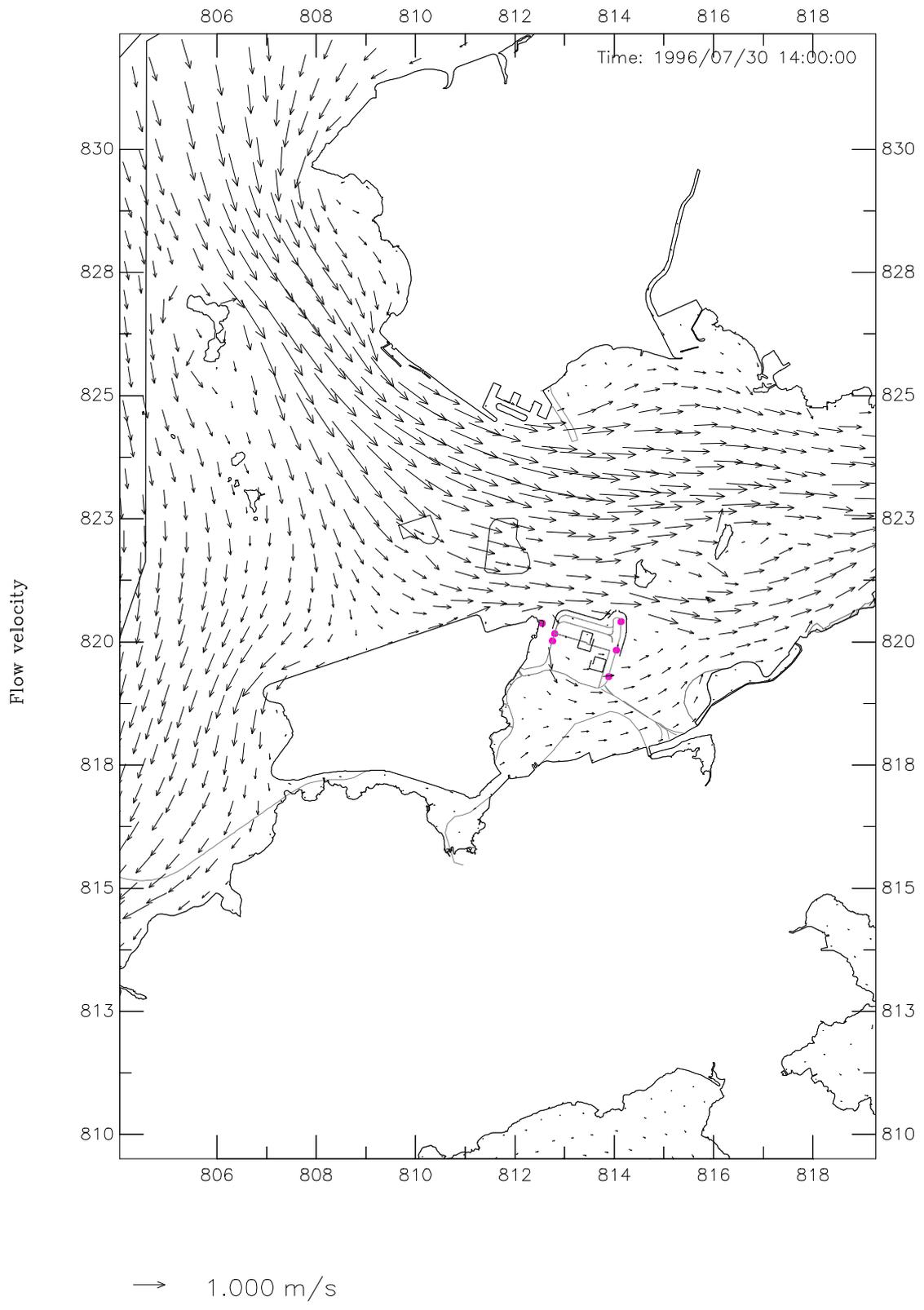
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Year 2011 (Sequence B)  
 Wet Season Velocity Vector Plot at Ebb Tide – Surface Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

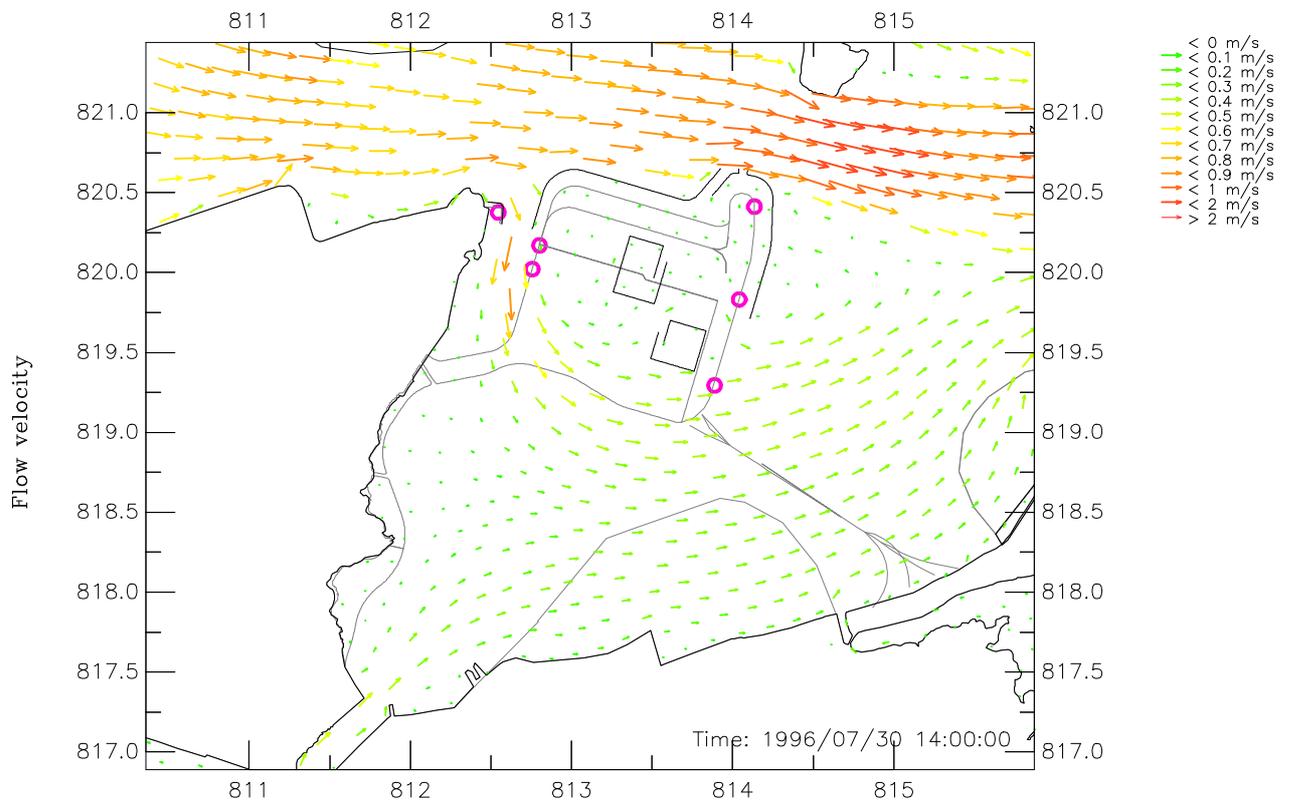
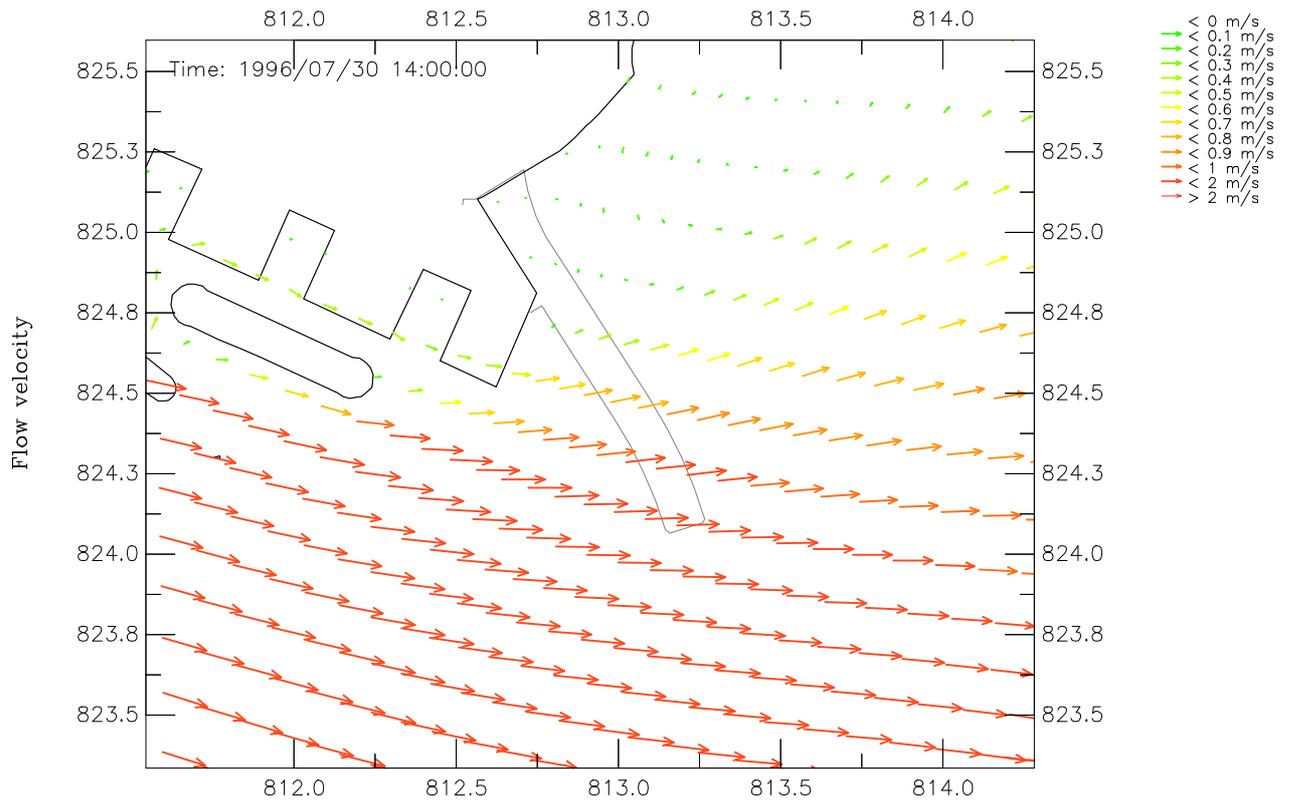
Jul 2009

Figure 004



Year 2011 (Sequence B)  
 Dry Season Velocity Vector Plot at Ebb Tide – Mid-Depth

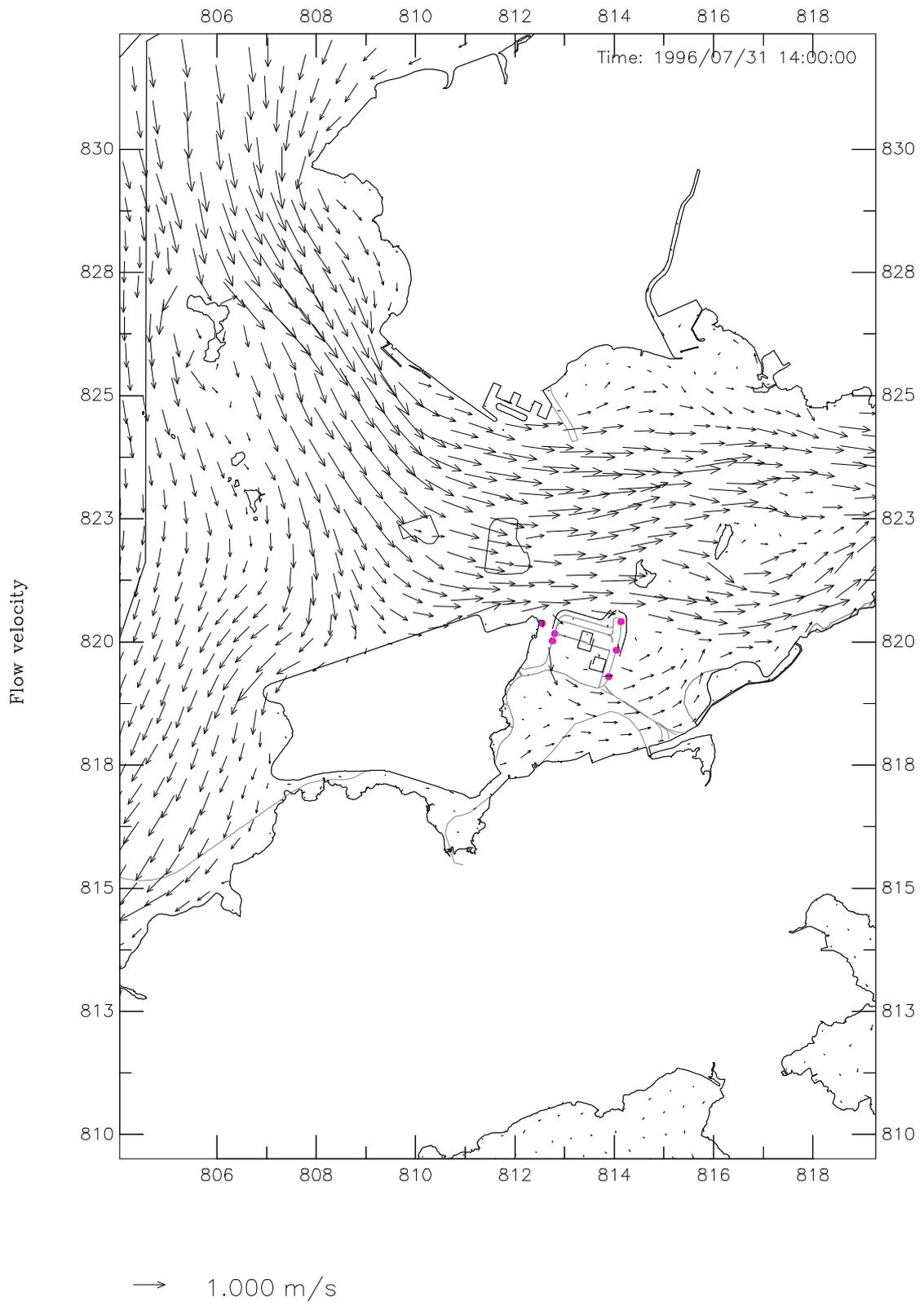
Jul 2009      Figure 005



Year 2011 (Sequence B)  
 Dry Season Velocity Vector Plot at Ebb Tide – Mid-Depth  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

Jul 2009

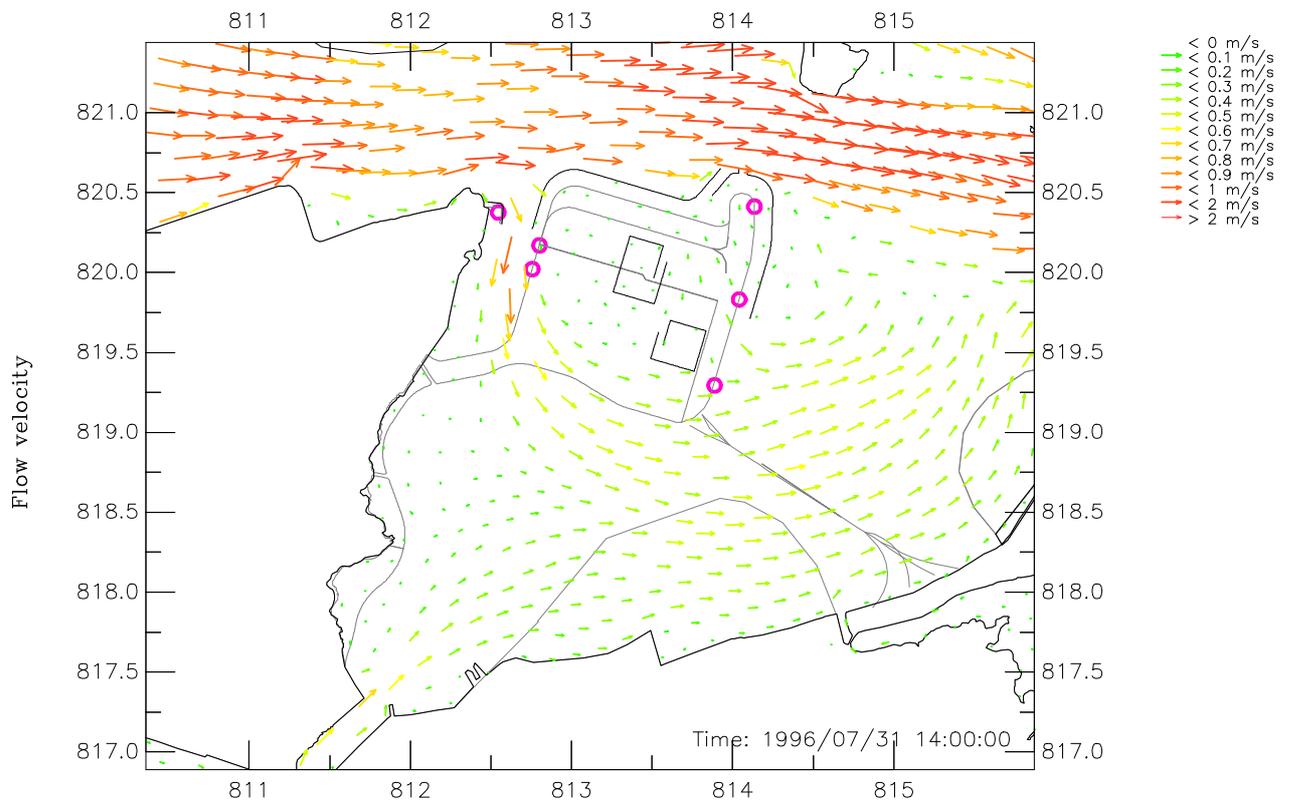
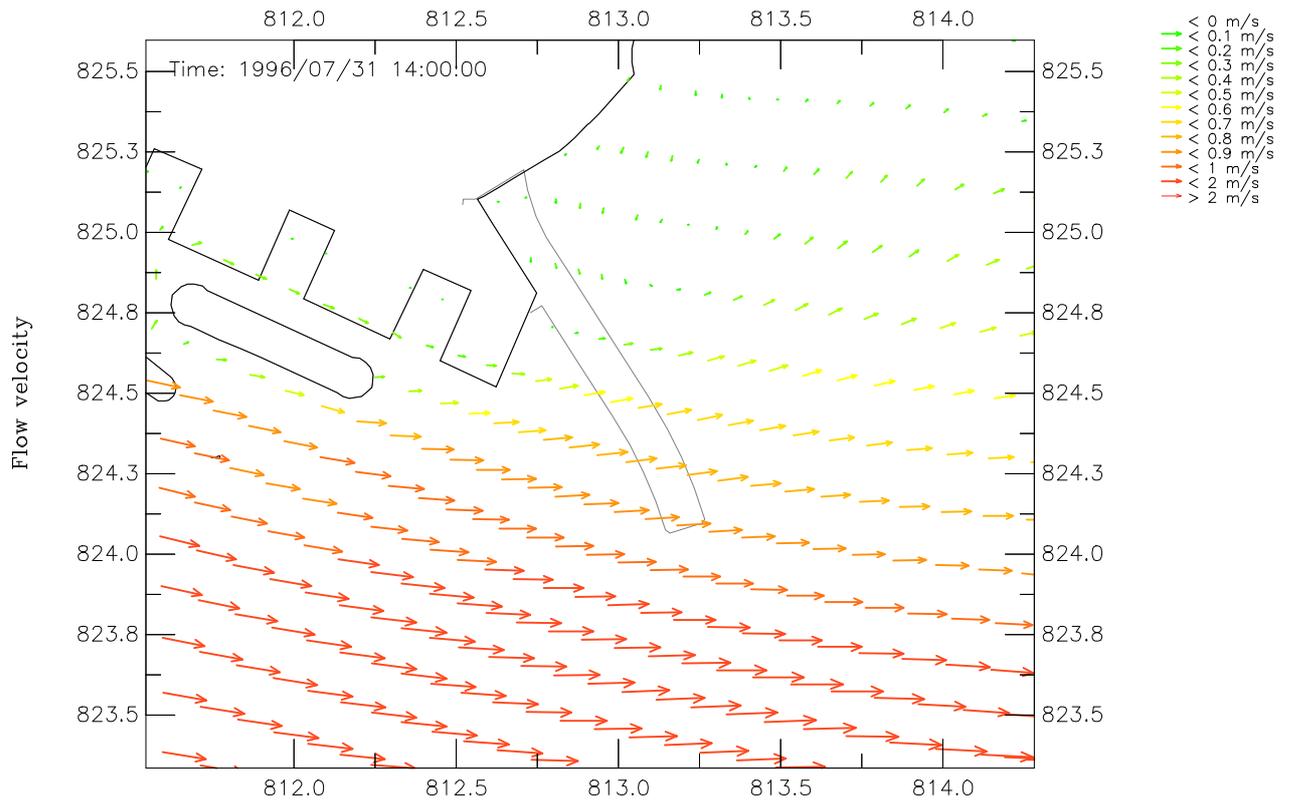
Figure 006



Year 2011 (Sequence B)  
 Wet Season Velocity Vector Plot at Ebb Tide – Mid-Depth

Jul 2009

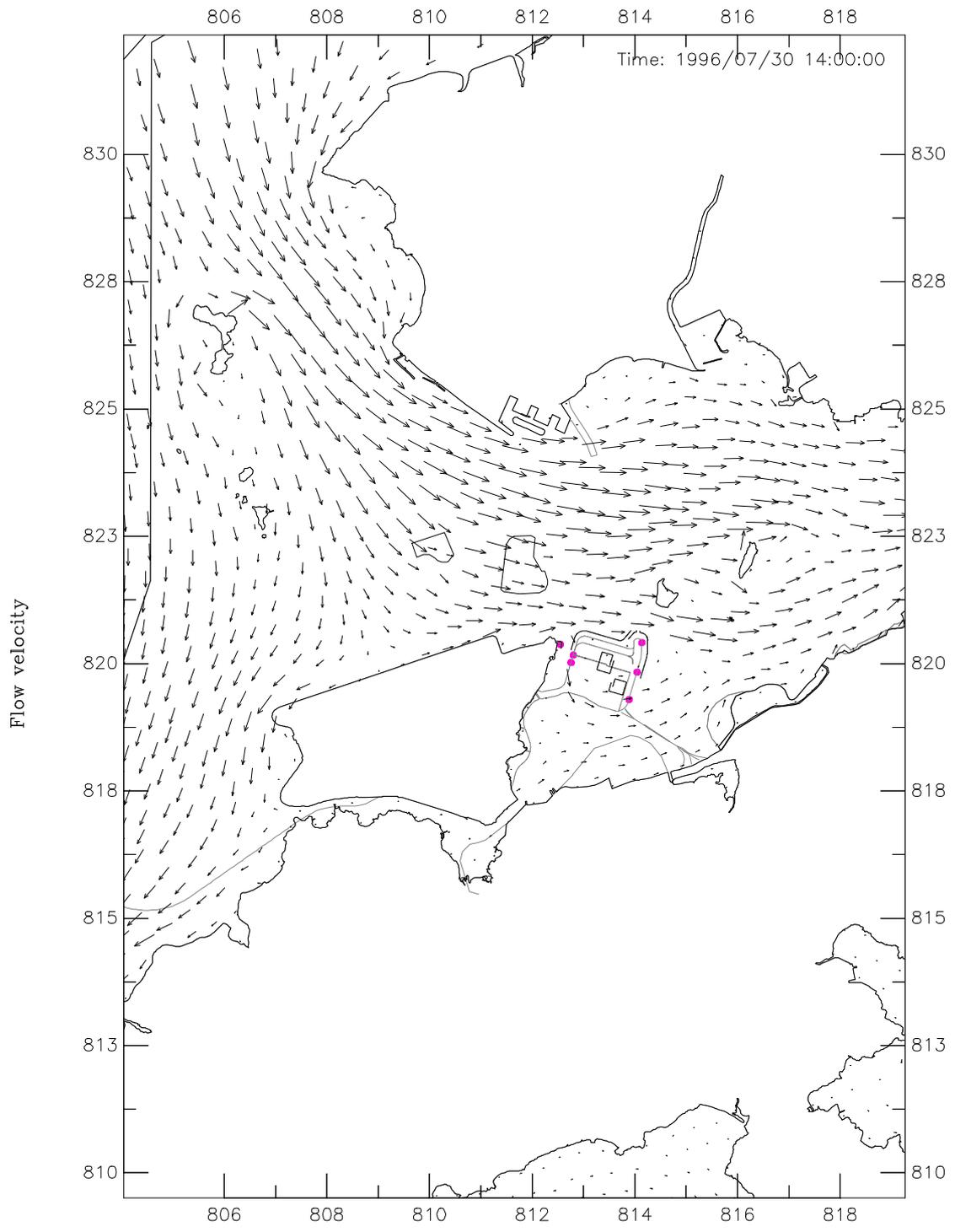
Figure 007



Year 2011 (Sequence B)  
 Wet Season Velocity Vector Plot at Ebb Tide – Mid-Depth  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

Jul 2009

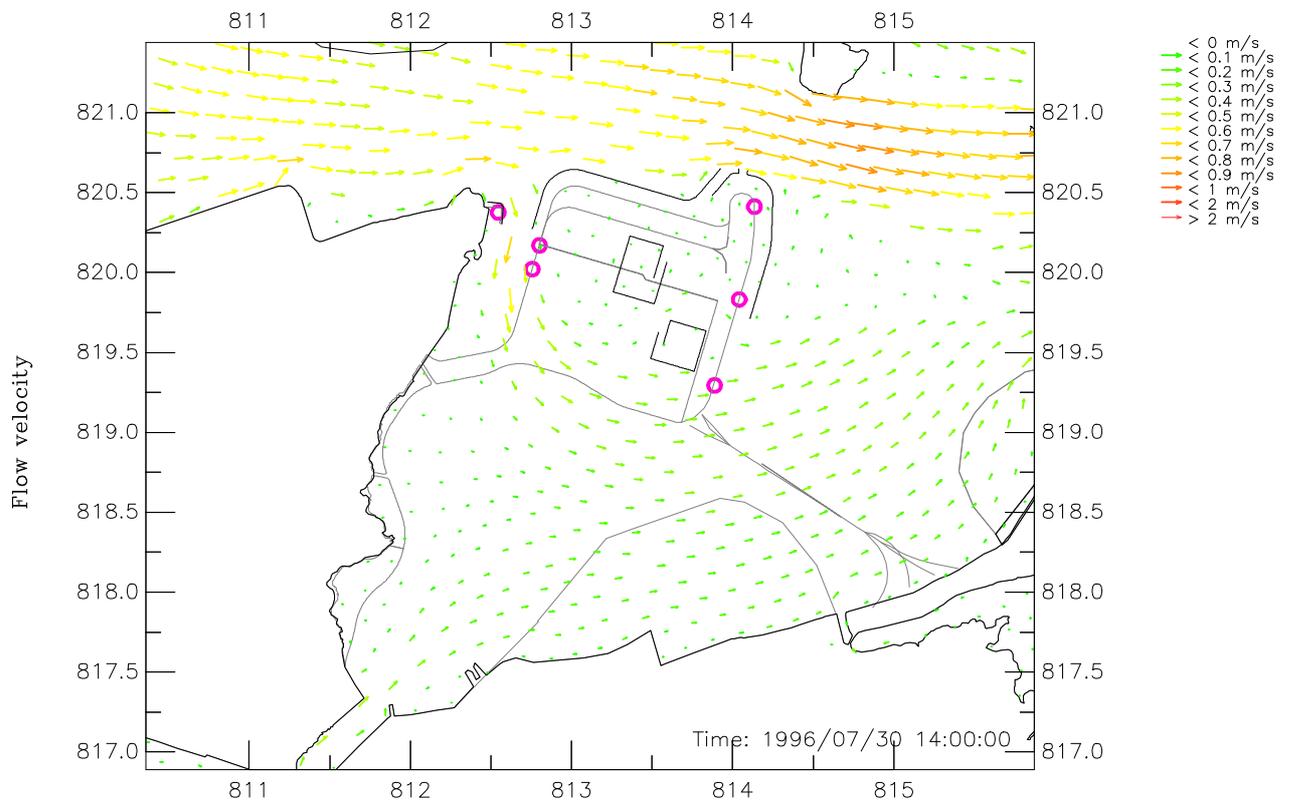
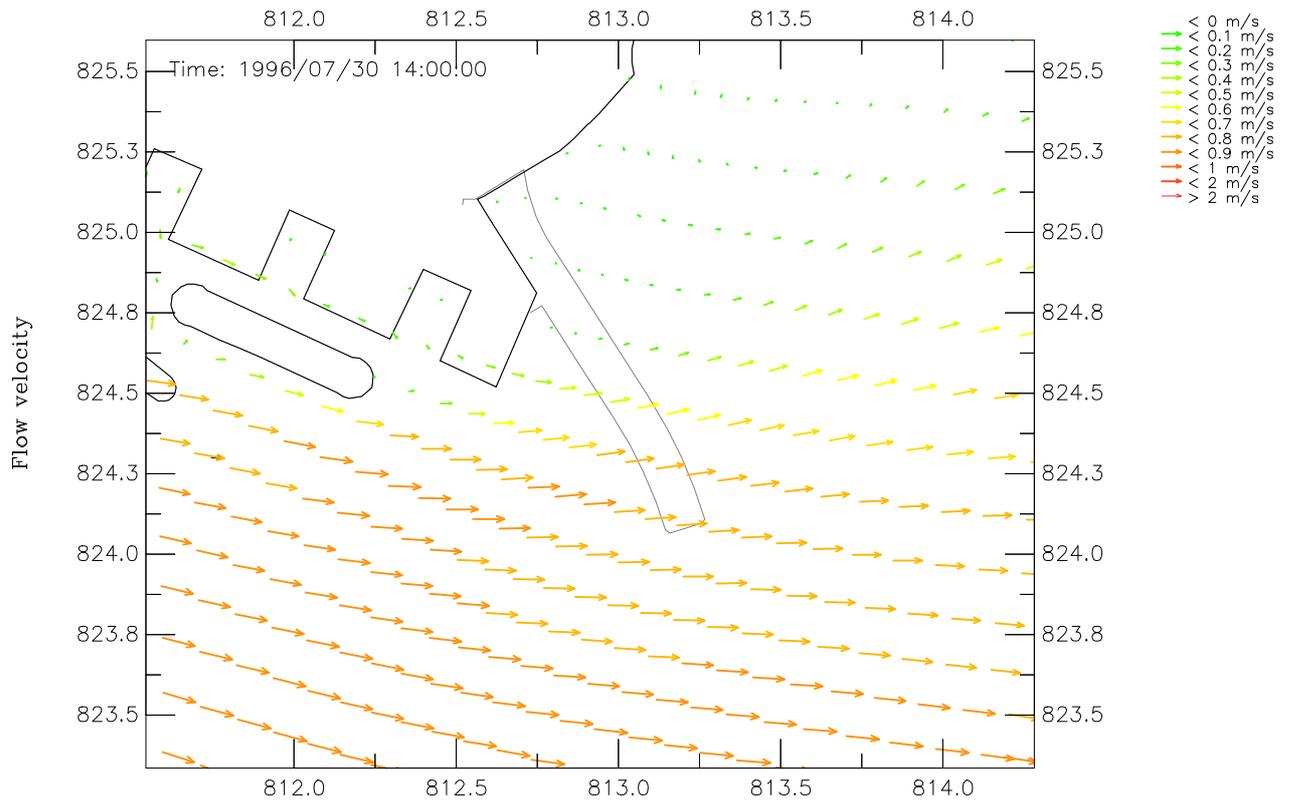
Figure 008



Year 2011 (Sequence B)  
 Dry Season Velocity Vector Plot at Ebb Tide – Bottom Layer

Jul 2009

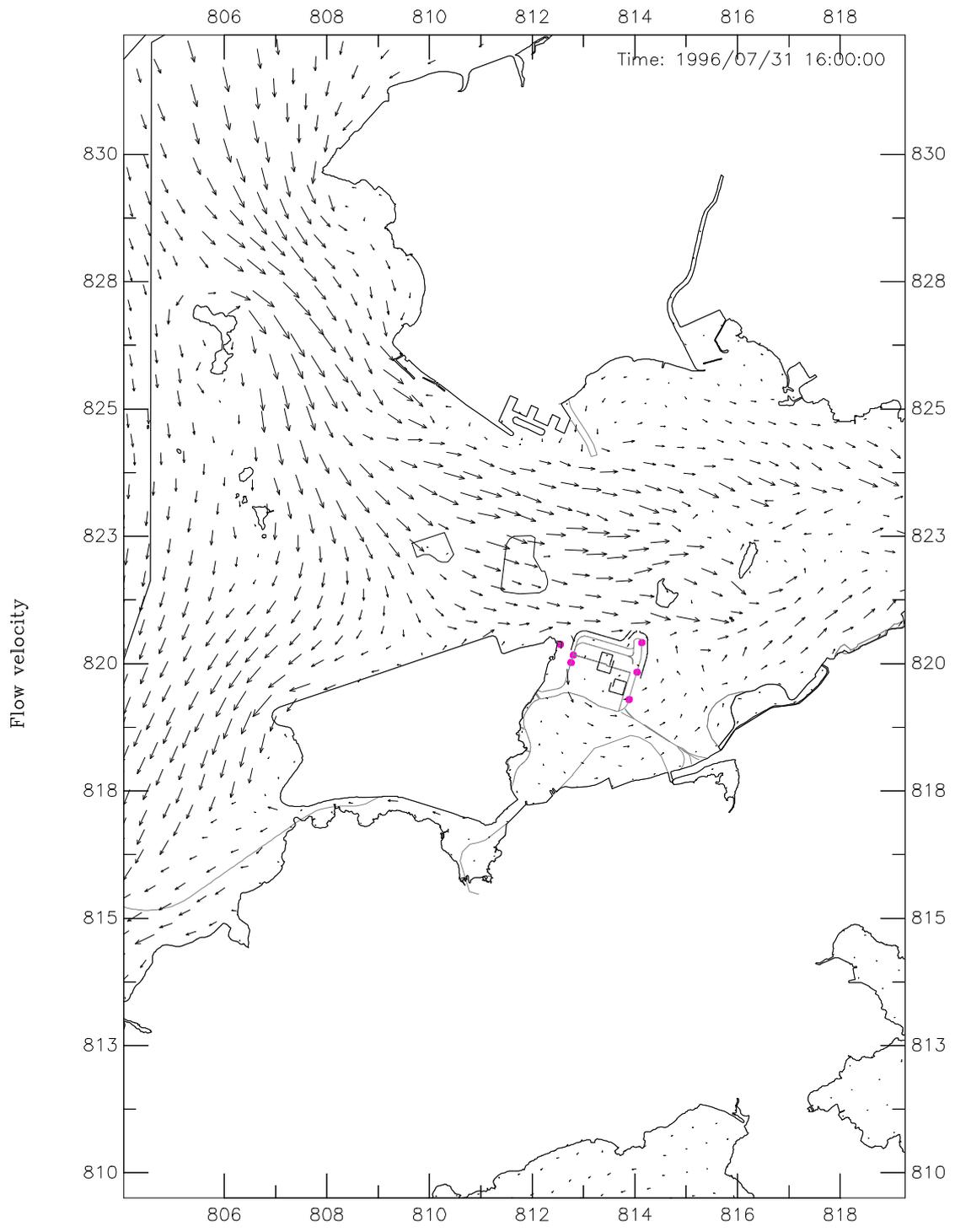
Figure 009



Year 2011 (Sequence B)  
 Dry Season Velocity Vector Plot at Ebb Tide – Bottom Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

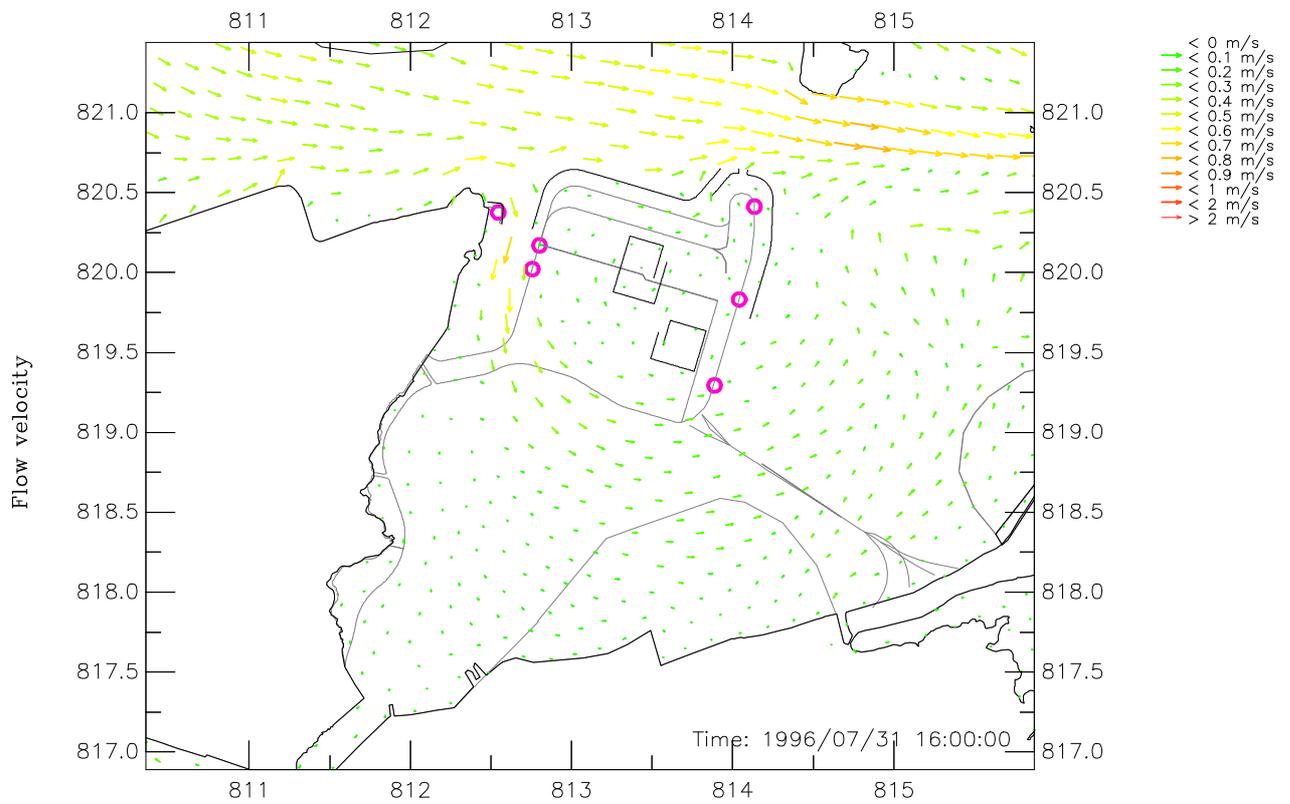
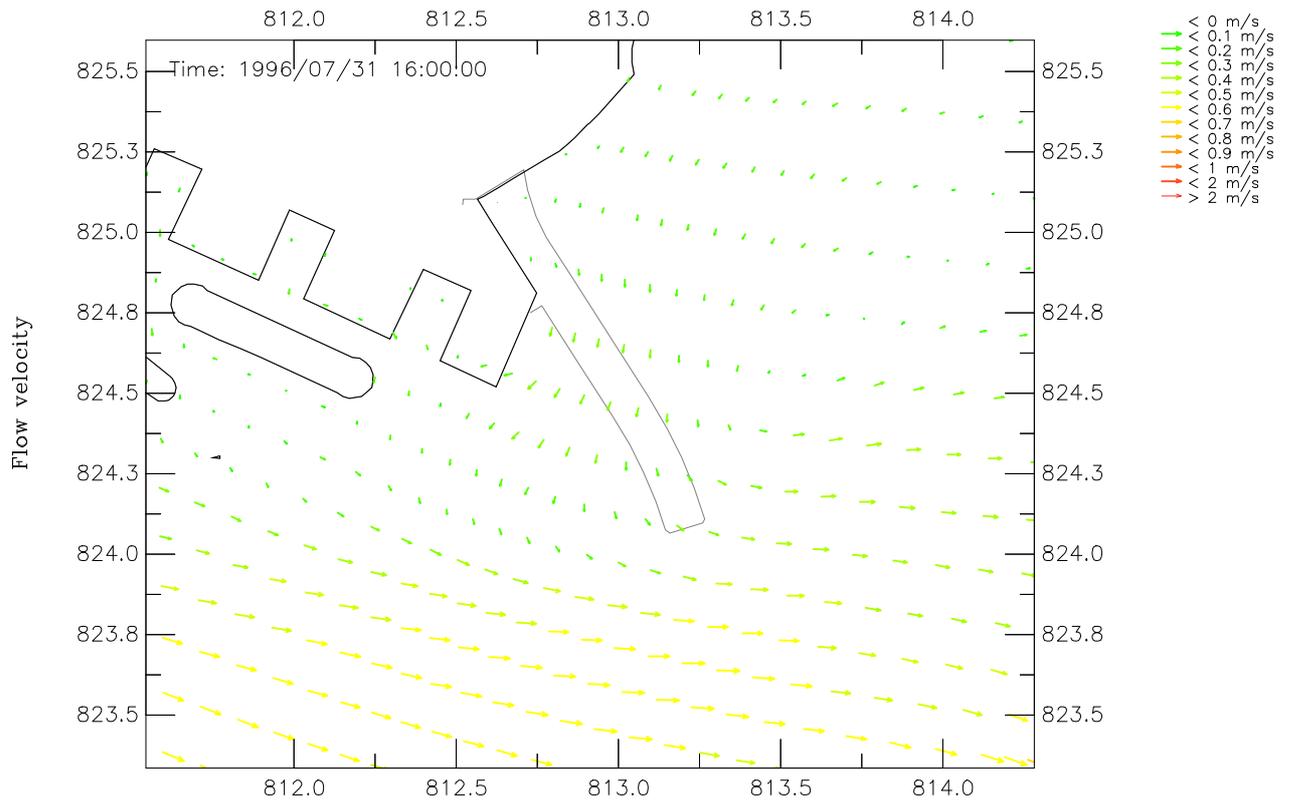
Jul 2009

Figure 010



Year 2011 (Sequence B)  
 Wet Season Velocity Vector Plot at Ebb Tide – Bottom Layer

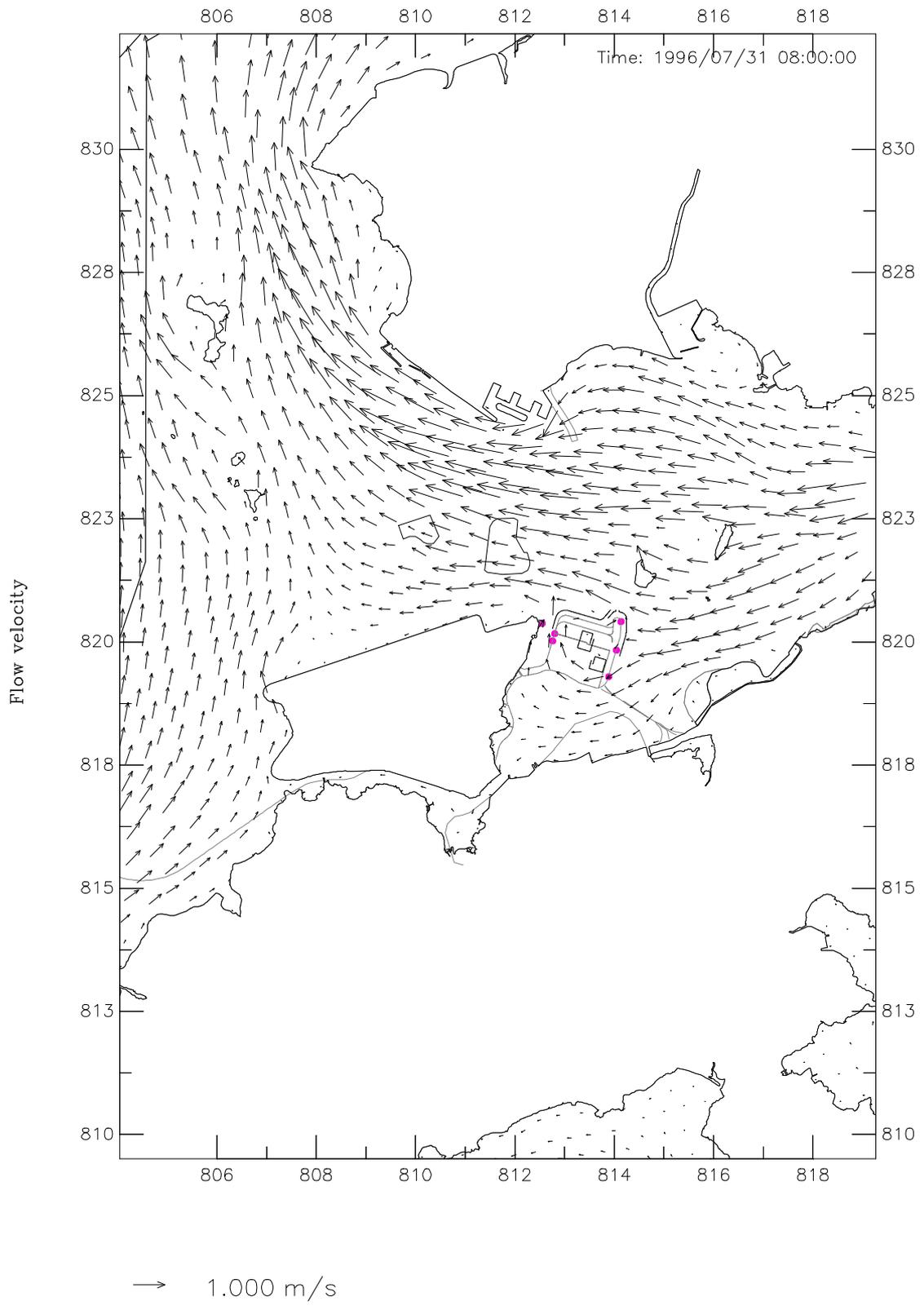
Jul 2009      Figure 011



Year 2011 (Sequence B)  
 Wet Season Velocity Vector Plot at Ebb Tide – Bottom Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

Jul 2009

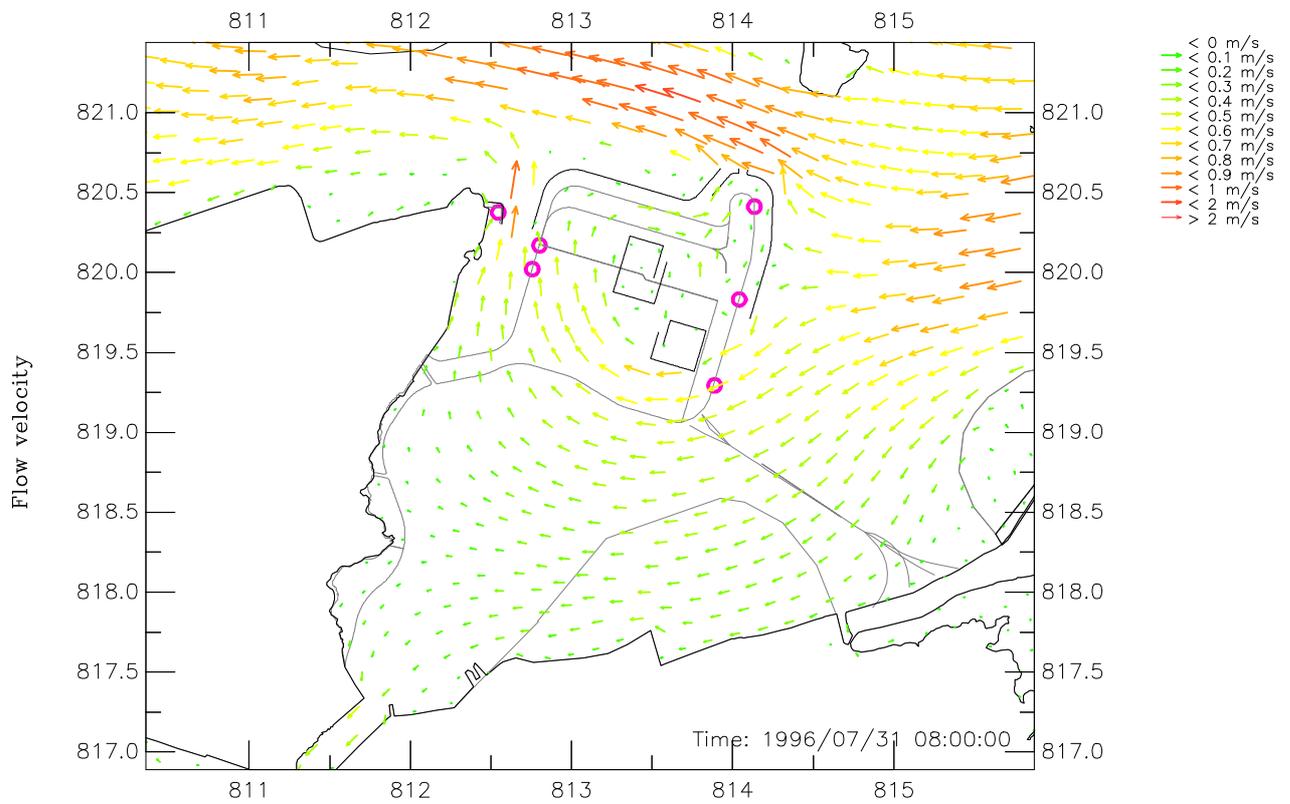
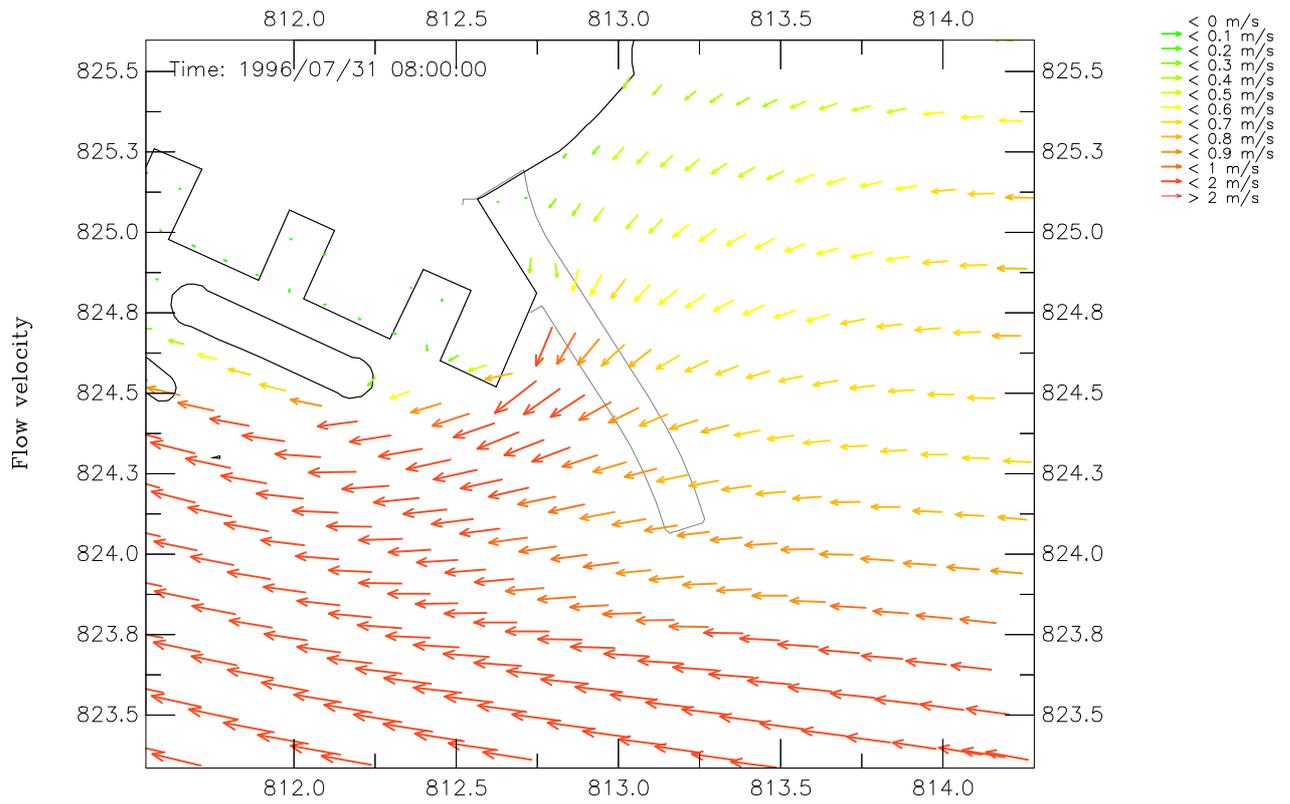
Figure 012



Year 2011 (Sequence B)  
 Dry Season Velocity Vector Plot at Flood Tide – Surface Layer

Jul 2009

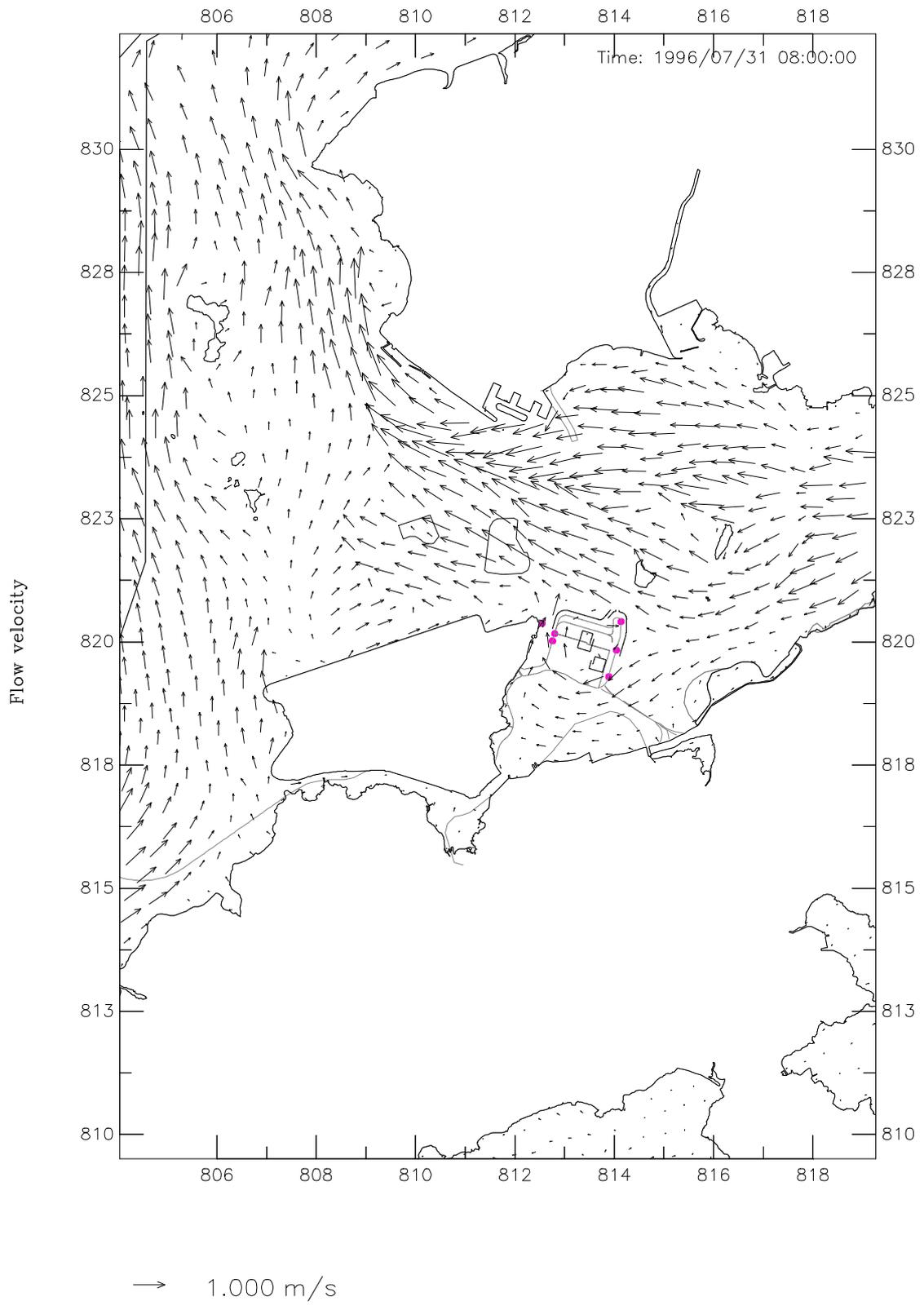
Figure 013



Year 2011 (Sequence B)  
 Dry Season Velocity Vector Plot at Flood Tide – Surface Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

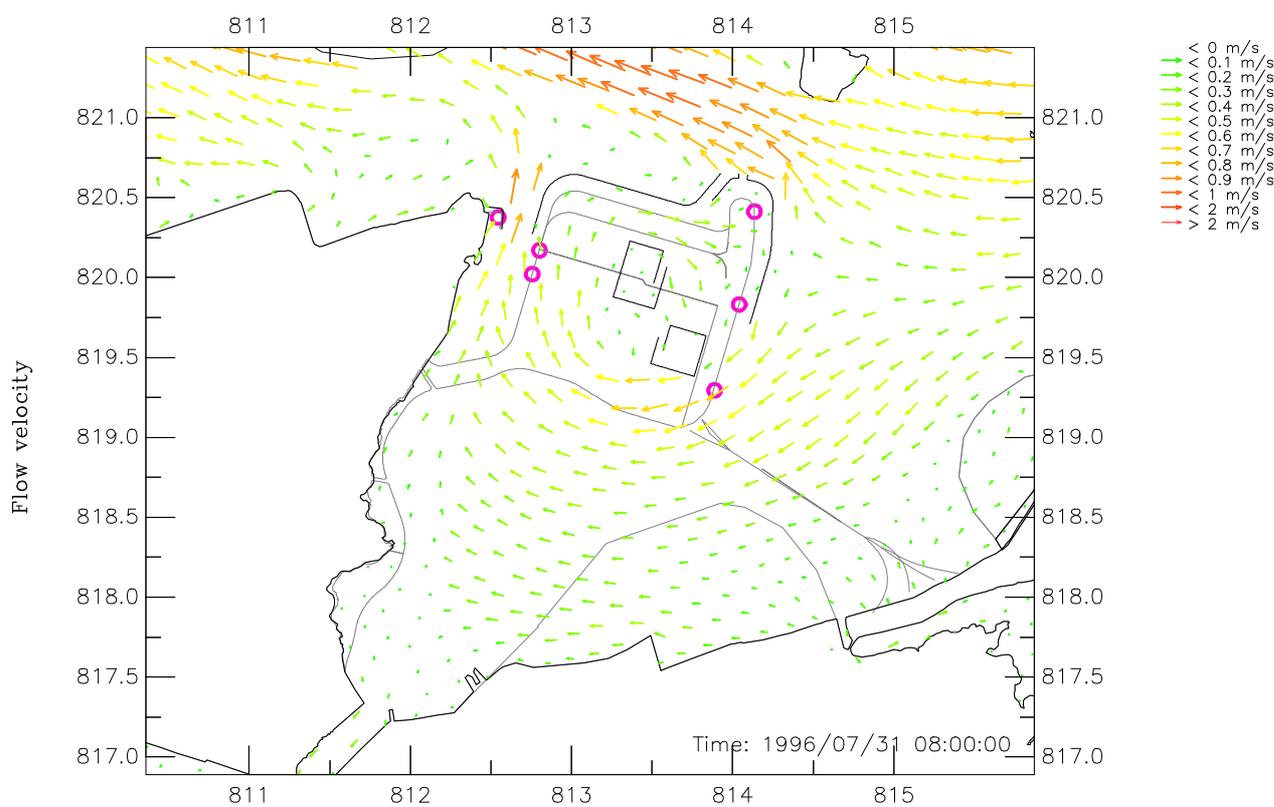
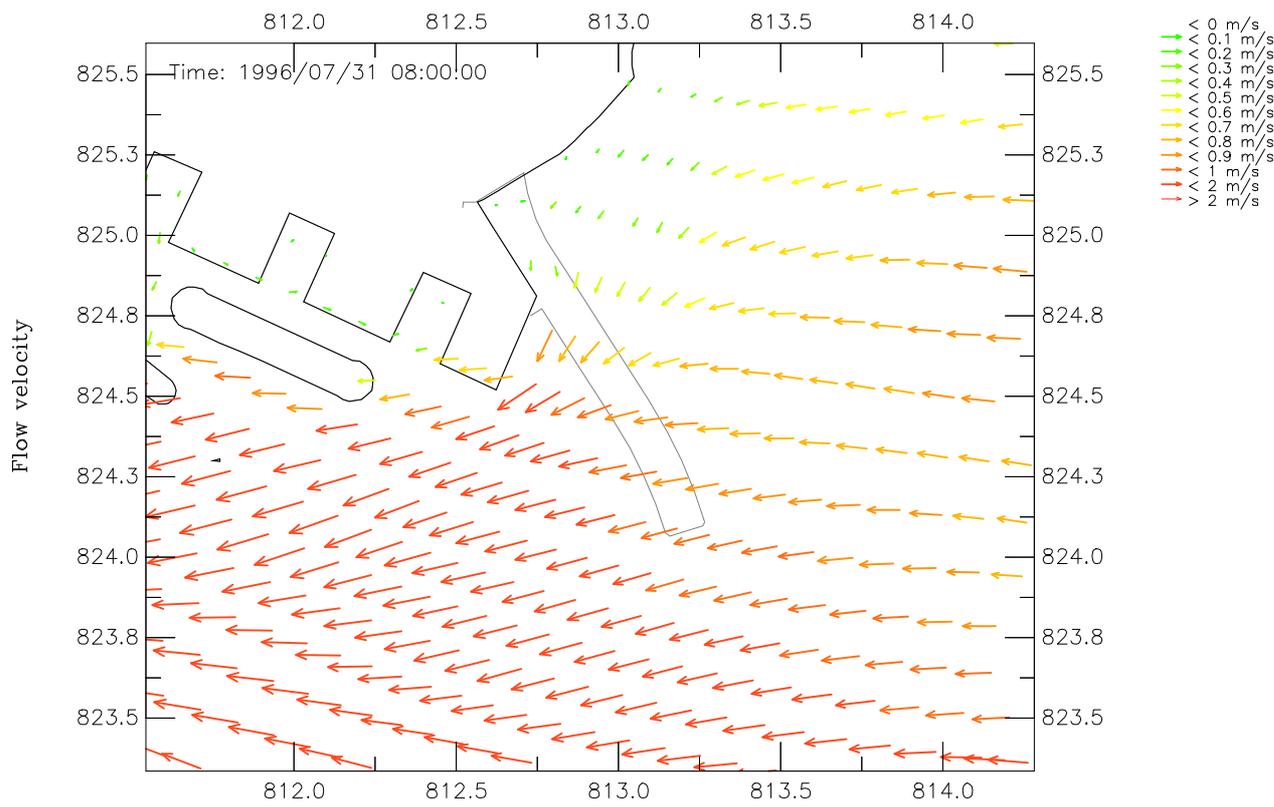
Jul 2009

Figure 014



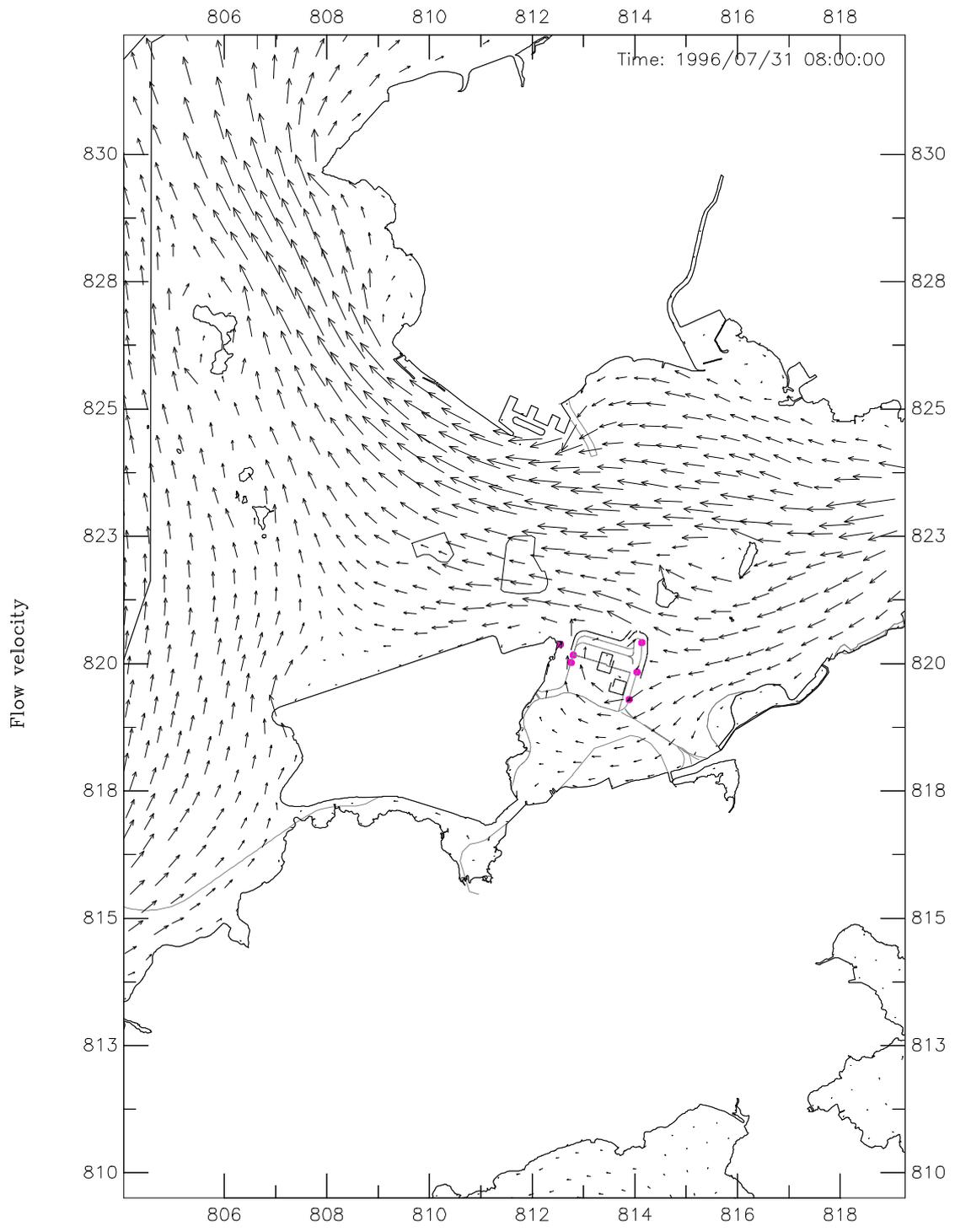
Year 2011 (Sequence B)  
 Wet Season Velocity Vector Plot at Flood Tide – Surface Layer

Jul 2009      Figure 015



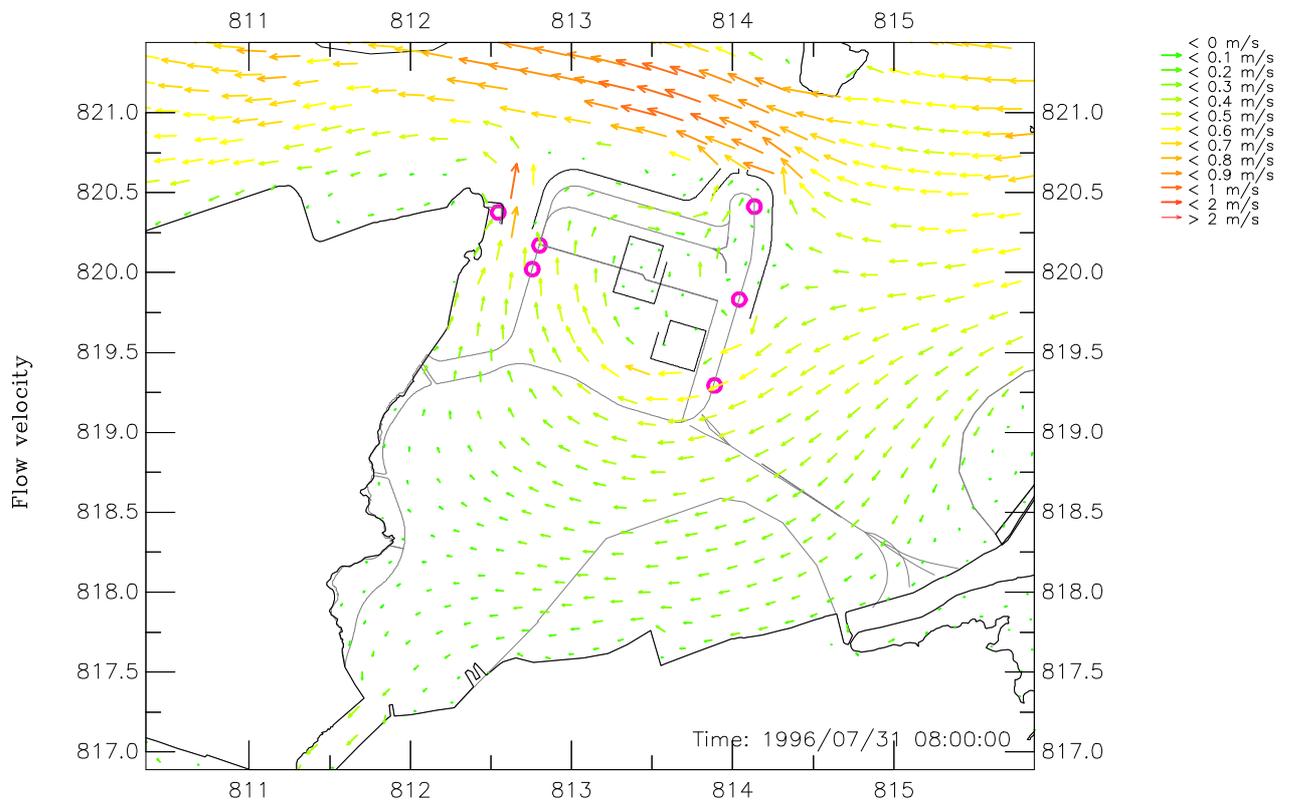
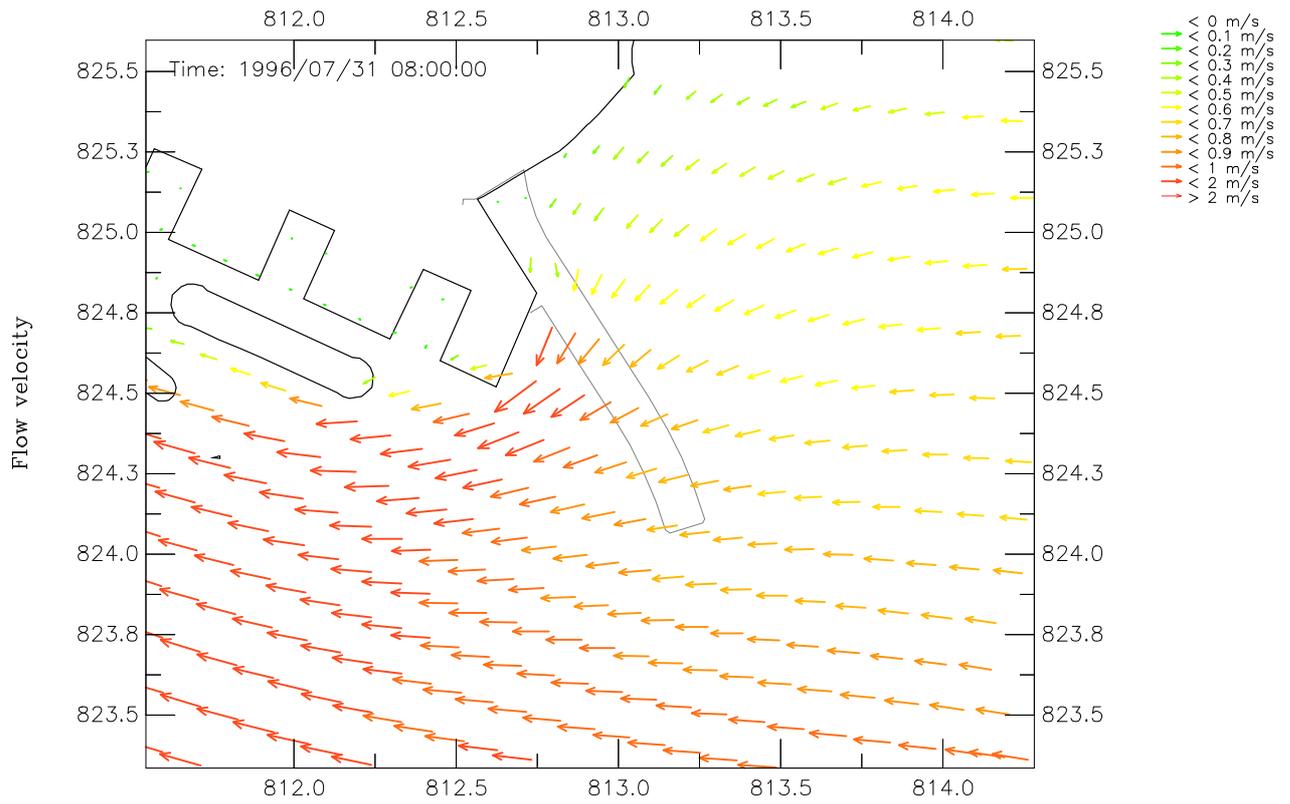
Year 2011 (Sequence B)  
 Wet Season Velocity Vector Plot at Flood Tide – Surface Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

Jul 2009 Figure 016



Year 2011 (Sequence B)  
 Dry Season Velocity Vector Plot at Flood Tide – Mid-Depth

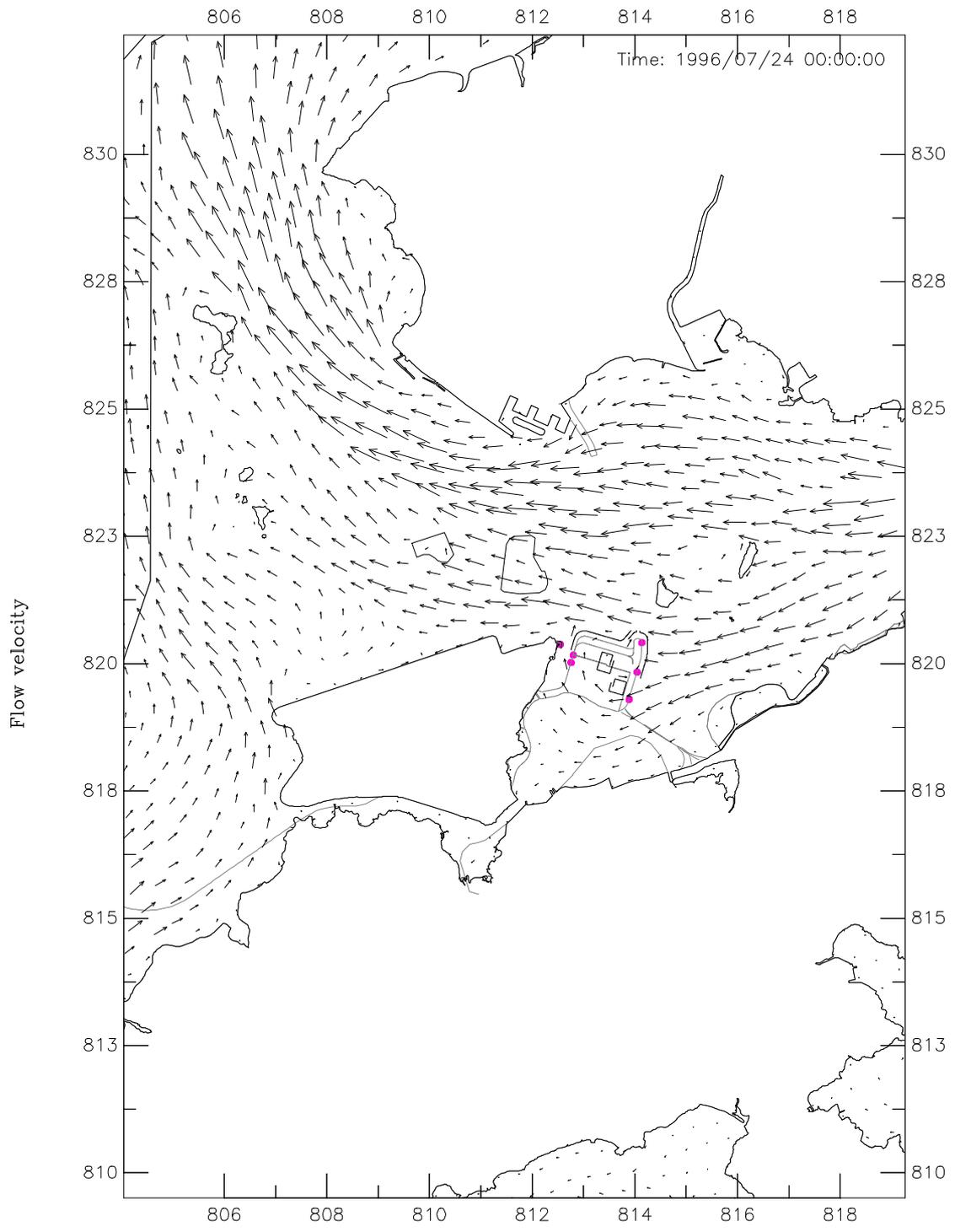
Jul 2009      Figure 017



Year 2011 (Sequence B)  
 Dry Season Velocity Vector Plot at Flood Tide – Mid-Depth  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

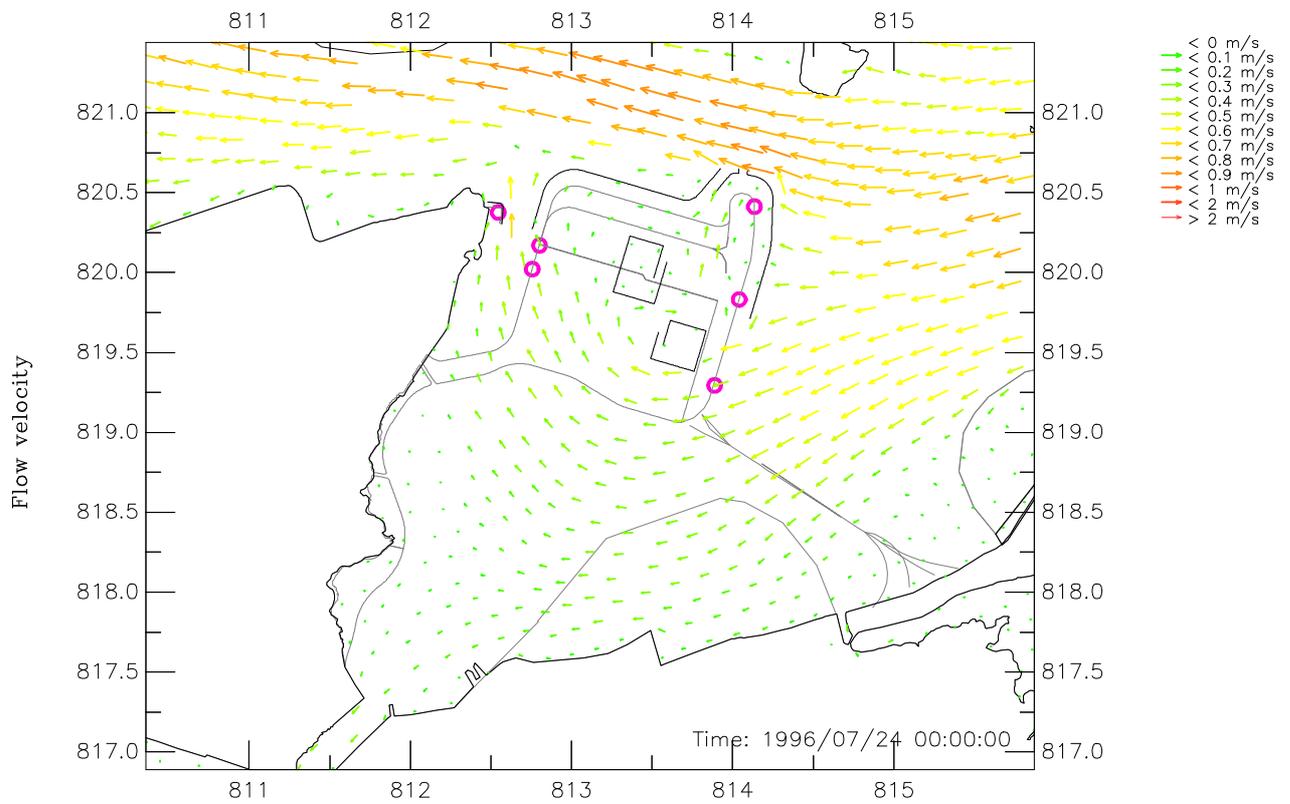
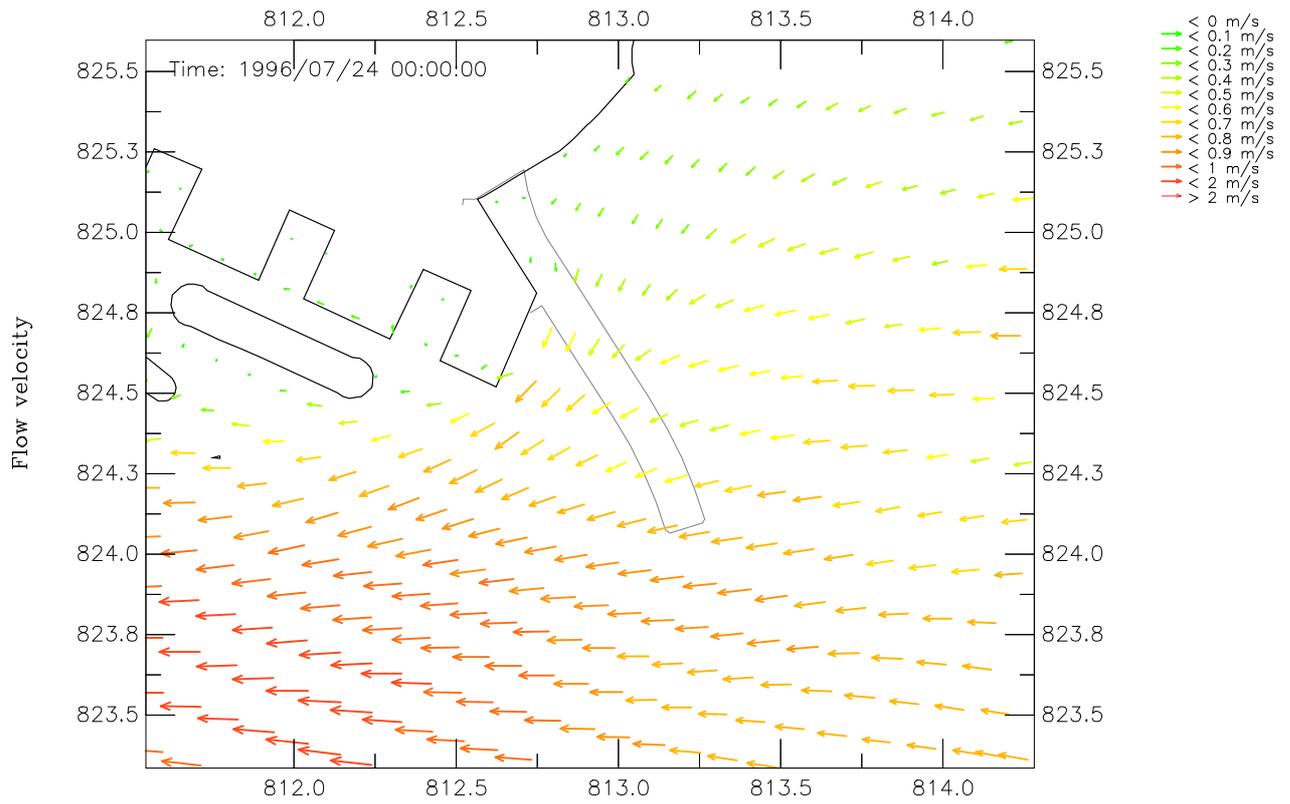
Jul 2009

Figure 018



Year 2011 (Sequence B)  
 Wet Season Velocity Vector Plot at Flood Tide – Mid-Depth

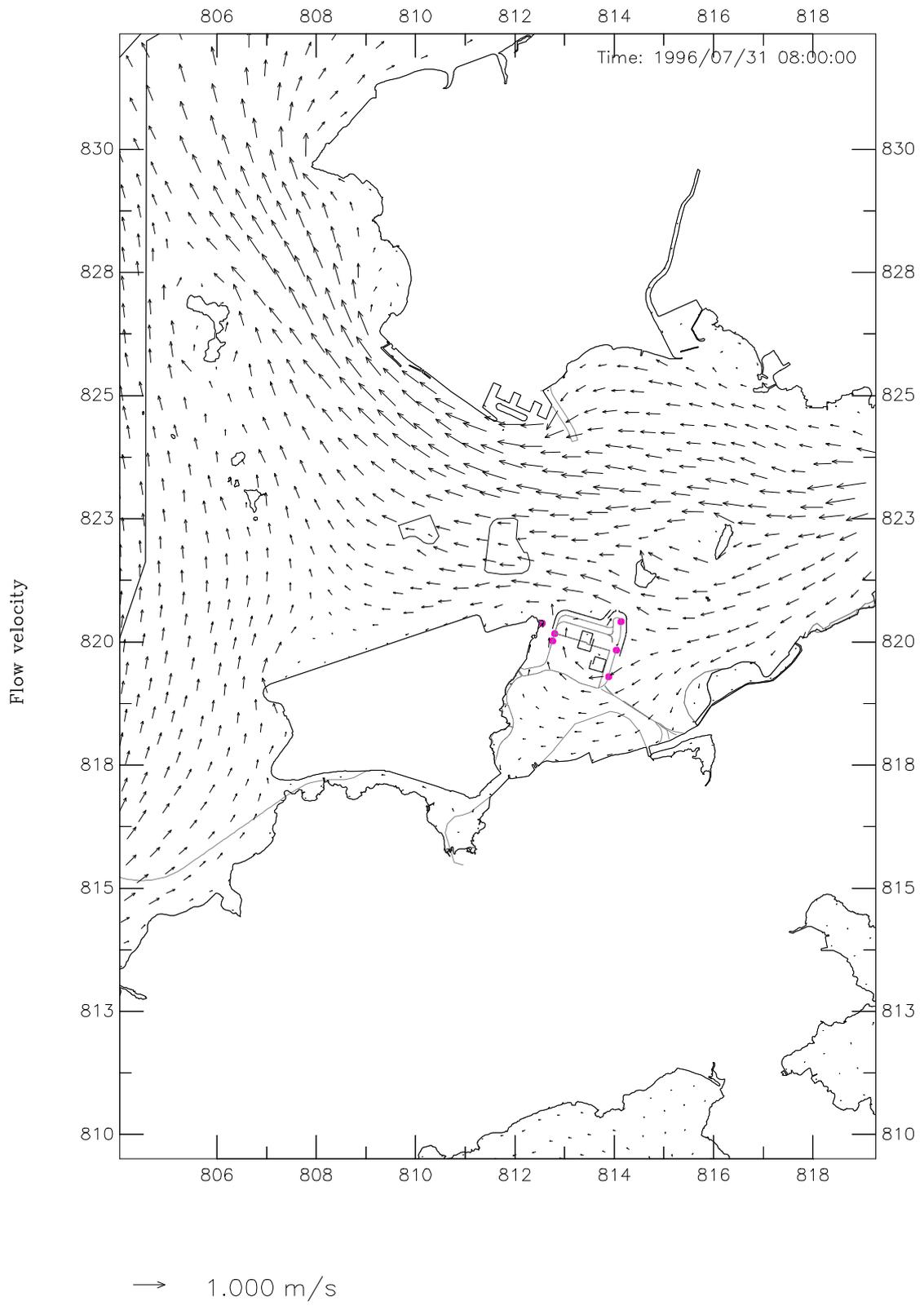
Jul 2009      Figure 019



Year 2011 (Sequence B)  
 Wet Season Velocity Vector Plot at Flood Tide – Mid-Depth  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

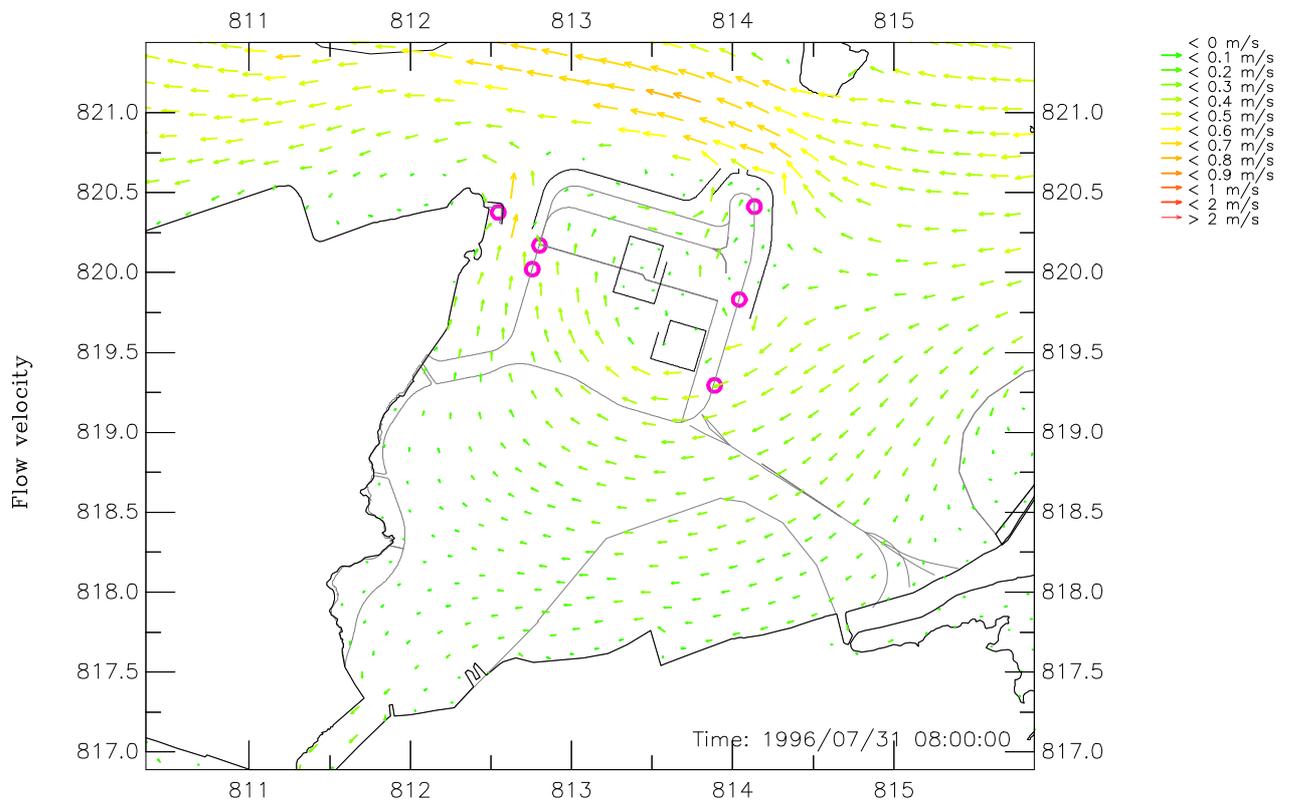
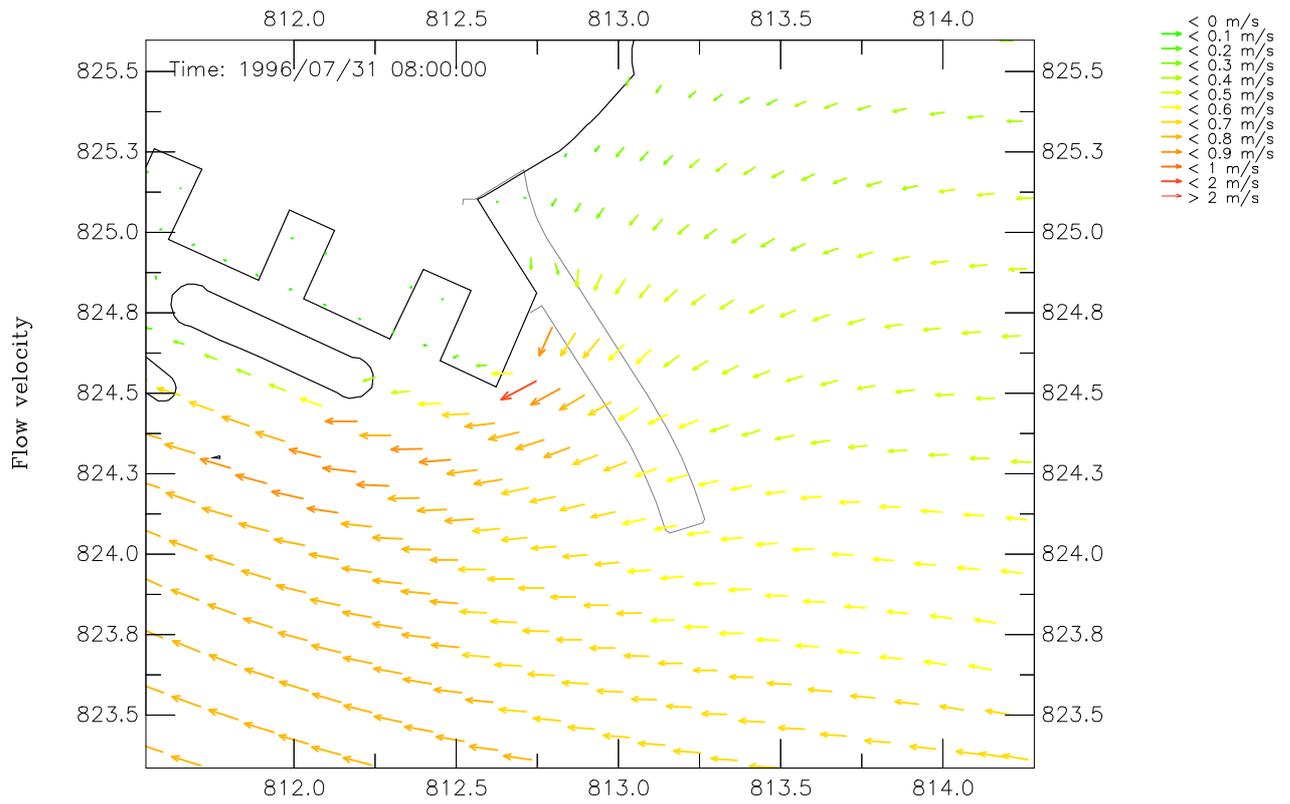
Jul 2009

Figure 020



Year 2011 (Sequence B)  
 Dry Season Velocity Vector Plot at Flood Tide – Bottom Layer

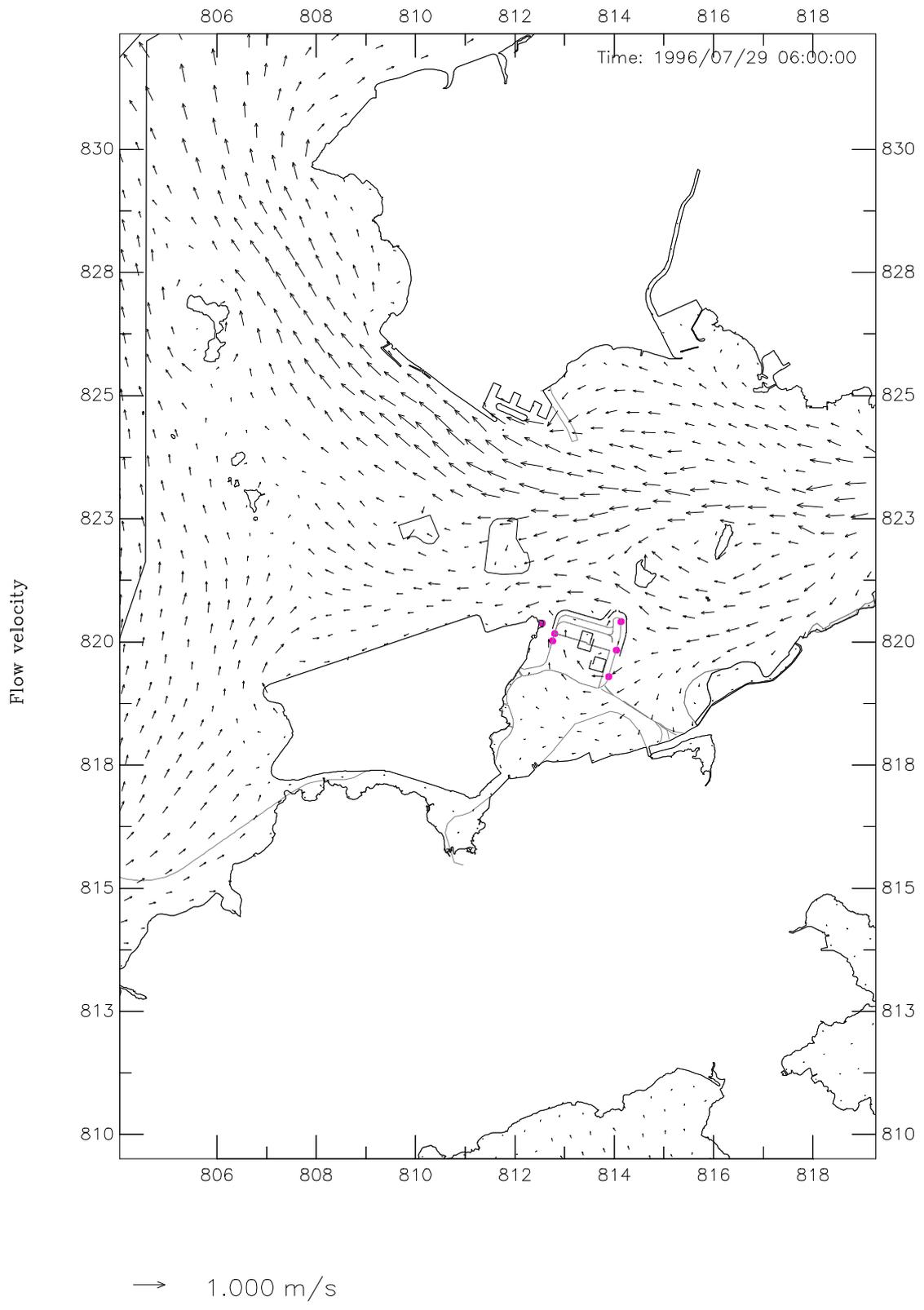
Jul 2009      Figure 021



Year 2011 (Sequence B)  
 Dry Season Velocity Vector Plot at Flood Tide – Bottom Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

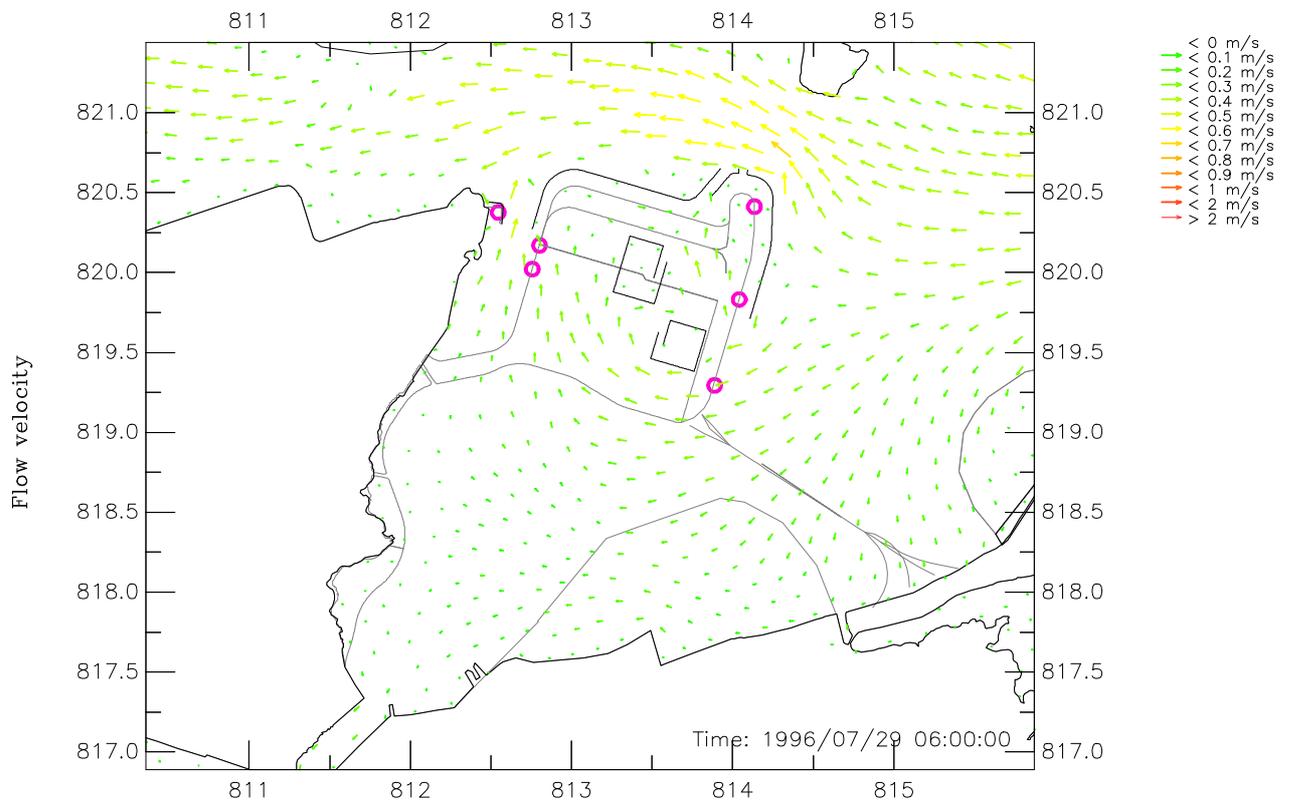
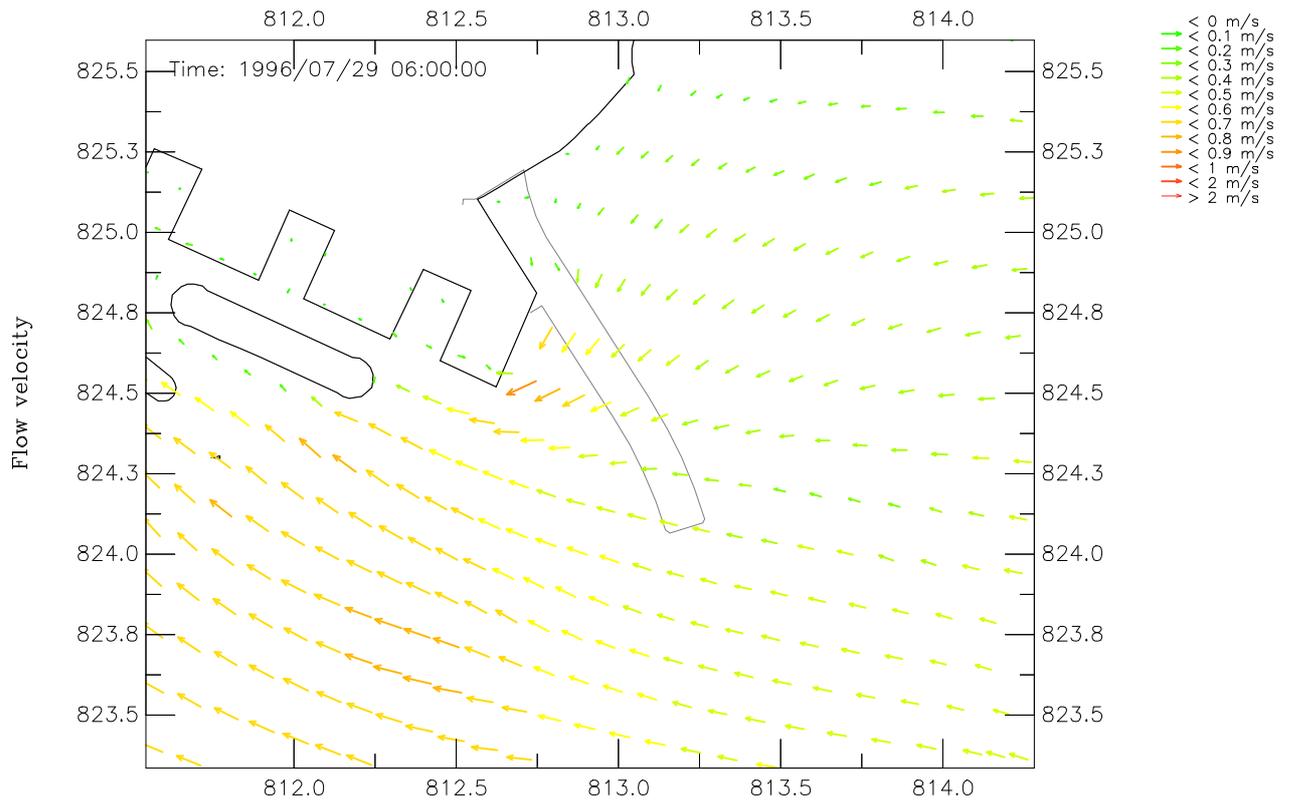
Jul 2009

Figure 022



Year 2011 (Sequence B)  
 Wet Season Velocity Vector Plot at Flood Tide – Bottom Layer

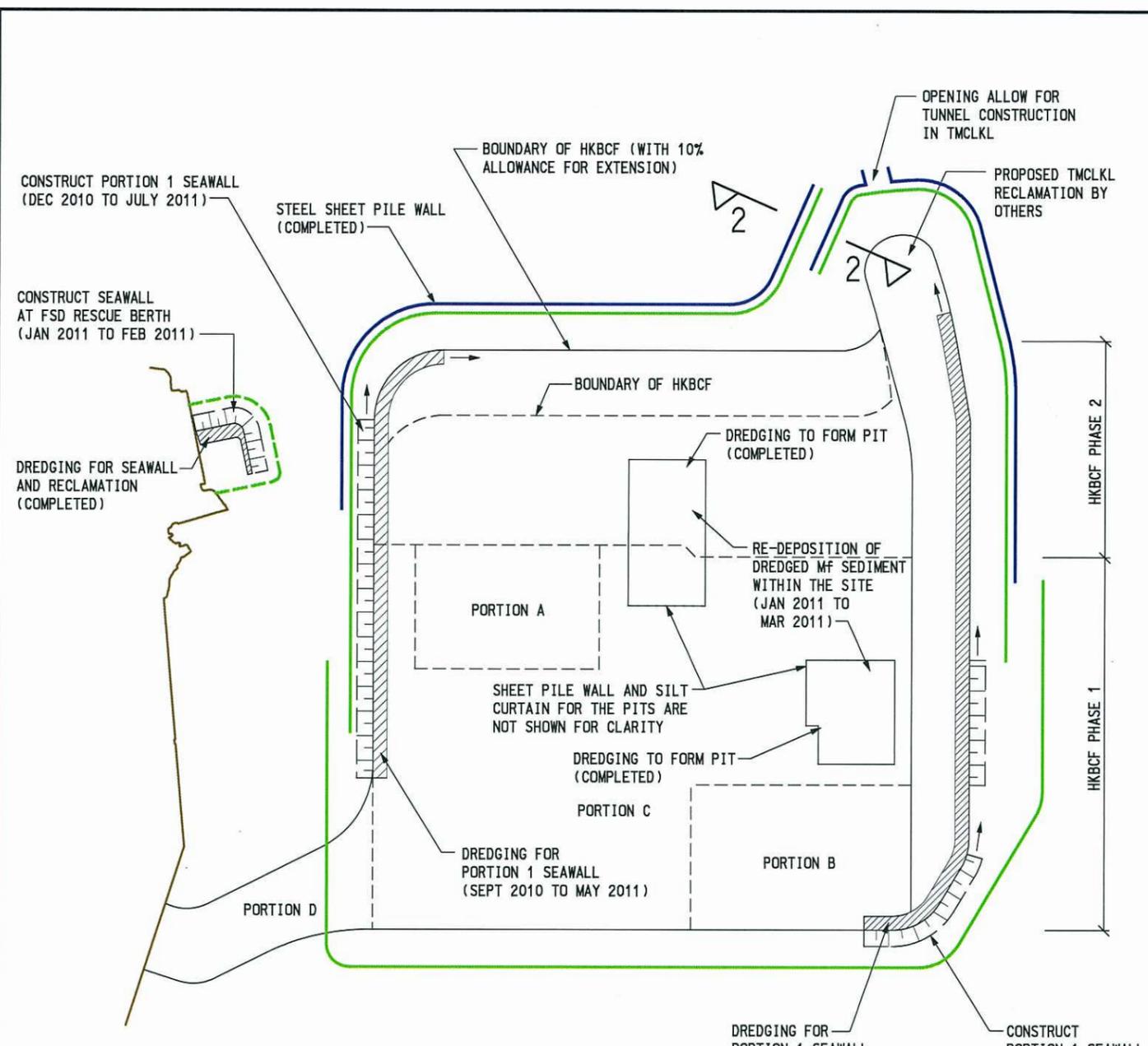
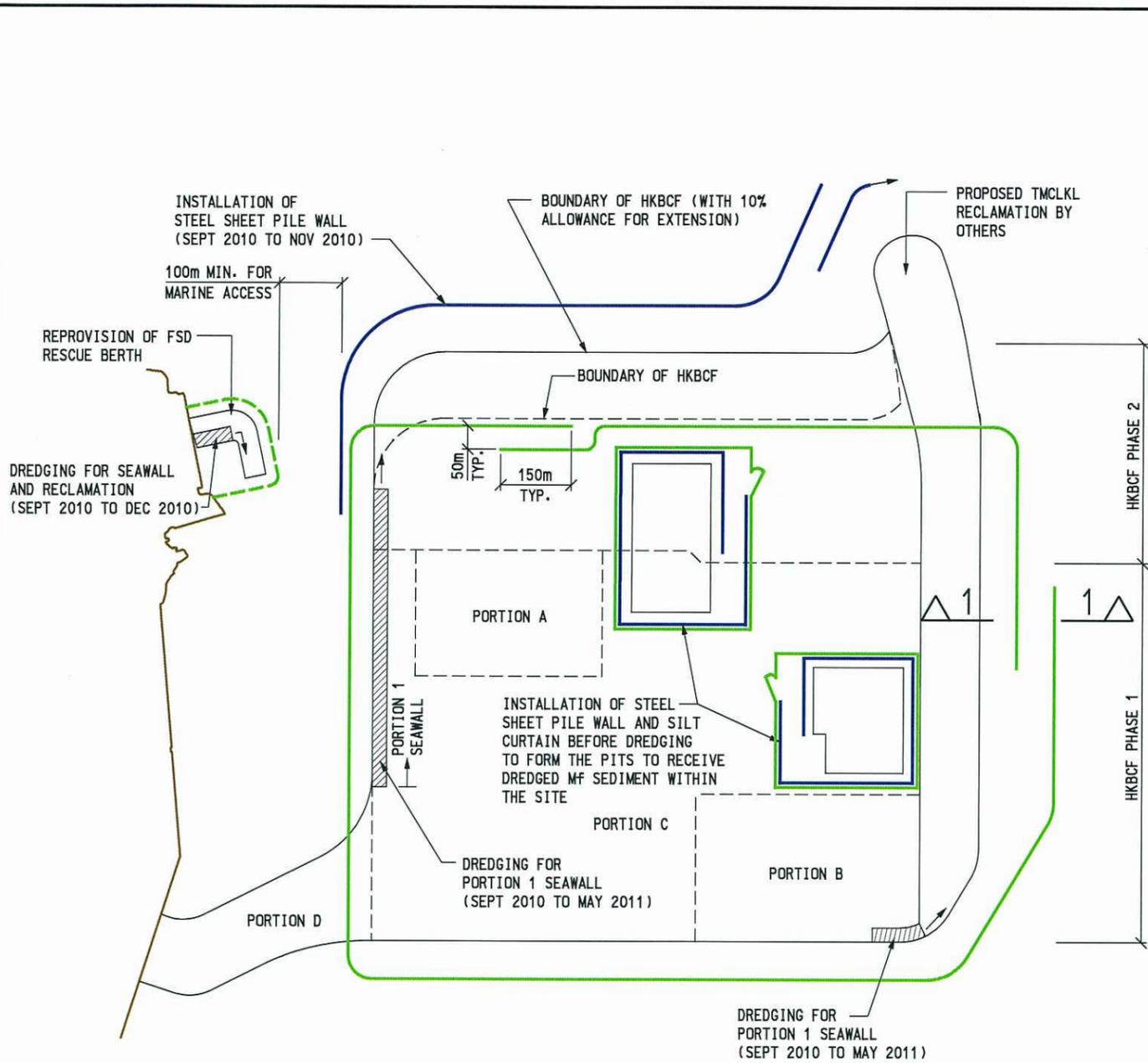
Jul 2009      Figure 023



Year 2011 (Sequence B)  
 Wet Season Velocity Vector Plot at Flood Tide – Bottom Layer  
 (Top: Northern Reclamation; Bottom: Southern Reclamation)

Jul 2009

Figure 024



**NOTE:**

FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

**LEGEND:**

- STEEL SHEET PILE WALL
- SINGLE SILT CURTAIN
- DREDGED AREA

STAGE 1 (ON OCT 2010)

**NOTE:**

FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

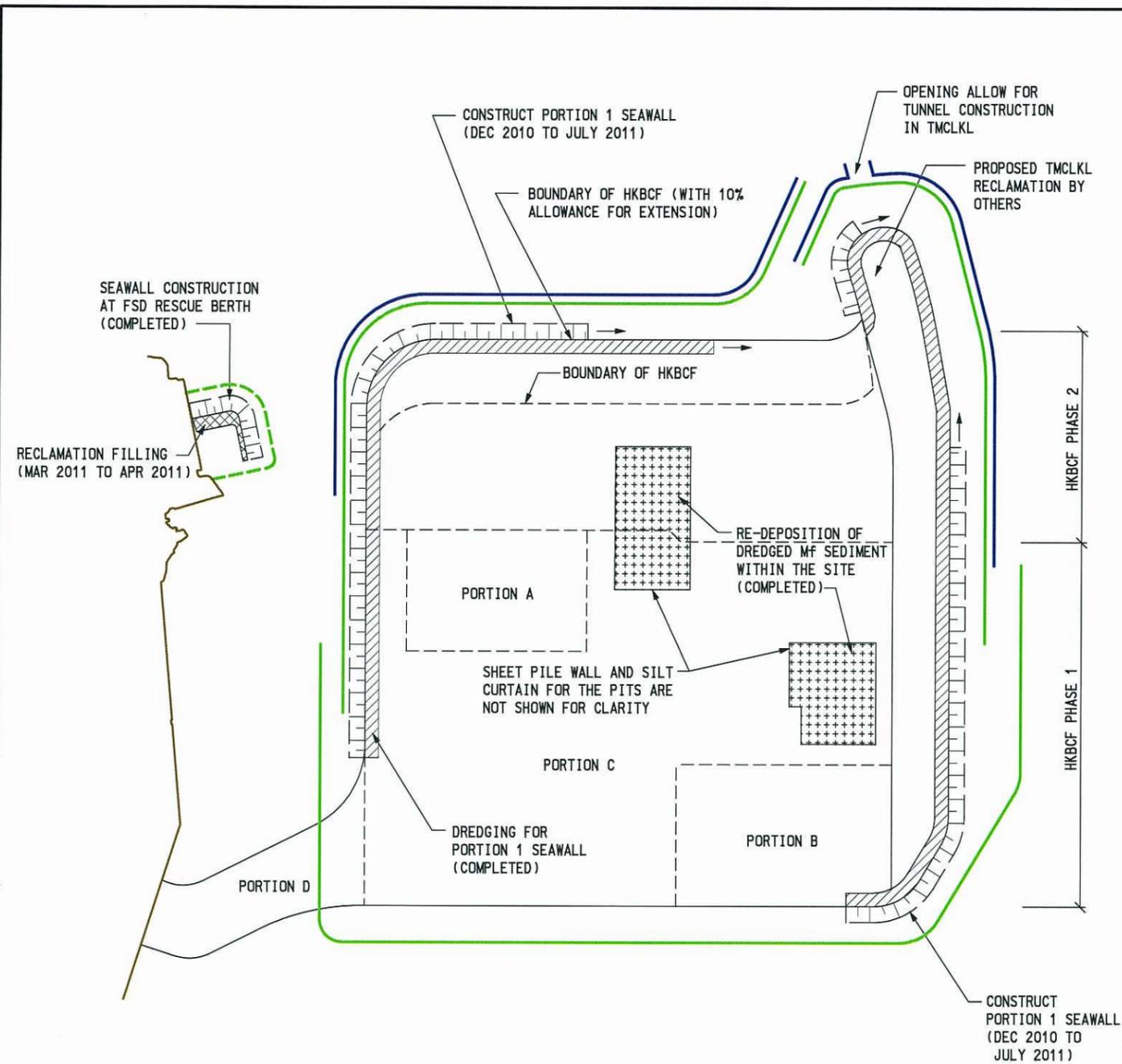
SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

**LEGEND:**

- STEEL SHEET PILE WALL
- SINGLE SILT CURTAIN
- DREDGED AREA
- COMPLETED SLOPING SEAWALL
- RE-DEPOSITION OF DREDGED MF SEDIMENT

STAGE 2 (ON FEB 2011)

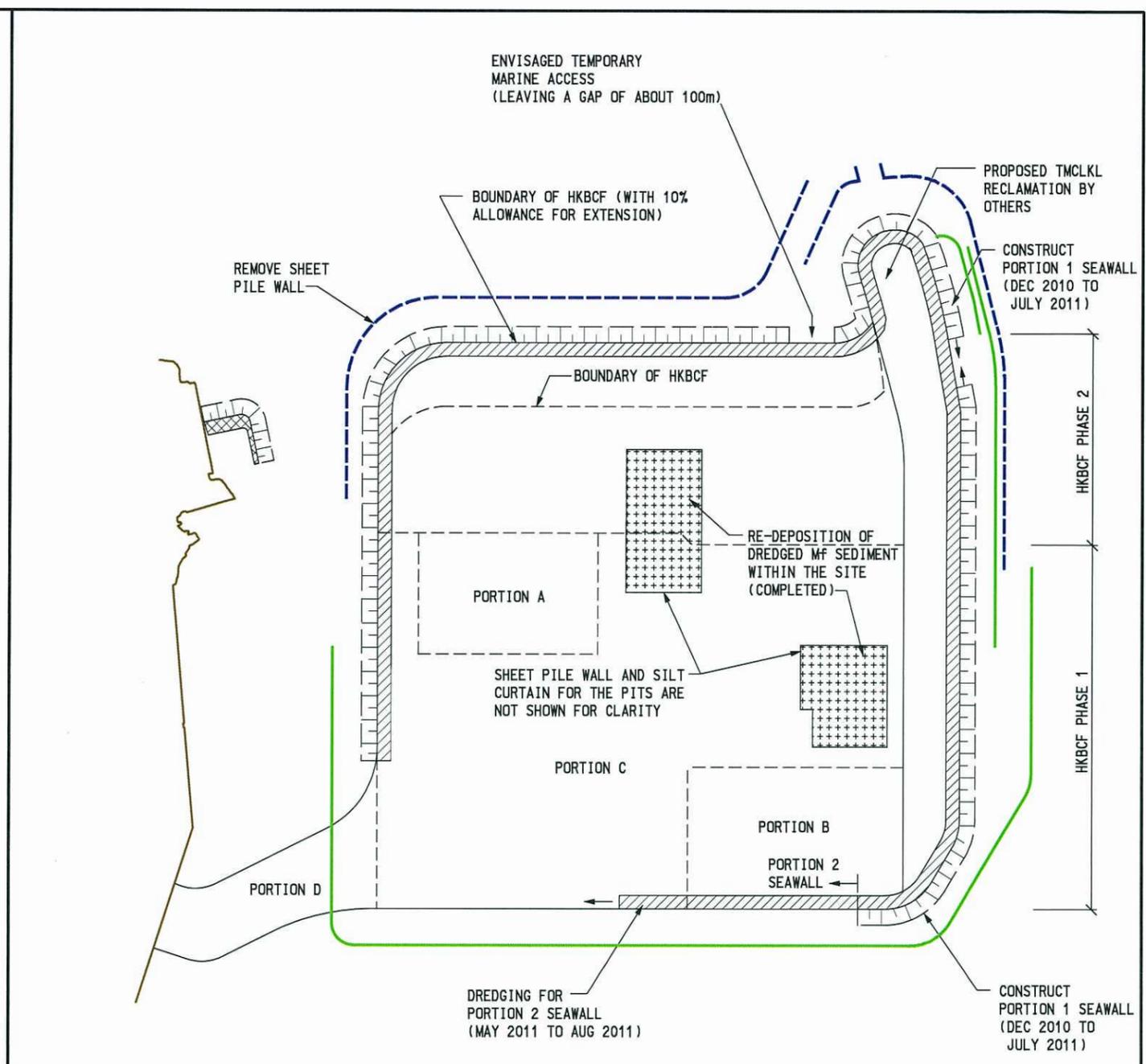
29/7/2009  
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 Printed by :  
 File name :



NOTE:  
 FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)  
 SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

- LEGEND:
- STEEL SHEET PILE WALL
  - SINGLE SILT CURTAIN
  - DREDGED AREA
  - COMPLETED SLOPING SEAWALL
  - RE-DEPOSITION OF DREDGED MF SEDIMENT
  - RECLAMATION WORKS COMPLETED

STAGE 3 (ON APR 2011)



NOTE:  
 FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)  
 SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

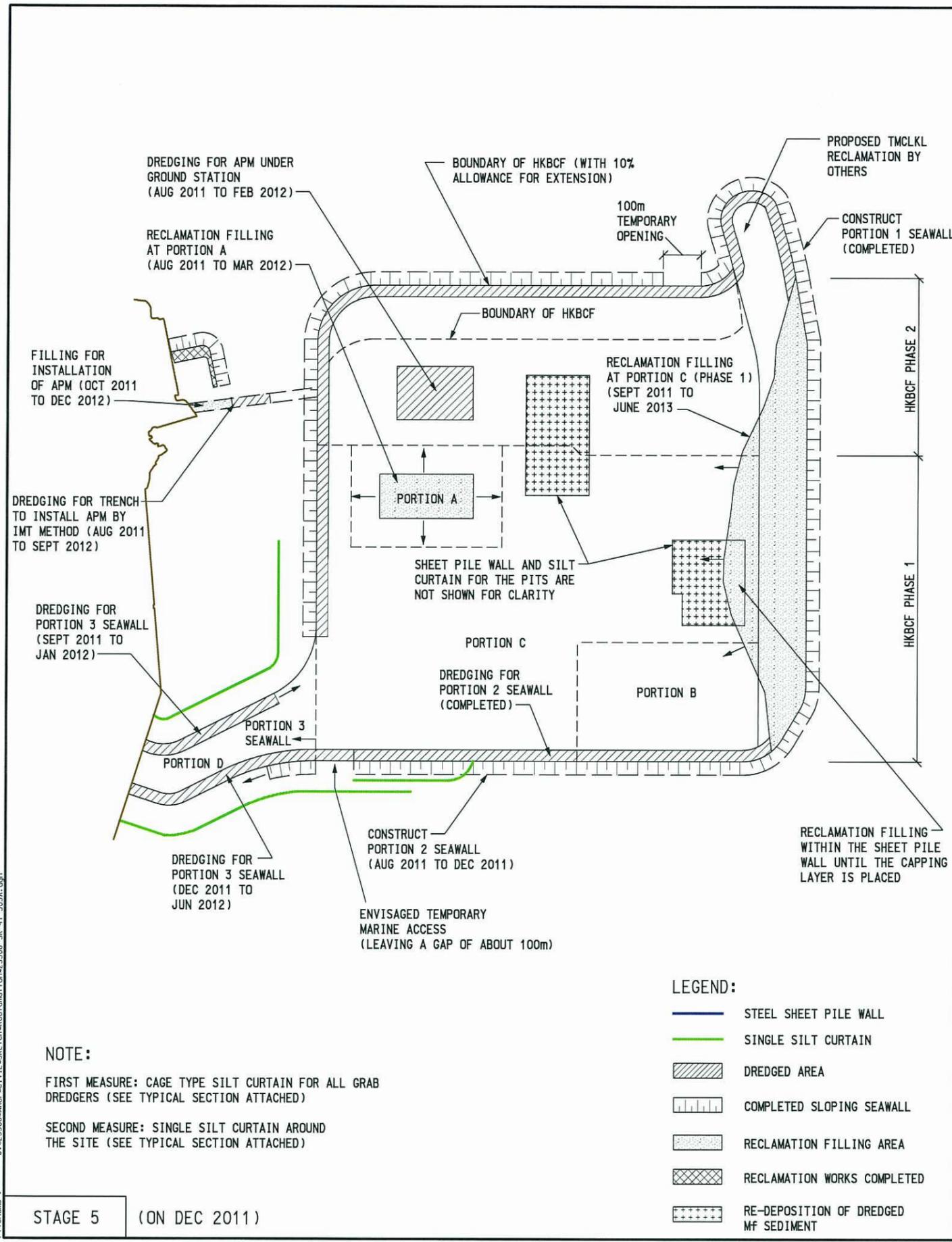
- LEGEND:
- STEEL SHEET PILE WALL
  - SINGLE SILT CURTAIN
  - DREDGED AREA
  - COMPLETED SLOPING SEAWALL
  - RE-DEPOSITION OF DREDGED MF SEDIMENT
  - RECLAMATION WORKS COMPLETED

STAGE 4 (ON JUNE 2011)

29/7/2009  
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 Printed by :  
 F:\Name :

<b>路政署</b> <b>HIGHWAYS DEPARTMENT</b> 港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office	<b>ARUP</b> Ove Arup & Partners Hong Kong Limited	Job Title <b>Agreement No. CE 14/2008 (CE)</b> <b>Hong Kong-Zhuhai-Macao Bridge Hong Kong</b> <b>Boundary Crossing Facilities - Investigation</b>	Drawing Title <b>ANTICIPATED CONSTRUCTION</b> <b>SEQUENCE OF HKBCF (SEQUENCE B)</b>	Drawn CN	Date 02/09	Drawing No. <b>25308/041/302A</b>	
				Checked SK	Approved AK		
Rev. A FIRST ISSUE				02/09	Scale 1:12500 on A3	Status <b>PRELIMINARY</b>	Rev. A

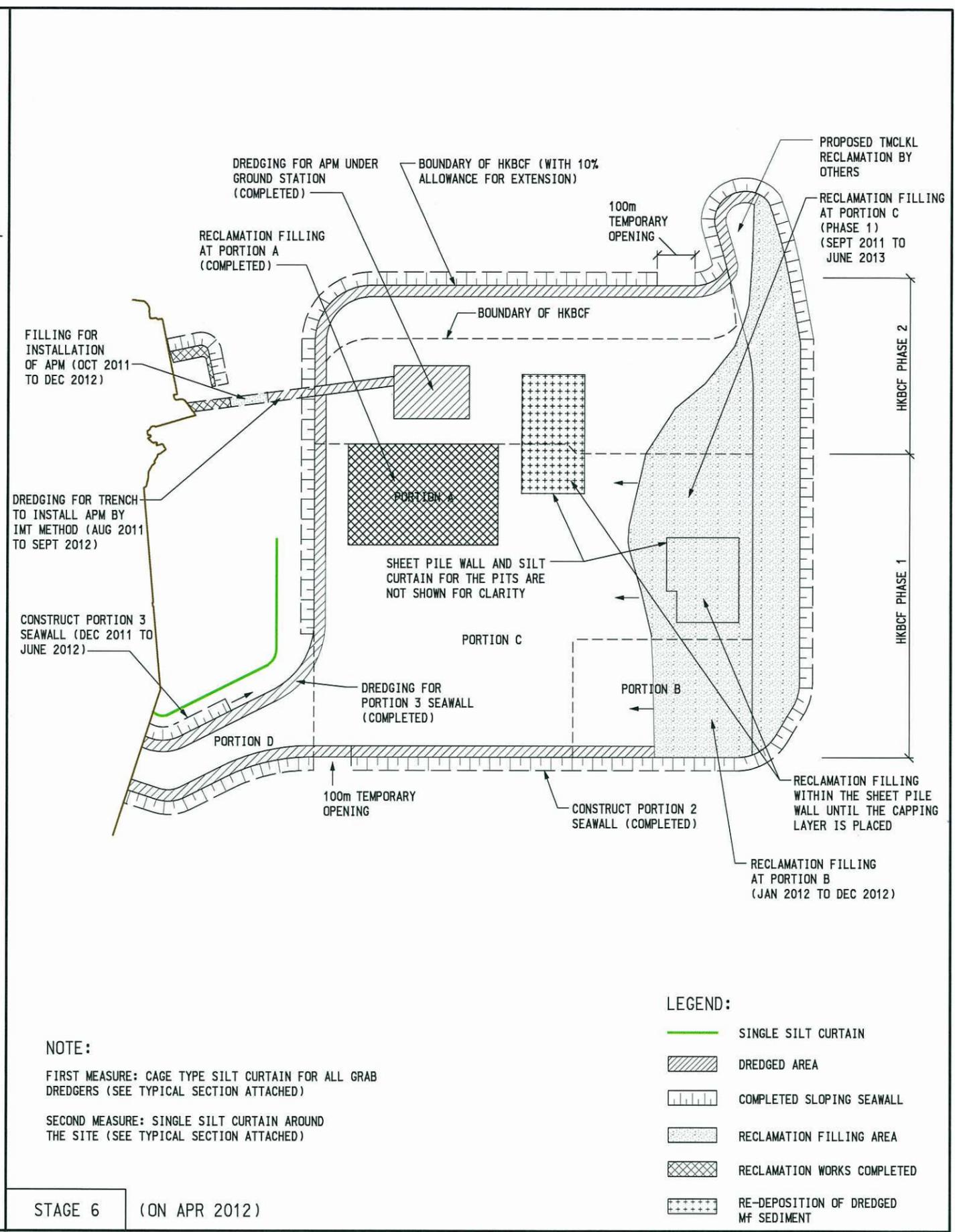
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 Printed by :  
 Filename :



**NOTE:**  
 FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)  
 SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

- LEGEND:**
- STEEL SHEET PILE WALL
  - SINGLE SILT CURTAIN
  - DREDGED AREA
  - COMPLETED SLOPING SEAWALL
  - RECLAMATION FILLING AREA
  - RECLAMATION WORKS COMPLETED
  - RE-DEPOSITION OF DREDGED MF SEDIMENT

STAGE 5 (ON DEC 2011)

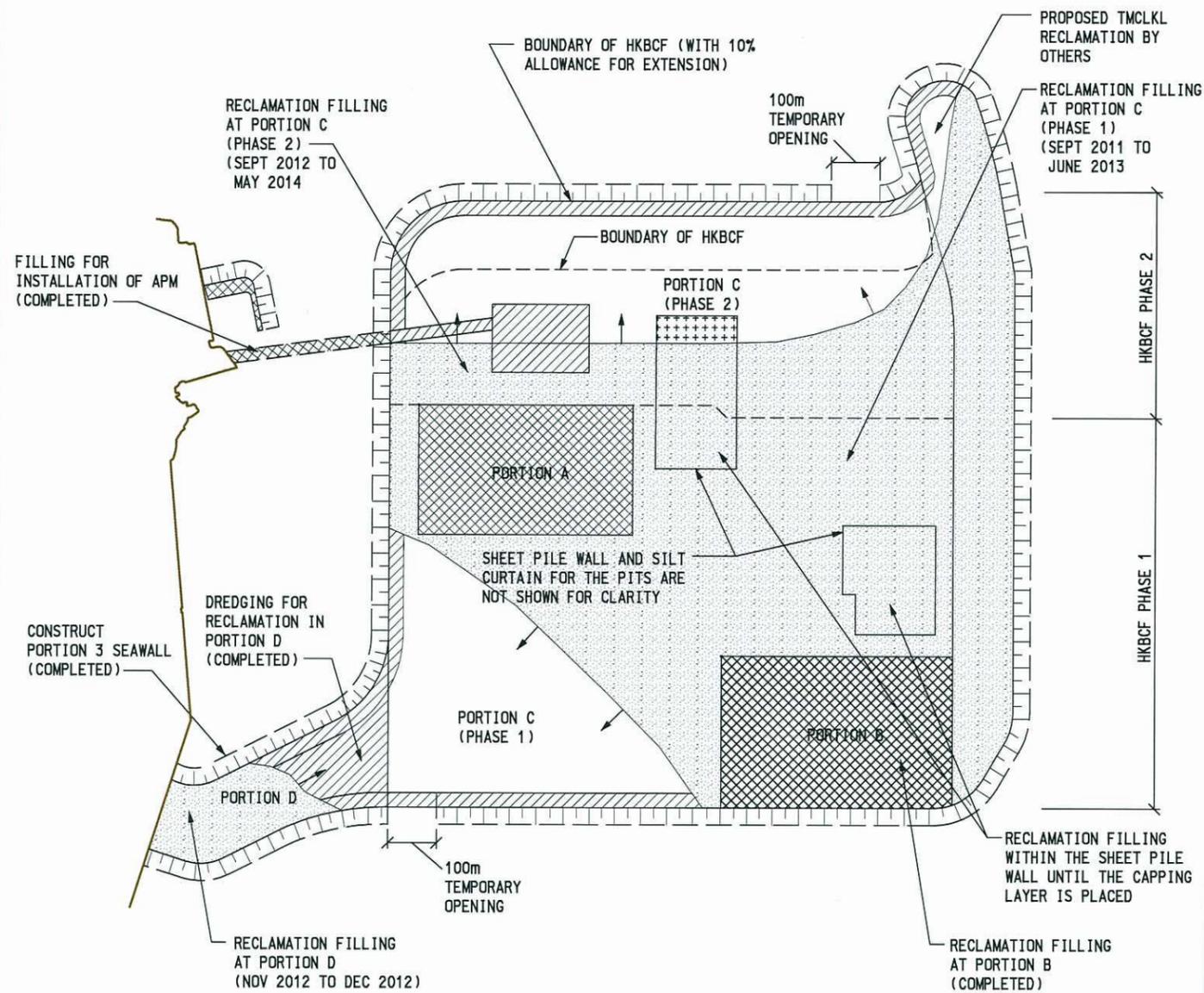


**NOTE:**  
 FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)  
 SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

- LEGEND:**
- SINGLE SILT CURTAIN
  - DREDGED AREA
  - COMPLETED SLOPING SEAWALL
  - RECLAMATION FILLING AREA
  - RECLAMATION WORKS COMPLETED
  - RE-DEPOSITION OF DREDGED MF SEDIMENT

STAGE 6 (ON APR 2012)

<b>路政署</b> <b>HIGHWAYS DEPARTMENT</b> 港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office	<b>ARUP</b> Ove Arup & Partners Hong Kong Limited	Job Title <b>Agreement No. CE 14/2008 (CE)</b> <b>Hong Kong-Zhuhai-Macao Bridge Hong Kong</b> <b>Boundary Crossing Facilities - Investigation</b>	Drawing Title <b>ANTICIPATED CONSTRUCTION</b> <b>SEQUENCE OF HKBCF (SEQUENCE B)</b>	Drawn CN	Date 02/09	Drawing No. <b>25308/041/303A</b>	
				Checked SK	Approved AK		
Rev. A FIRST ISSUE				Date 02/09	Scale 1:12500 on A3	Status <b>PRELIMINARY</b>	Rev. A



**NOTE:**

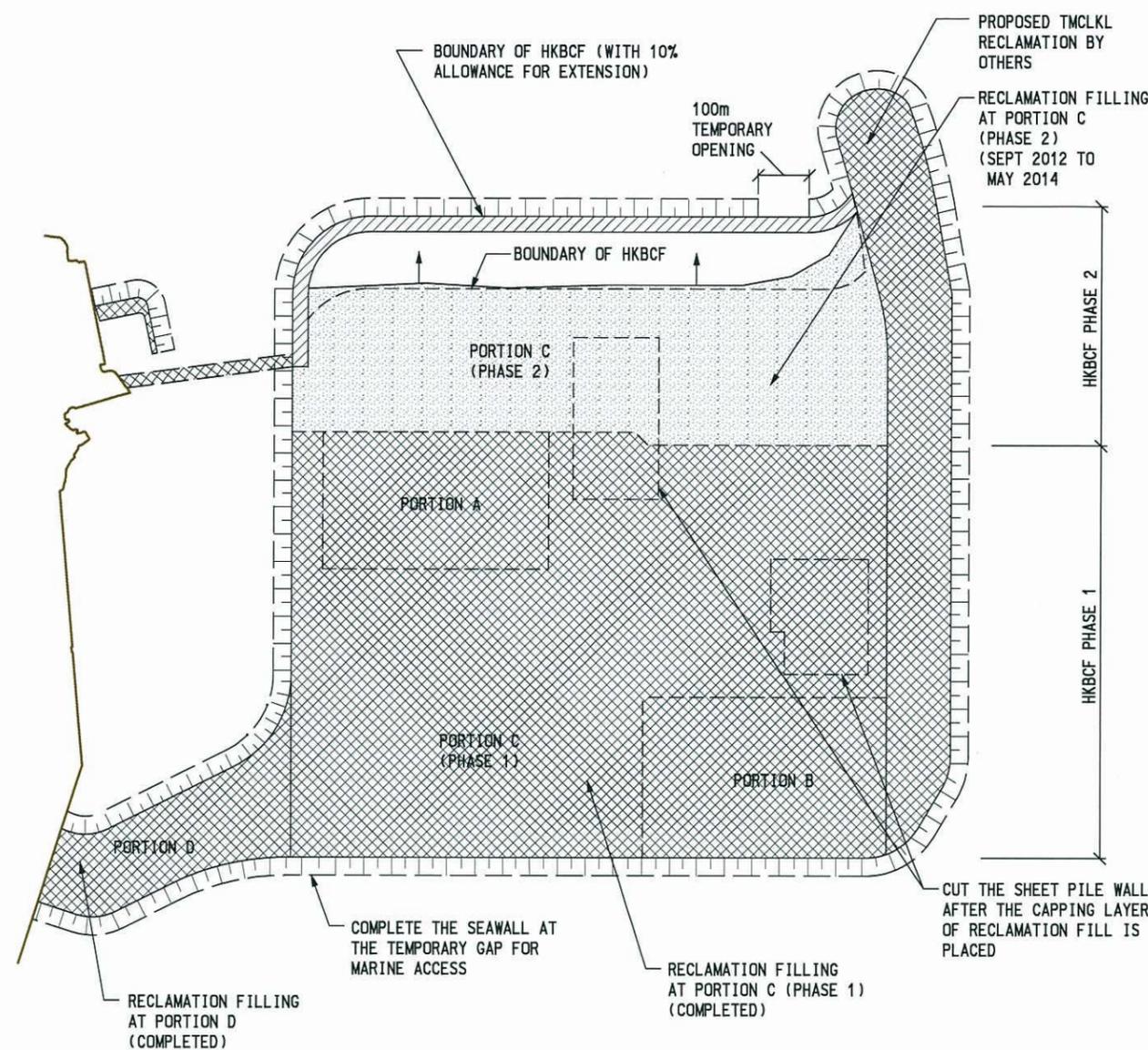
FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

**LEGEND:**

-  DREDGED AREA
-  COMPLETED SLOPING SEAWALL
-  RECLAMATION FILLING AREA
-  RECLAMATION WORKS COMPLETED
-  RE-DEPOSITION OF DREDGED MF SEDIMENT

STAGE 7 (ON DEC 2012)



**NOTE:**

FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

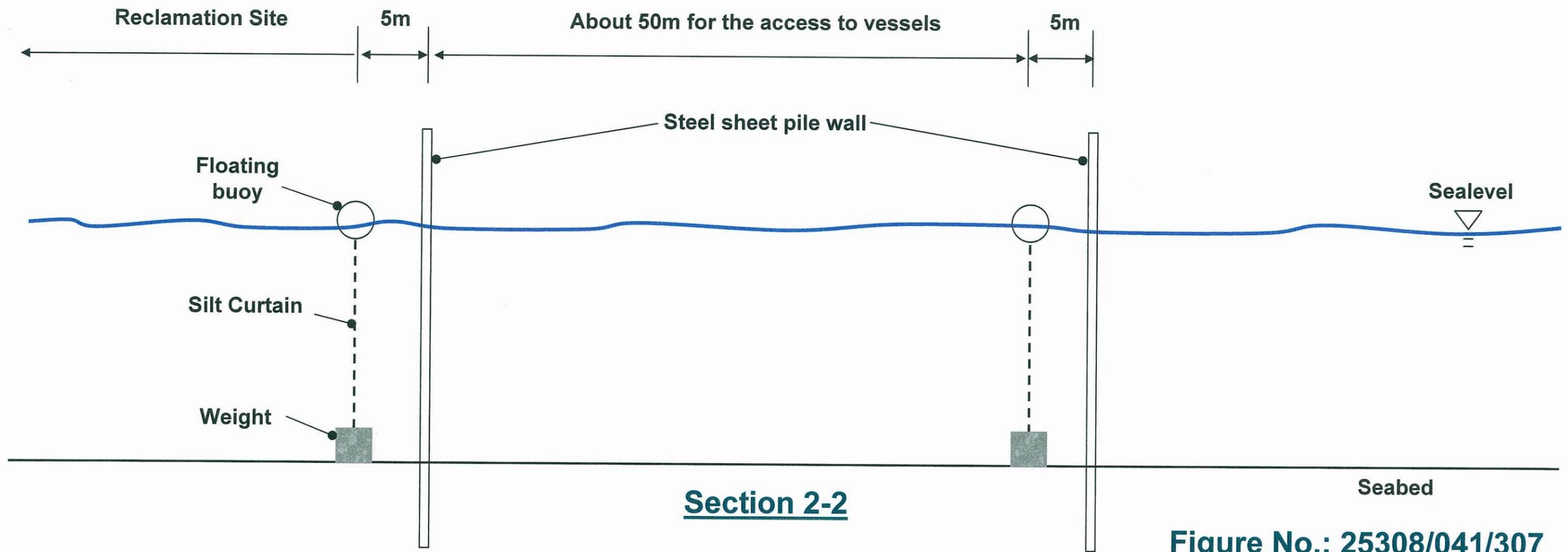
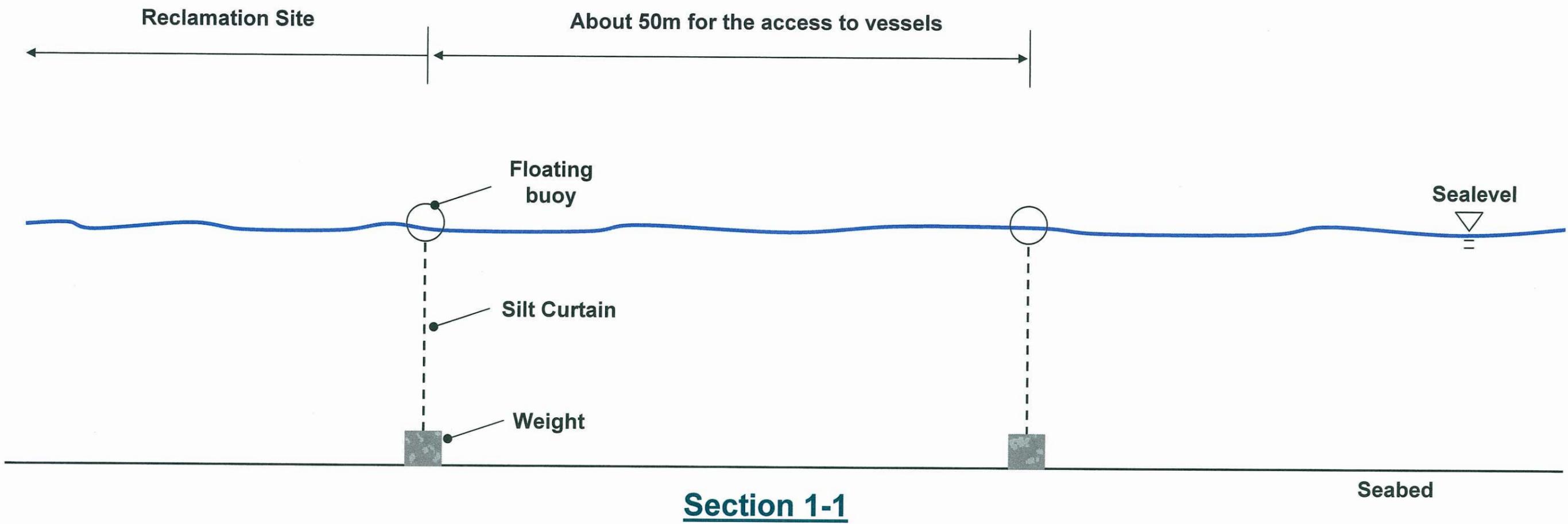
SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

**LEGEND:**

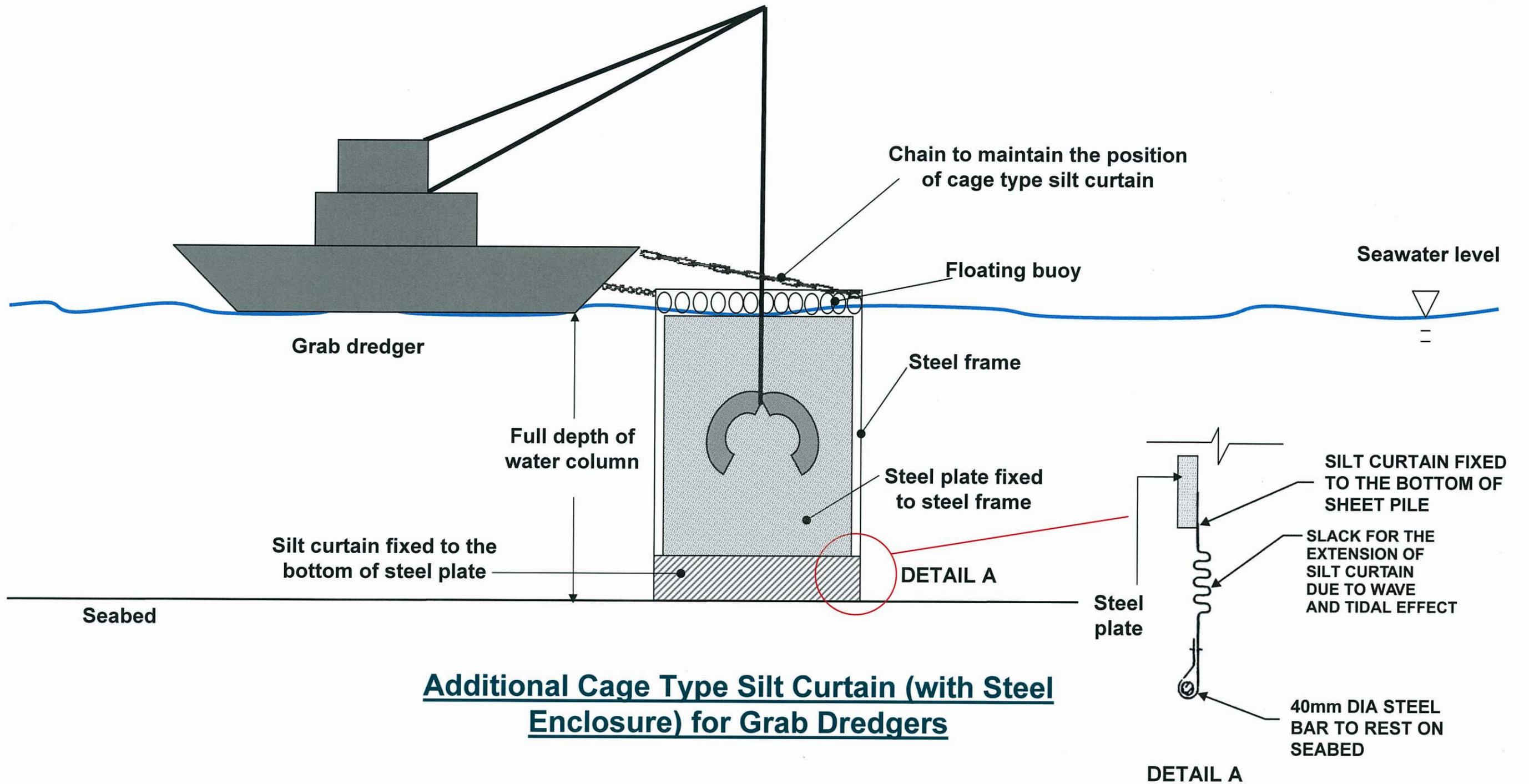
-  DREDGED AREA
-  COMPLETED SLOPING SEAWALL
-  RECLAMATION FILLING AREA
-  RECLAMATION WORKS COMPLETED
-  RE-DEPOSITION OF DREDGED MF SEDIMENT

STAGE 8 (ON DEC 2013)

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**Figure No.: 25308/041/307**



**Additional Cage Type Silt Curtain (with Steel Enclosure) for Grab Dredgers**

**Figure No.: 25308/041/308a**