Immingham Eastern Ro-Ro Terminal

Deadline 8 Appendices

Associated Petroleum Terminals (Immingham) Limited and Humber Oil Terminals Trustee Limited

Planning Inspectorate Ref: TR030007

8 January 2024

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Table of Contents

	Document	Page
1	Part 12 of the Energy Act 2023	**3**
2	Navigation simulation study - Briefing note – provided to IOT Operators on 11 December 2023	**21**
3	Letter APT / ABP 20 December 2023 – request for response on outstanding matters	**85**
4	IOT Operators' notes on navigational simulation runs for enhanced operational controls of 13 / 14 December	**88**

Deadline 8 Appendix 1

Excerpt - Part 12 of the Energy Act 2023

Document
Part 12 of the Energy Act 2023

Energy Act 2023

2023 CHAPTER 52

PART 12

CORE FUEL SECTOR RESILIENCE

CHAPTER 1

INTRODUCTION

267 General objective

The functions of the Secretary of State under this Part must be exercised with a view to—

(a) ensuring that economic activity in the United Kingdom is not adversely affected by disruptions to core fuel sector activities, and

(b) reducing the risk of emergencies affecting fuel supplies.

268 "Core fuel sector activity" and other key concepts

(1) In this Part "core fuel sector activity" means an activity of a kind mentioned in subsection (2), so far as the activity—

(a) is carried on in the United Kingdom in the course of a business, and

(b) contributes (directly or indirectly) to the supply of core fuels to consumers in the United Kingdom or persons carrying on business in the United Kingdom.

(2) The kinds of activity are—

(a) storing oil or renewable transport fuel;

(b) handling oil or renewable transport fuel;

(c) the carriage of oil or renewable transport fuel by sea or inland water;

(d) transporting oil or renewable transport fuel by road or rail;

(e) conveying oil or renewable transport fuel by pipes;

(f) processing or producing oil or renewable transport fuel (whether by refining, blending or otherwise).

(3) In subsection (2) the references to "oil" do not include crude oil which has not yet entered any refinery or terminal in the United Kingdom.

(4) In this Part "core fuels" means—

(a) crude oil based fuels, and

(b) renewable transport fuels.

(5) In this Part "core fuel sector resilience" means the capability of core fuel sector participants to—

(a) manage the risk of,

(b) reduce the potential adverse impact of, and

(c) facilitate recovery from,

disruptions to core fuel sector activities.

(6) In this Part "core fuel sector participant" means—

(a) a person carrying on core fuel sector activities;

(b) a Part 12 facility owner.

(7) For the purposes of this Part there is "continuity of supply of core fuels" where the supply of core fuels to consumers in all areas of the United Kingdom, and persons carrying on business in all areas of the United Kingdom—

(a) is reliable and continuous, and

(b) is maintained at normal levels.

(8) In subsection (7) "normal levels" means levels that—

(a) are not substantially below average monthly levels of supply in the United Kingdom (taking account of regional variations), and

(b) are consistent with a reasonable balance between supply and demand.

(9) For the purposes of subsection (8) "average monthly levels" are to be calculated by reference to levels of supply in the five years preceding the calculation.

(10) In this Part "relevant activities or assets"—

(a) in relation to a person carrying on core fuel sector activities, means the person's core fuel sector activities (and includes any land or assets under the person's control that are associated with those activities);

(b) in relation to a Part 12 facility owner, means the owned facility.

(11) In this Part—

(a) "Part 12 facility owner" means the owner of a pipeline, terminal, or other facility or infrastructure which is used, or any part of which is used, for the purposes of core fuel sector activities;

(b) in relation to a Part 12 facility owner, "the owned facility" means the facility or infrastructure mentioned in paragraph (a).

(12) In subsection (11) "owner", in relation to any facility or infrastructure, means—

(a) a person in whom the facility or infrastructure is vested, or

(b) a lessee of the facility or infrastructure.

(13) In this Part references to a "person carrying on core fuel sector activities" include any person carrying on such activities (whether or not as the owner of the oil or renewable transport fuel).

CHAPTER 2

POWERS FOR RESILIENCE PURPOSES

Directions

269 Directions to particular core fuel sector participants

(1) The Secretary of State may, for the purpose of maintaining or improving core fuel sector resilience, direct a person to whom this section applies to do anything in relation to the person's relevant activities or assets (for example, to acquire and install specific equipment, or carry out specific works, at the person's own expense).

(2) The Secretary of State may not give a direction under subsection (1) unless the Secretary of State considers that the persons to whom this section applies have failed to make sufficient progress with the steps that the Secretary of State considers necessary for maintaining or improving core fuel sector resilience.

(3) Where there is disruption to, or a failure of, continuity of supply of core fuels, the Secretary of State may direct a person to whom this section applies to do anything in relation to the person's relevant activities or assets which the Secretary of State considers necessary or expedient for the purpose of—
   (a) restoring continuity of supply of core fuels, or
   (b) counteracting the disruption or failure, or its potential adverse impact.

(4) If the Secretary of State considers that there is a significant risk of disruption to, or a failure of, continuity of supply of core fuels, the Secretary of State may direct a person to whom this section applies to do anything in relation to the person's relevant activities or assets which the Secretary of State considers necessary or expedient for the purpose of—
   (a) reducing the risk, or
   (b) reducing the potential adverse impact of the disruption or failure.

(5) The Secretary of State may not make a direction under subsection (1), (3) or (4) unless the Secretary of State considers—
   (a) that, the corresponding cases (if any) are not sufficiently numerous to justify making regulations under section 272, or
   (b) that, by reason of urgency, it is not practicable to achieve the aims of the direction by regulations under section 272.

(6) In subsection (5)(a) the reference to "corresponding cases" is to persons to whom this section applies in relation to whom the Secretary of State considers it would be appropriate to take action corresponding to the direction.

(7) This section applies to the following persons—
   (a) a person carrying on core fuel sector activities in the course of a business which has capacity in excess of 500,000 tonnes;

(b) a Part 12 facility owner if the owned facility has capacity in excess of 20,000 tonnes.

(8) For the purposes of this Part—

(a) a business "has capacity in excess of" a specified number of tonnes if in the most recently ended calendar year core fuel sector activities were carried on in that business in relation to more than that number of tonnes of core fuel;

(b) a facility or infrastructure "has capacity in excess of" a specified number of tonnes if in the most recently ended calendar year it was used for the purposes of core fuel sector activities in relation to more than that number of tonnes of core fuels.

270 Procedure for giving directions

(1) Before giving a person a direction under section 269 the Secretary of State must give the person a written notice accompanied by a draft of the proposed direction.

(2) The notice under subsection (1) must—

(a) state that the Secretary of State proposes to give the person a direction in the form of the accompanying draft;

(b) explain why the Secretary of State proposes to give the direction;

(c) state when it is intended that the direction will come into effect;

(d) specify a period within which the person may make written representations with respect to the proposal.

(3) The period specified under subsection (2)(d) must begin with the date on which the notice is given to the person and must be not less than 14 days.

(4) Before giving a direction under section 269, the Secretary of State must consult—

(a) so far as the direction relates to relevant activities or assets in England, Scotland or Wales, the Health and Safety Executive;

(b) so far as the direction relates to relevant activities or assets in England, the Environment Agency;

(c) so far as the direction relates to relevant activities or assets in Scotland, the Scottish Environment Protection Agency;

(d) so far as the direction relates to relevant activities or assets in Wales, the Natural Resources Body for Wales;

(e) so far as the direction relates to relevant activities or assets in Northern Ireland—

(i) the Health and Safety Executive for Northern Ireland, and

(ii) the Department of Agriculture, Environment and Rural Affairs in Northern Ireland;

(f) any other persons the Secretary of State thinks appropriate.

(5) The Secretary of State must decide whether to give the person the proposed direction (with or without modifications), after considering any representations made by—

(a) the person mentioned in subsection (1), and

(b) any person consulted in accordance with subsection (4).

(6) The Secretary of State must give written notice of that decision to the person mentioned in subsection (1).

(7) If the decision is to give the proposed direction, the notice must—
   (a) contain the direction, and
   (b) state the time when the direction is to take effect.

(8) Consultation under subsection (4) with the Environment Agency, the Scottish Environment Protection Agency or the Natural Resources Body for Wales must be with reference to that body's functions under the Control of Major Accident Hazards Regulations 2015 (S.I. 2015/483).

(9) Consultation under subsection (4) with the Department of Agriculture, Environment and Rural Affairs in Northern Ireland must be with reference to the department's functions under the Control of Major Accident Hazards Regulations (Northern Ireland) 2015 (S.R. (N.I.) 2015 No. 325).

271 Offence of failure to comply with a direction

Any person who, without reasonable excuse, fails to comply with a direction given to the person under section 269 commits an offence and is liable—
   (a) on summary conviction in England and Wales, to imprisonment for a term not exceeding the general limit in a magistrates' court or a fine (or both);
   (b) on summary conviction in Scotland, to imprisonment for a term not exceeding 12 months or a fine not exceeding the statutory maximum (or both);
   (c) on summary conviction in Northern Ireland, to imprisonment for a term not exceeding 6 months or a fine not exceeding the statutory maximum (or both);
   (d) on conviction on indictment, to imprisonment for a term not exceeding 2 years or a fine (or both).

Corresponding powers to make regulations

272 Corresponding powers to make regulations

(1) The Secretary of State may, for the purpose of maintaining or improving core fuel sector resilience, by regulations require persons of a class or description specified in the regulations to do anything in relation to their relevant activities or assets.

(2) The Secretary of State may not make any provision by regulations under subsection (1) unless the Secretary of State considers that the persons mentioned in paragraphs (a) and (b) of subsection (5) have failed to make sufficient progress with the steps that the Secretary of State considers necessary for maintaining or improving core fuel sector resilience.

(3) Where there is disruption to, or a failure of, continuity of supply of core fuels, the Secretary of State may by regulations require persons of a class or description specified in the regulations to do anything in relation to their relevant activities or assets which the Secretary of State considers necessary or expedient for the purpose of—
   (a) restoring continuity of supply of core fuels, or
   (b) counteracting the disruption or failure, or its potential adverse impact.

(4) If the Secretary of State considers that there is a significant risk of disruption to, or a failure of, continuity of supply of core fuels, the Secretary of State may by regulations require persons of a class or description specified in the regulations to do anything

in relation to their relevant activities or assets which the Secretary of State considers necessary or expedient for the purpose of—

(a) reducing the risk, or

(b) reducing the potential adverse impact of the disruption or failure.

(5) A class or description specified for the purposes of subsection (1), (3) or (4) may not include persons other than—

(a) persons carrying on core fuel sector activities in the course of a business which has capacity in excess of 1,000 tonnes, or

(b) Part 12 facility owners whose owned facility has capacity in excess of 1,000 tonnes.

(6) Regulations under this section may provide that any person who, without reasonable excuse, fails to comply with a requirement imposed by the regulations commits an offence.

(7) Before making regulations under this section the Secretary of State must consult—

(a) so far as the regulations relate to relevant activities or assets in England, Scotland or Wales, the Health and Safety Executive;

(b) so far as the regulations relate to relevant activities or assets in England, the Environment Agency;

(c) so far as the regulations relate to relevant assets or activities in Scotland, the Scottish Environment Protection Agency;

(d) so far as the regulations relate to relevant activities or assets in Wales, the Natural Resources Body for Wales;

(e) so far as the regulations relate to relevant activities or assets in Northern Ireland—

(i) the Health and Safety Executive for Northern Ireland, and

(ii) the Department of Agriculture, Environment and Rural Affairs in Northern Ireland;

(f) any other persons the Secretary of State thinks appropriate.

(8) Regulations under this section are subject to the affirmative procedure.

(9) Consultation under subsection (7) with the Environment Agency, the Scottish Environment Protection Agency or the Natural Resources Body for Wales must be with reference to that body’s functions under the Control of Major Accident Hazards Regulations 2015 (S.I. 2015/483).

(10) Consultation under subsection (7) with the Department of Agriculture, Environment and Rural Affairs in Northern Ireland must be with reference to the department’s functions under the Control of Major Accident Hazards Regulations (Northern Ireland) 2015 (S.R. (N.I.) 2015 No. 325).

Information

273 Power to require information

(1) The Secretary of State may by notice in writing require any of the following to provide the Secretary of State with information relating to their relevant activities or assets—

(a) a person carrying on core fuel sector activities in the course of a business which has capacity in excess of 1,000 tonnes;

(b) a Part 12 facility owner whose owned facility has capacity in excess of 1,000 tonnes.

(2) The Secretary of State may by notice in writing require a relevant wetstock manager to provide the Secretary of State with information relating to the relevant activities or assets of a person carrying on core fuel sector activities to whom the relevant wetstock manager provides stock management services.

(3) In this Part "relevant wetstock manager" means a person who provides to persons who make retail supplies of core fuels in the United Kingdom stock management services in respect of such supplies.

(4) The Secretary of State may only require information under this section for the purpose of maintaining or improving core fuel sector resilience.

(5) A notice under subsection (1) or (2) may—

(a) specify the manner in which information is to be provided;

(b) specify time limits for providing information;

(c) require information to be provided at specified intervals.

(6) Before giving a person a notice under subsection (1) or (2) the Secretary of State must—

(a) notify the person in writing of the proposed contents of the notice and of the period within which the person may make written representations with respect to the proposed requirement, and

(b) consider any representations made by the person.

(7) The period notified under subsection (6)(a) must begin on the date on which the notification is given and (subject to subsection (8)) must be not less than 14 days.

(8) The Secretary of State may notify a period under subsection (6)(a) that is less than 14 days but not less than 7 days if the Secretary of State considers that it is it is necessary to do so by reason of urgency.

274 Duty to report incidents

(1) If at any time a person—

(a) knows, or has reason to suspect, that a notifiable incident is occurring or has occurred, and

(b) meets the condition in paragraph (a), (b) or (c) of subsection (2),

that person must notify the Secretary of State of the incident as soon as possible.

(2) The conditions mentioned in subsection (1)(b) are that—

(a) the person is carrying on core fuel sector activities in the course of a business which has capacity in excess of 500,000 tonnes;

(b) the person is a Part 12 facility owner in whose case the owned facility has capacity in excess of 500,000 tonnes;

(c) the person is of a class or description specified in regulations made by the Secretary of State under this subsection.

(3) In this section "notifiable incident", in relation to a person, means an incident which affects the person's relevant activities or assets in such a way as to create a significant risk of, or cause—

(a) disruption to, or
(b) a failure of,

the continuity of supply of core fuels.

(4) The Secretary of State may by notice in writing require a person who has given a notice under subsection (1) to provide further information about the incident.

(5) Before giving a person a notice under subsection (4) the Secretary of State must—
(a) notify the person in writing of—
(i) the proposed contents of the notice, and
(ii) the period within which the person may make written representations with respect to the proposal, and
(b) consider any representations made by the person.

(6) The period notified under subsection (5)(a)(ii) must begin on the date on which the notification is given and (subject to subsection (7)) must be not less than 14 days.

(7) The Secretary of State may notify a period under subsection (5)(a)(ii) that is less than 14 days but not less than 7 days if the Secretary of State considers that it is necessary to do so by reason of urgency.

(8) A notice under subsection (4) may specify—
(a) the manner in which information is to be provided, and
(b) time limits for providing information.

(9) Where a notification under subsection (1) is not made in writing, it must be confirmed in writing as soon as possible.

(10) Regulations under subsection (2)(c) may specify the meaning that "relevant activities or assets" is to have in subsection (3) in relation to persons of a class or description of persons specified in the regulations.

(11) Regulations under subsection (2)(c) are subject to the affirmative procedure.

275 Contravention of requirement under section 273 or 274

(1) A person who, without reasonable excuse, fails to comply with a requirement imposed by a notice under section 273(1) or (2) or 274(4) commits an offence.

(2) A person who, without reasonable excuse, fails to comply with section 274(1) commits an offence.

(3) A person who commits an offence under this section is liable—
(a) on summary conviction in England and Wales, to imprisonment for a term not exceeding the general limit in a magistrates' court or a fine (or both);
(b) on summary conviction in Scotland, to imprisonment for a term not exceeding 12 months or a fine not exceeding the statutory maximum (or both);
(c) on summary conviction in Northern Ireland, to imprisonment for a term not exceeding 6 months or a fine not exceeding the statutory maximum (or both);
(d) on conviction on indictment, to imprisonment for a term not exceeding 2 years or a fine (or both).

276 Provision of information at specified intervals

(1) The Secretary of State may by regulations require any of the following to provide to the Secretary of State, at intervals specified in the regulations, information relating to their relevant activities or assets—

(a) a person carrying on core fuel sector activities in the course of a business which has capacity in excess of 1,000 tonnes;

(b) a Part 12 facility owner whose owned facility has capacity in excess of 1,000 tonnes.

(2) The Secretary of State may by regulations require a relevant wetstock manager to provide to the Secretary of State, at intervals specified in the regulations, information relating to the relevant activities or assets of a person carrying on core fuel sector activities to whom the relevant wetstock manager provides stock management services.

(3) The power to make regulations under this section may only be exercised for the purpose of maintaining or improving core fuel sector resilience.

(4) The regulations may make provision about—

(a) the information to be provided;

(b) the manner in which information is to be provided;

(c) time limits for providing information.

(5) Regulations under this section may provide that any person who, without reasonable excuse, fails to comply with a requirement imposed by the regulations commits an offence.

(6) Regulations under this section are subject to the affirmative procedure.

277 Disclosure of information held by the Secretary of State

(1) Subsection (2) applies to information held by the Secretary of State which was provided to the Secretary of State under section 273, 274 or 276.

(2) The information may be disclosed—

(a) to any government department or devolved authority for the purpose of—

(i) maintaining or improving core fuel sector resilience, or

(ii) restoring, or counteracting a disruption to, or failure of, continuity of supply of core fuels (or counteracting the potential adverse impact of any such disruption or failure), or

(b) if the disclosure is necessary for the purpose of criminal proceedings.

(3) Nothing in this section authorises the making of a disclosure which—

(a) contravenes the data protection legislation (as defined in section 3 of the Data Protection Act 2018), or

(b) is prohibited by any of Parts 1 to 7 of, or Chapter 1 of Part 9 of, the Investigatory Powers Act 2016.

In determining whether a disclosure would fall within paragraph (a) or (b), the powers conferred by this section are to be taken into account.

(4) In subsection (2) "devolved authority" means—

(a) the Welsh Ministers,

(b) the Scottish Ministers, or
(c) a Northern Ireland department.

278 Disclosure of information by HMRC

(1) His Majesty's Revenue and Customs (or anyone acting on their behalf) may disclose information to the Secretary of State for the purpose of facilitating the exercise by the Secretary of State of functions relating to core fuel sector resilience.

(2) A person who receives information as a result of this section may not—
(a) use the information for a purpose other than that mentioned in subsection (1), or
(b) further disclose the information,

except with the consent of the Commissioners for His Majesty's Revenue and Customs (which may be general or specific).

(3) If a person discloses information in contravention of subsection (2)(b) which relates to a person whose identity—
(a) is specified in the disclosure, or
(b) can be deduced from it,

section 19 of the Commissioners for Revenue and Customs Act 2005 (offence of wrongful disclosure) applies in relation to that disclosure as it applies in relation to a disclosure of information in contravention of section 20(9) of that Act.

(4) This section does not limit the circumstances in which information may be disclosed under section 18(2) of the Commissioners for Revenue and Customs Act 2005 or under any other enactment or rule of law.

(5) Nothing in this section authorises the making of a disclosure which—
(a) contravenes the data protection legislation (as defined in section 3 of the Data Protection Act 2018), or
(b) is prohibited by any of Parts 1 to 7 of, or Chapter 1 of Part 9 of, the Investigatory Powers Act 2016.

In determining whether a disclosure would fall within paragraph (a) or (b), the powers conferred by this section are to be taken into account.

Appeal against notice or direction

279 Appeal against notice or direction

(1) A person to whom a direction under section 269 or a notice under section 273 or 274(4) is given may appeal to the First-tier Tribunal against the direction or notice on the ground that the decision to give it—
(a) is based on an error of fact,
(b) is wrong in law, or
(c) is unfair or unreasonable.

(2) On an appeal under this section the Tribunal may—
(a) confirm or cancel the direction or notice, or

(b) refer the matter back to the Secretary of State for reconsideration with such directions (if any) as the Tribunal considers appropriate.

CHAPTER 3

ENFORCEMENT

Offences

280 False statements etc

(1) It is an offence for a person to make a statement which the person knows is false or materially misleading—

(a) in responding to a requirement imposed by the Secretary of State—

(i) under section 273 (power to require information),

(ii) under section 274(4) (duty to report incidents), or

(iii) under regulations under section 276 (provision of information at specified intervals), or

(b) in making any other statement to the Secretary of State in connection with any of the Secretary of State's functions under this Part.

(2) A person who commits an offence under this section is liable—

(a) on summary conviction in England and Wales, to imprisonment for a term not exceeding the general limit in a magistrates' court or a fine (or both);

(b) on summary conviction in Scotland, to imprisonment for a term not exceeding 12 months or a fine not exceeding the statutory maximum (or both);

(c) on summary conviction in Northern Ireland, to imprisonment for a term not exceeding 6 months or a fine not exceeding the statutory maximum (or both);

(d) on conviction on indictment, to imprisonment for a term not exceeding 2 years or a fine (or both).

281 Offences under regulations

(1) This section applies to regulations under—

(a) section 272 (corresponding powers to make regulations);

(b) section 276 (provision of information at specified intervals).

(2) Regulations to which this section applies may provide for an offence under the regulations to be triable—

(a) only summarily, or

(b) either summarily or on indictment.

(3) Regulations to which this section applies may provide for an offence under the regulations that is triable either way to be punishable—

(a) on summary conviction in England and Wales with imprisonment for a term not exceeding the period specified or a fine (or both);

(b) on summary conviction in Scotland or Northern Ireland with imprisonment for a term not exceeding the period specified or a fine not exceeding the statutory maximum (or both);

(c) on conviction on indictment, with imprisonment for a term not exceeding the period specified, which may not exceed two years, or a fine (or both).

(4) A period specified under subsection (3)(a) may not exceed the general limit in a magistrates' court.

(5) A period specified under subsection (3)(b) may not exceed—
(a) in relation to Scotland, 12 months;
(b) in relation to Northern Ireland, 6 months.

(6) Regulations to which this section applies may provide for a summary offence under the regulations to be punishable—
(a) with imprisonment for a term not exceeding the period specified,
(b) with—
(i) in England and Wales, a fine (or a fine not exceeding an amount specified, which must not exceed level 4 on the standard scale), or
(ii) in Scotland or Northern Ireland, a fine not exceeding the amount specified, which must not exceed level 5 on the standard scale, or
(c) with both.

(7) A period specified under subsection (6)(a) may not exceed—
(a) in relation to England and Wales—
(i) 6 months, in relation to offences committed before the date on which section 281(5) of the Criminal Justice Act 2003 comes into force, or
(ii) 51 weeks, in relation to offences committed on or after that date,
(b) in relation to Scotland, 12 months,
(c) in relation to Northern Ireland, 6 months.

(8) In this section "specified" means specified in the regulations.

282 Proceedings for offences

Proceedings for an offence under this Part (including an offence created by regulations under section 272 or 276)—
(a) may not be brought in England and Wales except by or with the consent of the Secretary of State or the Director of Public Prosecutions;
(b) may not be brought in Northern Ireland except by or with the consent of the Secretary of State or the Director of Public Prosecutions for Northern Ireland.

283 Liability of officers of entities

(1) Where an offence under this Part committed by a body corporate is proved—
(a) to have been committed with the consent or connivance of an officer of the body corporate, or
(b) to be attributable to neglect on the part of an officer of the body corporate,

that officer (as well as the body corporate) commits the offence and is liable to be proceeded against and dealt with accordingly.

(2) In subsection (1) "officer", in relation to a body corporate, means—
(a) any director, manager, secretary or other similar officer of the body corporate, or

(b) any person purporting to act in any such capacity.

(3) In subsection (2) "director", in relation to a body corporate whose affairs are managed by its members, means a member of the body corporate.

(4) Where an offence under this Part is committed by a Scottish partnership and is proved to have been committed with the consent or connivance of a partner, or to be attributable to any neglect on the part of a partner, that partner (as well as the partnership) commits the offence and is liable to be proceeded against and dealt with accordingly.

Enforcement undertakings

284 Enforcement undertakings

(1) Subsection (2) applies if—

(a) the Secretary of State has reasonable grounds to suspect that a person has committed an offence falling within subsection (5),

(b) the person offers to the Secretary of State an enforcement undertaking in respect of the relevant act or omission, and

(c) the Secretary of State accepts that undertaking.

(2) Unless the person has failed to comply with the undertaking (or any part of it) the person may not at any time be convicted of that offence in respect of the relevant act or omission.

(3) In this Part "enforcement undertaking" means an undertaking to take, within any period specified in the undertaking, action—

(a) for any of the purposes in subsection (4), or

(b) of a description specified in regulations made by the Secretary of State.

(4) The purposes mentioned in subsection (3) are—

(a) to secure that the offence does not continue or recur,

(b) to secure that the position is, so far as possible, restored to what it would have been if the offence had not been committed, or

(c) to benefit any person affected by the offence.

(5) The following offences fall within this subsection—

(a) an offence under—

(i) section 271 (failure to comply with a direction),

(ii) section 275 (contravention of requirement under section 273 or 274), or

(iii) section 280 (false statements etc);

(b) an offence, other than an offence triable only summarily, that is created by regulations under—

(i) section 272 (corresponding powers to make regulations), or

(ii) section 276 (provision of information at regular intervals).

(6) The reference in subsection (4)(c) to action to "benefit any person affected by the offence" includes action by way of the payment of a sum of money.

(7) Where a person from whom the Secretary of State has accepted an enforcement undertaking has failed to comply fully with the undertaking but has complied with part of it, the partial compliance must be taken into account in any decision whether to institute any criminal proceedings in respect of the offence in question.

(8) In this section "relevant act or omission" means an act or omission of the person to which the grounds mentioned in subsection (1)(a) relate.

(9) Regulations under subsection (3)(b) are subject to the affirmative procedure.

(10) Schedule 20 contains further provision about enforcement undertakings, including provision about—

(a) procedure;

(b) compliance certificates;

(c) appeals.

Guidance

285 Guidance: criminal and civil sanctions

(1) The Secretary of State must issue guidance as to—

(a) the sanctions (including criminal sanctions) to which a person who commits an offence under this Part may be liable,

(b) the action which the Secretary of State may take to enforce offences under this Part, whether by virtue of section 284 and Schedule 20 or otherwise, and

(c) the circumstances in which the Secretary of State is likely to take any such action.

(2) The Secretary of State—

(a) must issue guidance about how the Secretary of State intends to exercise the Secretary of State's functions under section 284 and Schedule 20;

(b) must have regard to the guidance in exercising the Secretary of State's functions under those provisions.

(3) Before issuing guidance under this section, the Secretary of State must—

(a) prepare a draft of the proposed guidance;

(b) consult such persons as the Secretary of State considers appropriate;

(c) comply with the requirements of section 286.

(4) The Secretary of State may from time to time revise guidance issued under this section and issue revised guidance.

(5) Subsection (3) applies to revised guidance as it applies to the original guidance.

(6) The Secretary of State must arrange for the publication of guidance (or revised guidance) issued under this section.

286 Guidance: Parliamentary scrutiny

(1) Before issuing guidance under section 285, the Secretary of State must lay a draft of the proposed guidance before both Houses of Parliament.

(2) The Secretary of State must not issue the guidance until after the period of 40 days beginning with—

(a) the day on which the draft is laid before both Houses of Parliament, or

(b) if the draft is laid before the House of Lords on one day and the House of Commons on another, the later of those two days.

(3) If before the end of that period either House resolves that the guidance should not be issued, the Secretary of State may not issue it.

(4) In reckoning any period of 40 days for the purposes of subsection (2), no account is to be taken of any time during which—

(a) Parliament is dissolved or prorogued, or

(b) both Houses are adjourned for more than four days.

CHAPTER 4

GENERAL

Financial assistance

287 Financial assistance for resilience and continuity purposes

(1) The Secretary of State may, with the consent of the Treasury, provide financial assistance to a core fuel sector participant for the purpose of—

(a) maintaining or improving core fuel sector resilience, or

(b) securing or maintaining continuity of supply of core fuels.

(2) Financial assistance under this section may be given in any form.

(3) Financial assistance under this section may, in particular, be given by way of—

(a) grants,

(b) loans,

(c) guarantee or indemnity,

(d) the acquisition of shares or any other interest in, or securities of, a body corporate,

(e) the acquisition of any undertaking or assets, or

(f) incurring expenditure for the benefit of the person assisted.

(4) Financial assistance under this section may be given on such terms and conditions as the Secretary of State considers appropriate (including provision for repayment, with or without interest).

(5) The Secretary of State is not authorised by this section to give financial assistance in the way described in subsection (3)(d) without the consent of the body corporate concerned.

Power to amend thresholds

288 Power to amend thresholds

(1) The Secretary of State may by regulations amend or modify any provision mentioned in subsection (2) for the purpose of varying any amount for the time being specified in that provision.

(2) The provisions are—

(a) section 269(7) (directions to core fuel sector participants);

(b) section 272(5) (corresponding powers to make regulations);

(c) section 273(1) (power to require information);

(d) section 274(2)(a) and (b) (duty to report incidents);

(e) section 276(1) (provision of information at specified intervals).

(3) Regulations under this section are subject to the affirmative procedure.

Interpretation of Part 12

289 Interpretation of Part 12

(1) In this Part—

"company" means a company within the meaning of section 1 of the Companies Act 2006;

"continuity of supply of core fuels" is to be interpreted in accordance with section 268(7);

"core fuel sector activity" has the meaning given by section 268;

"core fuel sector participant" has the meaning given by section 268(6);

"core fuel sector resilience" has the meaning given by section 268(5);

"core fuels" has the meaning given by section 268(4);

"crude oil" means any liquid hydrocarbon mixture occurring naturally in the earth whether or not treated to render it suitable for transportation, and includes—

(a) crude oils from which distillate fractions have been removed, and

(b) crude oils to which distillate fractions have been added;

"crude oil based fuel" means any fuel comprised wholly or mainly of crude oil or substances derived from crude oil;

"enactment" includes—

(a) an enactment contained in subordinate legislation (as defined in section 21 of the Interpretation Act 1978);

(b) an enactment contained in, or in an instrument made under, a Measure or Act of Senedd Cymru;

(c) an enactment contained in, or in an instrument made under, an Act of the Scottish Parliament;

(d) an enactment contained in, or in an instrument made under, Northern Ireland legislation;

(e) any retained direct EU legislation;

"enforcement undertaking" has the meaning given by section 284;

"oil" means—

(a) crude oil;
(b) crude oil based fuels;
(c) components;

"the owned facility", in relation to a Part 12 facility owner, has the meaning given by section 268(11);

"Part 12 facility owner" has the meaning given by section 268(11);

"person carrying on core fuel sector activities" is to be interpreted in accordance with section 268(13);

"relevant activities or assets" is to be interpreted in accordance with section 268(10);

"relevant wetstock manager" has the meaning given by section 273(3);

"renewable transport fuel" has the meaning given by section 132 of the Energy Act 2004;

"terminal" means any site for the storage in bulk of oil or renewable transport fuel.

(2) In this Part references to the "capacity" of a business or of a facility or infrastructure are to be interpreted in accordance with section 269(8).

(3) References in this Part to a person carrying on business include references to a person carrying on business in partnership with one or more other persons.

(4) For the purposes of the definition of "oil" in subsection (1) "component" means any substance (whether or not derived from crude oil) of a kind which is mixed with other substances to produce a crude oil based fuel.

Deadline 8 Appendix 2

Navigation simulation study - Briefing note – provided to IOT Operators on 11 December 2023

Document
Navigation simulation study - Briefing note – provided to IOT Operators on 11 December 2023

Humber Navigation Assessment

Navigation simulation study - Briefing note

DJR6612-BN16-R01-00 8th December 2023

1 Introduction

1.1 Participants

ABP has requested further simulations be conducted to support their DCO application regarding the Immingham Eastern RoRo Terminal. The aim of the simulations will be to:

- Study the effectiveness of Tugs when used as enhanced control measures at IERRT Berth 1
- Consider the effect of the proposed impact protection on operations at IERRT and for coastal tankers at IOT berths 8 & 9
- Understand the flow model effects due to the increased size of the southern IERRT pontoon

A team from HR Wallingford will facilitate the simulation session.

Client representatives and key stakeholders from the port authority are expected to attend.

The following personnel will form the Simulation Team and support the simulation session:

Table 1.1: Simulation Team

Name	Role	Organisation
Mike Parr	Project Lead	HR Wallingford
Liam Monahan-Smith	Simulator Operator	HR Wallingford
Andrew Firman	Harbour Master Humber	ABP SCNA
Joseph Smith	Pilotage Operations Manager	ABP
Jason Melles-Sawyers	VLS Pilot	ABP
Josh Bush	Project Development Manager	ABP
Daniel Landi	Project Development Manager	ABP
Scott Arrowsmith	Tug Master	SMS
Olly Smith - TBC	Marine Superintendent	APT
Nigel Bassett - TBC		APT
Jesper Hartvig Nielsen		DFDS
TBC		DFDS
Marcel van der Vlugt	Project Manager Stena Line	Stena
Ian Penistone	Project Manager Stena Line	Stena
Laas van der Zee	Master Stena Line	Stena
Geert-Jan Feringa	Master Stena Line	Stena

H&S and domestic arrangements

For those attending in person the following H&S and domestic matters will be discussed at the initial briefing meeting:

- Introductions;
- Health and safety – steps, working from height, projectors
- COVID-19 precautions
- Fire alarm and evacuation

- Access to Conference Room and simulator areas
- Location of refreshments (tea, coffee and biscuits) but liquids or food are not permitted on the simulators
- Location of toilets
- Internet connection details: WiFi network name: **HRW_Visitors** Passkey: **4photoApple**
- Location of smoking area.

2 Schedule and run scenarios

The runs will be performed utilising one of HR Wallingford's ship bridge simulators and one of the independently controlled tug simulator bridges. Additionally, centrally controlled tugs will also be available.

A provisional schedule for the navigation simulations is summarised in Table 2.1.

Table 2.1: Provisional schedule for navigation simulations

Date	Time	Content
13th December 2023	12:30 – 13:00	Arrive
	1300	Initial Briefing
	1300-1645	Simulation runs
	16:45 – 17:00	De-brief of day's simulation runs or whole session on Day 2
14th December 2023	13:00 – 16:45	Resume simulation runs
	16:45 – 17:00	De-brief of day's simulation runs or whole session on Day 2
	12:30 – 13:00	Break for lunch
	13:00 – 16:45	Resume simulation runs
	16:45 – 17:00	De-brief of day's simulation runs or whole session on Day 2

Timings are approximate only and may be adjusted to ensure that the most efficient use is made of the simulation time, individual attendance and attention.

The provisional structure of the navigation simulation is presented below with Table 2.2 & Table 2.3. The structured runs below will help conclude the tug effectiveness and the effect of the proposed structure on operations at both IERRT Berth 1 (see Table 2.2) and IOT berth 8/9 (see Table 2.3). Throughout simulations at both berths, the new flow model effects will become clear.

Table 2.2: Run matrix for IERRT berth 1

Run	Layout	Vessel	Starting Position	Starting Velocity	Tugs	Flow Model (Tide)	Wind (from) (Dir., Speed)
1	Layout A	Stena T class	A	2 kts	1 x 50t ASD	Peak Spring	(045°) 27.5 knots ± 2.5 knots
2	Layout A	Stena T class	A	2 kts	1 x 50t ASD	Peak Spring	(225°) 27.5 knots ± 2.5 knots
3	Layout A	Stena T class	A	2 kts	1 x 50t ASD	Peak Spring	(315°) 27.5 knots ± 2.5 knots
4	Layout A	Stena T class	B	1 kts	1 x 50t ASD	Peak Spring	(045°) 27.5 knots ± 2.5 knots
5	Layout A	Stena T class	B	1 kts	1 x 50t ASD	Peak Spring	(225°) 27.5 knots ± 2.5 knots
6	Layout A	Stena T class	B	1 kts	1 x 50t ASD	Peak Spring	(315°) 27.5 knots ± 2.5 knots

Run	Layout	Vessel	Starting Position	Starting Velocity	Tugs	Flow Model (Tide)	Wind (from) (Dir., Speed)
7	Layout A	G9	A	2 kts	2 x 50t ASD	Peak Spring	(045°) 27.5 knots ± 2.5 knots
8	Layout A	G9	A	2 kts	2 x 50t ASD	Peak Spring	(225°) 27.5 knots ± 2.5 knots
9	Layout A	G9	B	1 kts	2 x 50t ASD	Peak Spring	(045°) 27.5 knots ± 2.5 knots
10	Layout A	G9	B	1 kts	2 x 50t ASD	Peak Spring	(225°) 27.5 knots ± 2.5 knots
11	Layout A	G9	A	2 kts	1 x 50t ASD 1 x 70t ASD	Peak Spring	(045°) 27.5 knots ± 2.5 knots

Table 2.3: Run matrix for IOT berth 8 & berth 9

Run	Layout	Vessel	Starting Position	Starting Velocity	Tugs	Flow Model (Tide)	Wind (from)
12	Layout B	Whisby Teak	Arrival	-	1 x 10t workboat	Mean Spring (LW +1)	(225°) 20 knots
13	Layout B	Whisby Teak	Arrival	-	1 x 10t workboat 1 x 50t ASD	Mean Spring (LW +1)	(225°) 22.5 knots ± 2.5 knots
14	Layout B	Whisby Teak	Arrival	-	1 x 10t workboat 1 x 50t ASD	Mean Spring (LW +1)	(225°) 27.5 knots ± 2.5 knots
15	Layout B	Whisby Teak	Arrival	-	1 x 10t workboat	Mean Spring (LW +1)	(225°) 27.5 knots ± 2.5 knots Sheltering
16	Layout B	Whisby Teak	Arrival	-	1 x 10t workboat	Mean Spring (LW +1)	Sensitivity NE (045)
17	Layout B	Whisby Teak	Departure	-	1 x 10t workboat	Mean Spring (LW +1)	(225°) 27.5 knots ± 2.5 knots Sheltering
18	Layout B	Whisby Teak	Departure	-	1 x 10t workboat	Mean Spring (LW +1)	(225°) 20 knots
19	Layout B	Whisby Teak	Departure	-	1 x 10t workboat 1 x 50t ASD	Mean Spring (LW +1)	(225°) 22.5 knots ± 2.5 knots
20	Layout B	Whisby Teak	Departure	-	1 x 10t workboat 1 x 50t ASD	Mean Spring (LW +1)	(225°) 27.5 knots ± 2.5 knots
21	Layout B	Whisby Teak	Departure	-	1 x 10t workboat	Mean Spring (LW +1)	(225°) 27.5 knots ± 2.5 knots Sheltering

Each run will be briefed and debriefed, including a full Pilot and Tug Master contribution. The run will be classified as success, marginal or fail. The Simulation Team will agree on any important issues emerging from the run and the nature of any additional runs required.

At the end of each day the Simulation Team will review the day's runs, the conclusions reached and an outline run proposal for the next day.

On the final day a set of conclusions will be agreed by the Simulation Team, which will form the basis for the main report.

3 Simulation Configuration

3.1 General

The simulator setup was undertaken in accordance with HR Wallingford's normal procedures; the layout, environmental models and ship manoeuvring models were tested beforehand.

3.2 Environment

3.2.1 Wind

The wind will be set at the beginning of each run. The wind speeds and directions have been provisionally set based on previous experience from simulations at the location.

3.2.2 Waves

As with the previous studies, no significant wave penetration is expected in normal operating conditions, at least not of the nature which would lead to any significant degradation.

3.2.3 Flow

The flows used in this simulation will be based on the recent flow modelling undertaken by HR Wallingford and reported on in '3d modelling of revised layout', DJR6612-RT015-R01-00 (Appendix A). Two flow models will be available:

- Mean Spring
- Peak Spring

3.3 Port layout

Two port layouts will be available:

- Layout A - Immingham Eastern RoRo terminal without impact protection which includes the increased southern pontoon area as shown within Figure 3.2.
- Layout B - incorporating proposed impact protection at the north western end of the IOT 6/8 finger pier and along the main tressle of the southern part of IOT structure as shown in Figure 3.3Figure 3..

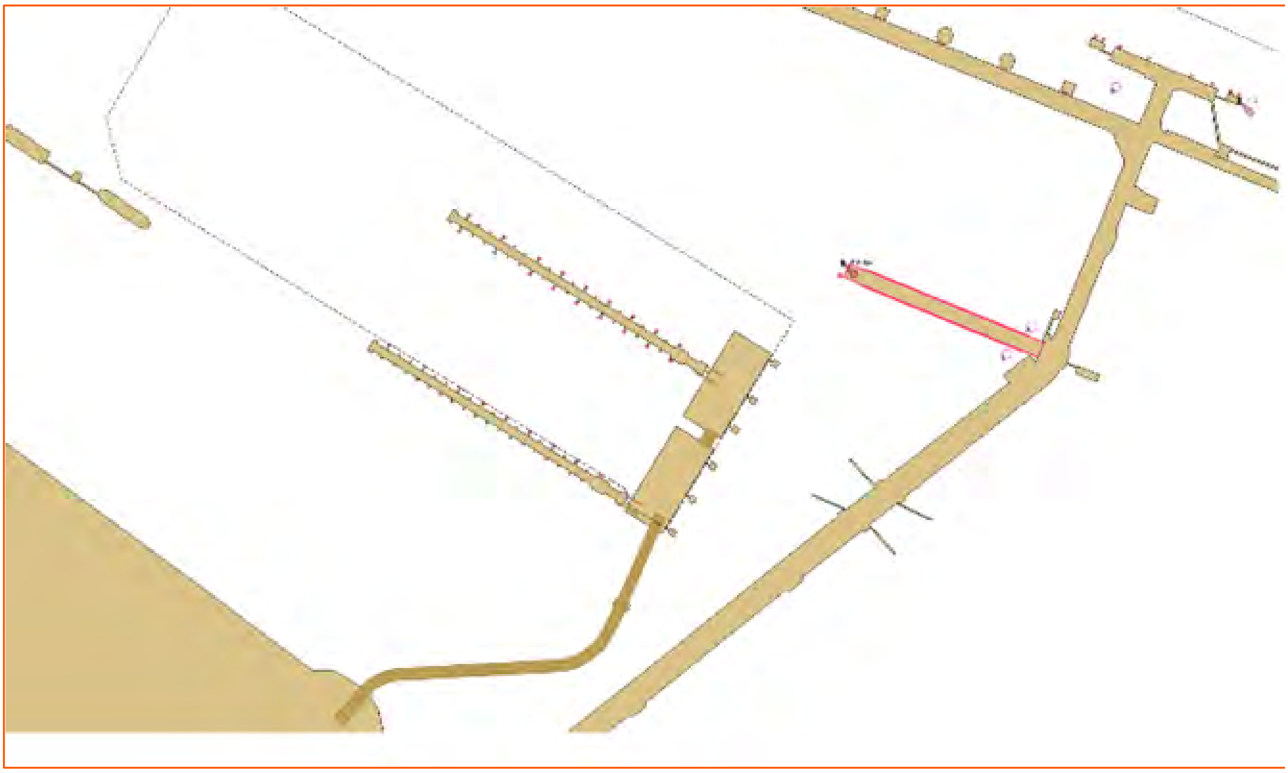

Figure 3.2: Port layout including larger southern pontoon

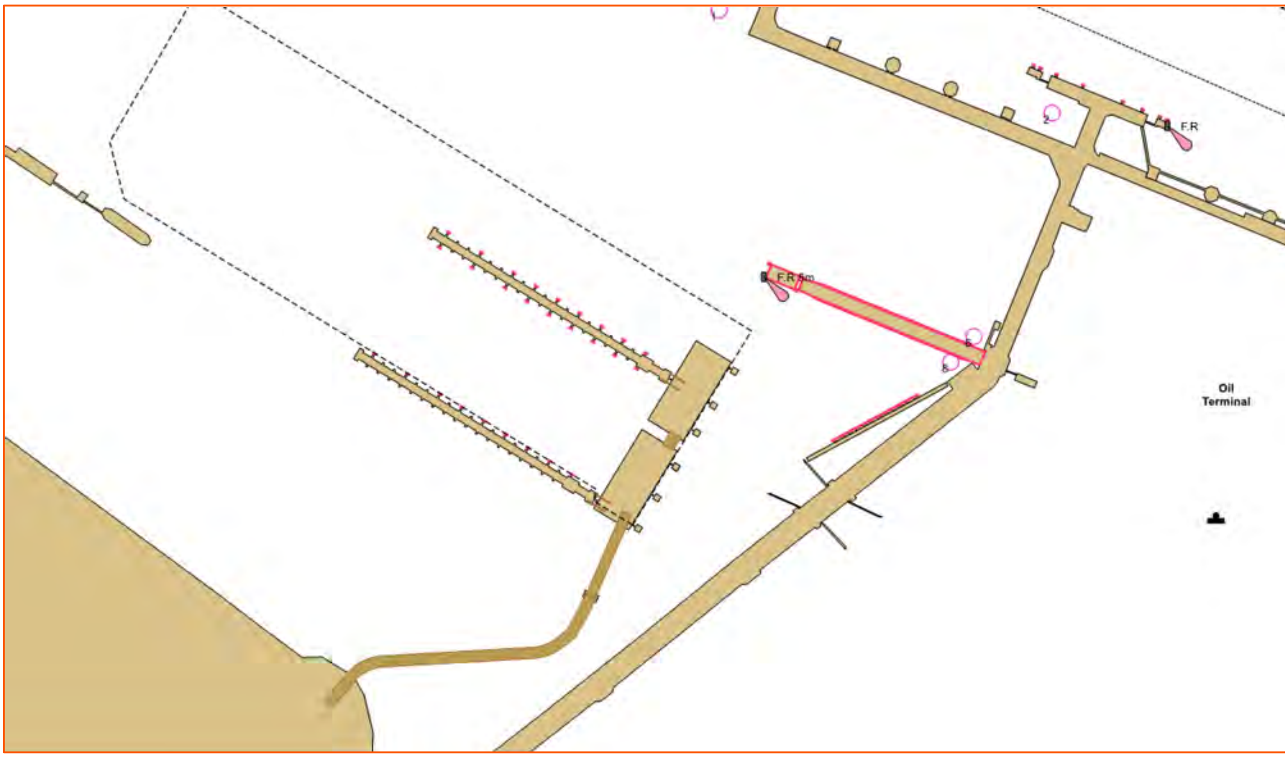

Figure 3.3: Port Layout incorporating impact protection at the north western end of IOT 6/8 finger pier

4 Simulation ships

During the navigation simulations, the behaviour and performance of each vessel, in terms of the response to any helm, engine or tug control, along with the effects of the local wind, wave and current conditions, is governed by a mathematical ship/tug manoeuvring model.

The mathematical model of the vessel must behave in such a way that the position, velocity, swept path and heading of the simulated ship are always representative of real ship behaviour.

ABP has requested the following simulation vessels are made available.

- 212m x 26.7m Stena Transit
- 100m x 18m Product Tanker "Whisby Teak"
- 234m x 35m CLdN G9 RoRo

The CLDN G9 model is a single-engine, single rudder RoRo and is being included due to its 47,000t displacement, and will be used only as a dead ship to consider the level of tug support required to arrest such a large vessel in the event of a total control failure. It is not intended that the G9 will operate at the IERRT terminal.

4.1.1 Stena Transit

The ship manoeuvring model of the Stena Transporter is shown in Figure 4.1 with the ship characteristics detailed within Table 4.1. The manoeuvering model has previously been used in a series of studies at HR Wallingford and so is well verified by experienced masters and PEC holders. During simulations with experienced masters, it was noted that the ship manoeuvring model was consistent with their experience of the vessel in reality. There were some circumstances in which the PEC holders considered the model was slightly conservative during the demonstration. However, no changes were made to the model's characteristics.

Figure 4.1: Stena Transporter ship simulation model

hr wallingford

Table 4.1: Characteristics – Stena T class

Characteristic	Unit	Stena Transporter	
Ship type		Ferry	
Length overall	m	212	
Length between perpendiculars	m	194.8	
Beam overall	m	26.7	
Distance bridge to stern	m	196	
Modelled conditions			
Draught forward	m	6.3	
Draught aft	m	6.3	
Block coefficient		0.643	
Displacement	t	21600	
Propulsion			
Main engine type		2 x STX MAN 9L48/60B	
Engine power (total)	kW	21600	
No. of propellers, type		2 x CPP	
Bow thrusters	t	55	
Stern thrusters	t	none	
Rudder type		Becker flap	
Max rudder angle	°	35	
Manoeuvring engine order		**RPM**	**Speed (knots)**
Full Ahead		100	21.1
Half Ahead			
Slow Ahead			
Dead Slow Ahead			
STOP		0	0
Dead Slow Astern			
Slow Astern			
Half Astern			
Full Astern		100	– 13.7
Windage			
Windage lateral	m^2	4050	
Windage frontal	m^2	770	
Wind speed (knots)		**Beam wind force (t)**	
15		15	
20		26	
25		41	
30		59	
35		80	
40		105	
45		133	

4.1.2 Whisby Teak

The ship manoeuvring model of the Whisby Teak (see **Error! Reference source not found.** and **Error! Reference source not found.**3) was produced specifically for this demonstration session and was tested by an experienced Humber pilot beforehand. It was noted that the ship manoeuvring model was realistic, but conservative, particularly in terms of the power delivered by the bow thruster. However, no changes were made to the model's characteristics.

Figure 4.2: Whisby Teak ship simulation model

Table 4.2: Characteristics – Whisby Teak

Characteristic	Unit	100m x 18m Product Tanker Laden		100m x 18m Product Tanker Ballast	
Ship type		Product Tanker		Product Tanker	
Length overall	m	99.9		99.9	
Length between perpendiculars	m	95		95	
Beam overall	m	18.25		18.25	
Distance bridge to stern	m	19.4		19.4	
Modelled conditions					
Draught forward	m	6		3.73	
Draught aft	m	6.1		5.83	
Block coefficient		0.744		0.706	
Displacement	t	8000		6000	
Propulsion					
Main engine type		Wartsila 9L26		Wartsila 9L26	
Engine power (total)	kW	2925		2925	
No. of propellers, type		1 x CPP		1 x CPP	
Bow thrusters	t	7		7	
Stern thrusters	t	none		none	
Rudder type		Spade		Spade	
Max rudder angle	°	70		70	
Manoeuvring engine order		**RPM**	**Speed (knots)**	**RPM**	**Speed (knots)**
Full Ahead		100	13.0	100	13.1
Half Ahead					
Slow Ahead					
Dead Slow Ahead					
STOP		0	0	0	0
Dead Slow Astern					
Slow Astern					
Half Astern					
Full Astern		85	- 7.8	85	- 7.8
Windage					
Windage lateral	m^2	1006		1133	
Windage frontal	m^2	315.4		320.3	
Wind speed (knots)		**Beam wind force (t)**		**Beam wind force (t)**	
15		4		4	
20		7		7	
25		10		11	
30		15		17	
35		20		22	
40		26		29	
45		33		37	

4.1.3

4.1.3 CLdN G9

The ship manoeuvring model of the CLdN G9 (see Figure 4.3 and Table 4.3) has been extensively used in various studies and training simulations at HR Wallingford , such that it has been well verified by experienced masters and PEC holders.

The visual ship model is shown in Figure 4.3.

Figure 4.3: CLdN G9 ship simulation model

Table 4.3: Characteristics – CLdN G9

Characteristic	Unit	CLdN G9	
Ship type		RoRo	
Length overall	m	234.06	
Length between perpendiculars	m	226	
Beam overall	m	35	
Distance bridge to stern	m	216	
Modelled conditions			
Draught forward	m	7.51	
Draught aft	m	7.51	
Block coefficient		0.772	
Displacement	t	47000	
Propulsion			
Main engine type		MAN BW 9L60ME	
Engine power (total)	kW	21060	
No. of propellers, type		1 x CPP	
Bow thrusters	t	69	
Stern thrusters	t	62.5	
Rudder type		Flapped	
Max rudder angle	°	45	
Manoeuvring engine order		RPM	Speed (knots)
Full Ahead		100	19.6
Half Ahead			
Slow Ahead			
Dead Slow Ahead			
STOP		0	0
Dead Slow Astern			
Slow Astern			
Half Astern			
Full Astern		100	- 13.7
Windage			
Windage lateral	m^2	6791.75	
Windage frontal	m^2	1214.5	
Wind speed (knots)		Beam wind force (t)	
15		25	
20		44	
25		69	
30		99	
35		135	
40		176	
45		223	

4.2 Tugs

4.2.1 70tBP ASD tug

A 70tBP ASD tug has also been prepared by HR Wallingford at ABP's request which can be operated centrally by a simulator operator or independently by a tug master.

Figure 4.4: 70tBP ASD tug simulation model

Table 4.4: Characteristics – 70tBP ASD tug model

Characteristic	Unit	70t ASD2411 Tug
Ship type		Tug
Length overall	m	24.55
Length between perpendiculars	m	22.16
Beam overall	m	11.33
Distance bridge to stern	m	13.52
Modelled conditions		
Draught forward	m	5.56
Draught aft	m	5.56
Propulsion		
Main engine type		2 x Caterpillar 3516C TA HD
Engine power (total)	kW	4200
No. of propellers, type		2 x Azipod
Manoeuvring engine order	**RPM**	**Speed (knots)**
Full Ahead	247	12.9
STOP	0	0
Full Astern	0	12.6

4.2.2 50tBP ASD tug

A maximum of 2 x 50tBP ASD tugs as seen in be used in the simulation. Characteristics of the tug are seen in Table 4.5.

The same tug model has been used for previous work at the Immingam Eastern RoRo terminal ('considered revised flows and impact protection', DJR6612-RT013-R02-00).

Figure 4.5: 50tBP ASD 2411 tug simulation model

Table 4.5: Characteristics - 50tBP ASD tug model

Characteristic	Unit	50t 24m x 11m ASD tug	
Ship type		ASD tug	
Length overall	m	24.4	
Beam overall	m	9.15	
Modelled conditions			
Draught	m	4.8	
Displacement	t	370	
Propulsion			
Main engine type		2 x Cat 3512C	
Engine power (total)	kW	2,460	
No. of propellers, type		2 x Azipod	
Manoeuvring engine order		**RPM**	**Speed (knots)**
Full Ahead		300	12.5
STOP		0	0
Full Astern		300	10.0

4.2.3 Spurn Sand 10tBP work boat

Vessels operating at IOT Berth 8 are normally supported by a workboat which is able to deliver 10tBP of support by pushing. As with the previous studies, this vessel was simulated by a 16m long work boat, similar to the Spurn Sand vessel. The model was centrally controlled by the Simulator Operator in a realistic manner, in response to the master or pilot's commands.

4.3 Tug control

HR Wallingford's navigation simulation system supports two types of tug models:

Centrally-controlled tugs: The tug(s) assisting the vessel are controlled by the Simulator Operator following the pilot's commands, and in a manner similar to that which would be expected in practice, with realistic delays applied. The response of each centrally-controlled tug is governed by a tug performance model that ensures the response times and maximum force deliverable by each tug varies with tug type, winch type, vessel water speed and assist mode (push, direct pull, powered indirect, indirect pull and transverse arrest) as well as the local wave conditions and any hull sheltering effects.

Independently controlled tugs: The independently controlled tugs are operated by a tug master from separate, but linked simulator bridge(s) configured as a tug. The behaviour and performance of each independent tug model, in terms of the response to any helm, engine and towline/fender forces, along with the effects of the local wind, wave and current conditions, is governed by a full mathematical tug manoeuvring model. The tug model represents motions in all six degrees of freedom (6DOF), i.e. surge, sway, heave, roll, pitch and yaw motions, and includes tug interactions with waves, the tow line, winches and fenders. Independent tugs can be used in conjunction with centrally-controlled tugs to complete the full tug complement required for a manoeuvre.

A combination of independently and centrally controlled tug models will be used for this study.

With the independently controlled tug models, the operating delays and performance degradation are automatically taken into account.

4.4 Tug response

The response time to changes in mode or command of the tugs is provided in Table 4.6.

Table 4.6: Tug response delay

Tug response delay			Delay
Time to attach and secure			5 minutes (+ 3 minutes line pay-out)
Time to react to new thrust level command			1 minute
Time to react to change in thrust level			20 seconds
Time to change thrust direction	Direct	up to 90˚	Up to 1 minute
		90 to 180˚	Up to 2 minutes
	Indirect	Roll into assist	Up to 30 seconds
		quarter to quarter	Up to 1 minute
Time to detach	Push/pull mode		1 minute

4.5 Tug performance

The tugs will have their effectiveness realistically degraded by both wave action and their speed through the water, at which they were required to operate. The degradation of tug effectiveness with increasing water speed and waves are shown in Figure 4.6 and Figure 4.7, respectively. It can be deduced that the amount of wave penetration in the harbour will significantly effect the tug effectiveness and will be monitored throughout the study.

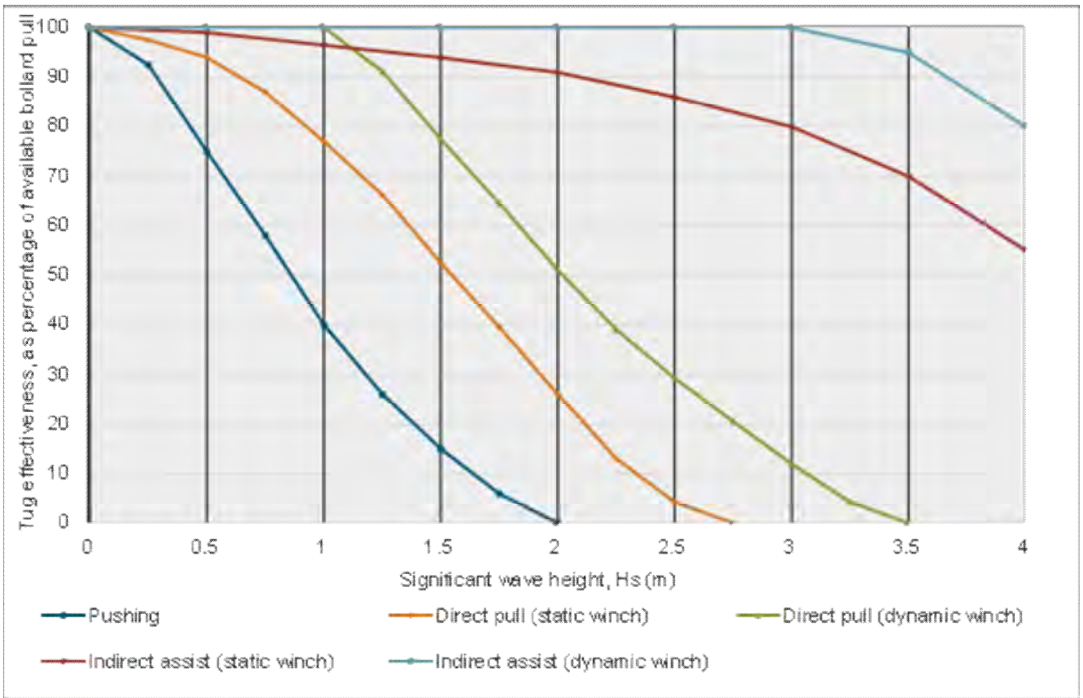

Figure 4.6: Tug power degradation with speed

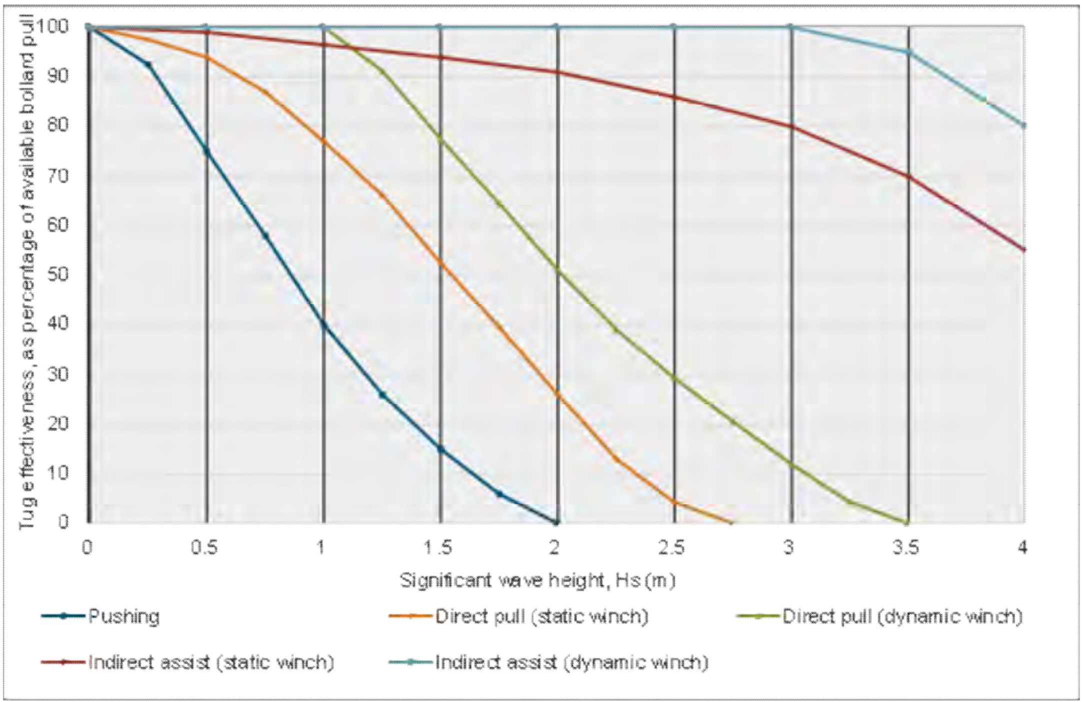

Figure 4.7: Tug power degradation with wave height

5 Records and assessments

5.1 Overview

A full digital record of each run will be recorded which is sufficient to fully recreate the run if required. For reporting purposes, a full run summary, showing details of the input parameters for each run, and track and data plots which visualise the data logged for each individual run will be produced.

5.2 Pilot debrief and run discussions

The Pilot will be briefed on the simulation run conditions and objectives before each run. At the end of each run a debrief and discussion is used to capture the views of the Pilot and Tug Masters, and any other members of the Simulation Team, the relevant aspects of which are recorded in the run summary.

5.3 Simulation run summary

Following each run, a summary table entry is completed. This details the set-up of the run including the vessel(s) used, the manoeuvre conducted, the tug configuration and the environmental conditions used. It also describes key aspects of the manoeuvre and captures the remarks and comments made by the pilot and the rest of the Simulation Team.

5.4 Grading of results

Each simulation run is graded by the Simulation Team as Successful, Marginal or Fail, according to the following evaluation criteria:

Successful Standard manoeuvres:

- The ship remains under full control at all times without resorting to aggressive manoeuvring techniques;

- The ship stays within safe water areas with acceptable clearances to all port and other structures, and other berthed ships;
- Tugs are operating safely and within sustainable limits;
- For berthing manoeuvres, the ship ends the run alongside, or in such a position that lines would be ashore without appreciable difficulty, at zero speed, with an acceptable sway velocity and no appreciable yaw rate;
- For departure manoeuvres the ship exits smoothly, without risk of drifting onto port structures or other ships.

Emergency/failure situations:

- The ship is brought back under full control without encountering significant hazards, with the risk of only minor damage;
- The ship may leave the designated manoeuvring area boundaries, but still has acceptable under keel clearance and maintains acceptable clearances to other ships/structures throughout the recovery;
- Tugs are neither endangered nor asked to operate in an unsafe manner;
- The ship can be moved into safe, deep water or to a position suitable to anchor safely, where the equipment failure can be investigated/resolved.

Marginal

Standard manoeuvres:

- The Pilot considers the ship is at the limit of control during standard manoeuvres;
- The ship stays within the safe water area boundaries, but with unacceptable clearances;
- The ship clears all port structures, and other berthed ships, but with unacceptable clearances;
- Tugs are operating safely, but approaching their sustainable operating limits (e.g. being used at 100% power for more than 15 minutes);
- For approach manoeuvres, the ship ends up alongside, but may have a high approach velocity. The manoeuvre can be concluded, but minor damage may occur;
- On departure, the ship is manoeuvred off the berth but with some difficulty. The manoeuvre is completed with the potential for minor damage only.

Emergency/failure situations:

- The ship is at the limits of control during the recovery from the failure;
- The ship has marginal under keel clearance or marginal clearances to other ships/structures during the recovery;
- Tugs operate at the limits of safety;
- The ship is at the limits of controllability as it is moved into safe, deep water or to a position suitable to anchor safely, where the equipment failure can be investigated/resolved.

Fail

Standard manoeuvres:

- The Pilot loses control of the ship;
- The ship strays outside the safe water area boundaries and/or grounds;
- The ship either contacts, or has a near-miss with port structures and/or other berth ships;
- Tugs are required to operate in an unsafe manner, or exceed sustainable operating limits (e.g. being used at 100% power for more than 30 minutes);
- For approach manoeuvres, the ship cannot get alongside at all, or contacts the berth with sufficient force that severe damage may have occurred;

- On departure, the ship either cannot be manoeuvred off the berth, or encounters significant difficulty in manoeuvring, such that severe damage may have occurred.

Emergency/failure situations:

- The Pilot cannot regain control of the ship before the ship is endangered;
- The ship cannot be prevented from entering dangerously shallow water and/or grounds;
- The ship either contacts or has a near-miss with a known hazard, port structures, and/or other berth ships;
- Tugs are endangered or are asked to operate in an unsafe manner;
- The ship cannot be moved into safe, deep water or to a position suitable to anchor safely.

Aborted — The run was aborted for efficiency reasons, to save wasting any time, due to either:

- The initial manoeuvring strategy or approach/departure manoeuvre was deemed to be inappropriate right at the start, so the run would be bound to fail if continued; or
- Because of the need to test aspects of the ship manoeuvring model.

5.5 Simulation track and data plots

The results of each navigation simulation run are available in the form of plots of the vessel tracks and graphs of key data parameters recorded during the run. These data are presented in Appendix A.

The vessel data and track plots show:

- The position of the ship and the tugs at one-minute intervals is indicated by a succession of black and blue vessel outlines. Red vessel outlines indicate the vessel's position every 10 minutes from the start of the run
- The positions of structures and aids to navigation
- A north arrow
- A scale bar
- Seabed contours (bed levels in mCD).

The data graphs plot the variation of various key parameters against elapsed simulation time and graphs have been included for all vessels in all of the runs. These graphs are presented by vessel, starting with the ship, and then the independent tug (where applicable). The vessel ID is identified in the text block on the bottom right of each page.

The ship graphs comprise:

- Ship's under keel clearance(s) in metres and speed over the ground (knots). The data plotted in these UKC graphs does not take account of wave-induced ship motions
- Speed (knots) and direction (°N) of the wind acting on the ship
- Lateral wind force acting on the ship (tonnes)
- Ship's rate of turn (°/min) and heading in °N
- Ship's course over the ground and drift angle in degrees
- Ship's speed (over the ground and through the water) in knots, expressed in terms of longitudinal and lateral components relative to the ship's head
- Ship's rate of turn (°/min)

- Ship's rudder angle (degrees)
- Ship's bow and/or stern thruster power (%)
- Number of ship's engine restarts.

Where there are no plots for a particular parameter, for example for bow thruster power, this indicates that the particular parameter was not relevant for the particular run or no bow thruster was available.

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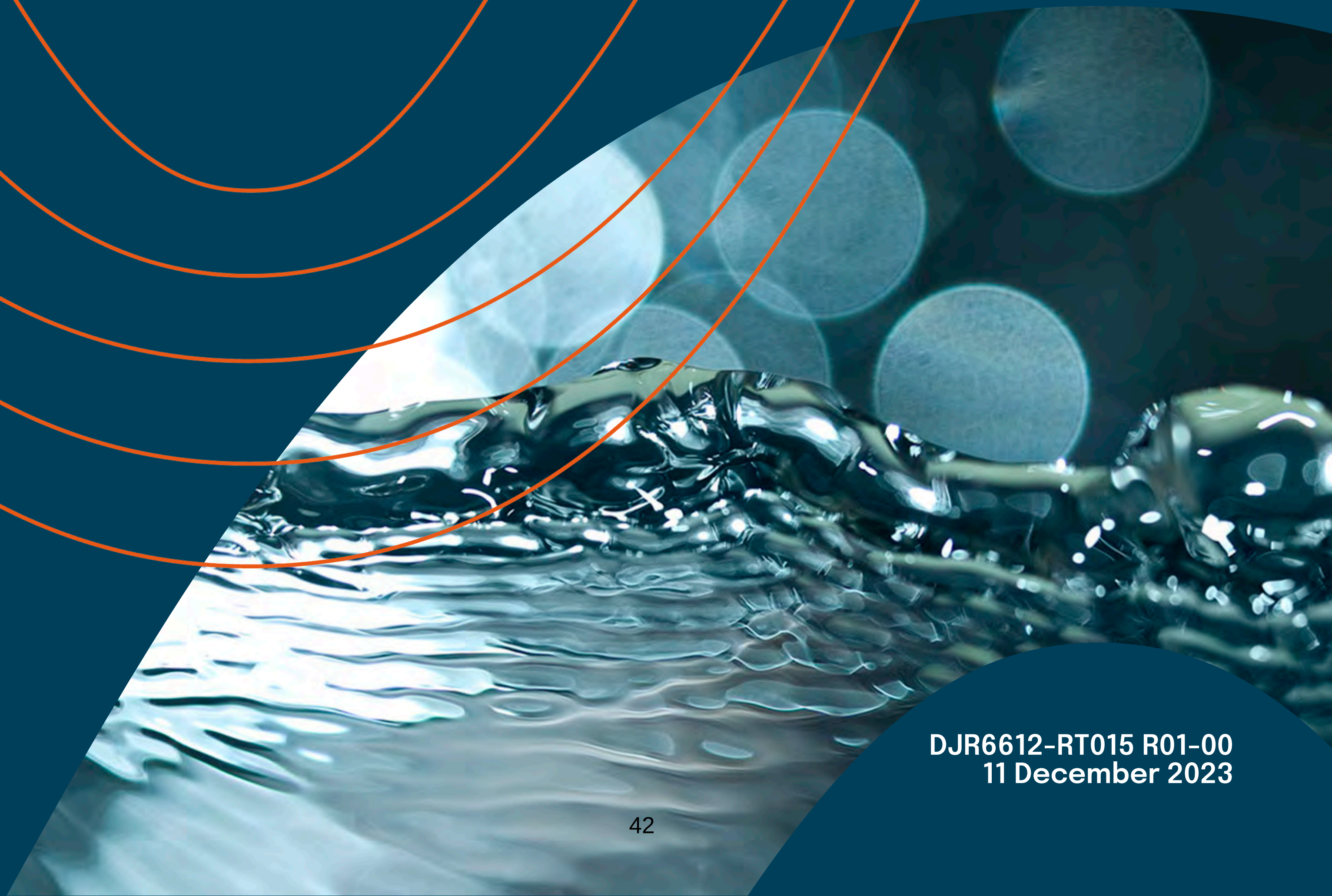
Appendix A

Immingham Eastern Ro-Ro Terminal

3D modelling of revised layout



DJR6612-RT015 R01-00
11 December 2023

Document information

Document permissions	Confidential - client
Project number	DJR6612
Project name	Immingham Eastern Ro-Ro Terminal
Report title	3D modelling of revised layout
Report number	RT015
Release number	01-00
Report date	11 December 2023
Client	ABP
Client representative	Josh Bush
Project manager	Mike Parr
Project director	Mark McBride

Document history

Date	Release	Prepared	Approved	Authorised	Notes
11 Dec 2023	01-00	JVB	MPD	MPD	

Document authorisation

Prepared	Approved	Authorised
John Baugh	Mike Dearnaley	Mike Dearnaley

Contents

1 Introduction 4
1.1 Background 4
1.2 Objective 4
2 Model basis 5
2.1 Choice of model 5
2.2 Inclusion of the effect of piled structures 6
2.3 Inclusion of the effect of floating structures 6
2.4 Model calibration and validation 7
2.4.1 Calibration 7
2.4.2 Validation 9
3 Model results 10
3.1 Comparison of revised scheme with original scheme 10
4 Conclusions 15
5 References 16

Appendices

A Hourly comparison of currents for revised and original IERRT layouts 17

Figures

Figure 1.1: Immingham Eastern Ro-Ro Terminal – general arrangement of revised layout 4
Figure 1.2: Area of flow data extraction for Navigation Simulator 5
Figure 2.1: Example cross section showing model mesh and 3D representation of pontoon and current speed 7
Figure 2.2: Locations of AWAC and ADCP survey data extraction points 8
Figure 2.3: Comparison of simulated current speed with data from AWAC, 25-27 November 2019 8
Figure 2.4: Comparison of simulated current speed and direction with data from ADCP point D1, 12/10/2022 9
Figure 2.5: Comparison of simulated current speed and direction with data from ADCP point D2, 12/10/2022 9
Figure 2.6: Comparison of simulated current speed and direction with data from ADCP point D3, 12/10/2022 9
Figure 2.7: Comparison of simulated current speed and direction with data from ADCP point D4, 12/10/2022 9
Figure 3.1: Difference in current speed between revised and original IERRT layout, LW + 0.5 hour, peak spring tide, location of data extraction point shown 11
Figure 3.2: Time series current speed and direction for revised and original IERRT layout, peak spring tide 11
Figure 3.3: Time series current speed and direction for revised and original IERRT layout, mean spring tide 12
Figure 3.4: Comparison of peak spring current vectors at LW - original layout (blue), revised layout (red) 13
Figure 3.5: Comparison of peak spring current vectors at LW+0.5 hours - original layout (blue), revised layout (red) 14
Figure 3.6: Comparison of peak spring current vectors at LW+1.0 hours - original layout (blue), revised layout (red) 15

1 Introduction

1.1 Background

Associated British Ports (ABP) Humber has applied for a Development Consent Order for the creation of a new Ro-Ro facility to the east of the Immingham dock, which will be known as the Immingham Eastern Ro-Ro Terminal (IERRT).

HR Wallingford have been supporting the project's marine design and impact studies by mooring and navigability analyses including hydrodynamic modelling of the project.

1.2 Objective

A series of modelling a navigation studies have been completed for the IERRT project. As the project has proceeded the layout has developed scheme with the present revised scheme shown by Figure 1.1.

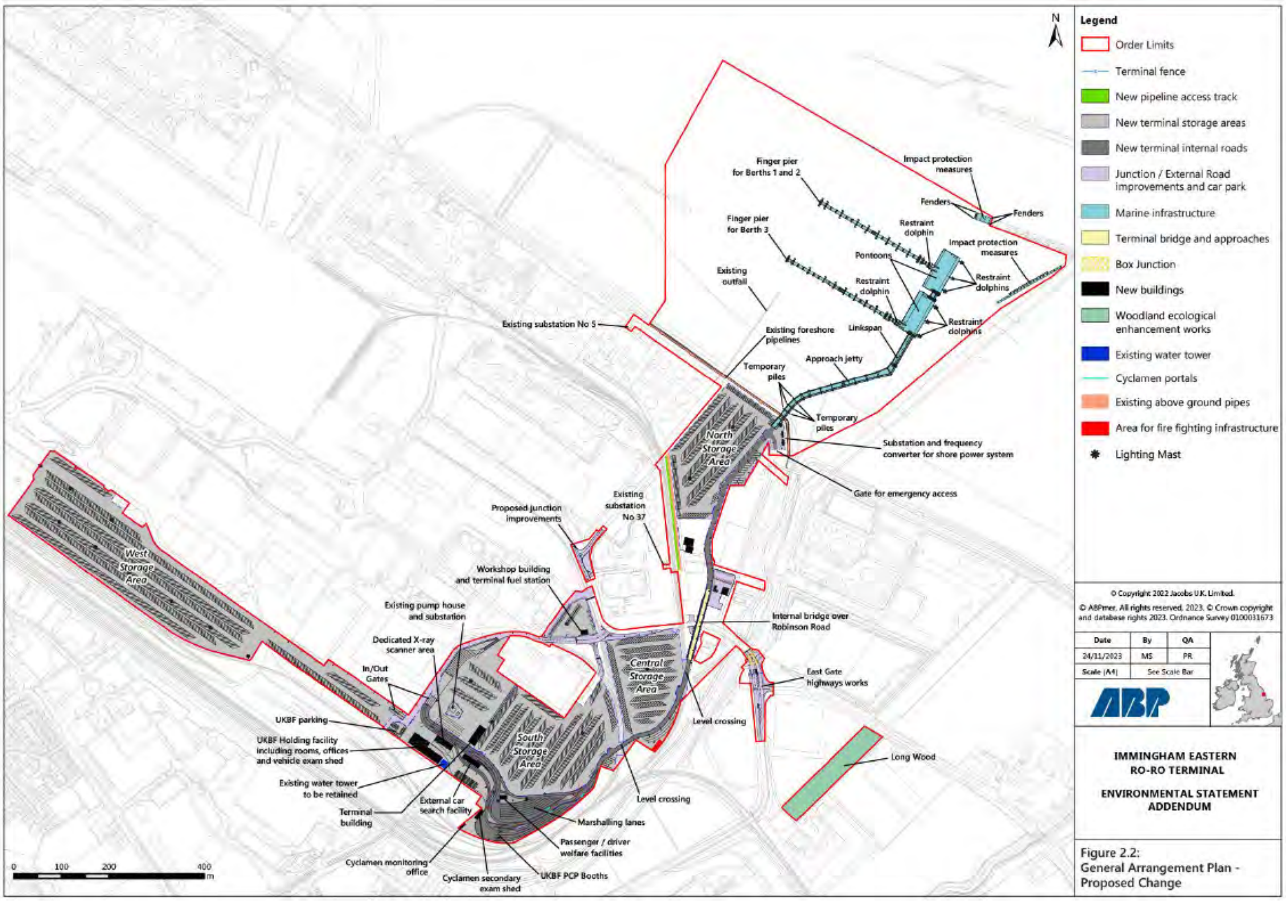


Figure 1.1: Immingham Eastern Ro-Ro Terminal – general arrangement of revised layout

Source: ABP (2023)

The revised layout to assess included larger Ro-Ro pontoons than that previously modelled and used in navigation simulation. All other parameters of the development, dredged area and depth are unchanged from that previously modelled and assessed.

The requirement for the modelling described in this report was to simulate the effect of the revised layout of the IERRT on local tidal flows and to provide currents and water depths for navigation simulation both for the existing and proposed cases. The area required for flow data to be extracted from the model and supplied to the navigation simulator is presented in Figure 1.2.

The hydrodynamic results for the revised scheme were also required to be compared to those previously modelled to confirm whether conclusions reached for the previous layout remain valid for the revised layout.

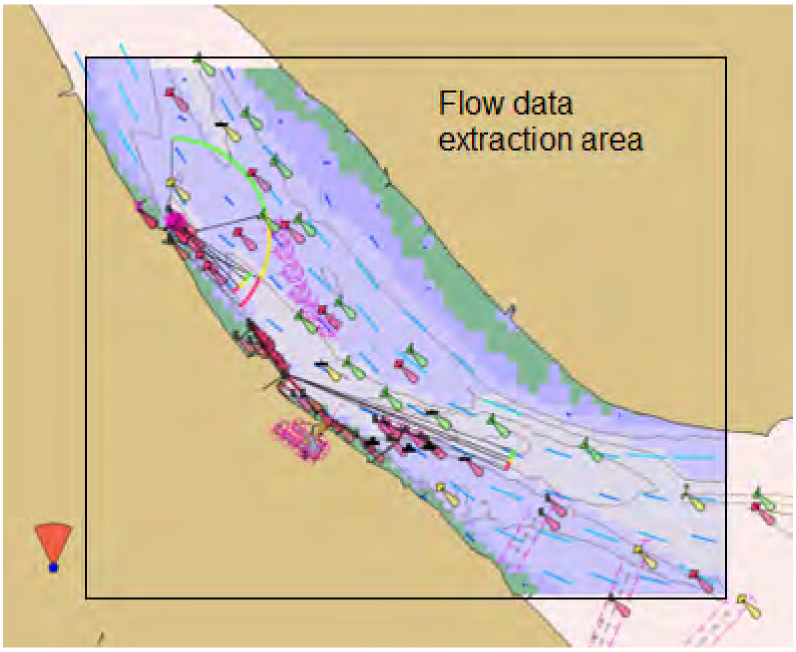


Figure 1.2: Area of flow data extraction for Navigation Simulator

2 Model basis

2.1 Choice of model

When considering the suitable modelling approach to achieve the objective the requirements are firstly, to model an area large enough to exclude any boundary effects for the flows within the area of data extraction for the navigation simulation, secondly to model through tide conditions over a series of tides and, thirdly detailed modelling at the site of the IERRT sufficient to resolve the principal effects of the structures on the flows. The need to model a suitably large area for a series of tides excluded application of Computational Fluid Dynamic (CFD) modelling.

The model applied to the project, TELEMAC-3D, solves the 3D Navier-Stokes flow equations making the hydrostatic pressure assumption (i.e. no significant vertical flow accelerations) using a finite element solution method on an unstructured triangular grid. This triangular grid allows the model mesh resolution to continually vary in space resulting in good representation of existing and proposed features. TELEMAC-3D is part of the TELEMAC system originated by the hydraulic research laboratory hosted by EDF.

The model used had its boundaries approximately 20 km away from the IERRT site. Both the landward and seaward boundary conditions were imposed water tidal levels which drove the currents in the study area.

The calibration exercise as summarised below showed that the observed flow direction changes at the end of the flood tide were likely to be driven by a longitudinal salinity gradient. Hence, schematized time varying salinity boundary conditions were also imposed at the open boundaries.

The model grid sizes ranged from approximately 250 m at the open boundaries to 10 m in the area around the IERRT site. The forms of all the structures – piled or floating – were included in the model mesh to provide an accurate representation of their effects on hydrodynamics.

The vertical mesh used a sigma approach where the model layers are located at a set proportion of the total water depth. 6 layers were used at the following proportions of the total water depth (D); 0D, 0.25D, 0.5D, 0.75D,0.9D, 1.0D. The vertical layering is illustrated by the section shown in Figure 2.1.

2.2 Inclusion of the effect of piled structures

A field of piles can alter the flow which would otherwise pass through it due to the local turbulence and complex flow structures as the flow interacts with each pile. This effect is increased with the density of piles, for example if the piles are less than 10 pile diameters apart the effect of each pile can combine to result in a significantly enhanced effect on the passing flow. In modelling the project site with several piled structures and hundreds of individual piles including each pile in the model would result in an extremely large number of model nodes and impractically long model run times. A reasonable approach to include the influence of piles on the flow in the model is available in TELEMAC-3D by adding extra turbulent drag within each model cell within the piled region using the following equation:

$$F_{u,v} = -0.5 * N * D * C_D * U_{norm} \qquad \text{(Eq. 1)}$$

Where:

- $F_{u,v}$ = drag in the X and Y direction;
- N = total number of piles in the jetty;
- D = diameter of the piles (m);
- C_D = a drag coefficient related to the shape of the pile; for example circular piles have C_D = 1.0 and square piles have C_D = 2.0 (Mutlu Sumer and Fredsøe, 2006);
- U_{norm} = depth averaged current flow speed (m/s);
- F_u and F_v are then included implicitly within the hydrodynamic momentum equations used by the model within areas containing the piles.

The existing structures were represented as above using data on the number and diameter of piles as provided in drawings supplied by the client team. The proposed development also includes some piles however their spacing is considered large enough to exclude the risk of a cumulative drag effect and therefore we have not included them in the simulations.

2.3 Inclusion of the effect of floating structures

The blockage effect of the proposed pontoons on the passing flow was included in the model by applying additional air pressure to the free surface of the 3D hydrodynamic model, locally depressing the water surface to a level equivalent to the draft of each pontoon. A cross section showing the representation of the IERRT pontoon in the model is provided by Figure 2.1. As TELEMAC is a free surface model whilst the overall blockage of the pontoon is included and varies with the tide, representation of exactly vertical structures using this method is not possible as some the effect of the pontoon can extend in the area up to the next adjacent model node – in this application 10 m away from the pontoon.

TELEMAC-3D's use of the hydrostatic pressure assumption means that any large vertical accelerations close to the pontoon, up and downstream of the structure are not modelled. However, assuming a typical expansion rate of the flow around the pontoon of 1:10 any local effects would be confined to within 50 m of the pontoon in the up and down stream directions. Neither of these assumptions would be expected to have any significant influence on flows perpendicular to the stream direction.

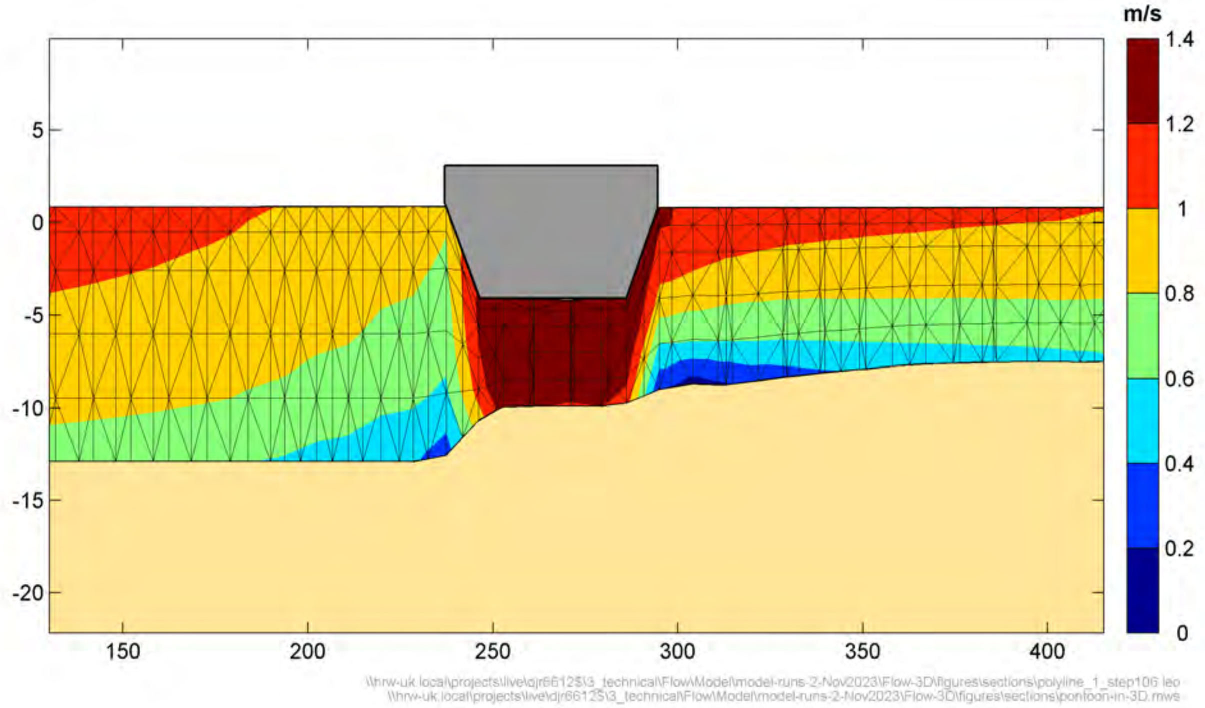


Figure 2.1: Example cross section showing model mesh and 3D representation of pontoon and current speed

2.4 Model calibration and validation

The applied TELEMAC-3D model has been extensively calibrated and validated against data collected at the IERRT site. HR Wallingford (2022) describes the data comparison. For completeness a summary of the calibration and validation results are included below.

2.4.1 Calibration

The original model validation was against a set of spring tides of tidal range close to a mean spring tide. The particular focus was to represent the variation in current direction towards high water. Figure 2.3 shows the original validation against a set of spring tides observed by a long term Acoustic Wave and Current Profile (AWAC) deployment in November 2019. The location of the AWAC data is shown in Figure 2.2.

The AWAC data collected at the site over an 18 month period provided an excellent presentation of the currents at the site covering both tide to tide and seasonally variability. Furthermore, data was available throughout the water column to aid understanding of vertical variability on flows as emerged to be the case at this site. This data source provides a much improved dataset for calibration of the model compared to, for example, tidal diamonds which only provide representative currents for mean spring and mean neap tides.

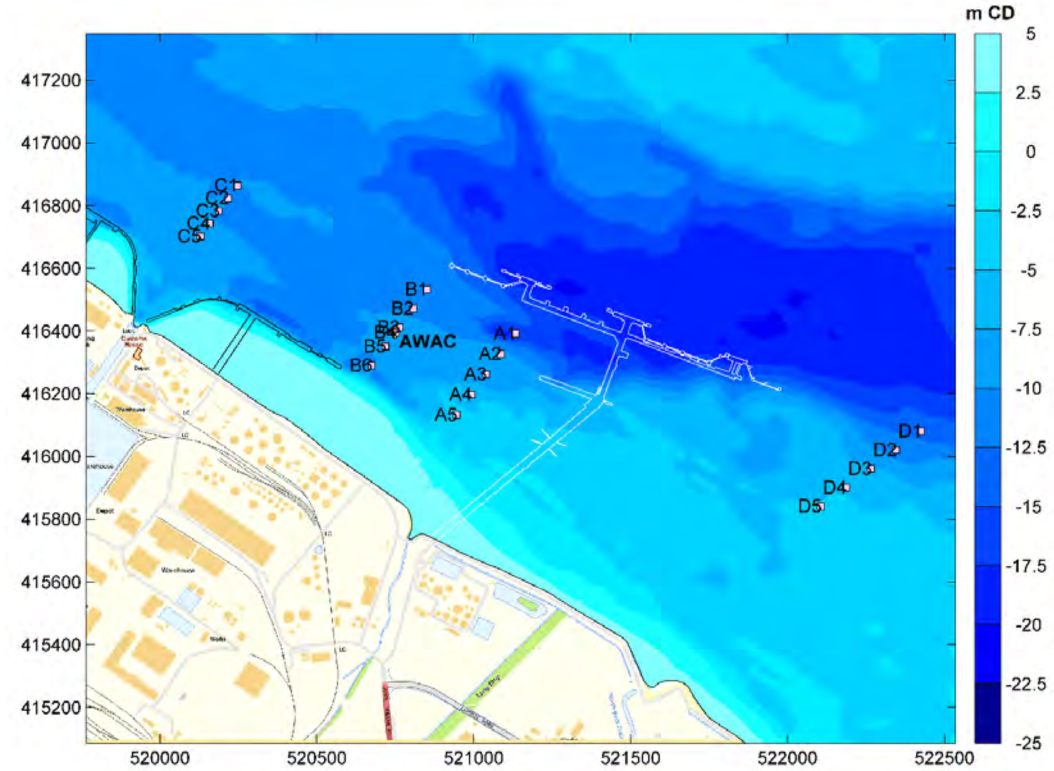


Figure 2.2: Locations of AWAC and ADCP survey data extraction points

Source: Background information includes data from Ordnance Survey © Crown Copyright 2022

To show the simulated currents in the upper part of the water column the model results shown in Figure 2.3 are the predicted near surface current and the predicted current at 0.75 and 0.9 times the water depth above the seabed, i.e. 25% and 10% of total water depth below the water surface.

The key phenomena of the AWAC data are well represented by the model with the dominance of ebb tide currents and the variation in flood tide currents between 295° in the early flood to 315° as the tide level approaches high water. During the ebb tide the current directions in both the model and observations are more consistent, being around 120°.

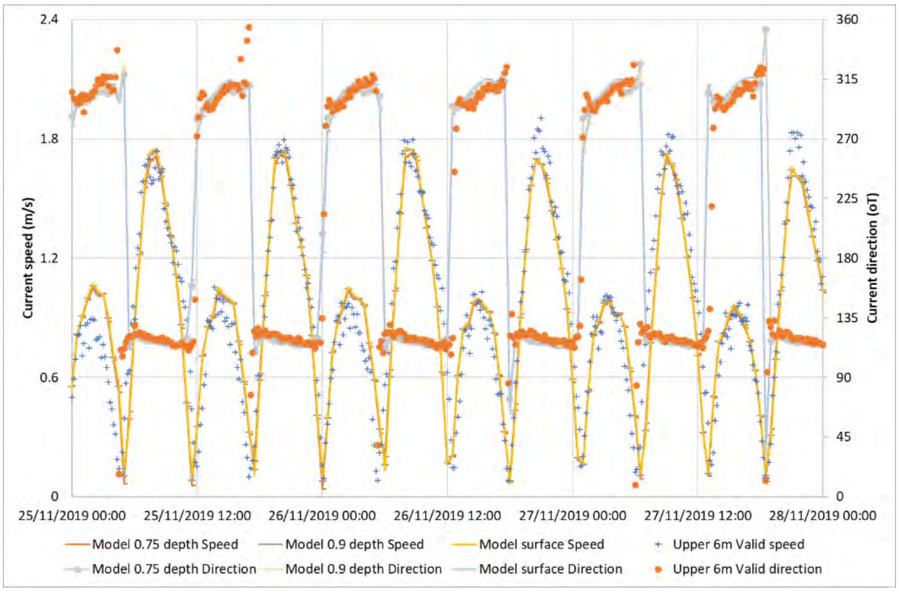


Figure 2.3: Comparison of simulated current speed with data from AWAC, 25-27 November 2019

2.4.2 Validation

As described by HR Wallingford (2022) a set of four vessel mounted Acoustic Dopler Current Profiler (ADCP) transects were performed in October 2022. The project team requested that the validated model be compared to the new data without rerunning the model for the specific tidal period of the ADCP transects. Hence, the model was validated against a period of the existing simulation of approximate mean spring tide conditions with tide ranges of the order of 6.2 m whereas the ADCP observations included tide ranges of 6.6 to 6.9 m. Some additional variance in the model comparison may occur by not modelling the conditions on the day of the ADCP survey.

Data was extracted at 21 points from the four ADCP transects. These were averaged over the total water depth and over the top 5, 6 and 7 m of the water column to allow observation of the current directional variability in the portion of the water column corresponding to various vessel drafts. The full set of comparisons are provided in HR Wallingford (2022).

The ebb tide comparison at Transect D is of particular interest to the inclusion of the piled structures using drag as it includes the area where currents would be expected to be influenced by the piled Immingham Oil Terminal (IOT) jetty.

Figure 2.4 to Figure 2.7 show the comparison of the modelled and observed currents at the relevant points along Transect D. Interestingly, both the data and model show a reduction in ebb tide currents at Point D2 compared to the neighbouring Points D1 and D3. This shows that the effect of the drag due to the piles on the IOT jetty can be seen at some distance from the structures and that the modelled approach to representing the piled IOT jetty is reasonable.

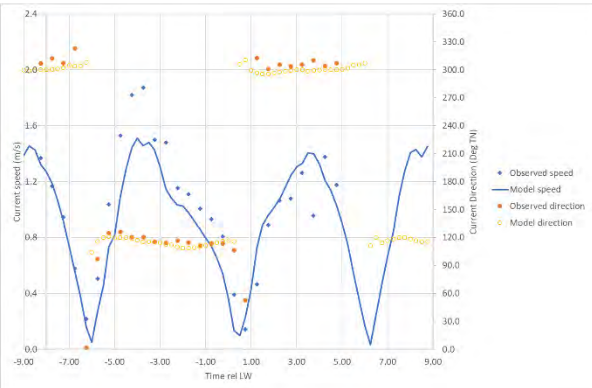


Figure 2.4: Comparison of simulated current speed and direction with data from ADCP point D1, 12/10/2022

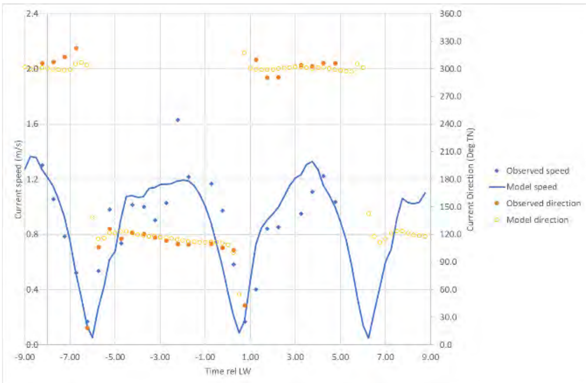


Figure 2.5: Comparison of simulated current speed and direction with data from ADCP point D2, 12/10/2022

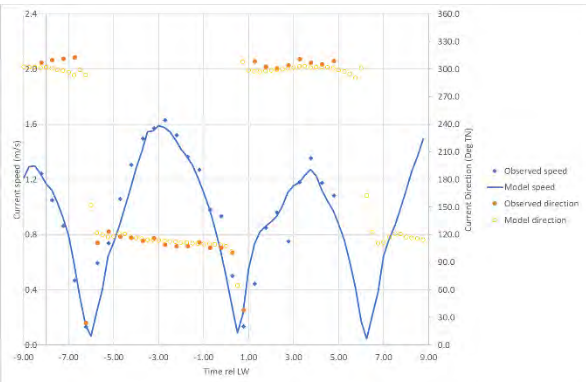


Figure 2.6: Comparison of simulated current speed and direction with data from ADCP point D3, 12/10/2022

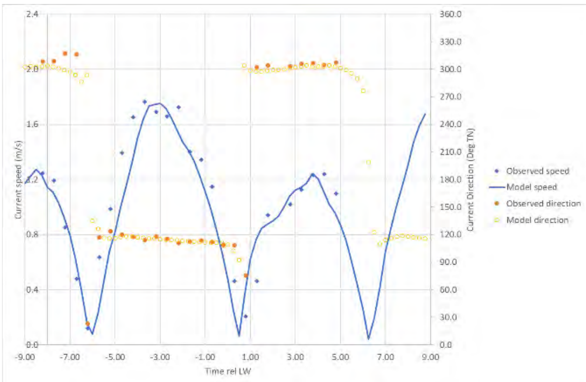


Figure 2.7: Comparison of simulated current speed and direction with data from ADCP point D4, 12/10/2022

3 Model results

3.1 Comparison of revised scheme with original scheme

To demonstrate any difference in hydrodynamics with the revised layout for the IERRT compared to that previously included in navigation simulations the same two tidal conditions as used previously were modelled with the new layout – a peak spring tide range and a mean spring tide range case. The tides chosen cover the conditions for larger tide ranges; the peak spring tide may occur monthly, mean spring (or larger) tides occur every two weeks.

Any changes to currents at lower range tides would be expected to be within the footprint of the changes modelled. Hourly plots showing the comparison of the results are included in Appendix A. All results are for the top 7m of the water column as that was the data supplied to the navigation simulations. For reference the time of tide of the results plotted is indicated in the frame on the bottom left of the plot. Figure A.1 to Figure A.13 show the results for the peak spring tide and Figure A.14 to Figure A.26 show the results for the mean spring tide.

Inspection of the results presented in Appendix A confirmed the anticipated effect of the larger pontoon in the revised layout leading to a larger effect in reducing currents up and down stream of the pontoon and some associated speed increases immediately to the side of the pontoon. The area of speed increase greater than 0.05 m/s is confined to with 30 m of the edge of the pontoon between the pontoon and the IOT finger jetty. The area of speed reduction up and down stream is larger with changes greater than 0.2 m/s extending 500 m north west during the flood tide and 1000 m south east during the ebb. The differences in these areas is linked to the larger currents which occur on the ebb.

The results indicate no additional hydrodynamic effects from the revised layout at the IOT jetties at times of peak ebb or flood tide flow. In the immediate approaches to the IERRT berths currents are lower in the revised layout compared to the original case.

The results did show a period shortly after LW which had a transient, short period of increased footprint of change for both the peak and mean spring cases. Further investigation of these effects were completed by extracting time series results at the location of the highest speed increase shown close to the IOT finger jetty. The time series extraction point is shown in Figure 3.1.

Figure 3.2 and Figure 3.3 show the comparison of the time series current speed and direction and indicate the transient nature of the effect as the tide turns following low water. At all other times of tide negligible differences are seen.

The reason for this effect is illustrated by Figure 3.4 to Figure 3.6 which overlay the current patterns for the original layout (blue vectors) with current pattern for the revised layout (red vectors). As is typical for estuaries the tide turns first over the shallow edges of the estuary, being areas of increased bed friction. Then, slightly later the tide turns within the deeper channel. During this period an area of low flow propagates offshore. The blockage effect of the pontoons and the deeper dredged depths appear to alter the propagation of the turn in the tide very slightly which can make apparently larger changes appear, albeit on low currents. For example Figure 3.2 shows very low currents (less than 0.1 m/s) at LW+0.5 but for the revised layout the current is approximately 0. 3 m/s. It should be noted that this effect is much smaller for the second LW simulated (after hour 12 in Figure 3.2) confirming the transient nature of the effect.

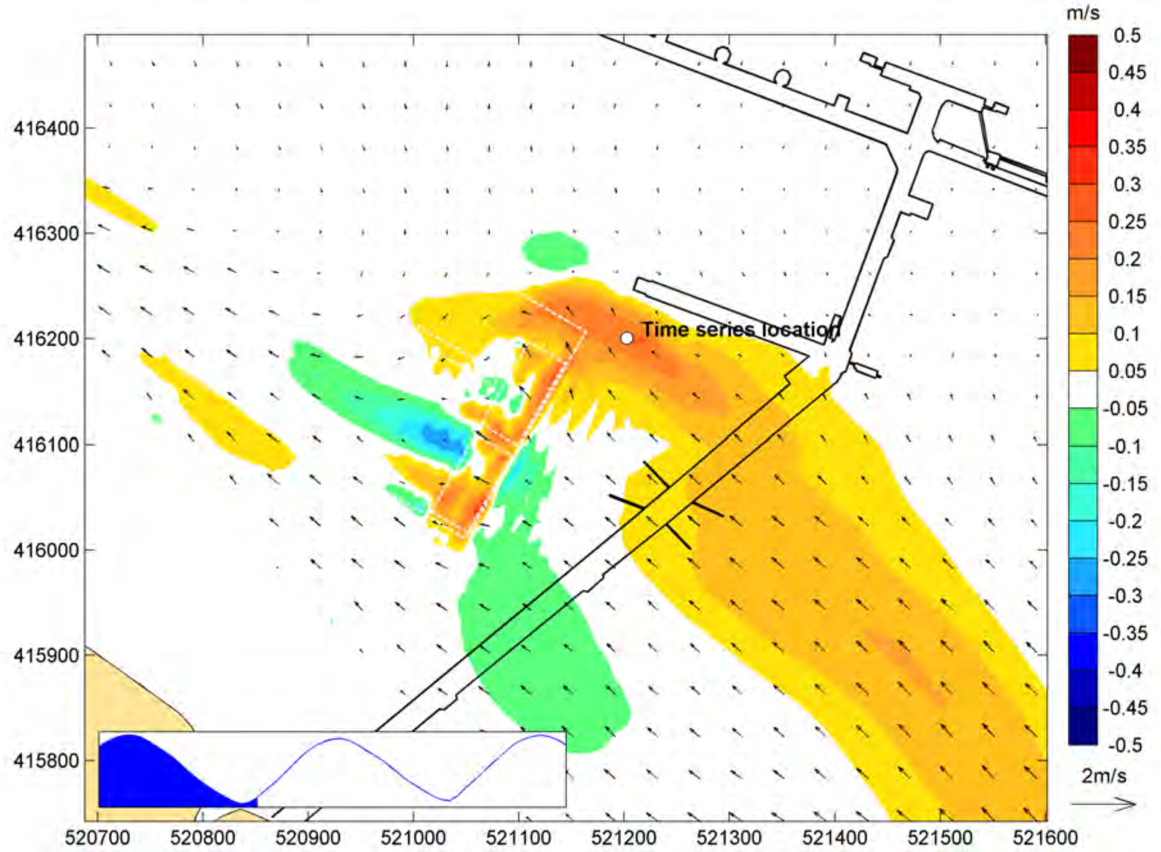


Figure 3.1: Difference in current speed between revised and original IERRT layout, LW + 0.5 hour, peak spring tide, location of data extraction point shown

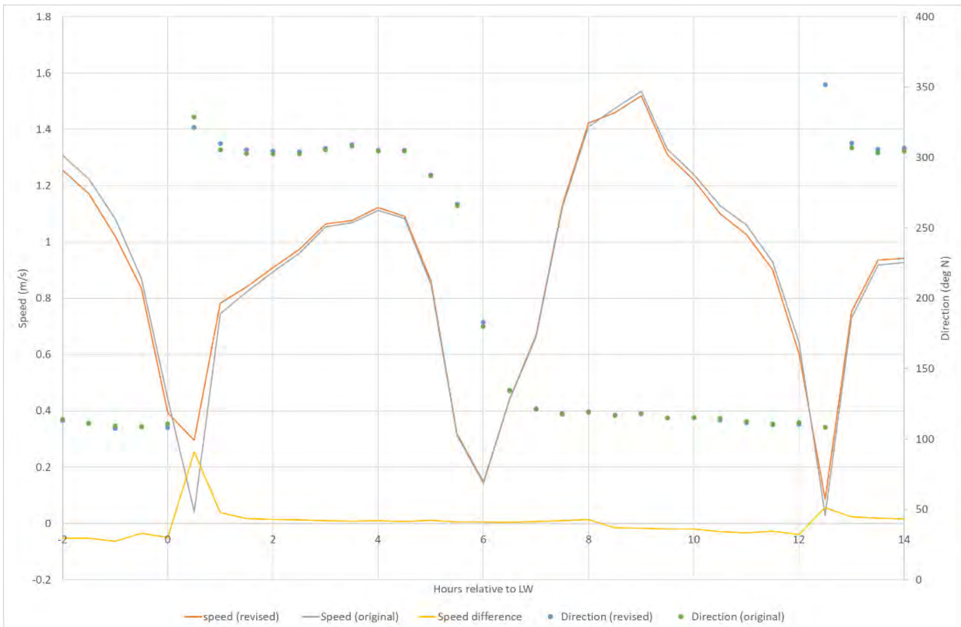


Figure 3.2: Time series current speed and direction for revised and original IERRT layout, peak spring tide

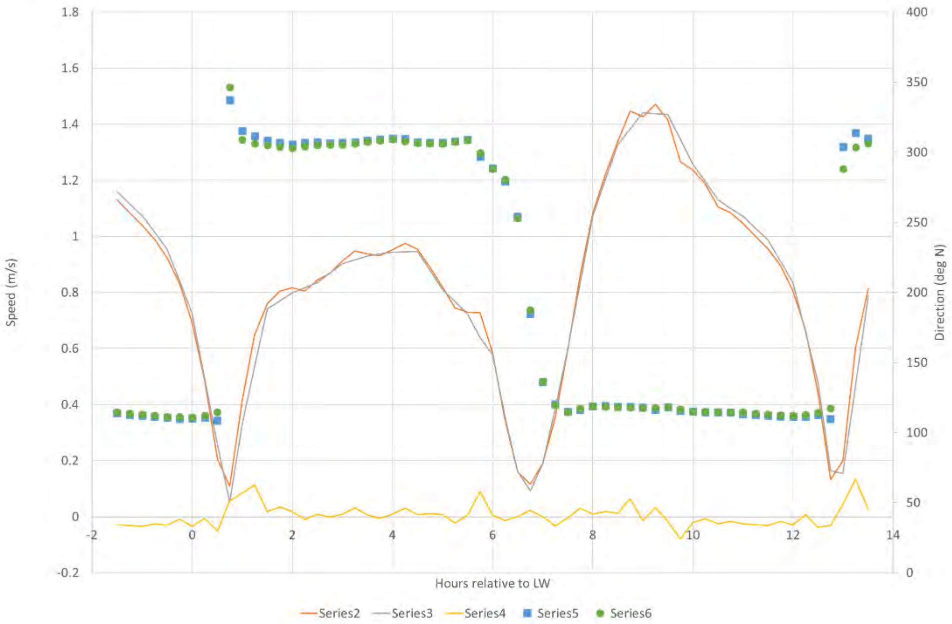


Figure 3.3: Time series current speed and direction for revised and original IERRT layout, mean spring tide

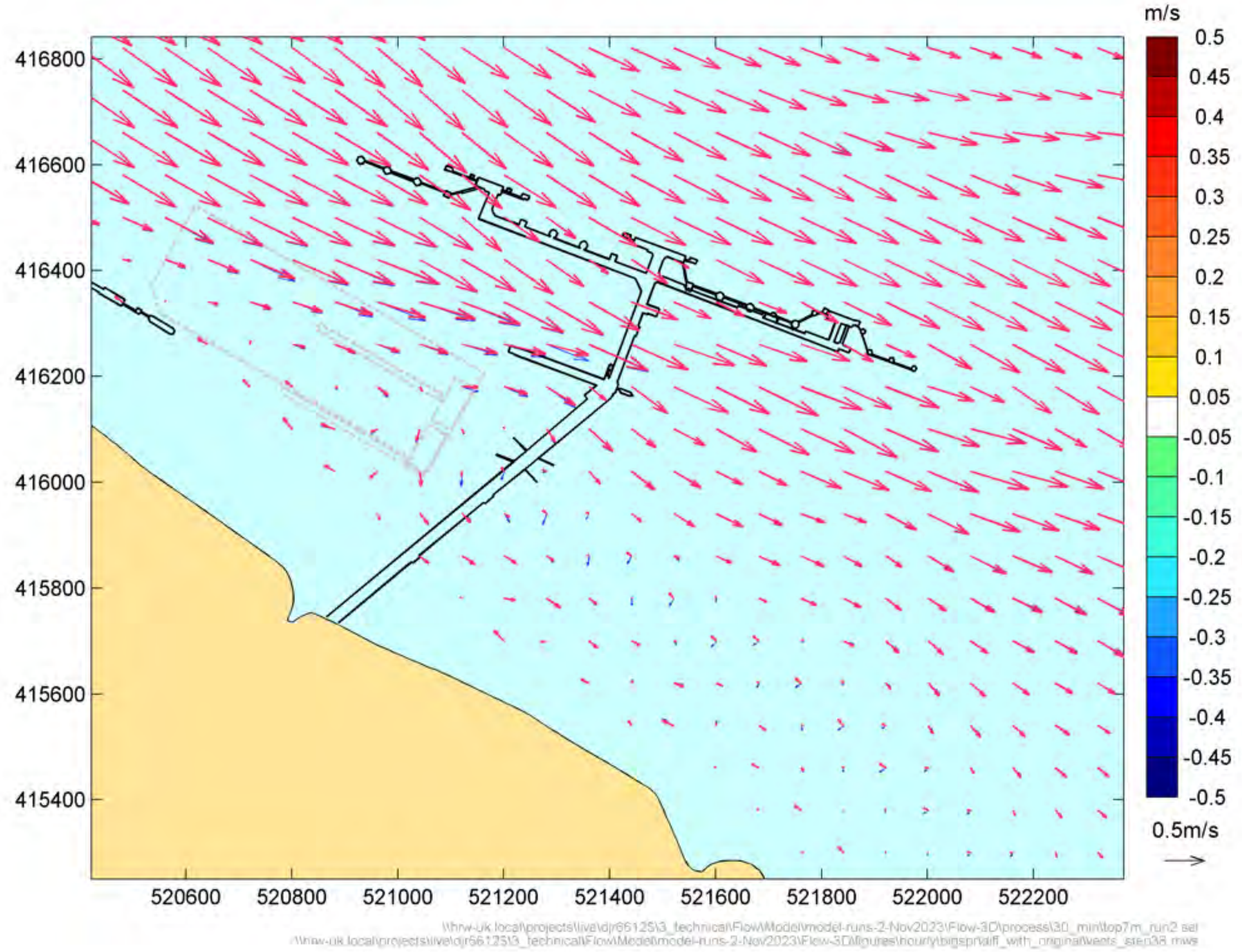


Figure 3.4: Comparison of peak spring current vectors at LW - original layout (blue), revised layout (red)

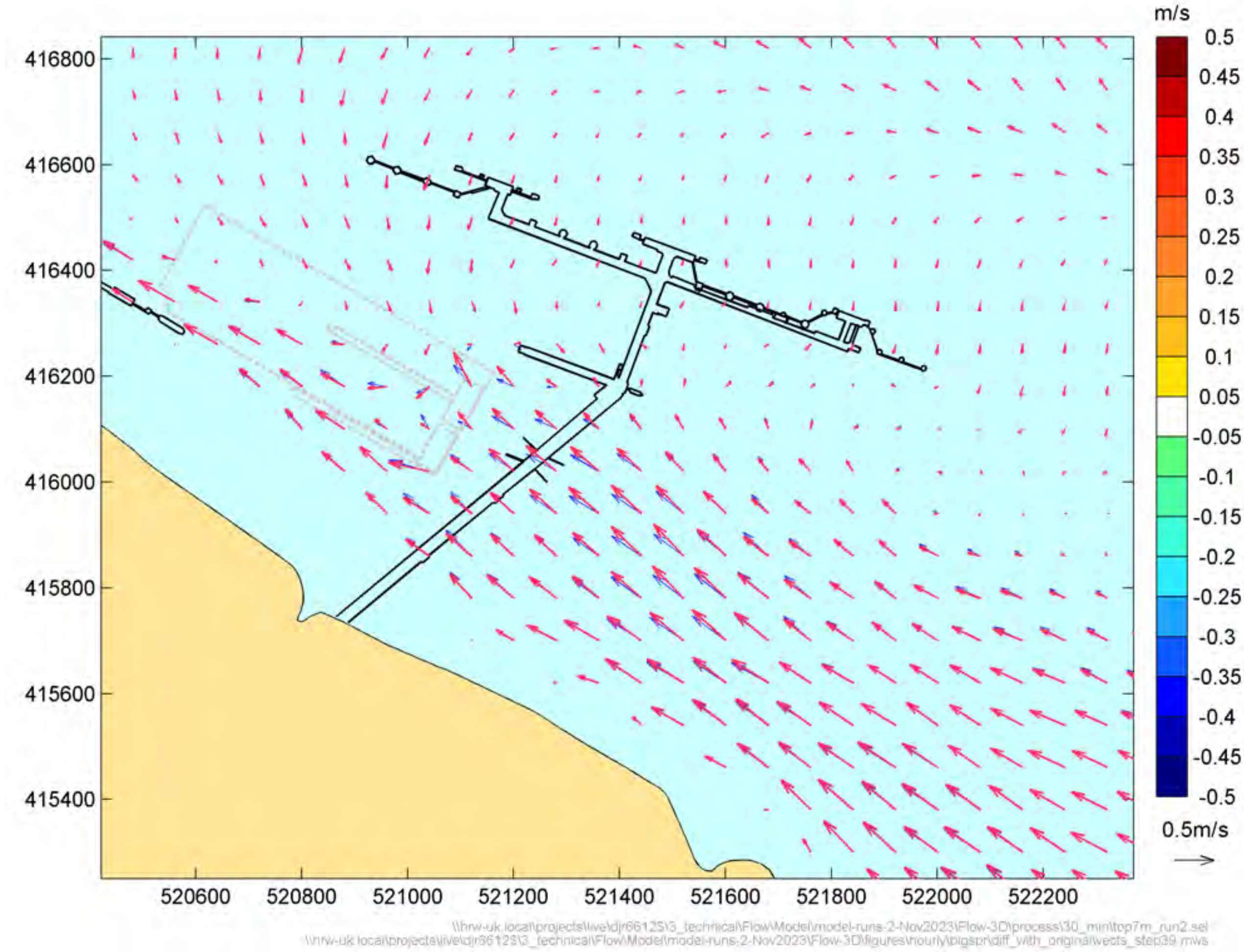


Figure 3.5: Comparison of peak spring current vectors at LW+0.5 hours – original layout (blue), revised layout (red)

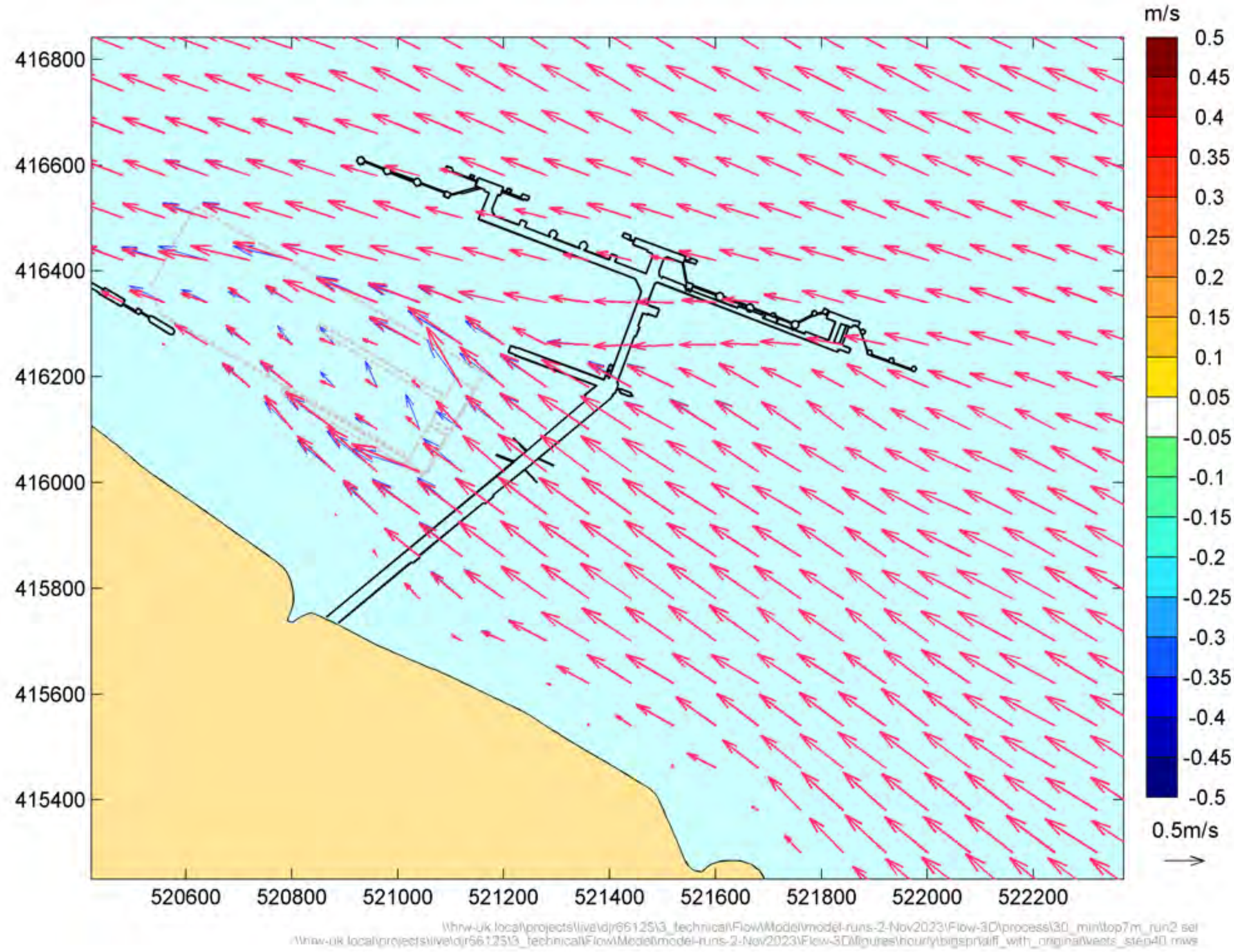


Figure 3.6: Comparison of peak spring current vectors at LW+1.0 hours - original layout (blue), revised layout (red)

4 Conclusions

A 3D modelling exercise of the revised IERRT has been completed to demonstrate any difference between its impacts on flows and those modelled for the original scheme. The difference between the hydrodynamics were extracted hourly throughout the tide for two tidal conditions and are included in Appendix A. Further plotting and assessment was undertaken for the period differences seen at the turn of the tide at low water. The conclusions of the work are:

- The revised IERRT layout does not change the assessment of the hydrodynamic effect of the IERRT for nearby maritime facilities. No changes in the effect of the IERRT on hydrodynamics are shown at IOT. The area of speed increase across the flow greater than 0.05 m/s is confined to the area close to the IERRT pontoon, within 30 m of the edge of the pontoon between the pontoon and the IOT finger jetty.
- The revised layout results in lower currents at the times of peak flow up and down stream of the IERRT as might be expected for the larger pontoon associated with the revised layout. The area of speed reduction with changes greater than 0. 2 m/s extends 500 m north west during the flood tide and 1000 m south east during the ebb. The differences in the spatial extent of these areas is linked to the larger currents which occur on the ebb tide.
- A short, period of higher differences between the revised and original layouts is seen on occasion as the tide turns at low water. This phenomenon appears linked to localised,

transient changes to the timing and pattern of the turn of the tide. It should be noted that current magnitudes at these times are low (<0.3 m/s) for both the original and revised layout.

5 References

ABP (2023). Immingham Eastern Ro-Ro Terminal. Environmental Statement Addendum. Document 10.3.8.

HR Wallingford (2022). Project Sugar - ABP Humber - Immingham East Development, flow model comparison with October 2022 ADCP survey. Report DJR6612_RT007_R01-00.

Mutlu Sumer, B. and Fredsøe, J. (2006). Hydrodynamics Around Cylindrical Structures (New edition). World Scientific Publishing Co Pte Ltd, Singapore. ISBN 13: 978-9-81-270039-1.

Appendices

A Hourly comparison of currents for revised and original IERRT layouts

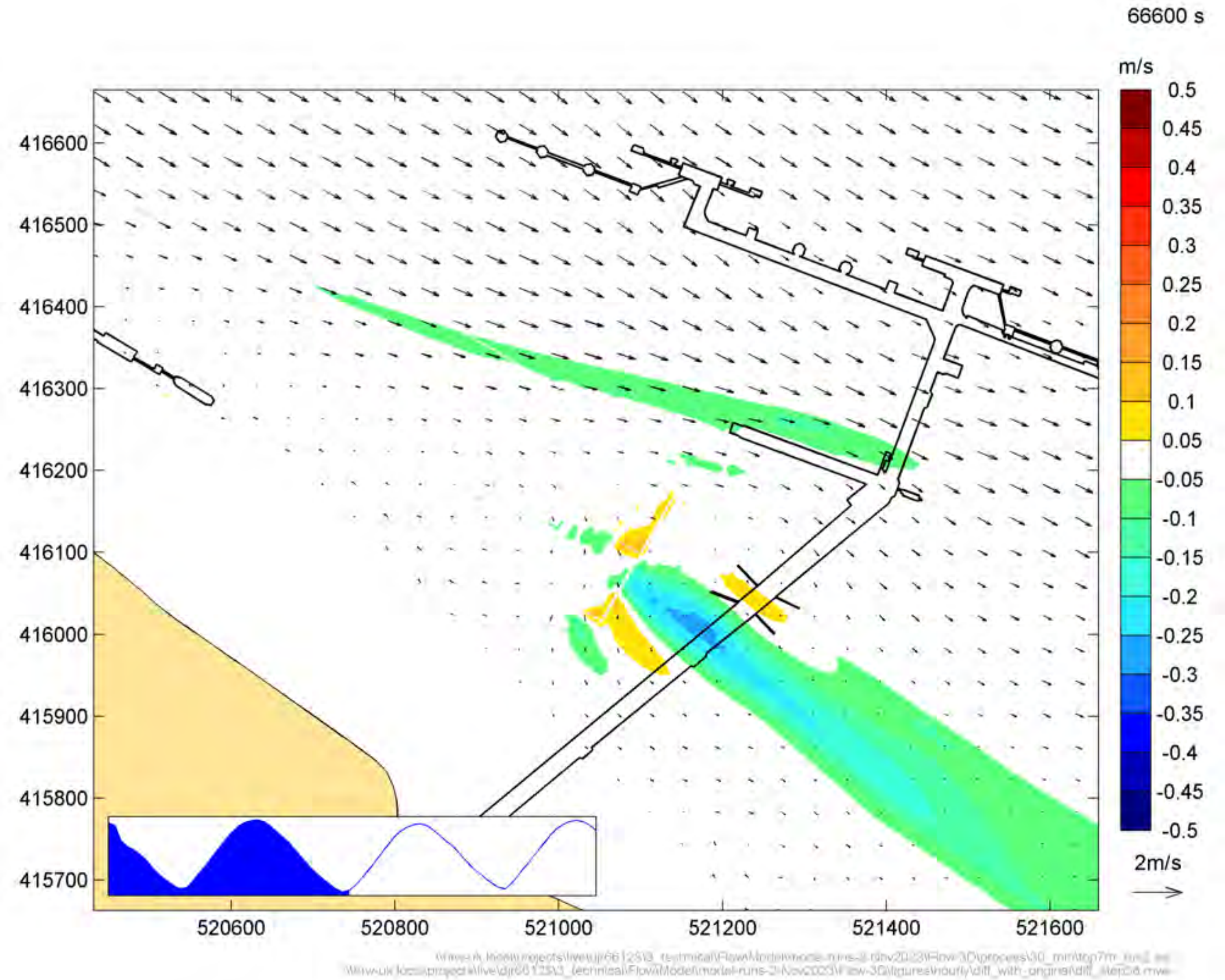


Figure A.1: Difference in current speed between revised and original IERRT layout, LW, peak spring tide

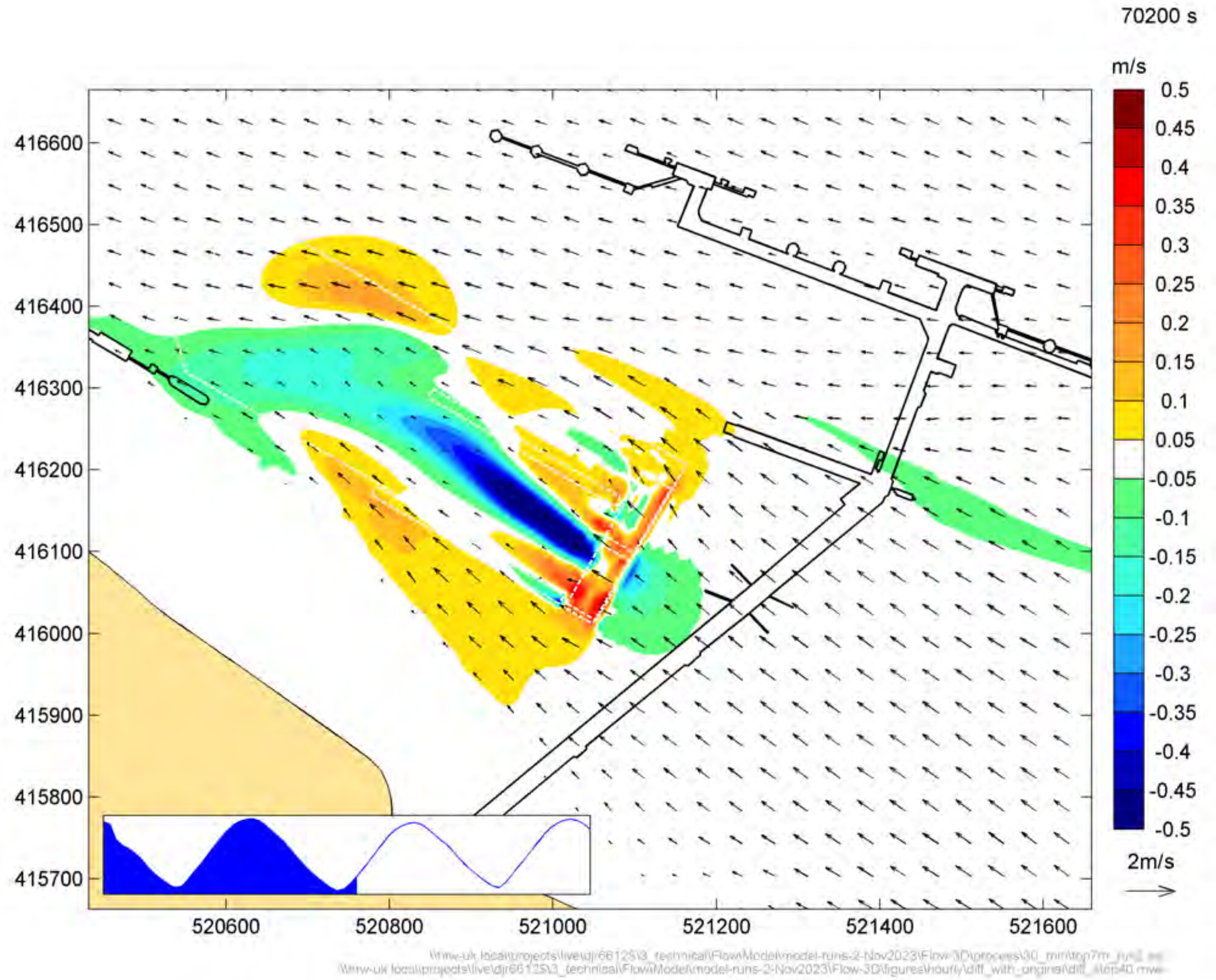


Figure A.2: Difference in current speed between revised and original IERRT layout, LW+1, peak spring tide

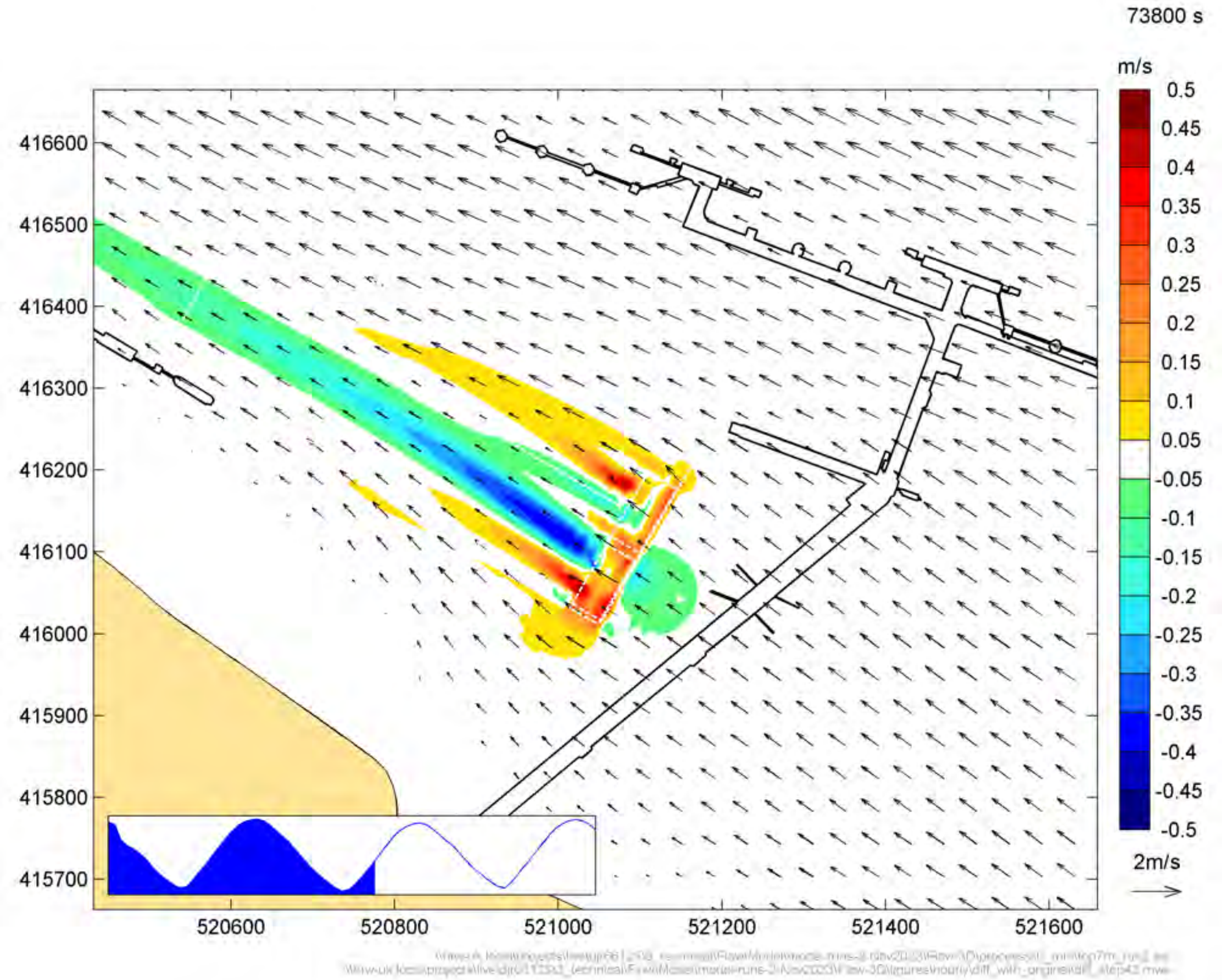


Figure A.3: Difference in current speed between revised and original IERRT layout, LW+2, peak spring tide

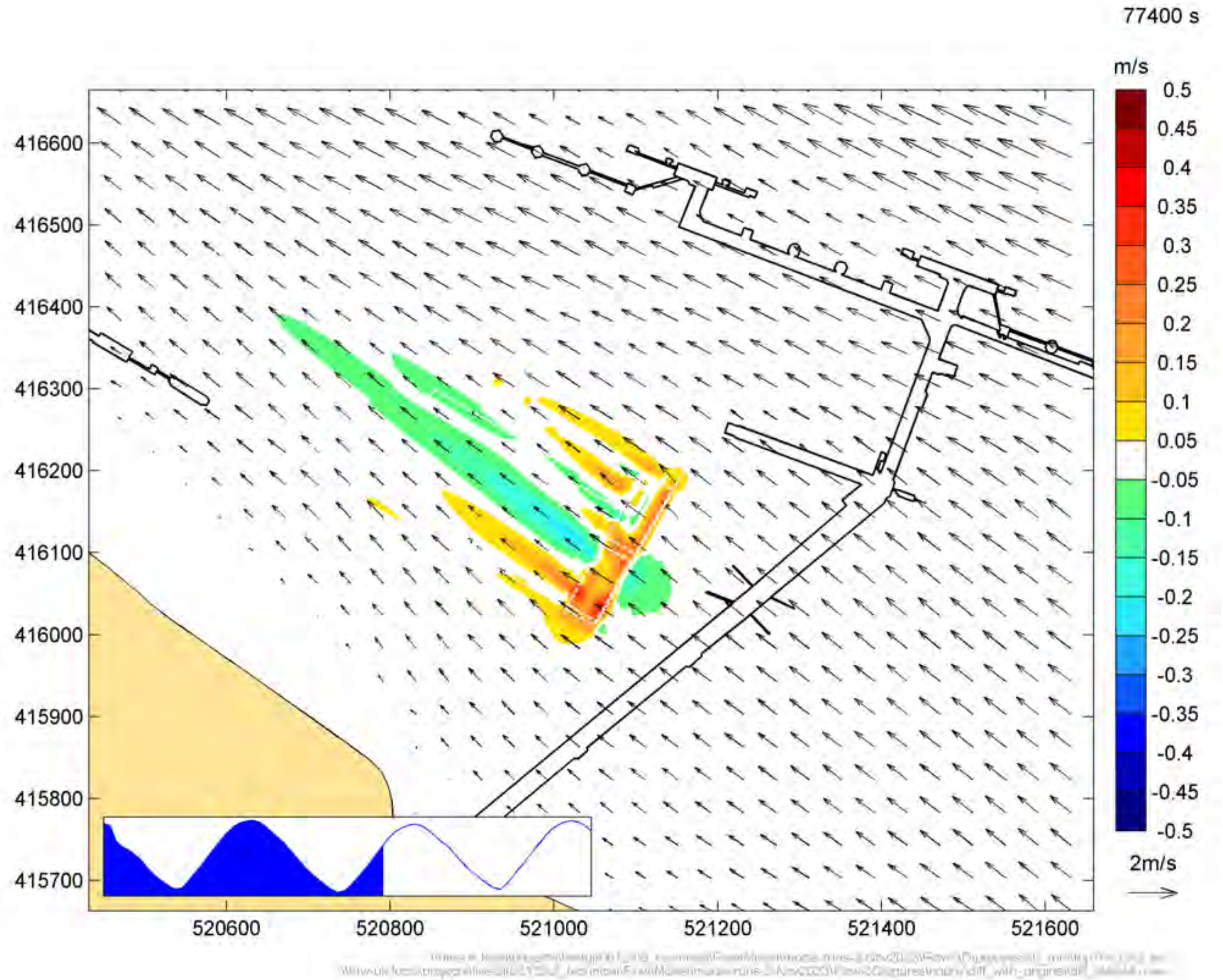


Figure A.4: Difference in current speed between revised and original IERRT layout, LW+3, peak spring tide

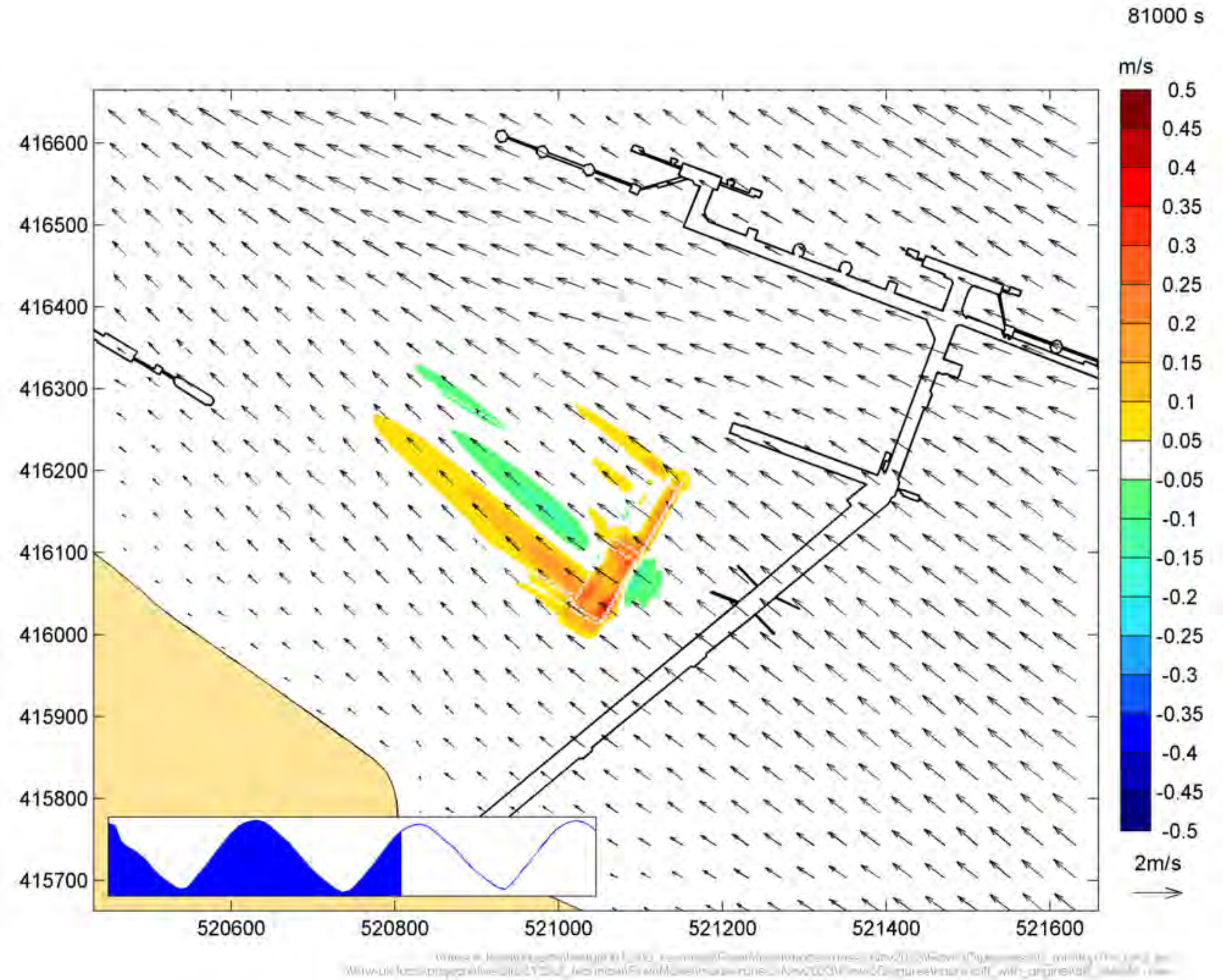


Figure A.5: Difference in current speed between revised and original IERRT layout, LW+4, peak spring tide

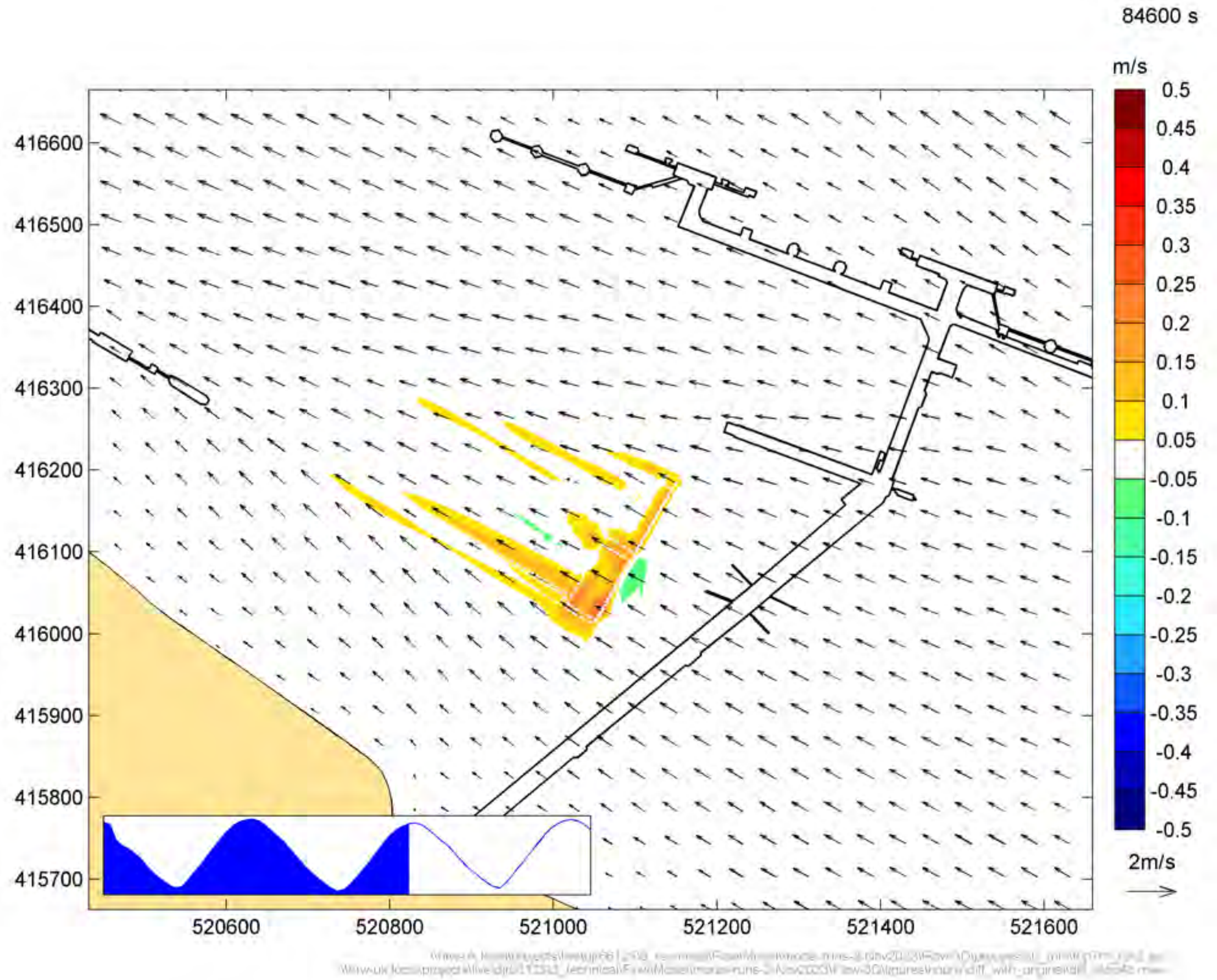


Figure A.6: Difference in current speed between revised and original IERRT layout, LW+5, peak spring tide

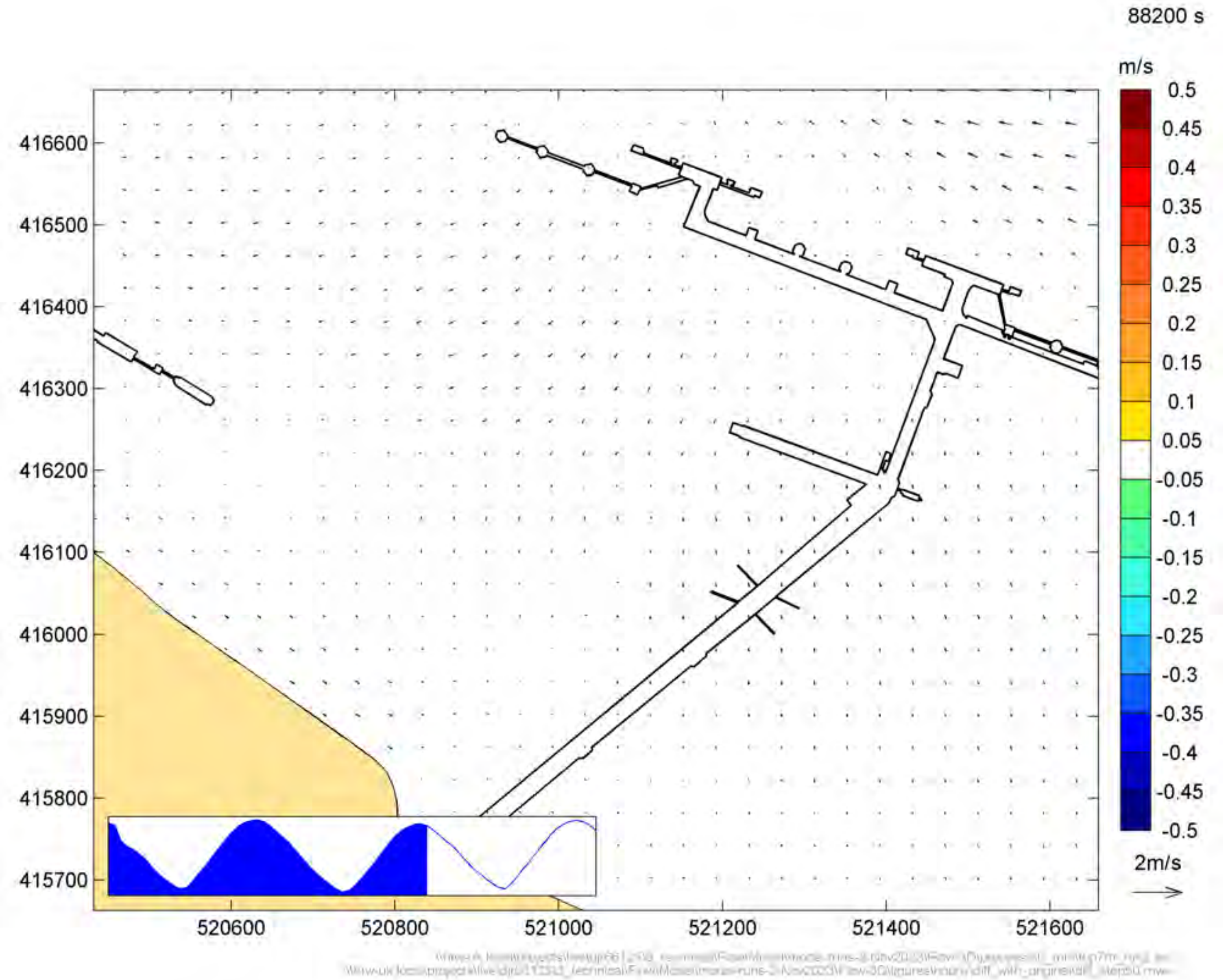


Figure A.7: Difference in current speed between revised and original IERRT layout, LW+6, peak spring tide

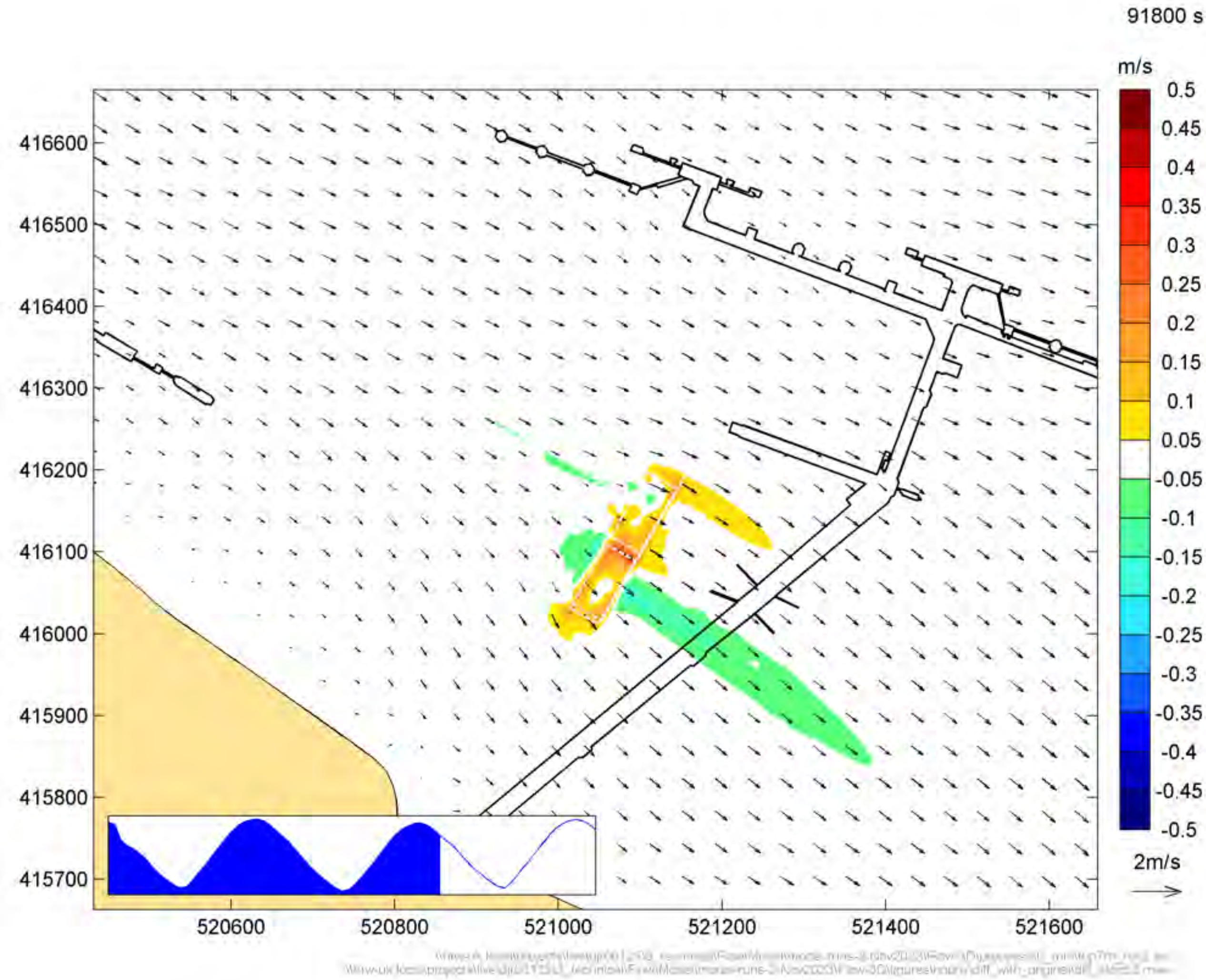


Figure A.8: Difference in current speed between revised and original IERRT layout, LW+7, peak spring tide

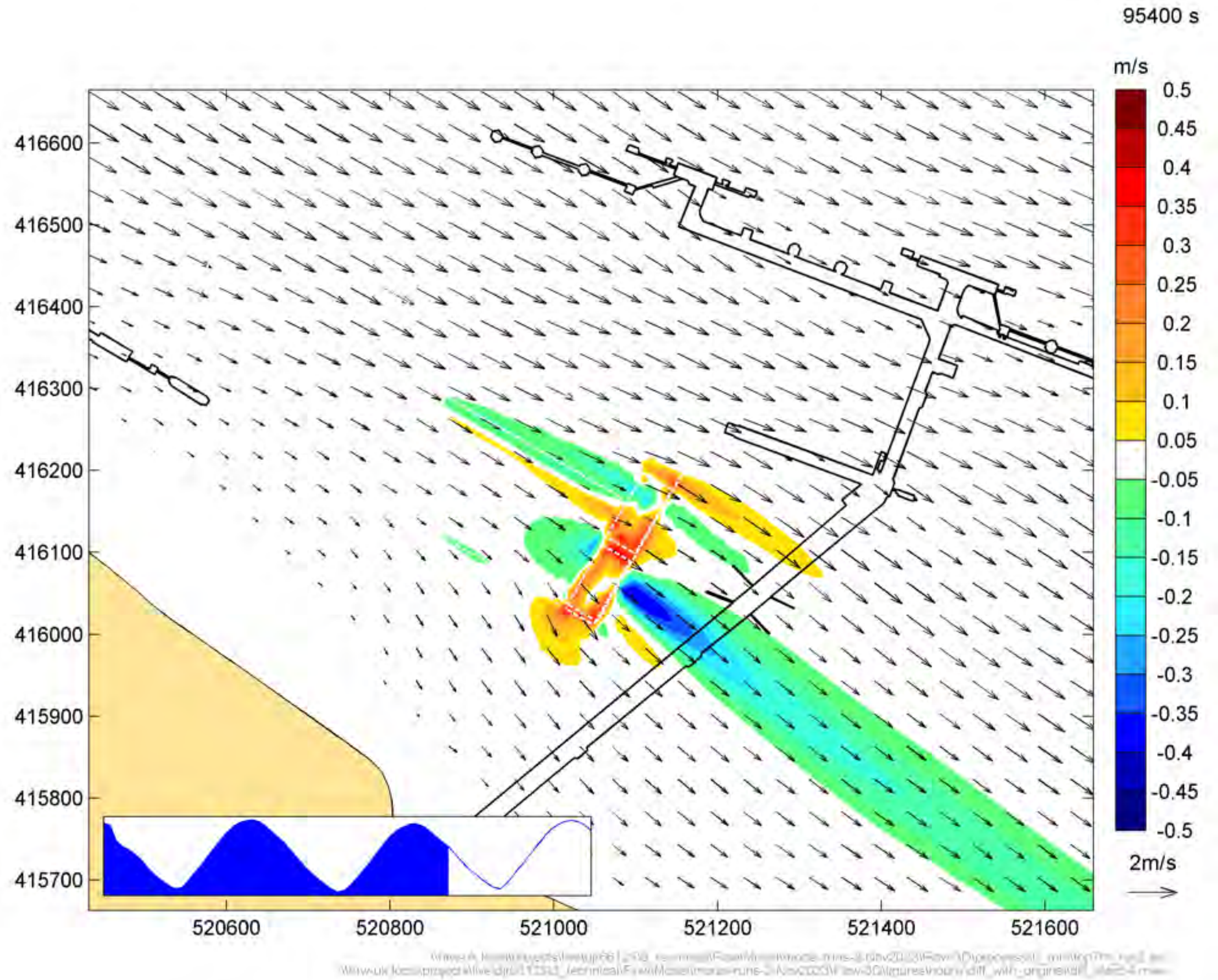


Figure A.9: Difference in current speed between revised and original IERRT layout, LW+8, peak spring tide

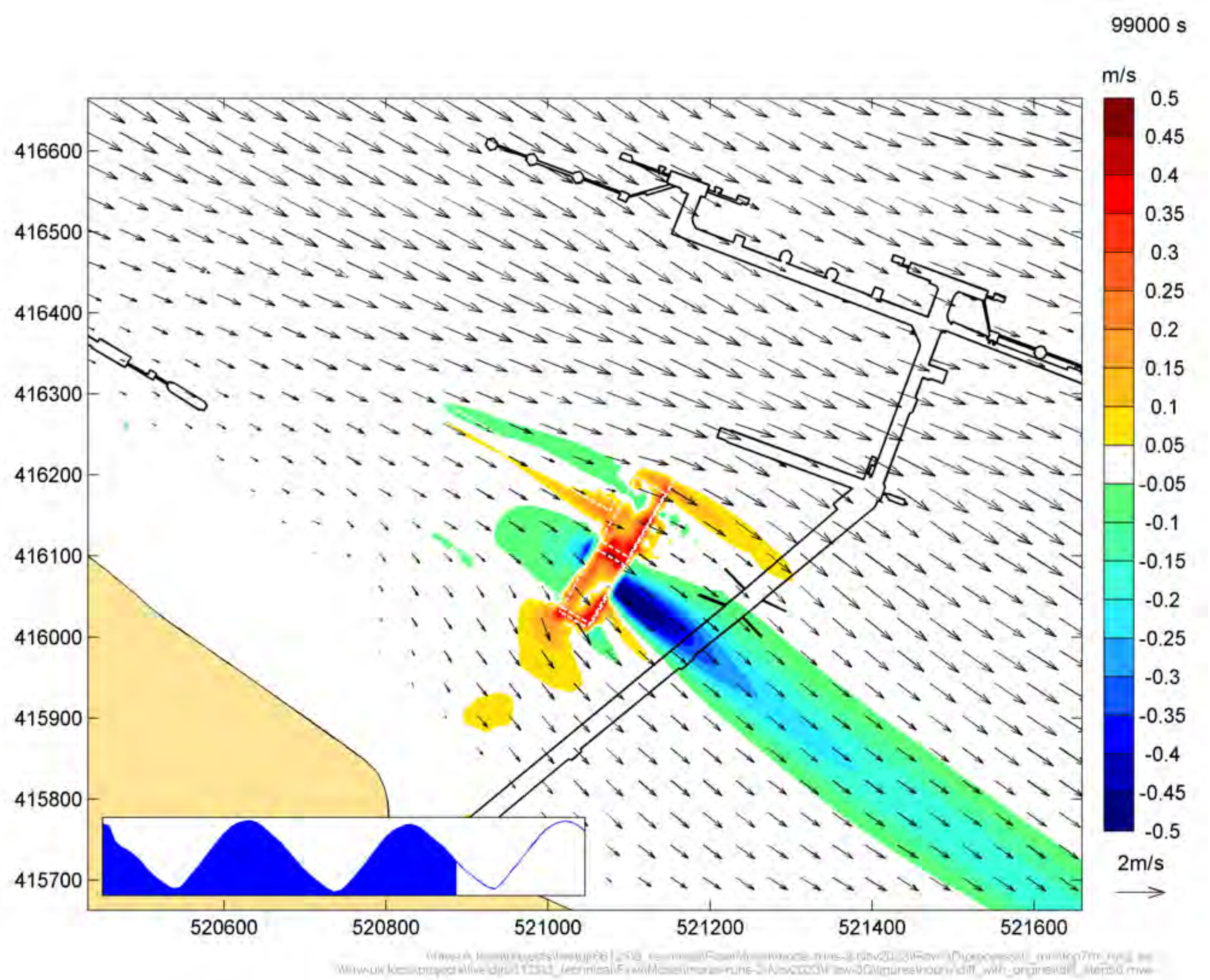


Figure A.10: Difference in current speed between revised and original IERRT layout, LW+9, peak spring tide

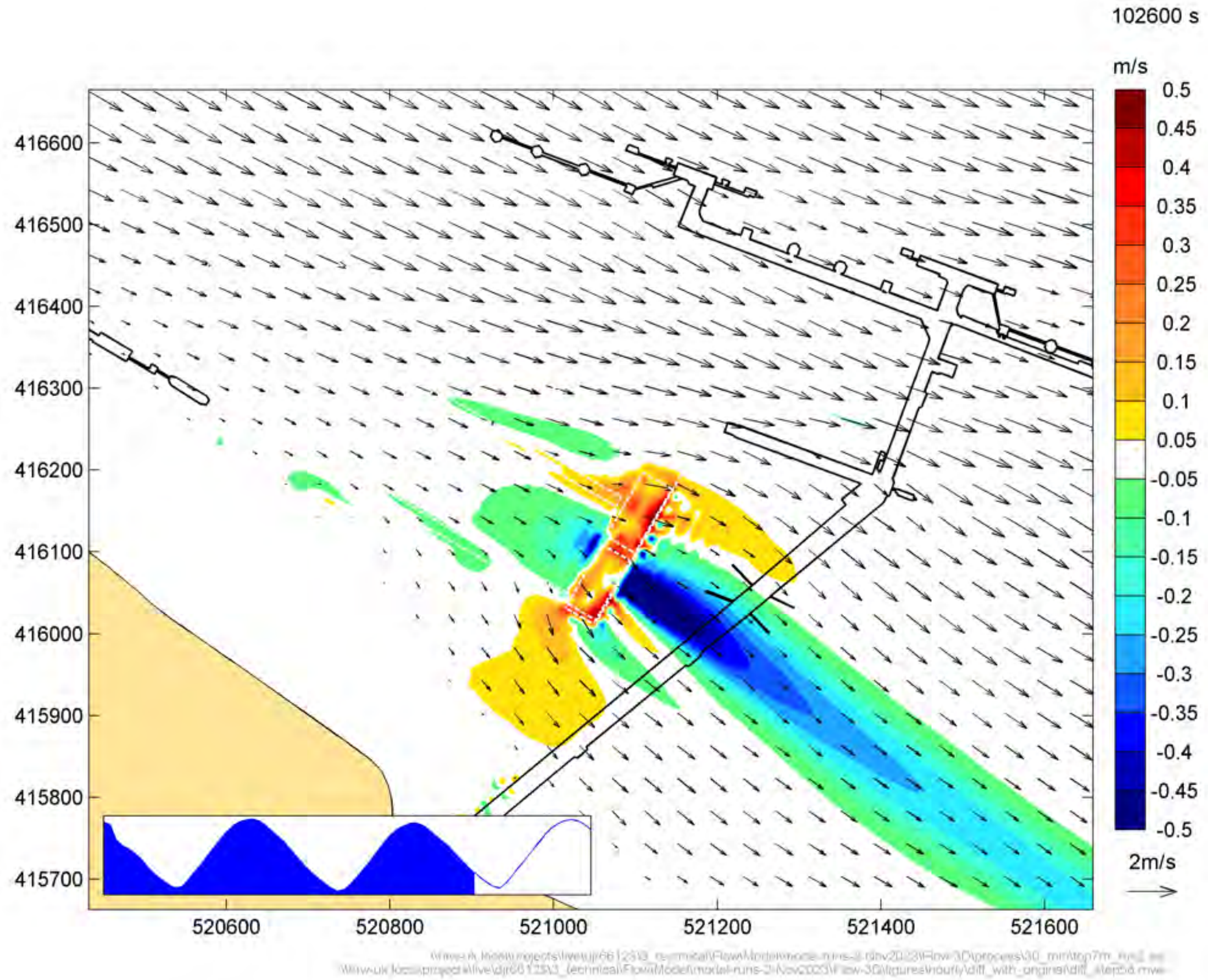


Figure A.11: Difference in current speed between revised and original IERRT layout, LW+10, peak spring tide

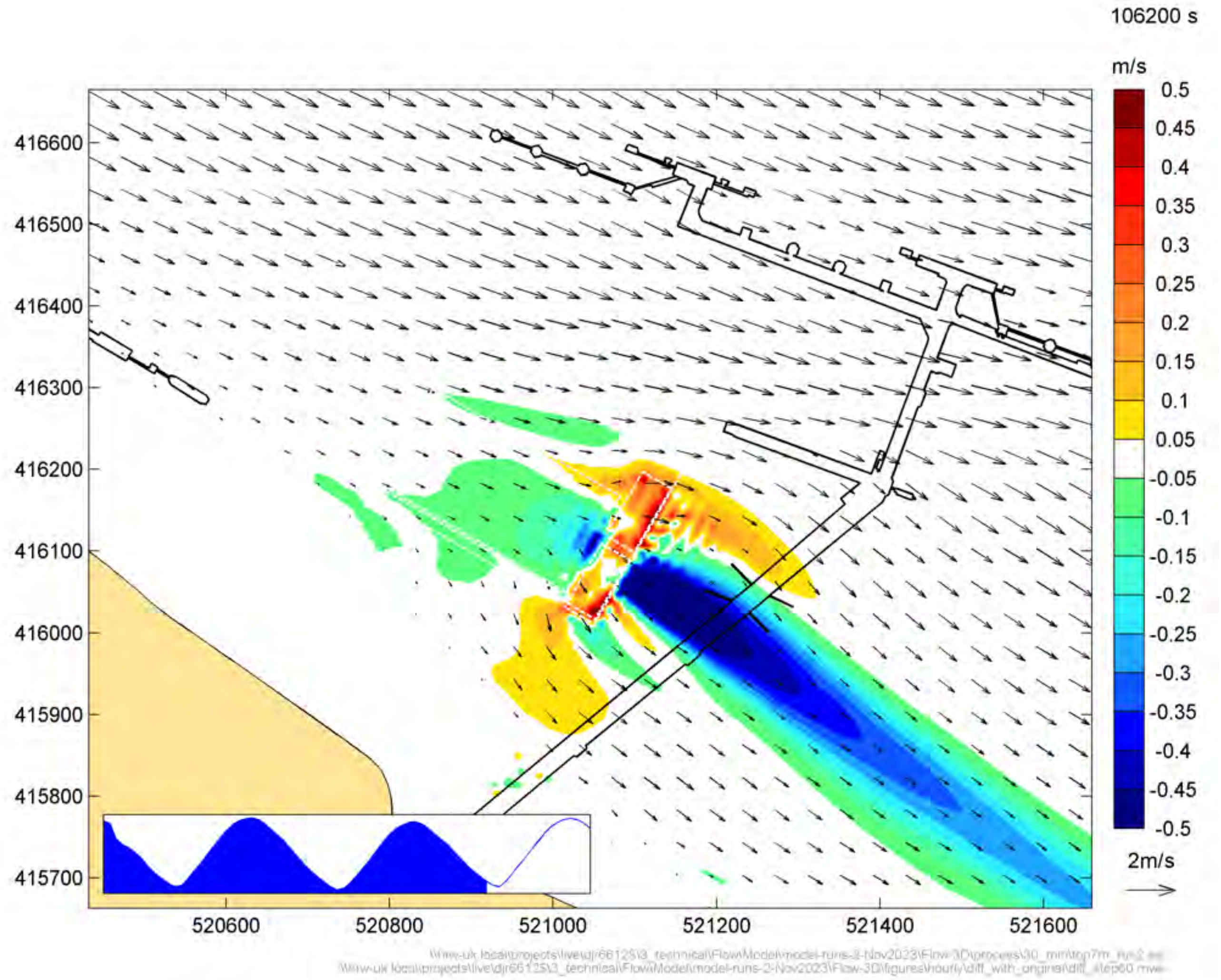


Figure A.12: Difference in current speed between revised and original IERRT layout, LW+11, peak spring tide

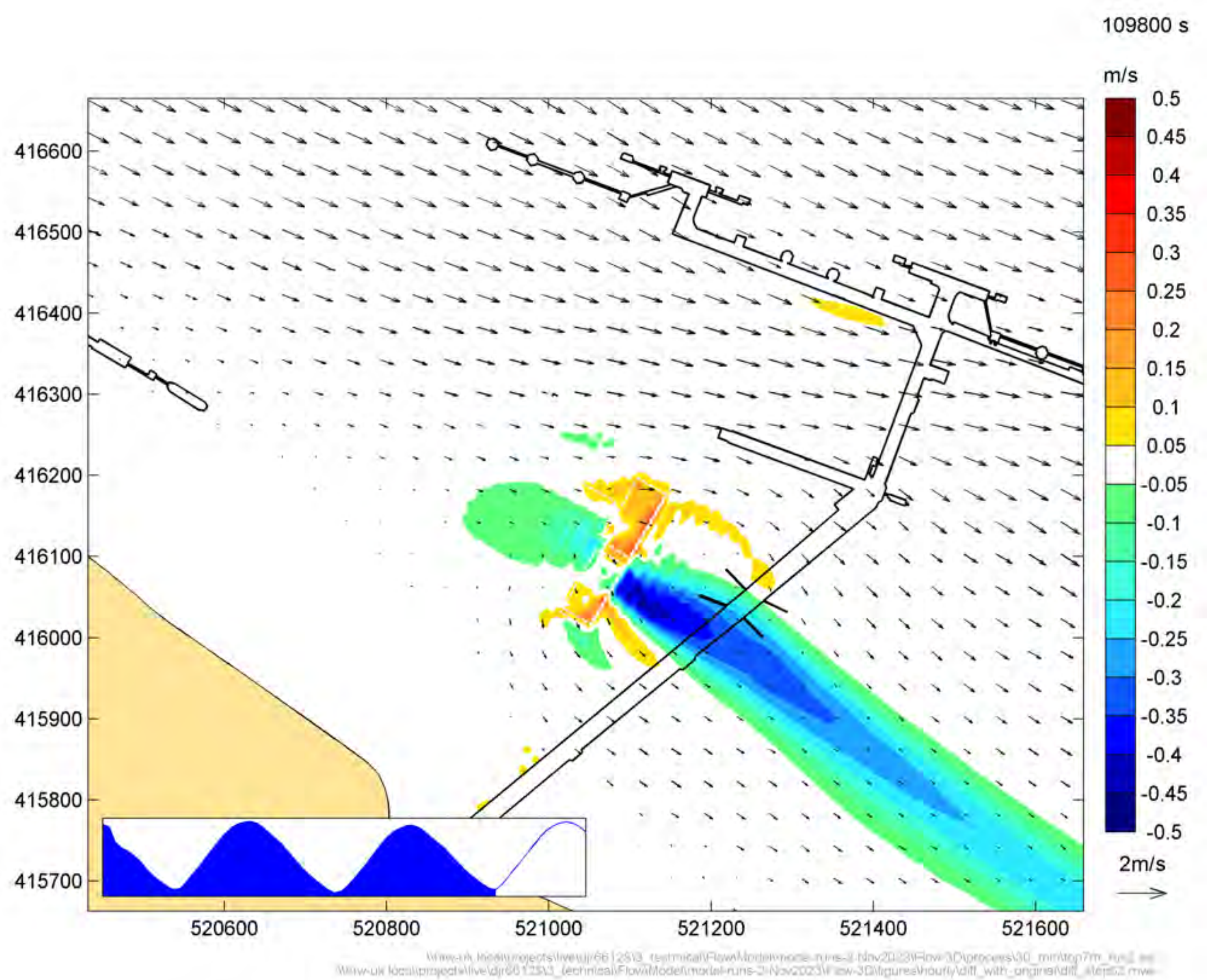


Figure A.13: Difference in current speed between revised and original IERRT layout, LW+12, peak spring tide

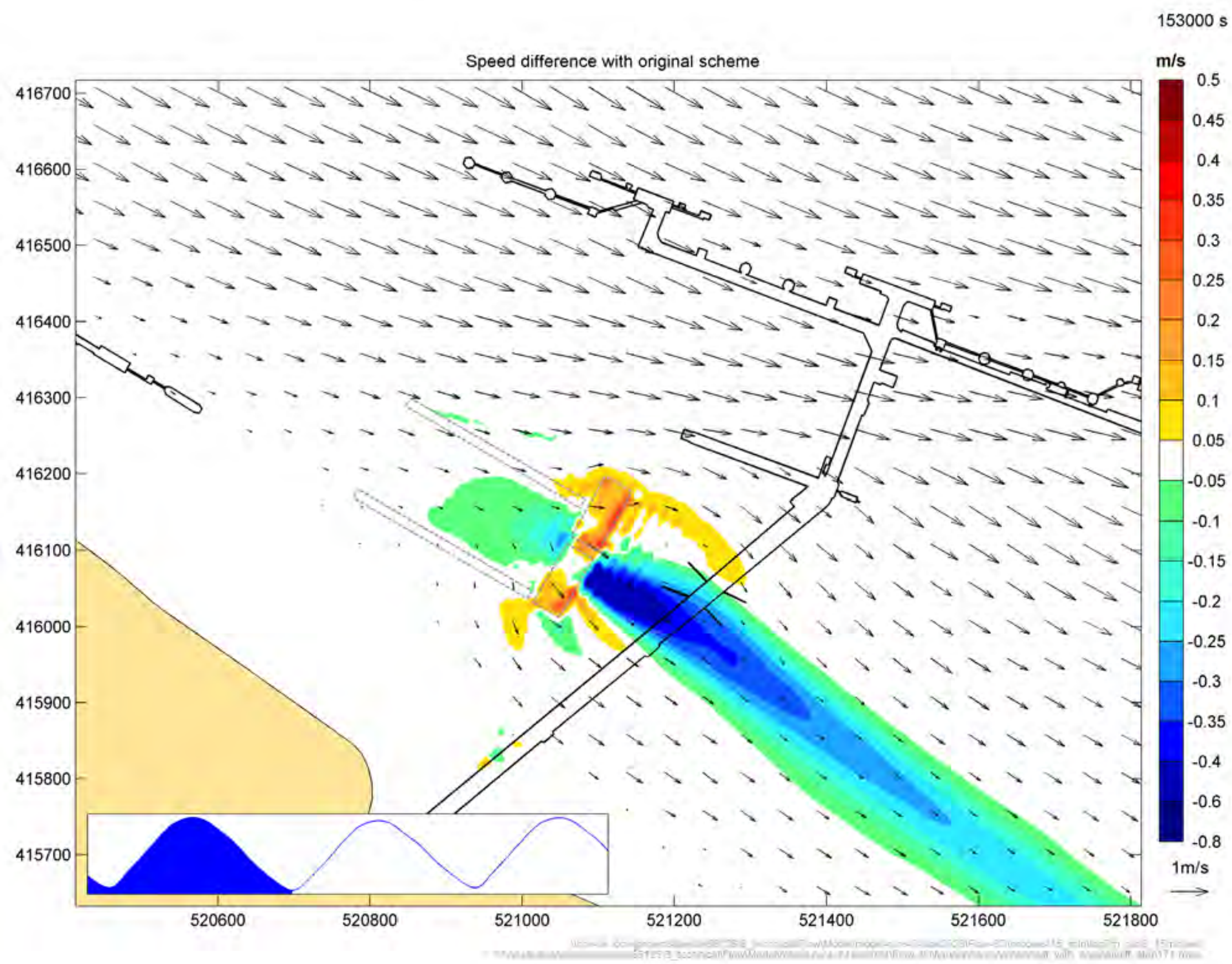


Figure A.14: Difference in current speed between revised and original IERRT layout, LW, mean spring tide

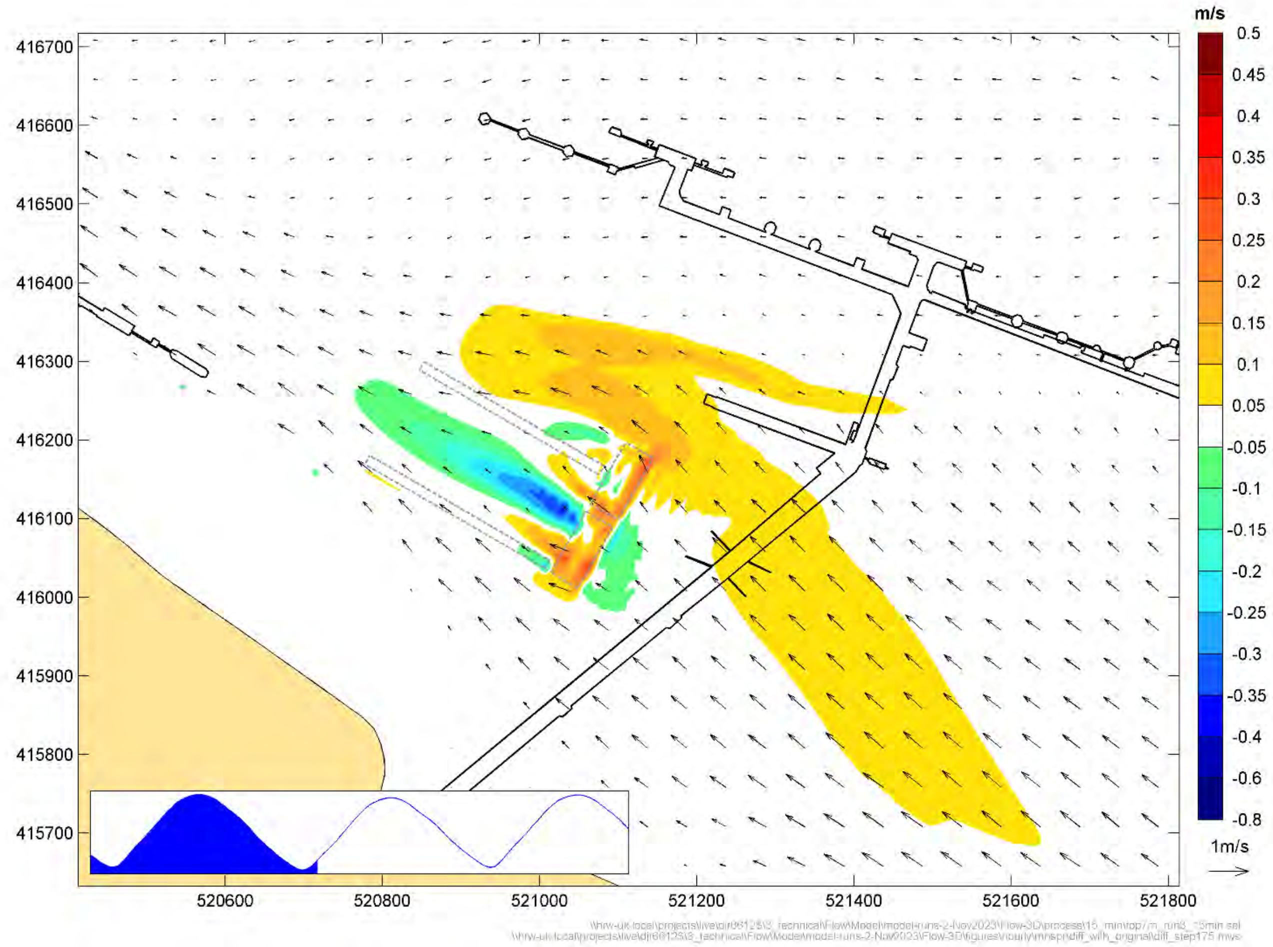


Figure A.15: Difference in current speed between revised and original IERRT layout, LW+1, mean spring tide

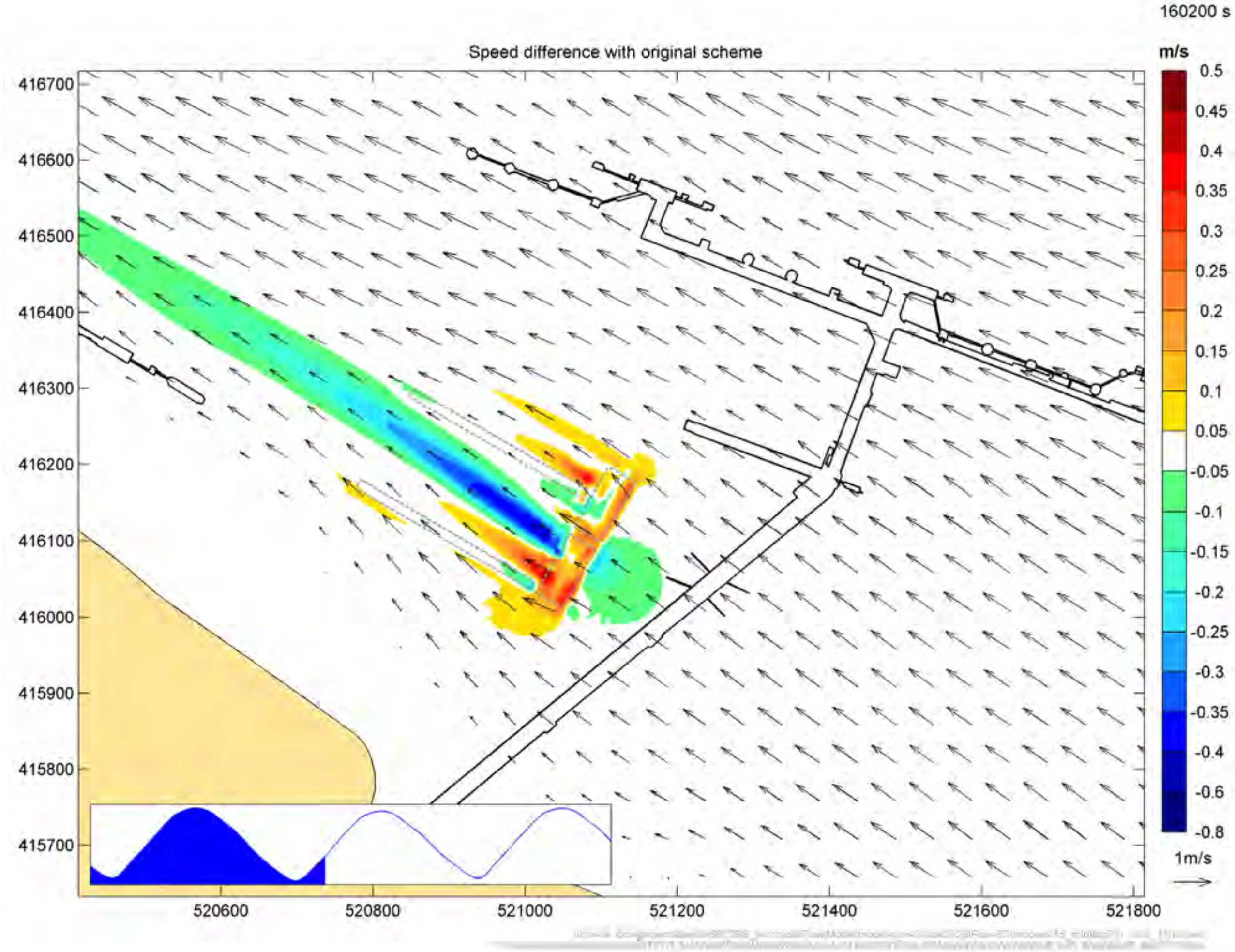


Figure A.16: Difference in current speed between revised and original IERRT layout, LW+2, mean spring tide

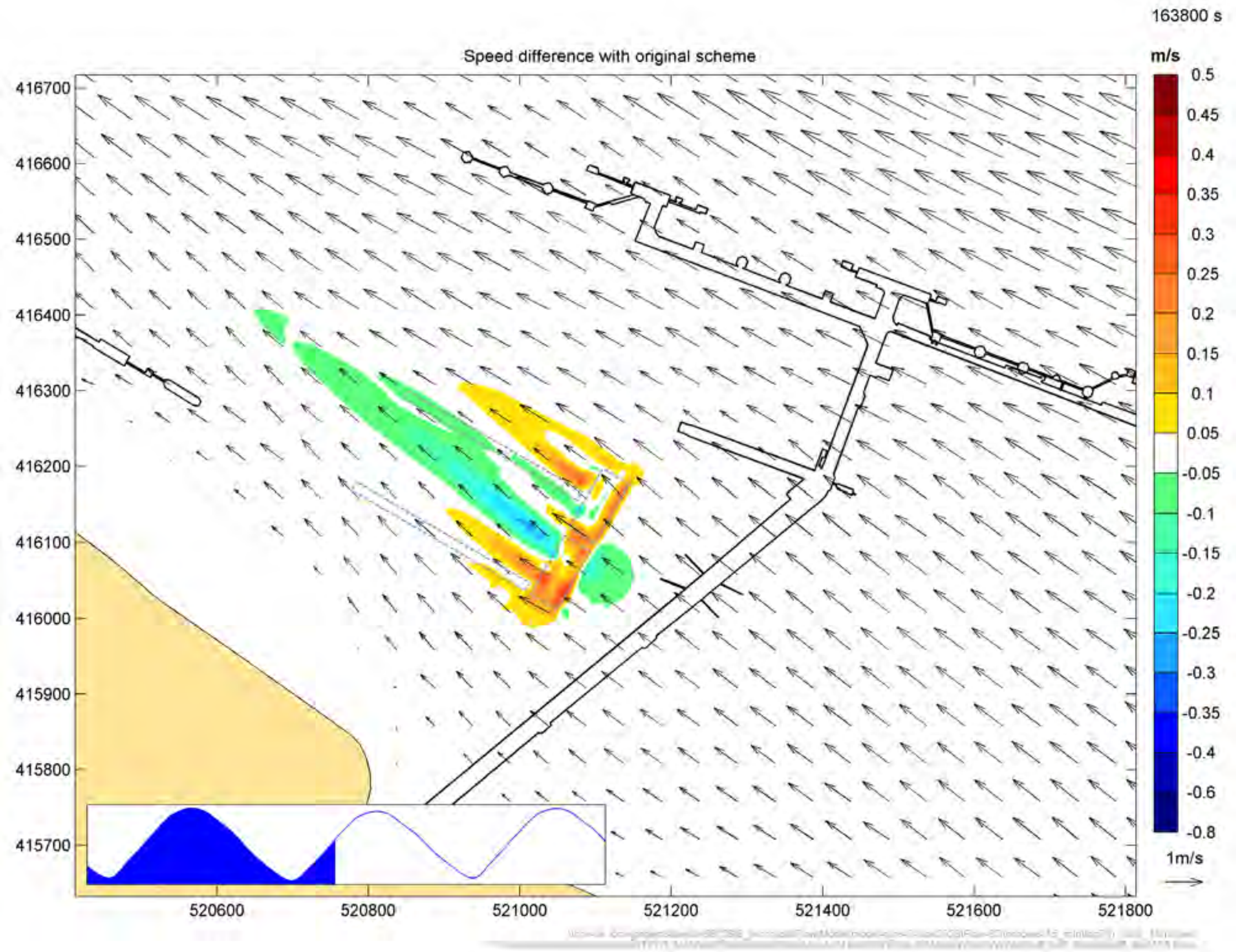


Figure A.17: Difference in current speed between revised and original IERRT layout, LW+3, mean spring tide

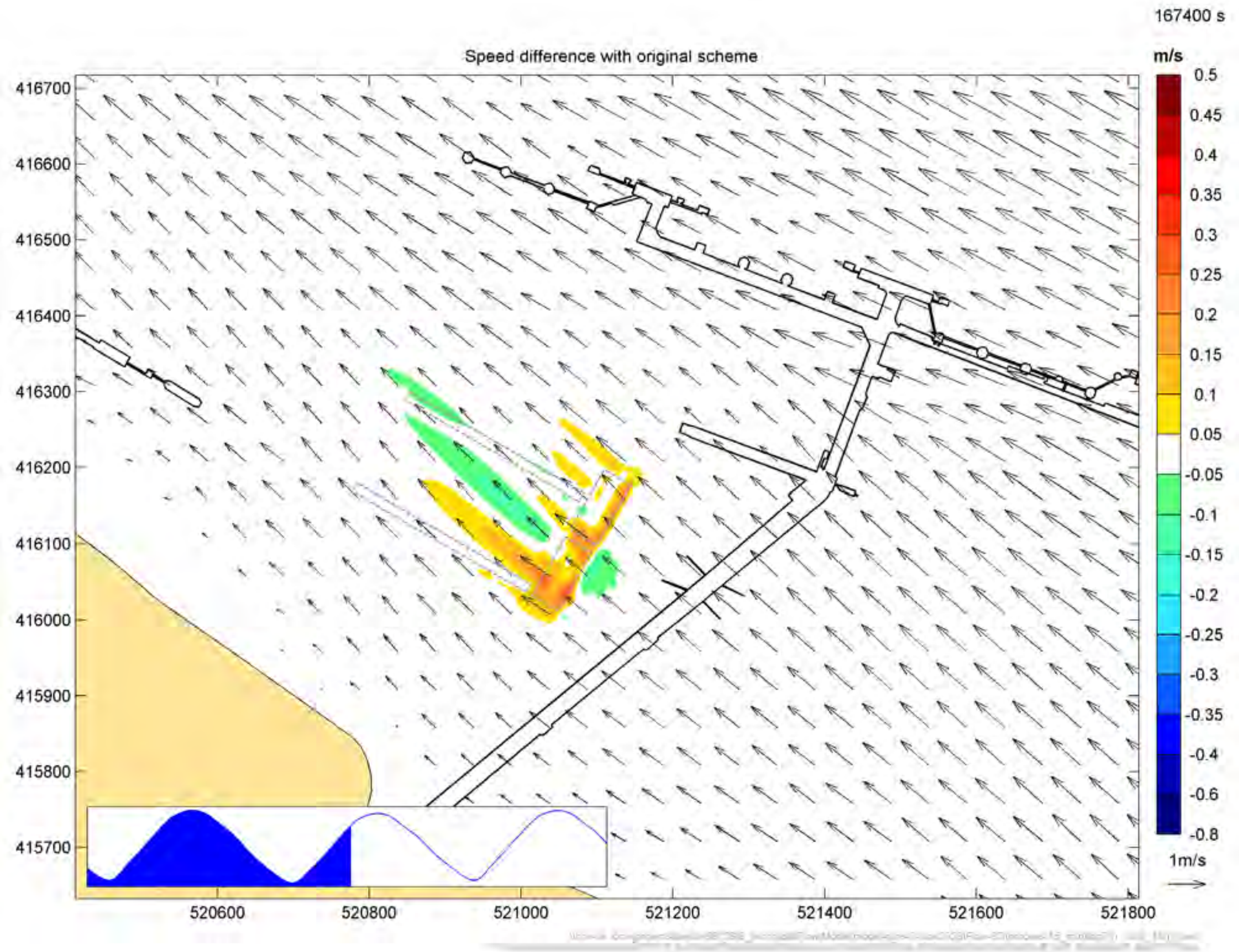


Figure A.18: Difference in current speed between revised and original IERRT layout, LW+4, mean spring tide

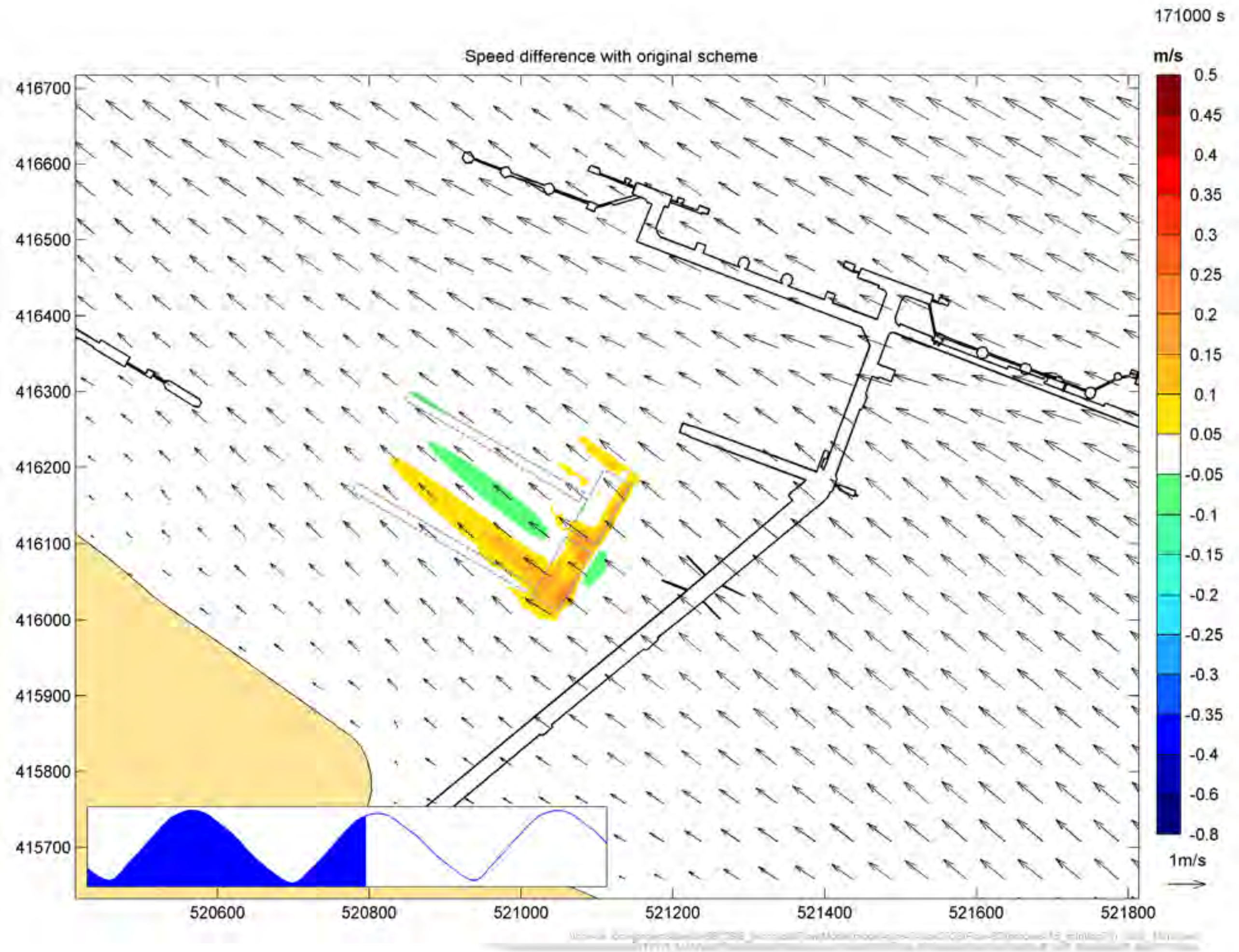


Figure A.19: Difference in current speed between revised and original IERRT layout, LW+5, mean spring tide

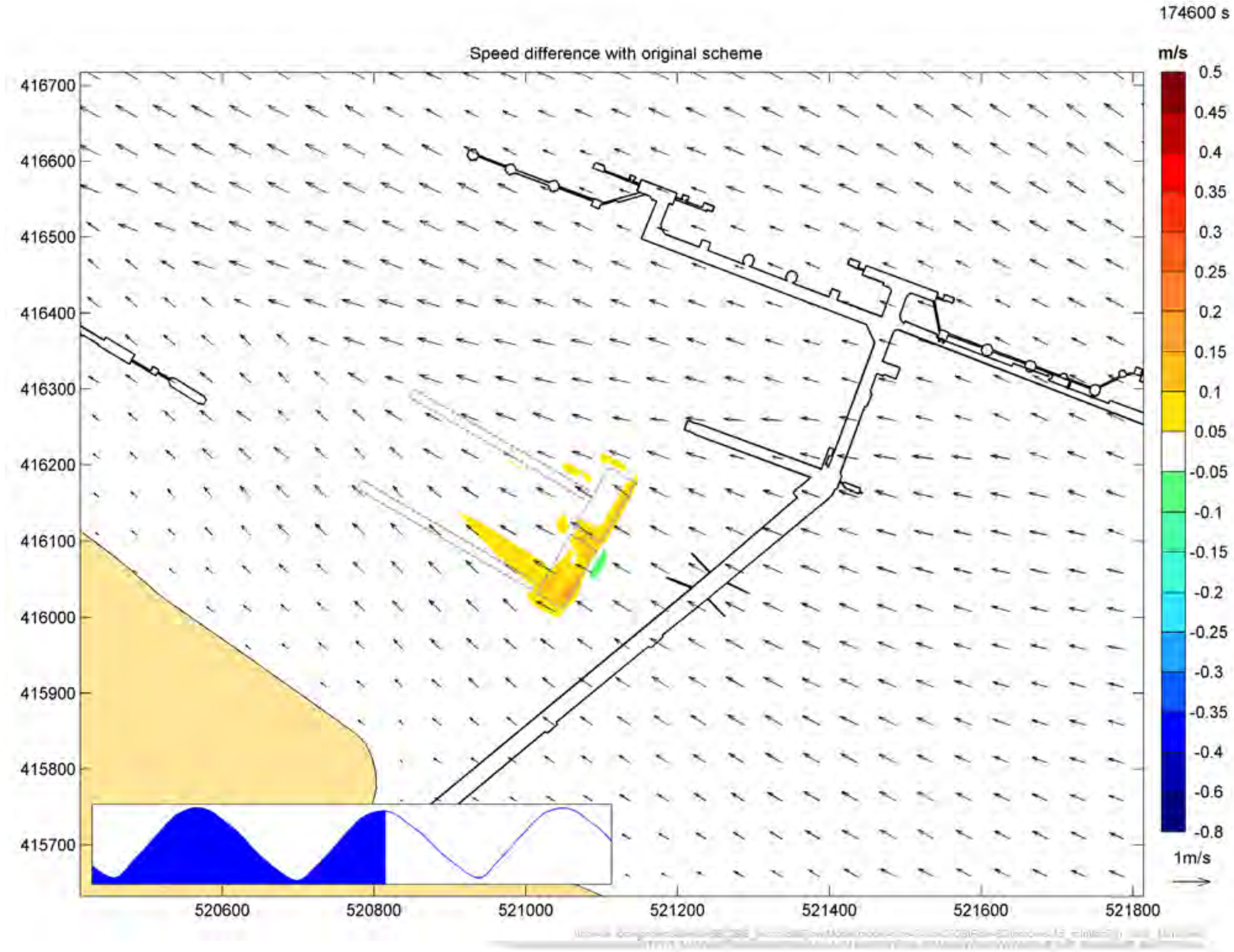


Figure A.20: Difference in current speed between revised and original IERRT layout, LW+6, mean spring tide

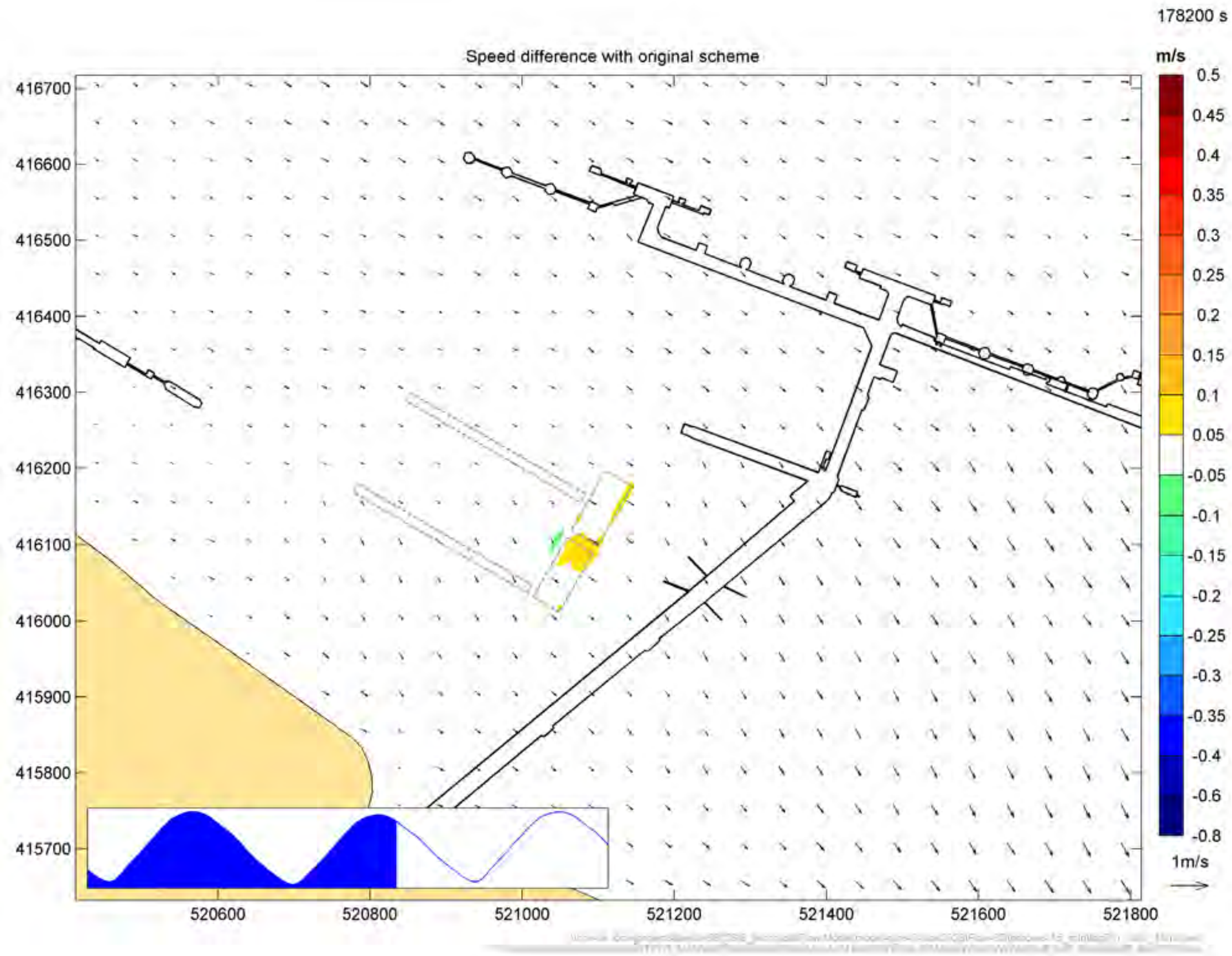


Figure A.21: Difference in current speed between revised and original IERRT layout, LW+7, mean spring tide

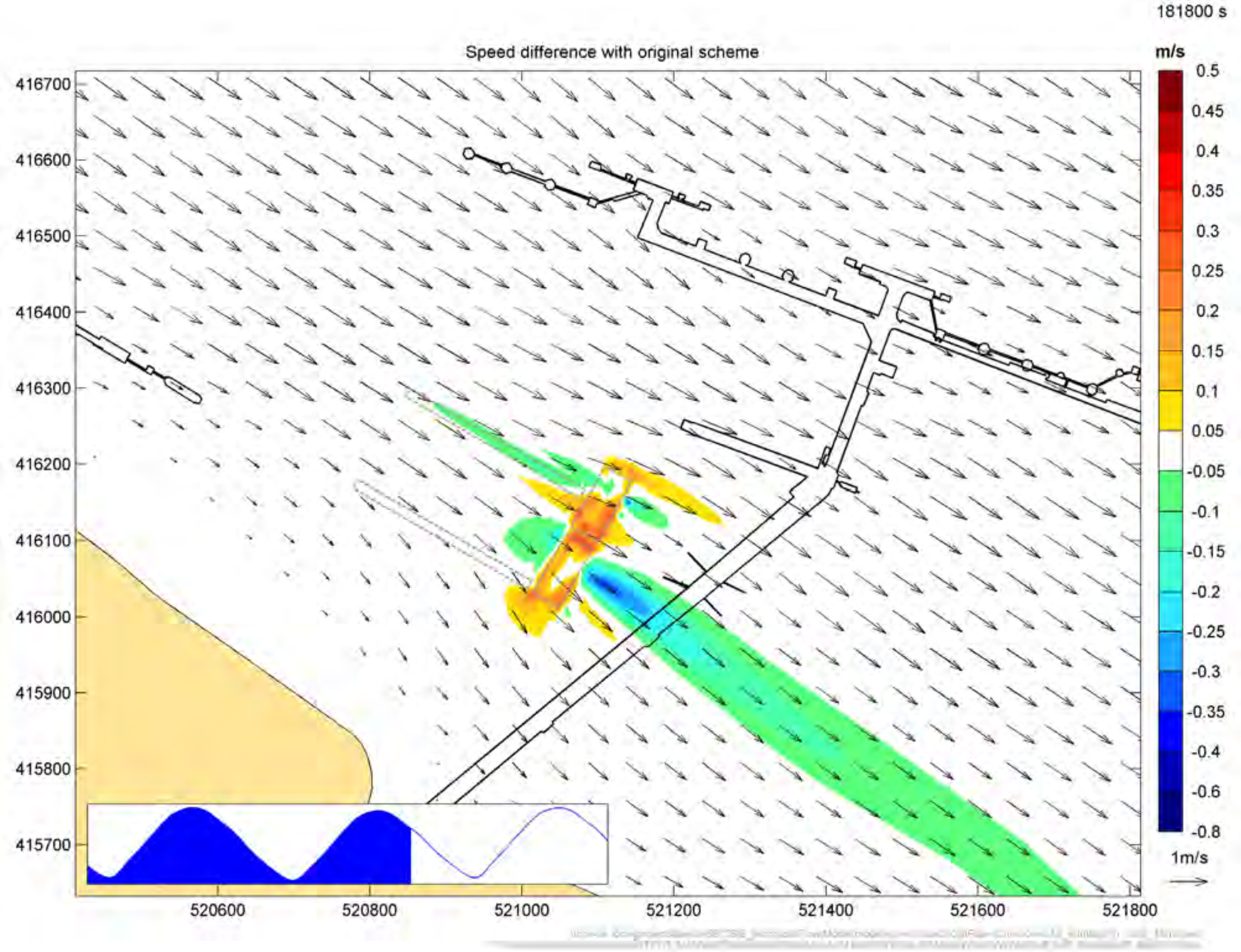


Figure A.22: Difference in current speed between revised and original IERRT layout, LW+8, mean spring tide

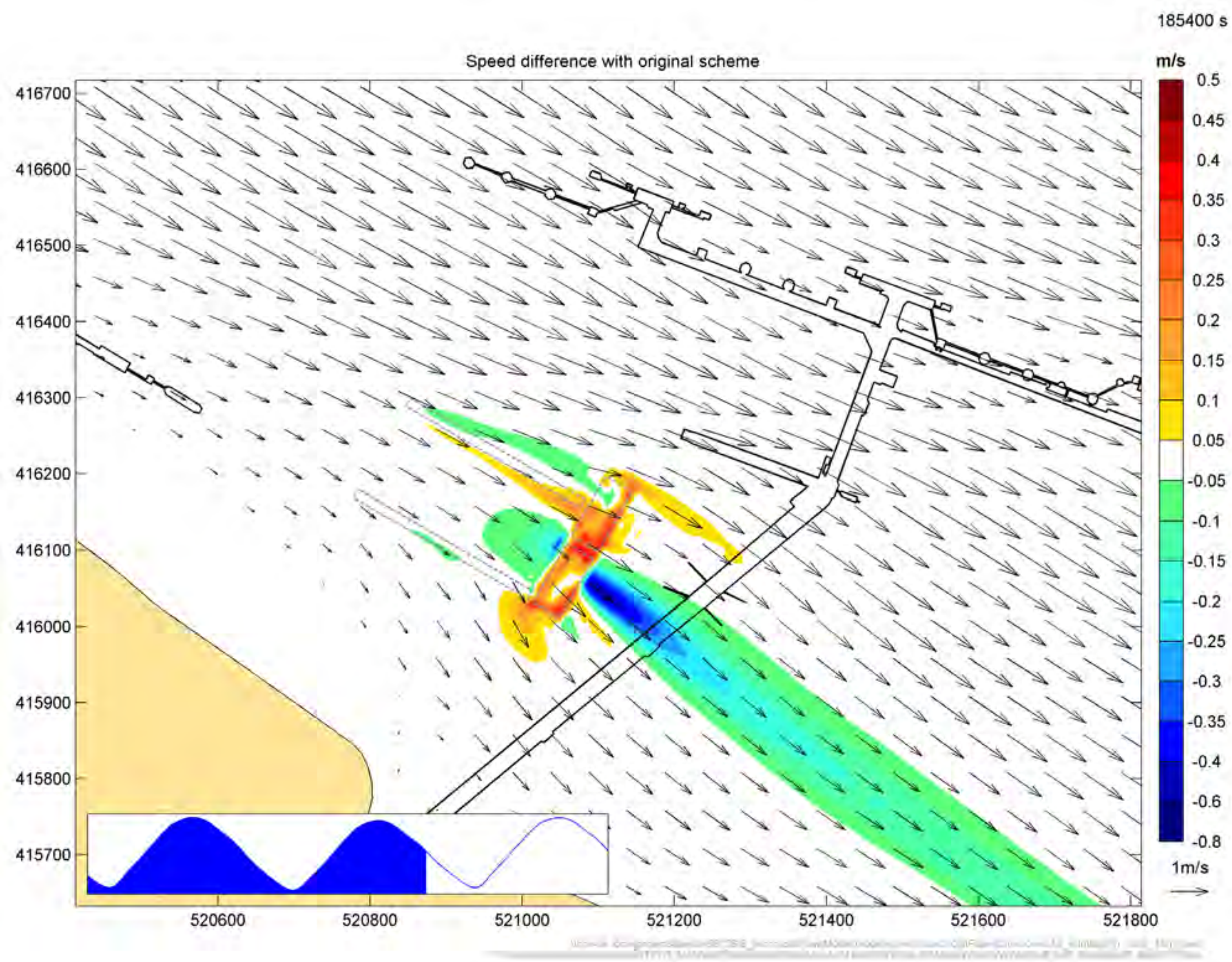


Figure A.23: Difference in current speed between revised and original IERRT layout, LW+9, mean spring tide

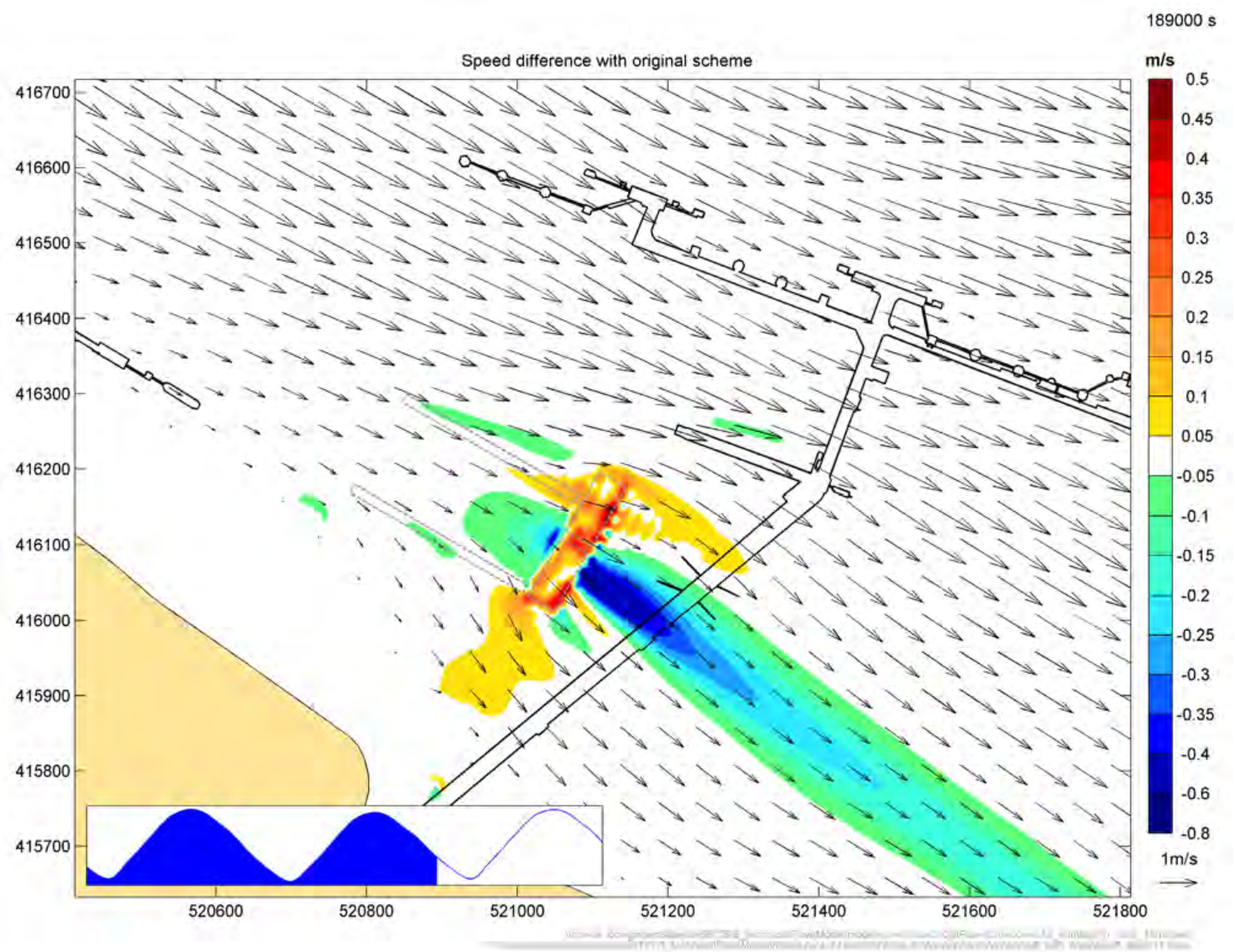


Figure A.24: Difference in current speed between revised and original IERRT layout, LW+10, mean spring tide

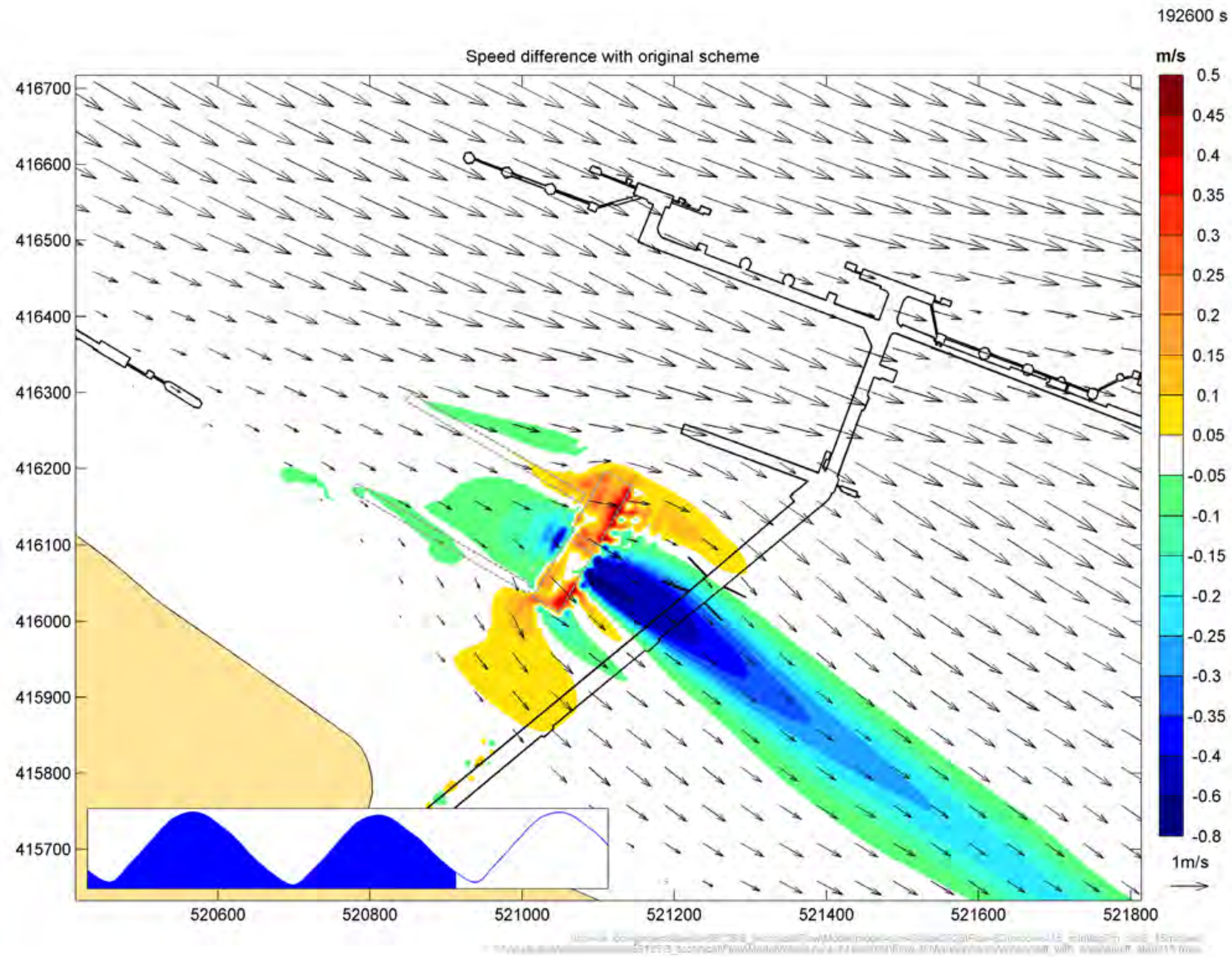


Figure A.25: Difference in current speed between revised and original IERRT layout, LW+11, mean spring tide

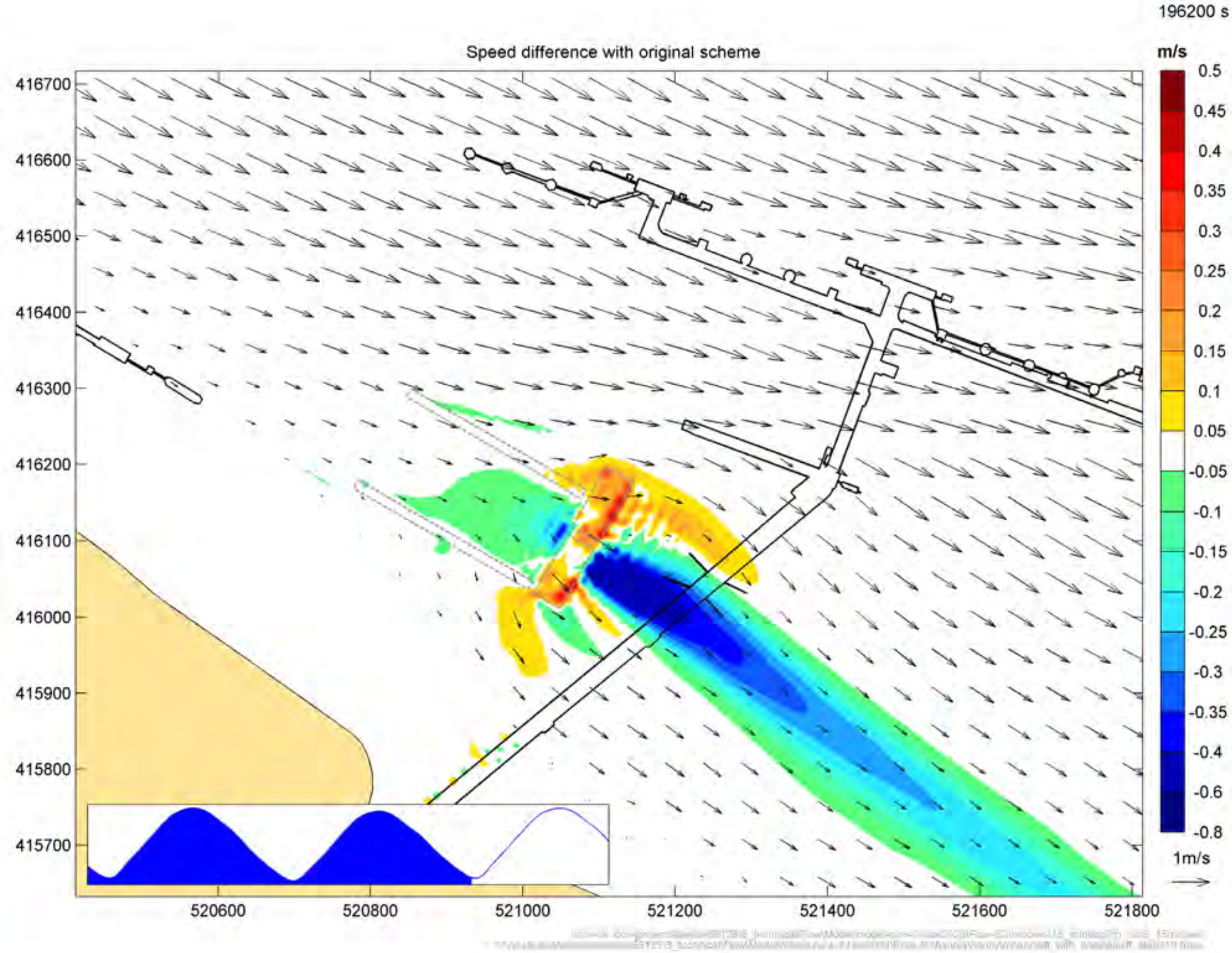


Figure A.26: Difference in current speed between revised and original IERRT layout, LW+12, mean spring tide

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Deadline 8 Appendix 3

Letter APT / ABP 20 December 2023 – request for response on outstanding matters

Document
Letter APT / ABP 20 December 2023 – request for response on outstanding matters

ASSOCIATED PETROLEUM TERMINALS (IMMINGHAM) LIMITED

QUEENS ROAD
IMMINGHAM
N E LINCOLNSHIRE
DN40 2PN

TEL.: (01469) 570300
FAX: (01469) 570321

Date: 20 December 2023

Ref: APT

For the attention of **immroro@abports.co.uk**

Dear Associated British Ports,

IERRT DEVELOPMENT – FURTHER MATTERS

We write with reference to Associated British Ports' ("**ABP**") application for the proposed Immingham Eastern Ro-Ro Terminal Development ("**IERRT**") and to the ongoing DCO Examination. Where relevant we have referred to document references from the IERRT DCO Examination Library.

Associated Petroleum Terminals (Immingham) Limited and Humber Oil Terminals Trustee Limited (together the "**IOT Operators**") continue to have significant concerns regarding the potential navigation and shipping effects of the IERRT on the Immingham Oil Terminal ("**IOT**") and have now raised several requests for further engagement or information to be provided.

We ask that you please provide a response to the following matters:

Document	Response or information requested
Statement of Common Ground (SOCG)	The draft SOCG that was included in our letter dated 4 December 2023. We note a draft was submitted to the ExA as [**REP7-004**].
Protective provisions	It is noted that a response has been provided in the Applicants D7 submissions on the protective provisions sought by the IOT Operators [**REP7-029**]. That response has not been shared with the IOT Operators or otherwise brought to our attention. In the Applicant's protective provisions tracker [**REP7-018**] it is said that "***The Applicant is reviewing the draft protective provisions in light of the ongoing without prejudice negotiations with HOTT***". There are no ongoing negotiations on the protective provisions, but the IOT Operators would welcome the chance to discuss them. Please confirm what discussions are being referred to.

Design details for IERRT infrastructure and vessel impact protection	The request in our letter of 4 December 2023 (see Appendix 2 of [**REP7-70**]) for full information regarding: a. the jetty design parameters, including IERRT infrastructure and proposed vessel impact protection design criteria for the design vessel; and b. the design vessel, including propulsion, rudder, thruster and windage detail. The information required was detailed in the Beckett Rankine memo titled "Design Basis Review" appended to that correspondence.
November 15/17 Simulations	Full and comprehensive information regarding the program and parameters for the simulations conducted on 15 and 17 November, along with a report detailing the outcomes. This was previously requested in our letter on 4 December 2023 (see Appendix 2 of [**REP7-70**]).
December 13/14 Simulations	Full and comprehensive information regarding the program and parameters for the simulations conducted on 13 and 14 December, along with a report detailing the outcomes. Given the limited time remaining in the Examination it is essential that a draft of that report is shared at the earliest opportunity.
Tidal modelling	Full and comprehensive information regarding tidal modelling, including zoomed in area plots of current vectors around the end of the proposed IERRT pontoon – at model grid resolution (ca 10m) – rather than current ca 50m resolution images.
Flow assessment	A detailed flow assessment concerning flows affecting IOT Finger Pier operations, including aspects of IOT vessels arriving, departing, and transferring cargo, as requested in our 4 December 2023 letter (see Appendix 2 of [**REP7-70**]).
Maintenance dredging	Please explain how maintenance dredging is to be achieved for the water space under the proposed IERRT pontoons

We await your response to the requests detailed in this letter.

There is little time left in the examination, with Deadline 8 falling on 8 January and Deadline 9 (the final deadline) on 15 January – meaning we would ask that a response is provided by no later than **Wednesday 3 January 2024**.

[redacted]

Matt Dearnley

Terminal Manager

ASSOCIATED PETROLEUM TERMINALS (IMMINGHAM) LIMITED

Deadline 8 Appendix 4

IOT Operators' notes on navigational simulation runs for enhanced operational controls of 13 / 14 December

Document
IOT Operators' notes on navigational simulation runs for enhanced operational controls of 13 / 14 December

APT / Nash - Navigational Simulation Run Comments for 'enhanced operational controls' - **13th/14th December 2023:**

Models used:

- Stena Transporter/Transit - Stena 'T' Class.
- Celestine - CLdN G9 - dead ship only and with slightly modified (increased) displacement and draft (briefed by MP as 48,400t and 7.72m).
- Wisby Teak coastal product tanker.

HRW stated purpose of ferry simulations was solely to prove that a disabled RoRo ferry of up to design displacement could be arrested, during a peak spring rate ebb tide, only by using a tug(s) and no other emergency means (e.g. use of thrusters, rudders or anchors) prior to alliding with IOT infrastructure, assuming that RoRo has already swung, is heading NW, backing down towards IERRT and the tug's towline is already secured. Previous discussions about whether anchors could/should/can be deployed if a tug is secured via the forward centre lead were repeated, however it was explained that anchors would not be used in these simulations.

T**he coastal tanker simulations were to appraise berthing at IOT 8 with a large finger pier impact protection structure in place and the revised tidal flow due to increased pontoon blockage**. A blockage allowance for up to 3 IERRT design vessels alongside the IERRT berths was not modelled.

A request by APT to simulate at least one RoRo failure inside the line of IOT main berths, prior to completing a swing and prior to the forward tug securing was not deemed to be within the scope of the simulations.

The usual pre-session discussion ensued regarding what constituted successful/marginal/fail. IOT stated that even a minor contact with a ship alongside IOT could have catastrophic outcome and should be categorised fail not marginal.

The level of wind variance gusting was requested by IOT to be increased to +/- 5kts rather than =/- 2.5kts as proposed – agreed.

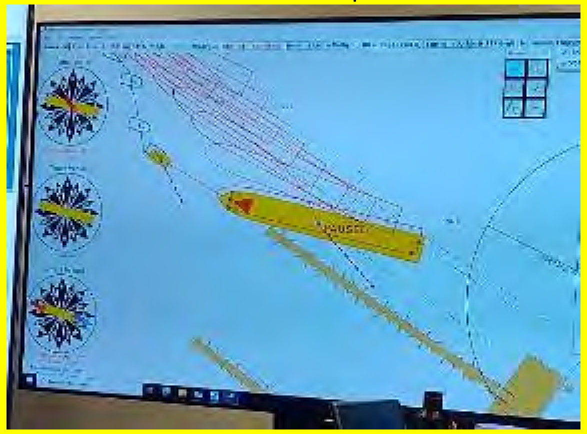
HMH was of the opinion that RoRo approach speeds would be limited by Harbour Direction and therefore that the start speeds used in the simulation runs (2.6 from point A and 1.1 from point B) were excessive. HRW explained that the speeds adopted had been sourced from the actual speeds in those locations as observed during many months of simulation runs to date and there was no evidence to support using a slower speed.

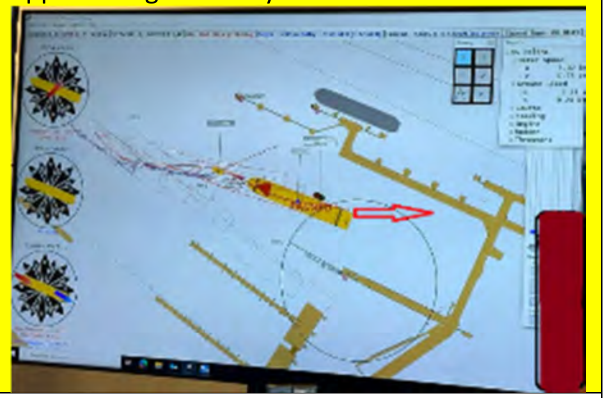
Images of selected photographs taken during the simulations are enclosed as thumbnails within the following table and in larger size at Appendix.

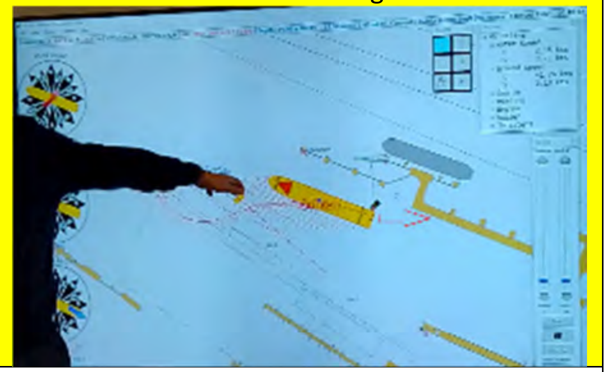
Run ID	IERRT Manoeuvre	Wind	Tide	Tug	HRW Comment	Pilot / Stena / Tug Comment	APT Comment
1	**Stena T Class:** Blackout whilst arriving onto IERRT Berth 1	NE'ly 27kts (gusting +/- 5)	Peak Ebb tide 120T x 4.3kts	1 x 50t secured centre forward	Start position with ship's centre 0.5 ship's length NW of starting point A. Simulated blackout 10secs after commencement of simulation – tug line already connected. Start speed - V/l moving at 2.6kts astern	Tug on the bow was able to pull the Bow round into the wind. Arresting the drift and starting to move the vessel ahead. SMS Tug Master discussed that 100% power isn't normally used, apart from very short periods. Operating at 100% power massively increases the chance of mechanical or tow line failure and that 90% was the normal 'maximum'.	Took 4min 45secs to arrest the vessel, assuming tug already secured. (Note – it takes >25mins to obtain the fire Tug for support – not immediate). In response to SMS tug skipper, HRW stated that the idea of the simulations is not to introduce 'double jeopardy' whereby the tug is not available to deliver full power. APT commented that HRW must listen to the experience of the tug skipper and act accordingly in a way which is normal and representative, therefore operating the tug at 90% power when asked for maximum lift by a pilot. HRW / ABP reluctantly agreed to 90% as 'routine' maximum.
2	**Stena T Class:** Blackout whilst arriving onto IERRT Berth 1	SW'ly 27kts (gusting +/- 5)	Ebb tide 120T x 4.3kts	1 x 50t secured centre forward	Start position with ship's centre 0.5 ship's length NW of starting point A. V/l moving at 2.6kts astern Simulated blackout after 10secs from simulation starting. Simulation ends with V/L in a Position after 12 minutes near to S'ly side of Berth 1 heading NW'ly	Tug on the bow was able to eventually arrest the drift and starting to move the vessel ahead by the time the run was suspended. No anchors were deployed. Tug skipper – need more dialogue between master and tug re progress & outcome so that % power and angle can be optimised.	RoRo was trending was towards unprotected inside of IOT1 had the tug power not been adequate or had failed.

							
3	**Stena** **T Class:** Blackout whilst arriving onto IERRT Berth 1	NW'ly 27kts (gusting +/- 5)	Ebb tide 120T x 4.3kts	1 x 50t secured centre forward	Start simulation from ship's centre at point A. V/l moving at 2.6kts astern Simulated blackout after 10secs from simulation starting. **IERRT Vessel allided with IERRT berth 1 structure to arrest the retardation astern and laterally.**	This was an emergency scenario – never had Stena vessels fail like this! No anchors were deployed.	Can't judge the exact impact force on the IERRT terminal infrastructure or damage to vessel. Landed on port shoulder, impact speed bodily sideways at approx 0.6 - 0.7kts on sharp jetty end). HRW could not show in the simulation to what extent any momentum would be lost during a allision / collision. The model therefore must be stopped when the allision / collision is made and the eventual resting position of the vessel is unknown.  A single 50t tug was unable to arrest a Stena T Class vessel in these conditions of tide & wind resulting in unknown consequences for IOT.
4	**Stena** **T Class:** Blackout whilst arriving onto IERRT Berth 1	NE'ly 27kts (gusting +/- 5)	Ebb tide 117T x 4.0kts	1 x 50t secured centre forward	Starting simulation from point B. V/l moving at 1.9kts astern. Simulated blackout after 10secs from simulation starting. **Vessel allided with IERRT structure at its N'ly point.**	v/l retardation had stopped and vessel had just started to move ahead again, although was setting sideways in the wind. No anchors were deployed.	Can't judge the exact impact force on the IERRT terminal infrastructure. Landed with port quarter square alongside and of jetty face, impact speed approx 0.5kts).

							 HRW could not show in the simulation to what extent any momentum would be lost during a allision / collision. The model therefore must be stopped when the allision / collision is made. A single 50t tug arrested the sternway but the lateral leeway resulted in IERRT heavy contact.
5	**Stena T Class:** Blackout whilst arriving onto IERRT Berth 1	SW'ly 27kts (gusting +/- 5)	Ebb tide 117T x 4.0kts	1 x 50t secured centre forward	Starting simulation from stern on point B (stern of RoRo level with end of IERRT Berth 1. V/l moving at 1.9kts astern	V/L retardation had stopped about 200m from IOT finger pier after 12 minutes. No anchors were deployed.	
6	**Stena T Class:** Blackout whilst arriving onto IERRT Berth 1	NW'ly 27kts (gusting +/- 5)	Ebb tide 114T x 4.0kts	1 x 50t secured centre forward	Starting simulation with centre of RoRo on point B, level with middle of IERRT Berth 1. V/l moving at 1.9kts astern. **Simulation ended with Port Bow striking the tip of IERRT.**	One 50t tug cannot arrest the vessel in these extreme conditions. No anchors were deployed.	Vessel allided with IERRT, still moving at 1.2 kts astern and with the bow 1.3kts to port. RoRo would have contacted the finger pier & moored tankers if simulator had allowed continuation.  Rudders noted to be hard to starboard, although should be kept amidships (so as not to induce any turning moment with tidal flow past hull). HRW viewed this as partial success because the premise was to stop vessel alliding with IOT infrastructure, but a single 50t tug was not able to arrest a Stena T Class in these conditions of wind and tide resulting in unknown consequences for IOT.

6A	**Stena T Class:** Blackout whilst arriving onto IERRT Berth 1	NW'ly 27kts (gusting +/- 5)	Ebb tide 114T x 4.0kts	1 x 50t secured centre forward	Resumed run from 6A, starting simulation with stern of RoRo middle of IERRT Berth 1, bow dragging down jetty, v/l moving at 1.0 - 1.3kt bodily.	No anchors were deployed.	Unrealistic simulation outcome – the function of own ship contacting a jetty confuses the simulation software.
6B	**Stena T Class:** Blackout whilst arriving onto IERRT Berth 1	NW'ly 27kts (gusting +/- 5)	Ebb tide 114T x 4.0kts	1 x 50t secured centre forward	Rerun of run 6, BUT REDUCE STARTING SPEED to 1.1kts to 'see what is manageable'.	Run scrapped due to unexplained acceleration of RoRo -software error	
6C	**Stena T Class:** Blackout whilst arriving onto IERRT Berth 1	NW'ly 27kts (gusting +/- 5)	Ebb tide 120T x 4.3kts	1 x 50t secured centre forward	Starting simulation from point B Starting speed 1.1kts astern.	Better representation of a main power failure? No anchors were deployed.	RoRo allided with Berth 1 end, stern speed 0.9kts, lateral bodily set 1.0kt to port at time of allision with unknown consequences for IOT.  This is viewed by HRW as partial success as the premise was to stop vessel alliding with IOT Finger pier.
6D	**Stena T Class:** Blackout whilst arriving onto IERRT Berth 1	NW'ly 25kts (fixed no gusting)	Ebb tide 117T x 4.0kts	1 x 50t secured centre forward	Starting point 0.5 ship length NW of point B. Starting speed 1.1kts astern. Blackout initiated when vessel moving 0.7kts astern. RoRo Stern inline with tip of IERRT 1. Simulation stopped when IERRT v/l made contact with Berth 1 at 0.6kts.	Manoeuvre possible but may take further practice. Stena - as soon as bow goes across wind & tide, even at a 10 degree angle, it becomes unrecoverable – how many tonnes of lateral force from the tide is that situation!? Never lost both engines on a Ro-Ro before. No anchors were deployed.	**Starting point moved more to NW to give tug more opportunity to arrest RoRo. Wind variance removed and mean speed reduced in order to find a level of NW wind which might enable a safe outcome**. RoRo allided with IERRT 1 making 0.5 kts astern and 0.6 kts lateral speed to port. 

							This is viewed by HRW as partial success as the premise was to stop vessel alliding with IOT finger pier.
7	**Design displacement vessel:** Blackout whilst arriving onto IERRT Berth 1	NE'ly 27kts (gusting +/- 5)	Ebb tide 117T x 4.0kts	1 x 50t tug forward (interactive manned simulator) 1 x 50t tug aft (sim operator controlled effect)	Starting point 0.5 ship's length NW of point A at speed of 2.6kts astern. V/L characteristics only being considered to test if it is possible to control a "dead v/l" in these conditions (displacement, windage). Simulation stopped when IERRT v/l port Qtr contacted Berth 1 at 0.6kts.		Forward tug pulling directly ahead, 90%, aft tug secure starboard quarter pulling ahead along ship's side. RoRo allided with port quarter on IERRT berth 1, 0.8kts lateral speed to port, 0.6 kts sternway (as per run 4). This is viewed by HRW as partial success as the premise was to stop vessel alliding with IOT Finger Pier.
8	**Design displacement vessel:** Blackout whilst arriving onto IERRT Berth 1	SW'ly 27kts (gusting +/- 5)	Ebb tide 116T x 4.0kts	As above	Started 30m SW of point A (further to the SW to start a bit upwind) at 2.5kts astern. Run aborted due to vessel getting out of Position.		Forward tug pulling directly ahead, 90%, aft tug secure starboard quarter pulling ahead, 90%, along ship's side. Run aborted – unable to recover RoRo to desired approach trajectory.
9	**Design displacement vessel:** Blackout whilst arriving onto IERRT Berth 1	SW'ly 27kts (gusting +/- 5)	Ebb tide 116T x 4.0kts	As above	Re-run of run 8. Simulation aborted IERRT vessel 230m from IOT trunkway.	In these environmental conditions an approach to IERRT cannot be considered with 2 x 50t tugs. Need to either increase tug strength or decrease environmental parameters, Stena suggest 80/90t tugs or wait until 'some hours' later when peak winds have passed. No anchors were deployed.	APT requested run continue until point of contact but run aborted by HRW – all parties agreed if continued Design Vessel would have contacted IOT trunkway in region of Drakes Island (section of unprotected trunkway without proposed impact protection between Finger Pier and main jetty head). Run paused with RoRo north of Finger Pier, stern approaching trunkway. 
10 (7A)	**Design displacement vessel:** Blackout whilst arriving onto IERRT Berth 1	NE'ly 27kts (gusting +/- 5)	Ebb tide 120T x 4.4kts	1 x 70t tug forward (interactive manned simulator) 1 x 50t tug aft (sim operator controlled effect)	Starting 0.5 ship's length NW of point A Tugs able to arrest retardation of vessel moving astern & bring Design vessel to a holding position off the IERRT.	No anchors were deployed.	**(Repeat of run 7 but with 70t tug forward instead of 50t)** 70t forward tug pulling ahead, 50t aft tug secured starboard quarter pulling ahead. Both tugs' power used ahead until sternway arrested, then tug direction adjusted to arrest lateral drift also – well done.

11 (8C)	**Design displacement vessel:** Blackout whilst arriving onto IERRT Berth 1	SW'ly 27kts (gusting +/- 5)	Ebb tide 118T x 4.0kts	As above (70t/50t)	Starting position 0.5 ship's length NW of point A, 40m upwind in recognition of NE'ly drift. Tugs unable to arrest Design vessel. Continues to drift to a position inside IOT Berth 1 main jetty. HRW Commented that we can't model this scenario further.	No anchors were deployed.	70t forward tug pulling ahead, 50t aft tug secured starboard quarter pulling ahead. Run aborted – All agreed that if it continued the Design Vessel with a 70t and 50t tug would have contacted south side of IOT Berth 1 where no impact protection is planned – 0.5 kt sternway and 0.4kt lateral drift was not being arrested. 
12	**Design displacement vessel:** Blackout whilst arriving onto IERRT Berth 1	SW'ly 27kts (gusting +/- 5)	Ebb tide 118T x 4.0kts	70t/70t configured as above	Re-run of run 11 but with 2 x 70t tugs - 2 x 70t Tugs able to hold design vessel.	No anchors were deployed.	70t tug fwd pulling ahead. 70t tug secured starboard quarter pulling ahead Successfully arrested errant design displacement RoRo
13	**Design displacement vessel:** Blackout whilst arriving onto IERRT Berth 1	NE'ly 27kts (gusting +/- 5)	Ebb tide 117T x 4.0kts	As above (70t/70t)	Repeat of run 10 but from start point B rather than A, moving astern at 2.1kts towards IERRT 1. **Even with 2 x 70t Tugs** **Design Vessel contacted IERRT Jetty.** Vessel was just starting to make headway as she impacted.	No anchors were deployed. A worry that in these conditions and with 2 x 70t tugs a design vessel (dead ship) cannot be safely landed alongside IERRT	Sternway was arrested but IERRT design vessel allided with IERRT berth 1 end knuckle with port quarter, lateral speed 0.5kts. Similar result to run 4. This is viewed as partial success as the premise was to stop vessel alliding with IOT Finger pier.
14 (9B)	**Design displacement vessel:** Blackout whilst arriving onto IERRT Berth 1	NW'ly 27kts (gusting +/- 5)	Ebb tide 117T x 4.0kts	As above (70t/70t)	Starting position A stern near to tip of IERRT. Design vessel Moving astern at 2.5kts onto IERRT. RUN ADANDONED. Design vessel was in dangerous position across the tide.	**Stena Master withdrew from the simulation, citing that these conditions were totally unrealistic and unfair, and that he would never berth in more than 2.5 knots current or 20kts wind.**	APT noted that design vessel in NW wind had not been modelled. HRW agreed to rectify the oversight. Design vessel was clearly out of position and had lost control – once ship's bow drops off the NW wind and ebb tide it is not recoverable. HRW stated that additional risk controls would be required.
15	**Coastal Tanker Berthing to IOT**	SW'ly 20kts (no gusting)	Flood tide LW+1, mean spring,	1 x 10t Workboat	Wind shading **not** active. Design vessel alongside IERRT Berth 1		

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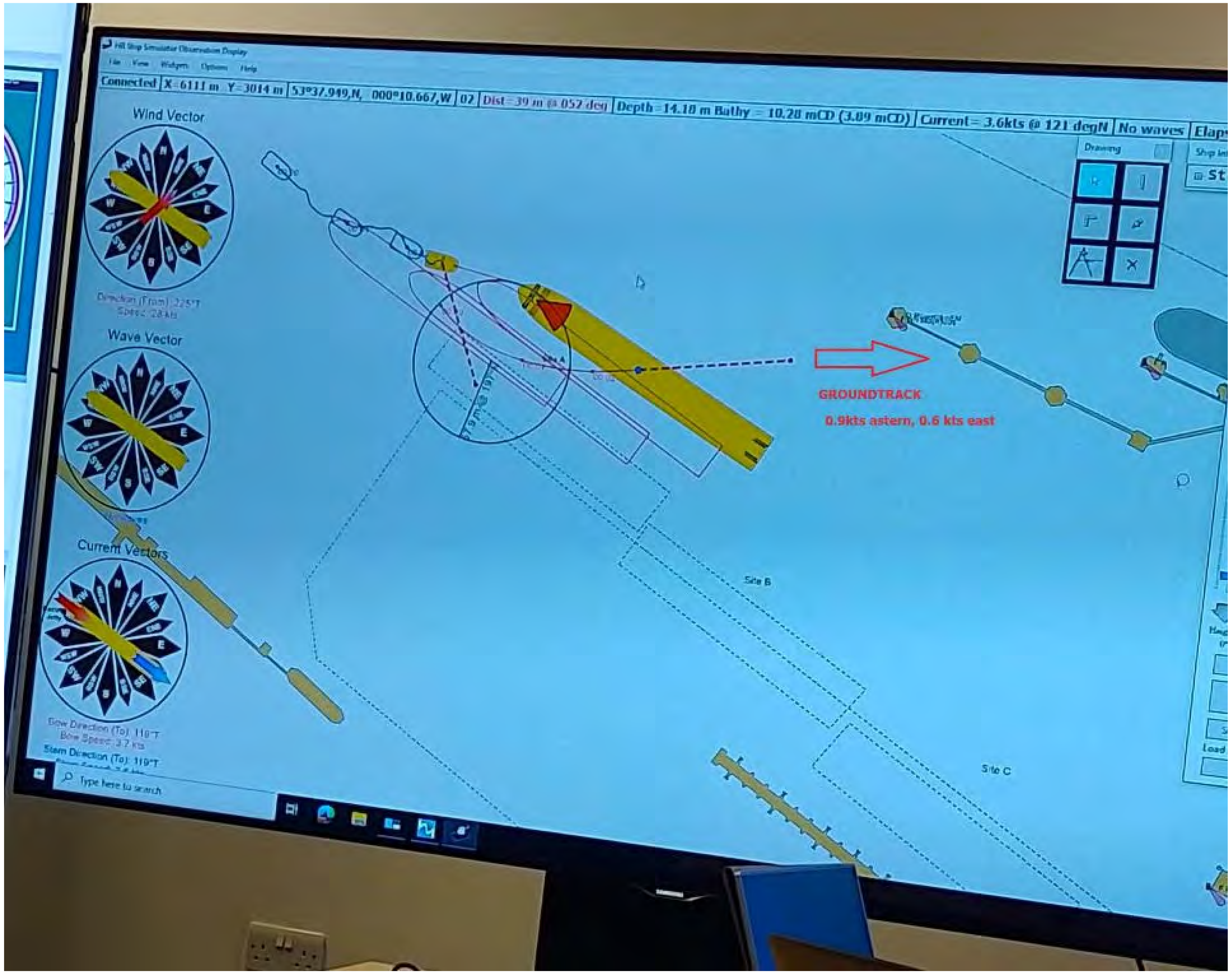
	Berth 8 Under Pilotage		290T x 0.6kts		Barge on Berth 9 Arrival at Flood Tide LW+ 1 Hr		Coastal tanker arrival in ballast – (condition of highest windage). Warm up run. Viewed as a successful run, however tanker must be landed on the section of impact protection and then 'walked' along to the loading berth (and same departing) with risk of damage to ship's rails etc on fendering plus damage to jetty equipment (hoses, hardarms etc with flare of bow).
16	**Coastal Tanker Berthing to IOT Berth 8** Under Pilotage	SW'ly 27kts (gusting +/- 5)	Flood tide LW+1, mean spring, 280T x 0.8kts	1 x 10t Workboat	Wind shading active. Design vessel alongside IERRT Berth 1 Barge on Berth 9 Arrival at Flood Tide LW+ 1 Hr	Noted that as the workboat runs out of space and has to back away from pushing the port quarter – the tanker lateral acceleration increases quickly. Approx 0.2kts landing speed against impact protection once workboat withdrew, 0.5kts landing speed mitigated by port port rudder, good kick ahead (flap rudder), then has to walk up berth in onshore wind. Pilot stated he preferred to remain tight on RoRo to be able to see the line of the berth on approach	Coastal tanker arrival in ballast. Near wind limits of APT Terminal Regulations for arrival.  **Coaster passed parallel, well within 10m of IERRT vessel which is too close for a non-gas free tanker in an open riverine environment**
17 (16)	**Coastal Tanker Berthing to IOT Berth 8** Under Pilotage	NE'ly 27kts (gusting +/- 5)	Flood tide, LW+1, mean spring, 280T x 0.8kts	1 x 10t Workboat	Wind shading active. Design vessel alongside IERRT Berth 1 Barge on Berth 9 Arrival at Flood Tide LW + 1 Hr	Run was commenced in same position as in SW wind – need to commence further NE to compensate for NE wind	Coastal tanker arrival in ballast. Near wind limits of APT Terminal Regulations for arrival. **Coaster passes 10m (half the tanker's beam) off IERRT Vessel – given the strong NE wind this is a near miss, not a controlled approach (see swept path).** 
18 (16B)	**Coastal Tanker Berthing to IOT**	NE'ly 35kts (gusting +/- 5)	Flood tide, LW+1, mean spring,	1 x 50t Tug (interactive	Wind shading active. Design vessel alongside IERRT Berth 1	Much better control with Tug alongside	Coastal tanker arrival in ballast.

	Berth 8 Under Pilotage		280T x 0.8kts	manned simulator) 1 x 10t Workboat	Barge on Berth 9 Arrival at Flood Tide + 1 Hr Starting Position further out (passing IOT1) and approached more upwind	Greater clearance with IERRT vessel than without tug	At upper limit of APT terminal Regulations for arrival. Tug pushing up, passed 15m clear of RoRo, no issues
19	**Coastal Tanker Berthing to IOT Berth 8** Under Pilotage	NE'ly 35kts (gusting +/- 5)	Flood tide, mid flood (highest rate of flow) and more set through jetty 298T x 2.2kts	As above	Starting Position West of IOT Berth 1 Wind shading active. Design vessel alongside IERRT Berth 1 Barge on Berth 9	Noted that as the tidal current increases there is an additional "kick" from 280T to 300T which assists in keeping the vessel to the North.	Coastal tanker arrival in ballast. Mid flood tide deemed to be worst case for on-berth set and rate. At upper limit of APT terminal Regulations for arrival. Tug was used less to push tanker up into the wind because the tide was pushing against the wind at a greater angle.
20 (22)	**Coastal Tanker Berthing to IOT Berth 8** Under Pilotage	SW'ly 27kts (gusting +/- 5)	Flood tide, LW+1, Mean Spring 288T x 0.9kts	1 x 10t Workboat	Wind shading active. Design vessel alongside IERRT Berth 1 Barge on Berth 9 Mean Spring Tide has slightly less flow than peak spring but an increased N'ly component through IOT8.	No Tug used only Workboat.	Landed parallel on jetty extension / impact protection but hard landing of tanker onto berth – circa 0.6kts alongside landing speed – too much for routine arrivals therefore MARGINAL OUTCOME. Near upper wind limit of APT terminal Regulations for arrival.
21 (23)	**Coastal Tanker Berthing to IOT Berth 8** Under Pilotage	SW'ly 27kts (gusting +/- 5)	Flood tide Peak Spring 295T x2.1kts	1 x 50t tug (manned) 1 x 10t Workboat	Peak Spring LW+3, mid flood, 2.1kts flow alongside RoRo Wind shading active. Design vessel alongside IERRT Berth 1 Barge on Berth 9	Stena master noted that terminal would significantly benefit from a small tug/workboat which can operate with a tow line rather than being limited to pushing only.	Hard landing of tanker's stern onto berth due to workboat having to vacate - 0.4kts alongside landing speed - is too high for routine arrival, therefore MARGINAL. Near upper wind limit of APT terminal Regulations for arrival.
22 (17)	**Coastal Tanker DEPARTURE** from **Berth 8**	SW'ly 27kts (gusting +/- 5)	Peak flood, mid flow, 301T x 1.8kts	As above	Peak Spring Tide 3hrs after LW. Wind shading active. Design vessel alongside IERRT Berth 1 Barge on Berth 9	50t tug secured centre aft Manoeuvre is to drag tug / coaster aft first along jetty / impact protection then lift off the jetty.	Dragging the tanker along the jetty & impact protection risks damage to ship's rails from fenders and to jetty hoses/hard arms from flare of bow. The effect of tankers being pinned alongside is exacerbated because vessels only sail from berth 8 during flood tide when there is a strong push on to the berth. Different states of vessel loading and variation in tidal heights would require considerable panel fendering along the face of the jetty extension impact protection. Tug dragged stern of coaster to north once clear of FP, used workboat to push bow through south, tanker bow passed 15m clear of RoRo. Roller fender located on impact protection will still be required (essential).
23 (24)	**Coastal Tanker DEPARTURE** from **Berth 8**	NE'ly 35kts (gusting +/- 5)	302T x 1.7kts	As above	Peak Spring Tide 3hrs after LW. Wind shading active. Design vessel alongside IERRT Berth 1	50t tug pushing amidships as tanker backed down jetty and around donut fender. Workboat pushed port bow through south once clear.	No issues on this occasion but need to carefully watch set onto moored RoRo during departure and swing in NE wind.

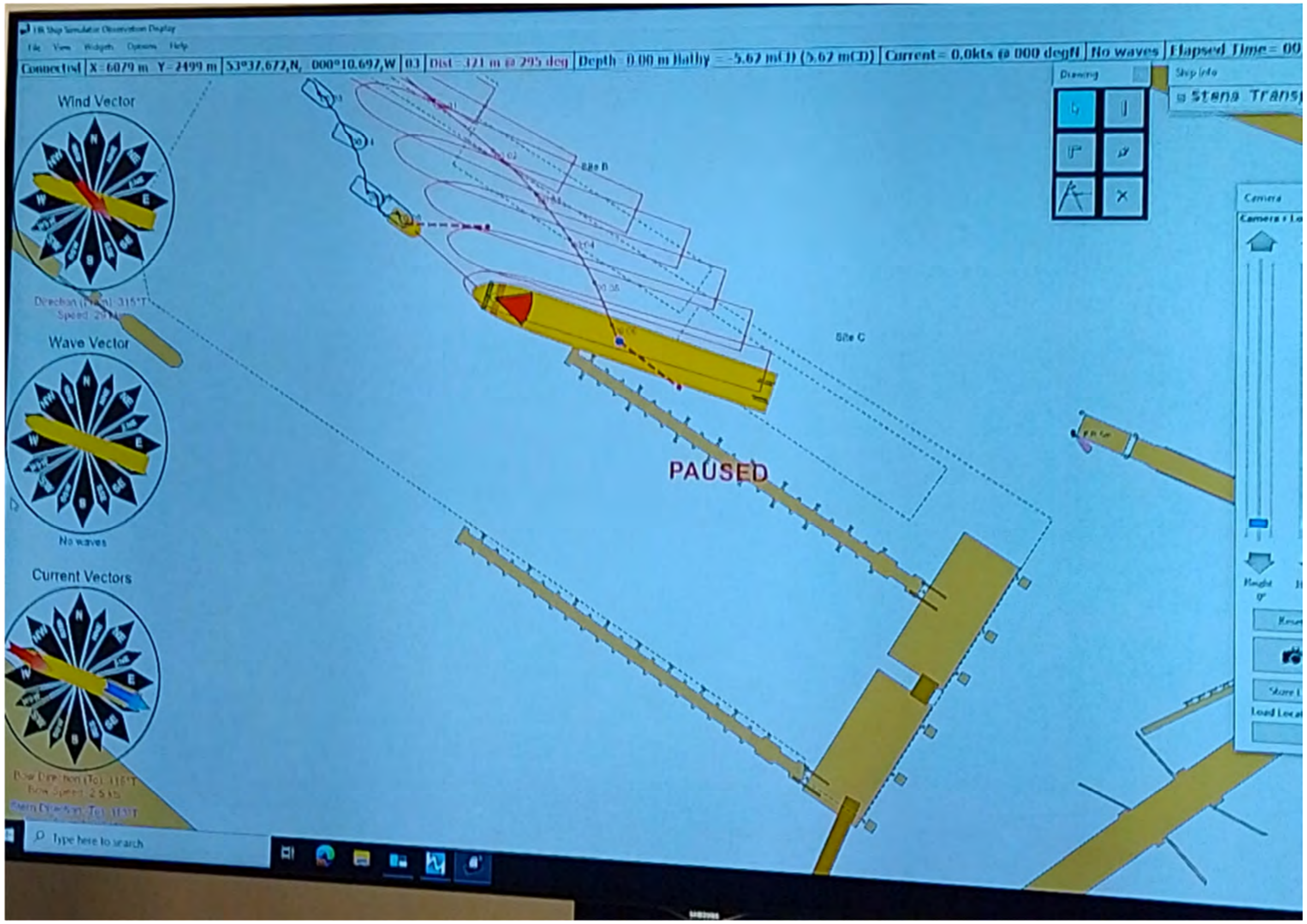
					Barge on Berth 9		

Appendix of images

Run 2



Run 3



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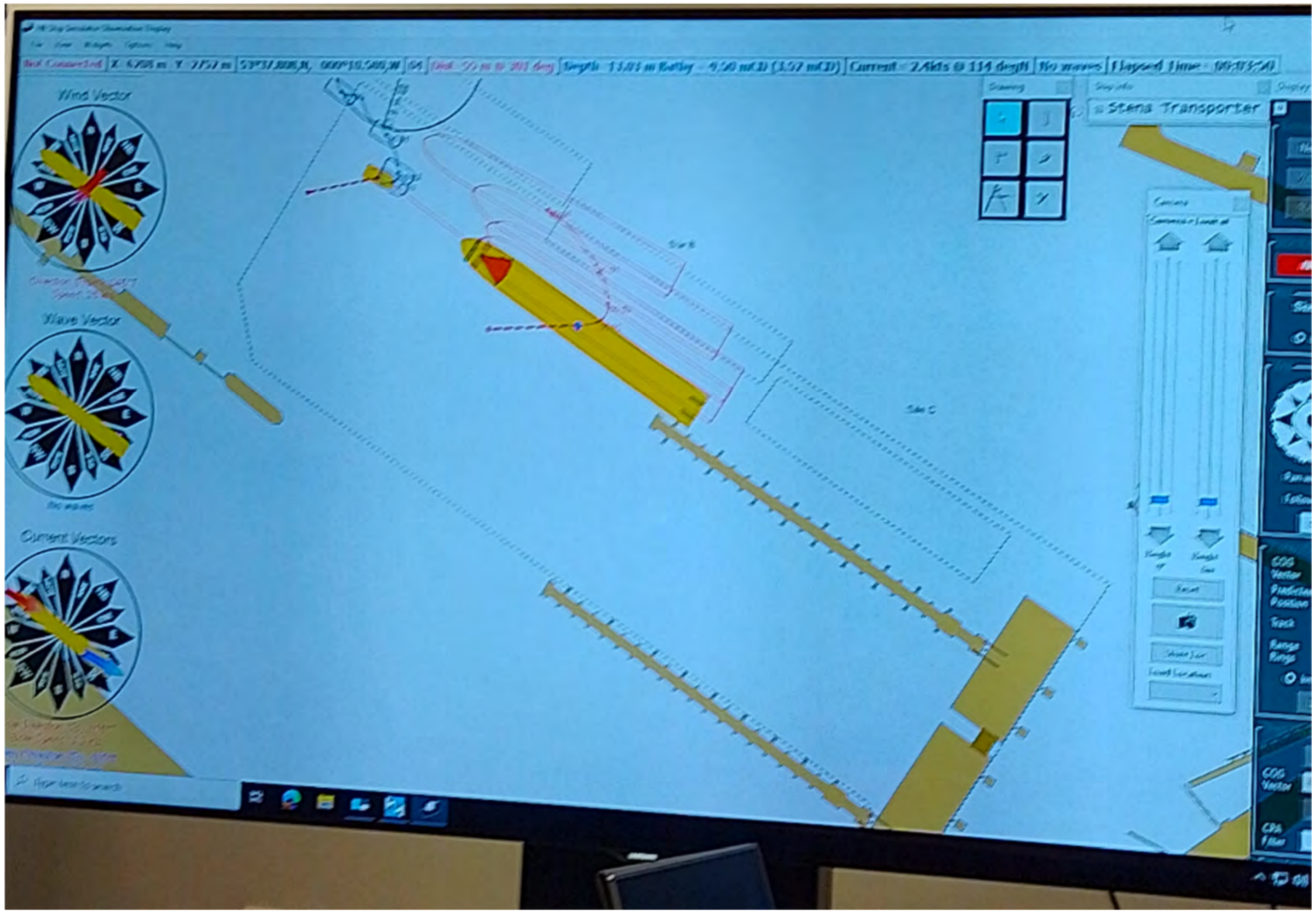

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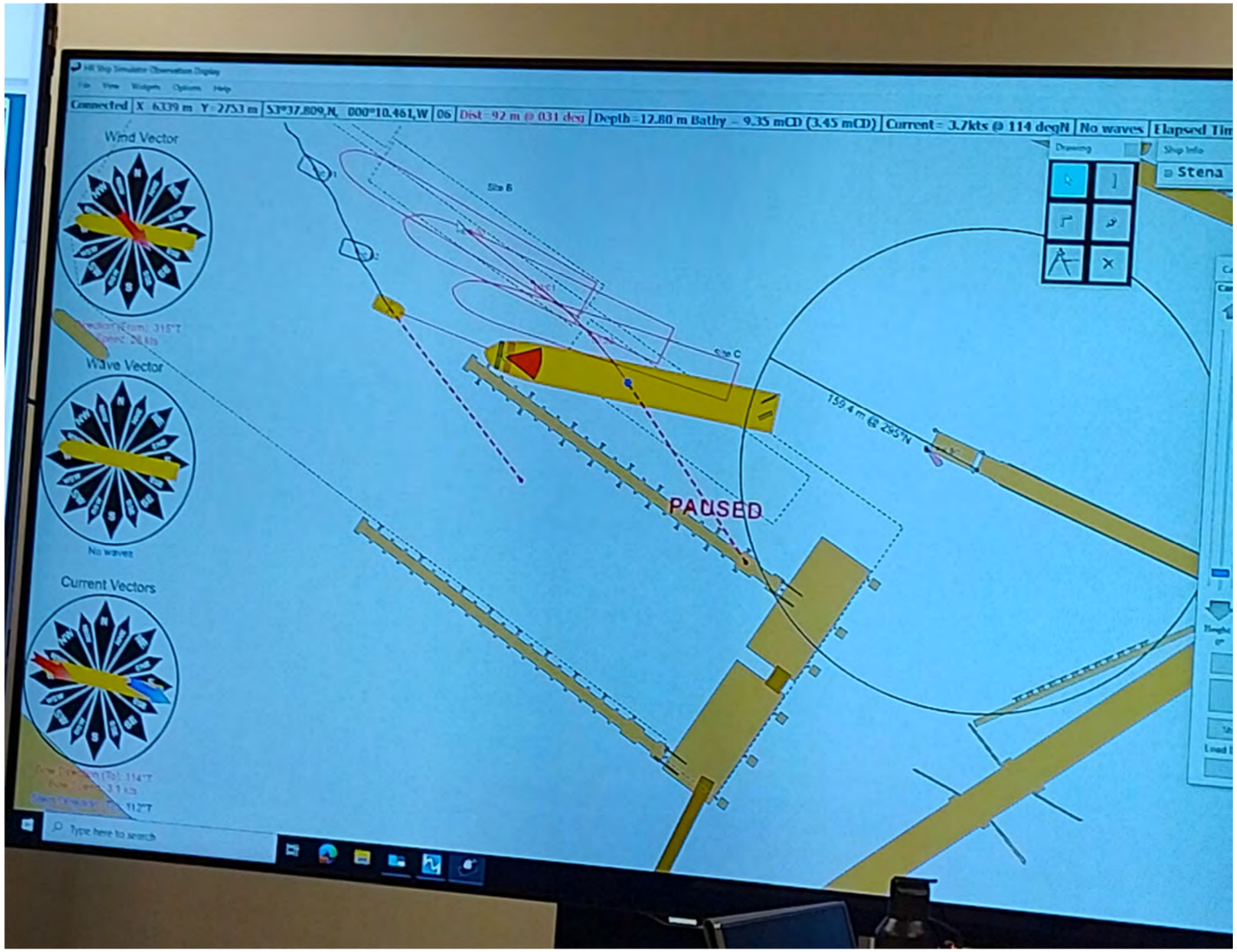
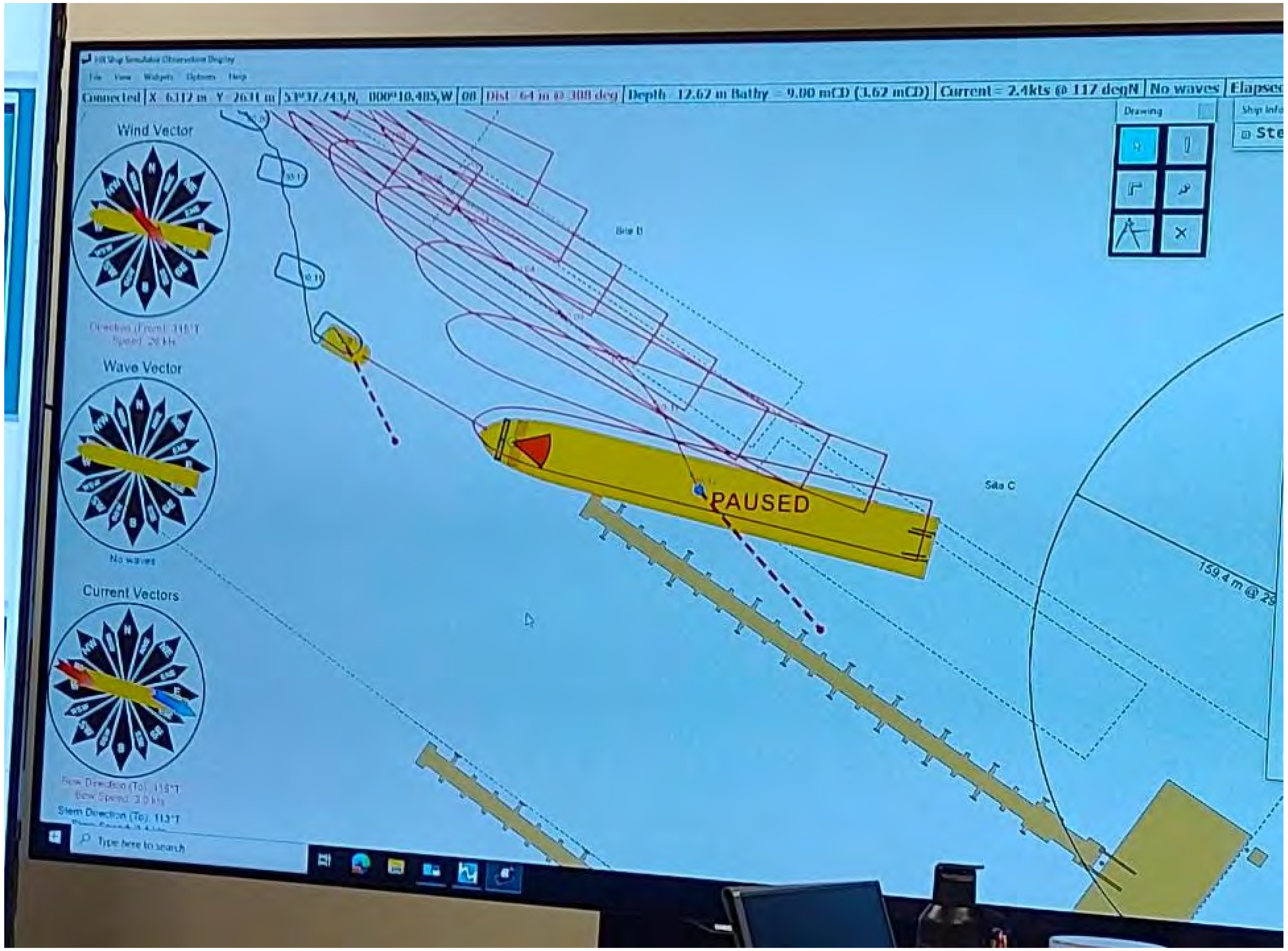
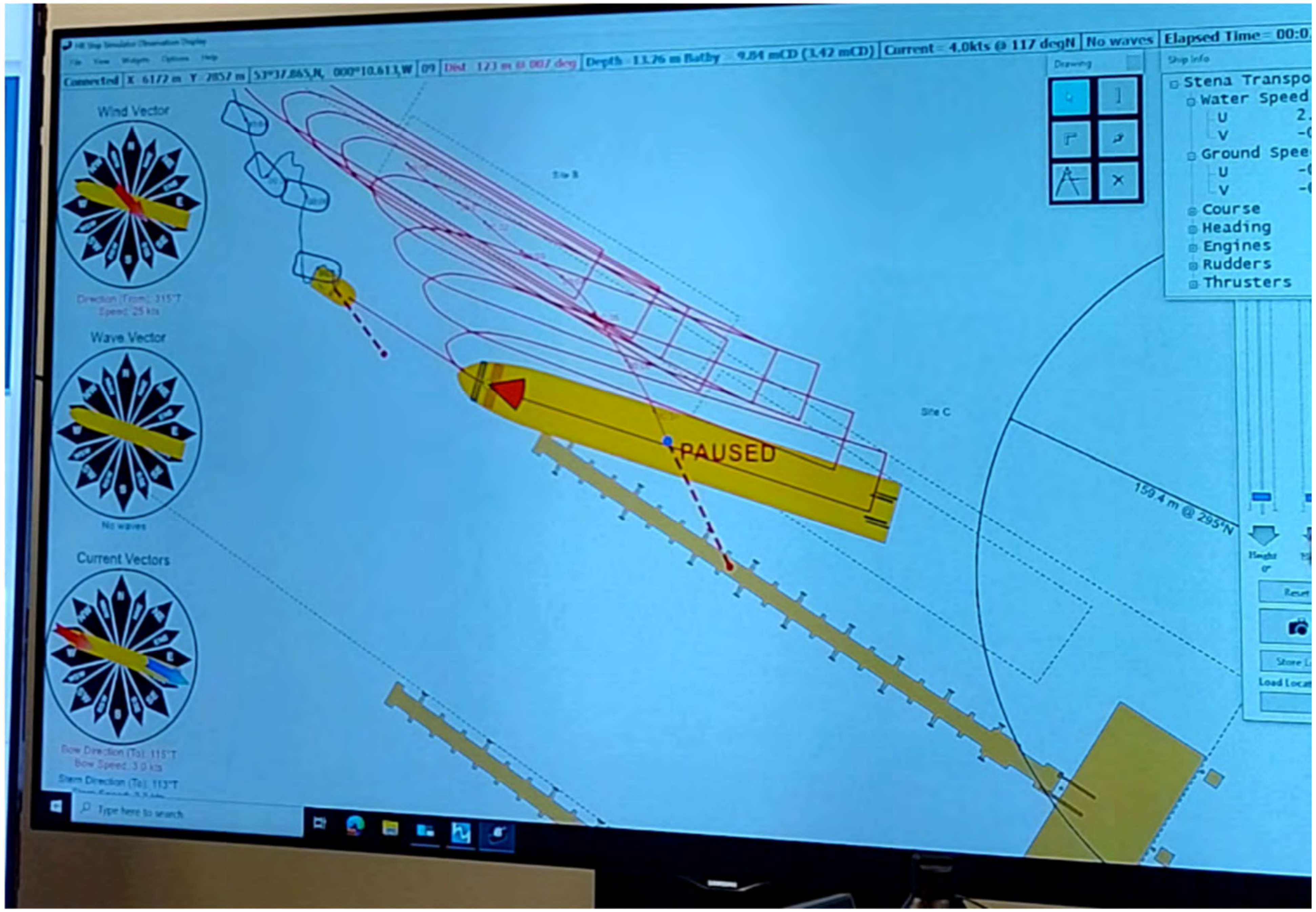


Connected | X=6339 m Y=2753 m | 53°37.809,N, 000°10.461,W | 06 | Dist=92 m @ 031 deg | Depth=12.80 m Bathy = 9.35 mCD (3.45 mCD) | Current= 3.7kts @ 114 degN | No waves | Elapsed Tim
Wind Vector
Wave Vector
No waves
Current Vectors
Stena
PAUSED
159.4 m @ 295°N

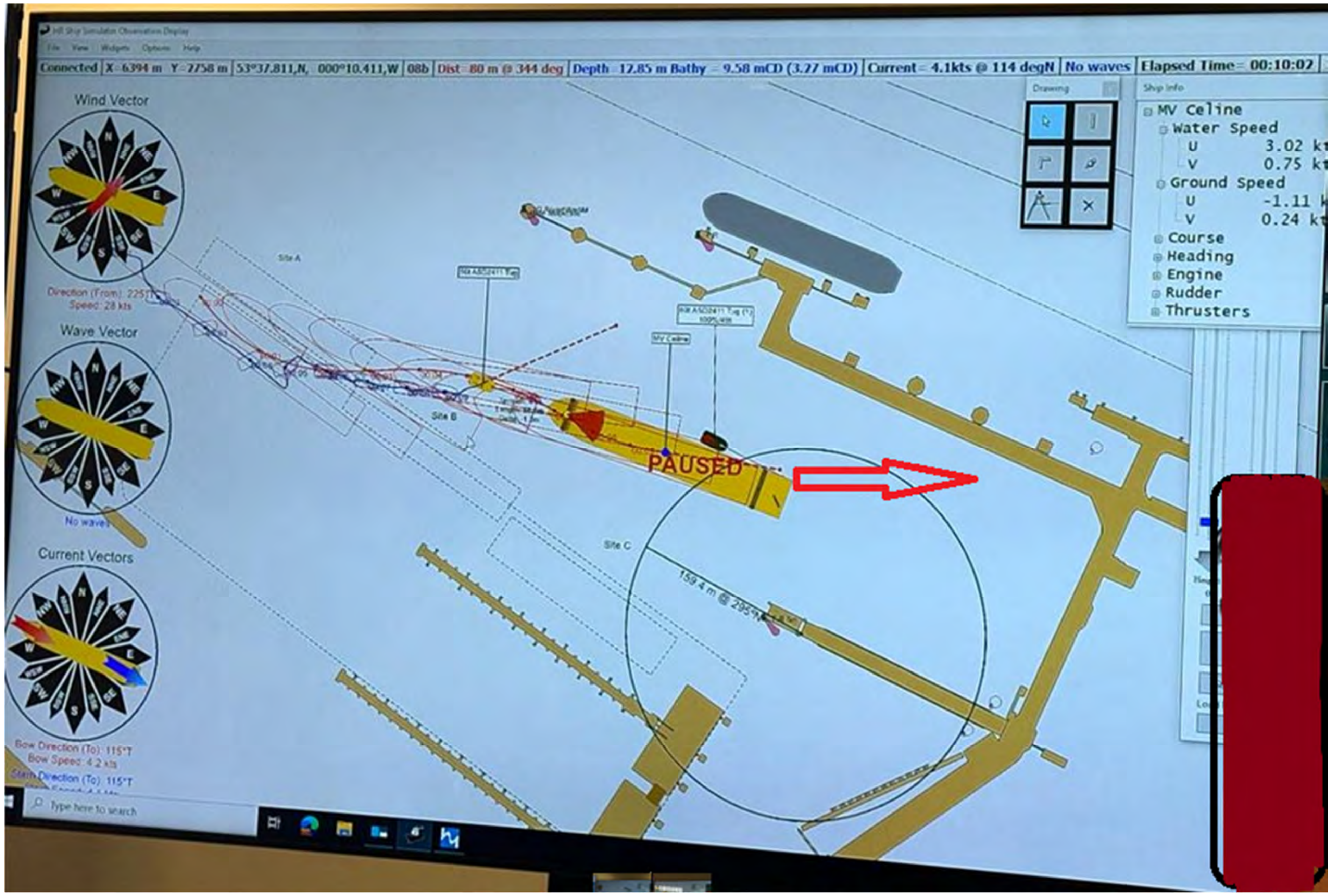
Run 6C


Connected
Depth 12.67 m Bathy = 9.00 mCD (3.62 mCD)
Current = 2.4kts @ 117 degN
No waves
Drawing
Wind Vector
Wave Vector
No waves
Current Vectors
PAUSED
Site C

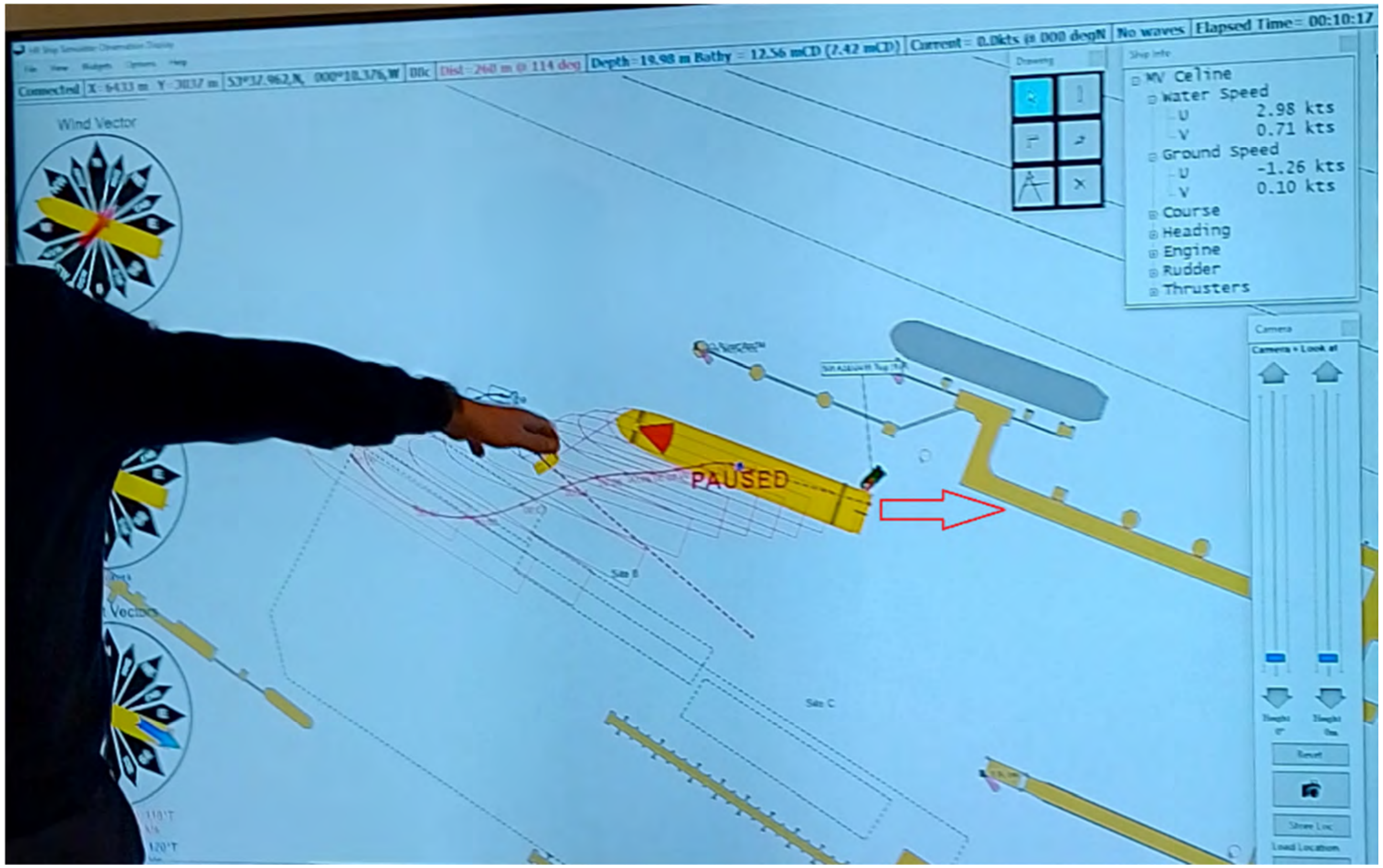
Run 6D


Connected
Current = 4.0kts @ 117 degN
No waves
Elapsed Time
Drawing
Ship Info
Wind Vector
Wave Vector
No waves
Current Vectors
Course
Heading
Engines
Rudders
Thrusters
PAUSED
159.4 m @ 295°N
Site C
Type here to search

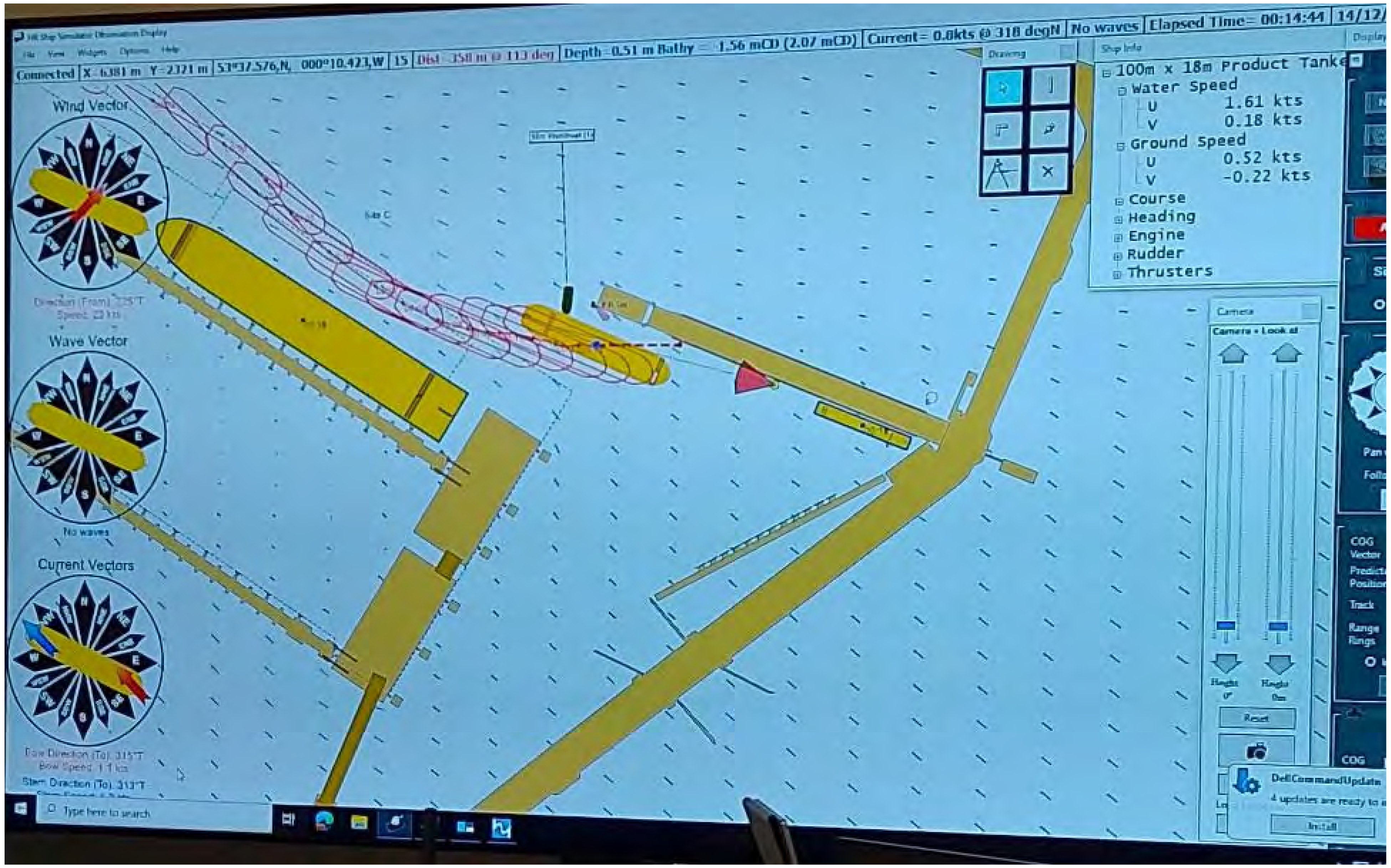
Run 9


Connected | X 6394 m Y 2758 m | 53°37.811,N, 000°10.411,W | 08b | Dist 80 m @ 344 deg | Depth 12.85 m Bathy 9.58 mCD (3.27 mCD) | Current = 4.1kts @ 114 degN | No waves | Elapsed Time = 00:10:02
Wind Vector
Wave Vector
No waves
Current Vectors
Drawing
Ship Info
MV Celine
Water Speed
U 3.02 kt
V 0.75 kt
Ground Speed
U -1.11 k
V 0.24 kt
Course
Heading
Engine
Rudder
Thrusters
PAUSED
Site A
Site B
Site C
159.4 m @ 295°N

Run 11


No waves
Elapsed Time= 00:10:17
Wind Vector
MV Celine
Water Speed
U 2.98 kts
V 0.71 kts
Ground Speed
U -1.26 kts
V 0.10 kts
Course
Heading
Engine
Rudder
Thrusters
PAUSED
Camera

Run 16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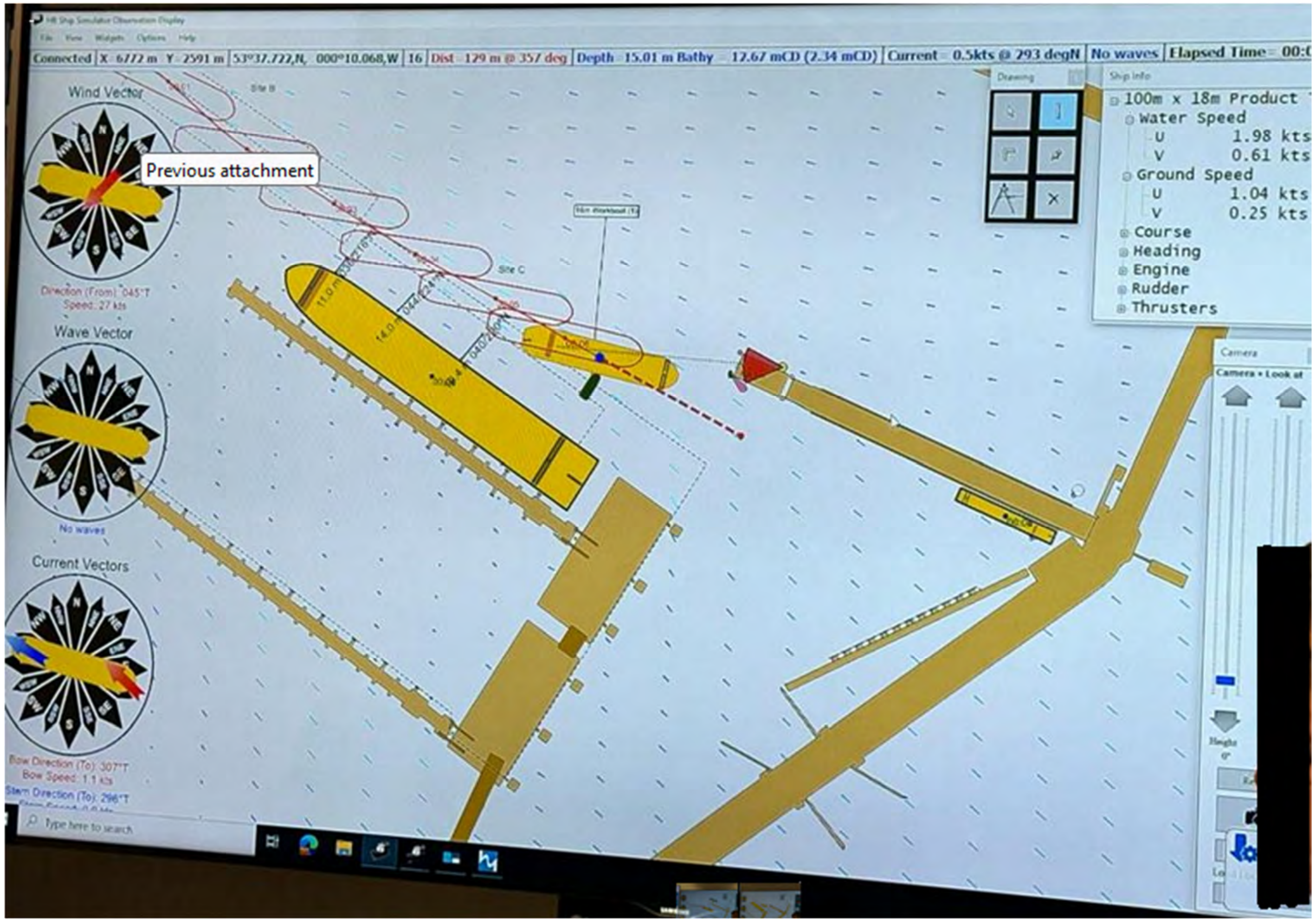
Current= 0.8kts @ 318 degN
No waves
Elapsed Time= 00:14:44
Wind Vector
Wave Vector
No waves
Current Vectors
Water Speed
u 1.61 kts
v 0.18 kts
Ground Speed
u 0.52 kts
v -0.22 kts
Course
Heading
Engine
Rudder
Thrusters
Camera
Reset
Type here to search

Run 17


Connected
No waves
Wind Vector
Previous attachment
Wave Vector
No waves
Current Vectors
100m x 18m Product
Water Speed
U 1.98 kts
V 0.61 kts
Ground Speed
U 1.04 kts
V 0.25 kts
Course
Heading
Engine
Rudder
Thrusters