PORT OF TILBURY LONDON

PLANNING ACT 2008

INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

Application by Thurrock Power Limited for an Order

granting Development Consent for the Thurrock Flexible Generation Plant

Planning Inspectorate Reference: EN010092

WRITTEN REPRESENTATION AND RESPONSE TO FIRST WRITTEN QUESTIONS

BY PORT OF TILBURY LONDON LIMITED (POTLL)

23 March 2021

PoTLL/TFGP/EX/6

Part 1: Written Representation

1. **INTRODUCTION**

1.1 This statement represents the Written Representation and responses to the Examining Authority's ('ExA') First Written Questions of Port of Tilbury London Limited (“PoTLL”) to the proposal by Thurrock Power Limited (“the Applicant”) to construct a flexible energy generating plant on land next to PoTLL’s recently developed Tilbury2 port terminal, known as the Thurrock Flexible Generation Plant ("the TFGP").

1.2 This representation has been prepared by PoTLL as:

1.2.1 the owner and operator of the current Port of Tilbury, which includes land which is 'operational land' held by PoTLL in its role as a statutory undertaker and is therefore capable of being 'statutory undertakers' land' for the purposes of section 127 of the Planning Act 2008 ("section 127");

1.2.2 the owner and operator of the Port Terminal known as Tilbury2 which lies immediately to the west of the main site of the TFGP, which is also operational land for the purposes of section 127;

1.2.3 the owner of land (plots 01/01 – 01/04) which is included within the draft Development Consent Order ("dDCO") limits for the purposes of facilitating access to the TFGP; and

1.2.4 a member of the consortium of interests which successfully bid for Freeport status for the 'Thames Freeport' from the UK Government; with the Freeport anticipated to include the current Port of Tilbury, Tilbury2 and further PoTLL expansion eastwards.

1.3 PoTLL has been in on-going discussions with the Applicant with regard to the TFGP, following its submissions to the Examination to date.

1.4 Further to those discussions PoTLL can confirm that progress has been made on key issues; namely that:

1.4.1 whilst, as explained below, the use of a causeway to facilitate abnormal indivisible loads ('AILs') is not supported by PoTLL, it is considered that the pNRA submitted by the Applicant [PDC-052] is acceptable subject to the mitigation measures contained therein being appropriately secured (also discussed below); and

1.4.2 the principle of terrestrial access for 'normal' construction vehicles through Tilbury is accepted; and discussions are on-going with the Applicant to document this in an appropriate manner such that compulsory acquisition powers sought in the DCO are not required and that PoTLL's concerns set out in its Examination submissions to date are adequately managed. It should be noted that PoTLL's objection in respect of these matters will remain until this Agreement is completed and secured.

1.5 However, there are a number of other matters still to be resolved. These are set out in further detail below. In setting these matters out, PoTLL notes further that that it has not yet been approached by the Applicant to agree a Statement of Common Ground.

2. USE OF THE CAUSEWAY

2.1 As stated in paragraph 48 of its Relevant Representation [RR-023], PoTLL objects to the proposed causeway in the river Thames. In support of this objection, PoTLL notes the following matters:

Exploration of Alternatives

2.2 Paragraphs 3.2.5 to 3.2.10 of the Alternatives Chapter of the ES [APP-046] say very little in terms of the consideration of alternative routes for access by abnormal indivisible loads (AILs). Whilst the constraints on possible routes for AILs are noted at paragraph 3.6.8 of the Non-Technical Summary [APP-043], namely the inability to use Fort Road railway bridge and Station Road level crossing, both documents fail to explore other alternative possibilities such as access through the Port of Tilbury or the A1089, utilising the highway network and then through Tilbury2 and RWE's land onto the main power plant site. This is particularly the case given the minimal amount of maintenance uses that would be required in the long term for AILs.

2.3 Whilst it is acknowledged that such a proposal would be subject to commercial discussions with PoTLL and RWE, this is not a reason why this could not have been considered as an alternative (particularly given the ability for DCO powers to be used, as the Applicant has suggested for 'normal' construction access through Tilbury2). Furthermore, it is considered that this could have been a 'reasonable' alternative examined in the ES, as is required by Regulation 14(2)(e) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is therefore a deficiency of the ES.

Effects of Causeway

2.4 This failure to consider reasonable alternatives should be seen in the context that such alternatives could have avoided the following effects identified in the Applicant's ES and plans:

2.4.1 potential effects to Avocets, which have affected the construction programme by not permitting works in November - March;

2.4.2 having to make changes to flood defences;

2.4.3 security issues having to be considered by RWE in terms of footpath users trying to access the causeway; and

2.4.4 the identified short term impacts to saltmarsh and intertidal mudflat habitat.

2.5 In respect of the final point, PoTLL is particularly concerned that the affected saltmarsh is directly adjacent to the saltmarsh and intertidal habitat that PoTLL is required to manage as part of 'Compartment 10' of the Landscape and Ecological Management Plan that PoTLL is required to comply with under the Port of Tilbury (Expansion) Order 2019 ("the Tilbury2 DCO") (see further

below in respect of PoTLL's concerns about its Landscaping and Ecological Management Plan in section 4 of this submission). PoTLL is concerned that the TFGP could risk its compliance with the management prescriptions for that compartment; and this risk would not arise if alternative arrangements had properly been considered.

2.6 Furthermore, although not identified in the ES, the use of the causeway will also have potential socio-economic effects, given that:

2.6.1 the former Power Station site which the causeway is adjacent to, and its access is proposed to cross, is previously developed land outside of the Green Belt with direct access to the river. Whilst RWE may still bring forward plans for electricity generation on the site, local planning policy makes clear a key priority is to ensure that the economic and commercial function of the river is protected and promoted[1];

2.6.2 the land should therefore be considered as having significant potential for uses that directly benefit from the riverside location, which can also be seen in the context of the Government's national policy support for ports set out in the National Policy Statement for Ports, which highlights the importance of ports in contributing to long term economic growth and prosperity; and

2.6.3 this is particularly the case given that the recently successful 'Thames Freeport' proposal includes Tilbury2 and RWE's land. The Government has given strong backing to Freeports as a driver of economic growth in a post-Brexit UK. The Thames Freeport, as one of the winning bids, is modelled to unlock more than 20,000 new, better jobs in an area which ranks highly in deprivation indices; and to facilitate over £400 million in port infrastructure to the Port of Tilbury and London Gateway Port; all estimated to lead to £5.1bn of additional GVA being created.

2.7 In this context, and its location adjacent to existing port uses at Tilbury2, PoTLL considers that the causeway would reduce or sterilise the potential of this land by significantly reducing the amount of river frontage that would be able to be utilised (both because of the causeway itself and movements to and from it) to support any development that were to take place on the land.

2.8 Such an impact is clearly contrary to the Thurrock Core Strategy and also wider English planning and economic policy supporting economic growth in sustainable development locations such as river frontages.

2.9 Given that an alternative option is in PoTLL's view available (see below), and the limited use and benefit that the causeway would actually have after the construction period of the TFGP, PoTLL considers that such impacts are unacceptable and unjustifiable. This is doubly the case given that, post construction, the use of the causeway for maintenance would be sporadic, leaving a disproportionate impact against the potential economic benefits that would otherwise arise from the same location.

[1] Thurrock Core Strategy and Policies for Management of Development (as amended), Policy CSTP28 River Thames

2.10 It is therefore considered that the Applicant should withdraw its proposals for the causeway and bring forward an alternative proposal for AILs access as soon as practicable and in any event by the next Examination Deadline.

Next Steps – Change Request should be made

2.11 In this context, PoTLL and RWE have been working with the Applicant to develop an alternative AILs access proposal which would involve constructing a track from Fort Road to connect to the access road through Tilbury2 ('Substation Road') and then on into RWE's land utilising Substation Road, and then curving up into the power plant site.

2.12 As this is an option that is acceptable to all parties, it is PoTLL's view that the Applicant should forthwith be bringing forward a change request to remove the unacceptable causeway and to facilitate this alternative proposal.

2.13 It is acknowledged that a change as suggested above would have procedural implications on the Examination timetable and therefore PoTLL considers that it would need to be brought forward as soon as possible by the Applicant.

2.14 However, it is PoTLL's view that such implications would be able to be, in the main, minimised given:

2.14.1 that whilst the ES identifies effects arising from the causeway, with mitigation these are considered not to be significant; and effects from construction traffic movements are assessed in the ES as not significant; and it is considered unlikely that the few AIL movements that would be required would change this significantly;

2.14.2 that land affected by the alternative proposal has been subject to environmental management already by PoTLL as a consequence of the requirements of the Tilbury2 DCO and the proposal should be able to be brought forward cognisant of that environmental management;

2.14.3 as such, removing the causeway would just be removing 'not significant effects' from the ES and would not require a new ES or identify new significant effects;

2.14.4 that the causeway was a late addition in project development for the TFGP, that marine access was referred to in statutory consultation materials and that the parties most concerned about the causeway (PoTLL, RWE and the PLA) have been involved in on-going discussions about causeway impacts, it is considered unlikely that the *Wheatcroft* principle would be invoked; and

2.14.5 many of the key parties that would be concerned about such a change (including land interests) have already been consulted and would be agreeable to the change in an acceptable form.

2.15 It is understood, however, that the land adjacent to Fort Road is common land and that, notwithstanding that many of the same parties hold an interest in that land who are otherwise affected by the TFGP and are amenable to it, this may

necessitate new land and interests to be subject to the land powers within the DCO ('the additional land').

2.16 As such, whilst most interests in the additional land would likely consent to this additional land being included in the DCO, the existence of a small amount of other minor subsidiary interests may require any change application to have some interaction with the procedural requirements of the Infrastructure Planning (Compulsory Acquisition) Regulations 2010 ("the CA Regulations").

2.17 The application for change should therefore be made as soon as possible by the Applicant or, at the very least, the Applicant should make a notification to the ExA of the proposed change and its proposals for the procedural timetable (including consultation) to deal with it, to enable the ExA to consider and make any required procedural decision and consequential addition or amendment to the overall Examination timetable accordingly.

2.18 PoTLL recognises that this may require the ExA to utilise its discretion in the proportionate application of procedural timeframes provided to Examining Authorities in the CA Regulations; but in the context of the unacceptability of the causeway proposals, PoTLL believes that this can be considered as appropriate and necessary in the circumstances.

2.19 PoTLL is prepared to continue to work with the Applicant on developing this alternative provision but believes that the Applicant should make the change application as soon as possible.

Next Steps – if no Change Request is made

2.20 PoTLL acknowledges that if a DCO change application is not possible, the Applicant would need to obtain various consents (including common land consents and planning permission) to bring the alternative access forward; as well as securing agreements for use of land. Given the minor nature of these works, and that the land interests involved are already in discussion with the Applicant, it is considered that these are not impediments to the Scheme.

2.21 As such, if it is considered by the ExA that a DCO change application is not procedurally possible, or the Applicant chooses not to bring one forward despite it being considered by PoTLL that there is still time to do so, PoTLL would advocate that the causeway should still be excluded from the DCO and a pre-commencement Requirement be imposed that the alternative AIL access should be provided (with reference to a plan or document that could be submitted to the Examination) by the Applicant and be fully consented.

2.22 It is only should the Secretary of State determine that a causeway is an acceptable AIL access option, that PoTLL (whilst maintaining an in-principle objection) would recommend an alternative approach to this issue.

2.23 This alternative approach would be that the draft DCO should be amended to provide (through a Requirement) that construction of the causeway could only begin once the Applicant has demonstrated to the satisfaction of Thurrock Council as Local Planning Authority, following consultation with PoTLL and RWE, that it is not possible to deliver the alternative AIL access proposal (again with reference to a plan or document that could be submitted to the Examination).

2.24 In contrast to the currently proposed wording in the draft DCO for 5 yearly reviews of the causeway, it is considered that such a Requirement would not need to include 'environmentally acceptable, permanent, feasible and economic' wording, because:

2.24.1 environmental matters would be dealt with through any required planning and commons applications;

2.24.2 PoTLL and RWE are working with the Applicant, and it is understood the Applicant is working with other land interests, to enable commercial agreements to be reached to facilitate the alternative access, which should be able to be completed by the end of Examination meaning there would be no issues about the alternative access proposal being permanent and economic; and

2.24.3 all parties consider that the alternative proposal is practically feasible.

2.25 PoTLL proposes that a plan would be submitted to this Examination which shows this alternative AIL access proposal which such a Requirement would then refer to. PoTLL would also suggest that such a requirement should oblige the Applicant to provide updates on obtaining the necessary consents and approvals for the alternative AIL access on a regular basis.

3. DEVELOPMENT CONSENT ORDER: PROTECTIVE PROVISIONS AND RELATED CONCERNS

3.1 The starting point of PoTLL's concerns in respect of the dDCO is that, in the absence of any Protective Provisions for its benefit in the dDCO, a number of the proposed powers will interfere with the safe and efficient operation of its statutory undertaking.

3.2 Preliminary discussions have begun with the Applicant on a form of Protective Provisions, with PoTLL's starting position being that its consent is required for the use of all works and land powers that could affect:

3.2.1 Tilbury2;

3.2.2 the infrastructure corridor that provides access to it; and

3.2.3 navigation in the river Thames to and from the Tilbury2 berths.

3.3 Such consent will ensure that such powers are exercised in a way that would not negatively affect PoTLL's statutory undertaking.

3.4 Draft Protective Provisions which seek to achieve this, alongside other protections, are set out at Appendix 1 to this submission for discussion with the Applicant.

3.5 In a similar vein and given the proposed terrestrial and marine access proposals, PoTLL considers that:

3.5.1 in article 8 (transfer of the benefit of the Order):

(a) paragraph 4(a)(iii) should refer to powers in relation to 'streets' rather than 'highways' being able to be transferred without Secretary of State consent – this will enable transfers

to be made to PoTLL for streets within Tilbury2 if this became required;

(b) PoTLL should be a notified party under paragraph (5); and

(c) PoTLL, the PLA and the MMO should be consulted by the Secretary of State prior to any consent for transfer of benefit being granted; and

3.5.2 in article 36(1), PoTLL should be consulted with, prior to any suspension of navigation in the river Thames to facilitate the causeway, if that is authorised contrary to PoTLL's submissions and in-principle objection set out above.

3.6 Finally, as noted in PoTLL's Relevant Representation, PoTLL considers that plots 01/02 and 01/03 of the Book of Reference [PDC-004] should be updated to reflect PoTLL as owner of those plots.

4. DRAFT DEVELOPMENT CONSENT ORDER: REQUIREMENTS

4.1 PoTLL has a number of concerns in respect of the TFGP proposals but these would be able to be managed by amendments to the proposed dDCO Requirements.

4.2 In making these comments PoTLL is particularly mindful that, notwithstanding its position as statutory undertaker, it also has its own obligations and requirements to meet under the Tilbury2 DCO that it would not wish to be prejudiced by the TFGP proposals and powers contained within the dDCO.

4.3 In particular, under Requirement 11 of the Tilbury2 DCO PoTLL is required to comply with the Landscape and Ecological Management Plan ("the LEMP") appended at Appendix 2 to this submission, and its Drainage Strategy (relevant extracts are appended at Appendix 3).

4.4 In that context, PoTLL has noted that:

4.4.1 plots 01/09 and 01/10 required for the purposes of Work No. 3, the underground connection to Tilbury substation, are located directly adjacent to land that is required for ecological mitigation for Tilbury2 (Compartment 5 of the LEMP); and

4.4.2 plots 01/12 and 01/13 comprised in the limits of deviation for Work Nos. 1 (the main power plant) and 4 (gas pipeline works) of the dDCO, and also being the Carbon Capture Readiness area, are located directly adjacent to land that makes up Compartment 5 and 6 of the LEMP.

4.5 PoTLL's comments on the Requirements are therefore made cognisant of the need to protect both its statutory undertaking and its obligations under the LEMP in respect of those compartments. These comments also assume that the causeway will be authorised even though, as expressed in section 2 of this submission, PoTLL does not support it and maintains an in-principle objection to the causeway.

4.6 Furthermore, PoTLL notes that the proposed alternative AIL access proposal discussed in section 3 would run through Compartment 8 of the LEMP. As

such, PoTLL would expect any change application to provide for drafting within the dDCO to indicate that nothing in or done under the changed DCO would constitute a breach of the Tilbury2 DCO.

Requirement	PoTLL Comment
4: Detailed Design	1. PoTLL considers that the words 'and development on the CCR area' should be added to paragraph (1) to ensure that the details of development on that area are approved by Thurrock Council (above and beyond any other planning consent that may be required). 2. PoTLL should be added as a consultee to paragraph (3) in respect of the design of the tidal defence wall in the vicinity of the proposed causeway as this is directly relevant to the operation of Tilbury2, i.e. ensure that there is no flooding to port operations. 3. It is understood that the Applicant may consider adding wording in relation to the approval of the design of the causeway. In such a scenario, it would wish to be a consultee on its design given that this has a bearing on its Port operations.
6. Construction Traffic Management Plan	Given that access proposals for construction traffic pass through the middle of an operational port, PoTLL considers that it is appropriate that this Requirement should provide that those matters within the CTMP that will affect PoTLL should be approved by it.
7. Construction Travel Worker Plan	Whilst PoTLL recognises that the Applicant's proposals should mean that construction worker travel movements are minimised, it would wish to be a consultee on this plan to ensure that this has been delivered.
14. Landscaping and Ecological Management Plan	The words 'and development on the CCR area' should be added to paragraph (1). This will ensure that if development on the CCR area is brought forward, Thurrock Council and Natural England can consider the landscape and ecology management proposals in the context of the LEMP, as they will do for those parts of Work Nos. 1, 3 and 4 that are located adjacent to Compartments 5 and 6 of the LEMP.
17: Review of access for abnormal indivisible loads	Please see PoTLL's responses to First Written Questions 1.7.28 and 1.11.17 in Part 2 of this submission, which contain PoTLL's suggestions for this requirement which seek to make the requirement internally consistent with the rest of the DCO and within itself; and also seek to define what could be meant by 'environmentally acceptable'. These comments are made additional to the suggested Requirement discussed in section 2 above – it is considered that both Requirements would be necessary if the section 2 suggestion is taken forward.
18: Causeway Decommissioning Plan	Further to its Procedural Deadline D submission [PDD-007], PoTLL continues to consider that if a causeway is authorised through the DCO then PoTLL should be a consultee on any decommissioning plan given its location adjacent to Tilbury2.
New Requirement: Navigational Risk Assessment	It is understood that the Applicant will be proposing a new requirement to secure the on-going development of the pNRA and the mitigation measures referred to within it. PoTLL supports this and considers that such a requirement should deal with the construction, operation, maintenance and decommissioning of the causeway. The draft Protective Provisions set out at Appendix 1 of this submission also include a paragraph which specifies the matters that must be included in the Marine

	Operations Plan that the pNRA states is necessary to be developed.
New Requirements: Carbon Capture Readiness	Given the context described above, PoTLL will have an on-going interest in understanding whether carbon capture development will be brought forward on the CCR area. Taking into account the general planning context of the need for new power proposals to develop CCR where possible, PoTLL suggests that requirements similar to Requirements 22 and 23 of the Drax Power (Generating Stations) Order 2019 and Requirements 31 and 32 of the Eggborough Gas Fired Generation Station Order 2018 should be imposed; as set out below: **CCR area** **xx .**—(1) Until such time as the authorised development is decommissioned, the undertaker must not, without the consent of the Secretary of State– (a) dispose of any interest in the CCR area; or (b) do anything, or allow anything to be done or to occur, which may reasonably be expected to diminish the undertaker's ability, within two years of such action or occurrence, to prepare the carbon capture readiness reserve space for the installation and operation of carbon capture equipment, should it be deemed necessary to do so. **Carbon Capture readiness monitoring report** **xx**.—(1) The undertaker must make a report ('carbon capture readiness monitoring report') to the Secretary of State— (a) on or before the date on which three months have passed from first commercial use; and (b) within one month of the second anniversary, and each subsequent even-numbered anniversary, of that date. (2) Each carbon capture readiness monitoring report must provide evidence that the undertaker has complied with requirement [previous requirement number]— (a) in the case of the first carbon capture readiness monitoring report, since this Order was made; and (b) in the case of any subsequent report, since the making of the previous carbon capture readiness monitoring report, and explain how the undertaker expects to continue to comply with requirement [previous requirement number] over the next two years. (3) Each carbon capture readiness monitoring report must state whether the undertaker considers the retrofit of carbon capture technology is feasible explaining the reasons for any such conclusion and whether any impediments could be overcome.
Part 2 of Schedule 2	Given that PoTLL is seeking to be an approving body for the CTMP, the references to 'relevant planning authority' in this Part of the Schedule should be amended to 'discharging body' with a relevant definition also added.

Part 2: PoTLL Response to First Written Questions

The table below sets out PoTLL's response to ExA's question 1.7.40 but also to a number of the ExA's questions that are directed to other parties; as it is considered that their content is relevant to PoTLL and its interests.

Question Number	Question	PoTLL Response
Compulsory Acquisition		
1.3.1	The SoR [APP-024] indicates (at paragraph 11.42) that the Applicant is not seeking CA powers over the land in the River Thames required for the causeway. The ExA also notes the matters raised by the Port of London Authority in their RR [RR-005]. Please explain how the Applicant proposes to secure this land and provide an explanation on the implications for the project (and assessments contained in the ES) in the event that the land is not secured by agreement.	PoTLL notes that the drafting of articles 19 (compulsory acquisition of land), 22 (compulsory acquisition of rights) 28 (temporary use of land for carrying out the authorised development) and 29 (temporary use of land for maintaining the authorised development) of the dDCO allows for the use of those powers over the 'Order land'. This drafting, taken with the definition of 'Order land' in article 2, which simply refers to the 'land which is required for or affected by the authorised development shown on the land plans', means that powers of compulsory acquisition of land and rights and temporary possession would be able to be exercised on the land in the river Thames. If the causeway is authorised by the DCO, PoTLL considers that it should then be brought forward pursuant to the river works regulatory regime (which will consider the works in the context of operations within the wider Port of London) alongside the protective provisions for the benefit of the PLA and PoTLL. As such, PoTLL would welcome a change in the definition of 'Order land' to either explicitly exclude the land within the River Thames; or to add the words 'as described in the book of reference' so it is clear that it is only the identified plots that form part of the 'Order land'. PoTLL understands that this is under discussion between the Applicant and the PLA.
1.3.6	Other than site selection, what other alternatives to CA, including modifications to the scheme, have	PoTLL considers that much of the compulsory acquisition proposals outside of the main site of the proposed power plant could have been avoided by

Question Number	Question	PoTLL Response
	been considered?	diligent detailed meaningful discussions with interested parties before the submission of the application. In particular: • in respect of the use of compulsory acquisition of rights powers to gain access through the Port of Tilbury, where discussions on an accessway agreement only sped up once the application was submitted; and • the powers over RWE's land to facilitate access for AILs. Given the small level of movements that such an access needed to facilitate, it is considered that the Applicant could and should have explored alternatives with PoTLL and RWE to facilitate such movements without the need for a causeway and associated access through RWE's land. The proposed new requirement to undertake a review of accesses on a five yearly basis seems to be a future exercise seeking to cover for an exercise that should have been done properly prior to the application being submitted. It is considered that the Applicant proceeded with the causeway option before fully exploring whether land-based alternatives were possible. As discussed in Part 1 of this submission, PoTLL considers that the causeway should not be brought forward; and is working with the Applicant and RWE to facilitate an alternative approach. .
1.3.22	In the event that agreement with Port of Tilbury London Limited (PoTLL) is not reached, how does the Applicant propose to ensure that PoTLL's interests, including the safety of any operational land affected, is protected?	As it has set out in its submissions to date, PoTLL expects the DCO to include Protective Provisions for its benefit which will require its consent to the use by the Applicant of any of the land powers contained within the DCO which affect PoTLL land. In giving its consent under such provisions, PoTLL would then be able to impose the relevant reasonable conditions to ensure that its interests are protected. PoTLL is working with the Applicant to develop an agreed form of Protective Provisions.
1.3.30	The Applicant indicates (at paragraph 12.6 of the	PoTLL considers that running the processes in parallel creates unnecessary

Question Number	Question	PoTLL Response
	SoR [APP-024]) that an application will be made under s16 of the Commons Act 2006 (CA2006). Please explain further the rationale for running parallel processes under the PA2008 and the CA2006, including details of likely timescales and whether, and if so how, the Applicant considers the two regimes interact.	uncertainty in timing for the project when, in the context of other developments in the area such as LTC and London Resort and likely PoTLL growth further to the successful Thames Freeport bid, clarity of land requirements and transfers is needed. PoTLL would note that under article 37 of the Port of Tilbury (Expansion) Order 2019, PoTLL dealt with the common land affected by Tilbury2 pursuant to the DCO, which was able to be done efficiently and without delay.
Cumulative Effects		
1.5.1	Please explain whether, and if so what, consideration has been given to the Tilbury Link Road scheme (referred to by PoTLL in their RR [RR-023]) in the assessment of cumulative effects on transport and traffic	Alongside Thurrock Council, PoTLL has been in conversations with Highways England for some time as to the development of a Tilbury Link Road between the Lower Thames Crossing scheme and Tilbury town. It previously formed part of the Lower Thames Crossing scheme but was removed prior to the EIA scoping process for that project. PoTLL is of the view that it should be restored to that scheme in order to improve the accessibility of the Port of Tilbury to the strategic road network and maximise the economic benefits of the LTC; if that does not occur, such a link should be facilitated by LTC, or at the very least should not be precluded from being brought forward either by Highways England or by the TFGP proposals. At the moment, its current status is that it is included within the 'RIS3 pipeline' set out in the Road Investment Strategy 2. However, in the context of the recent successful 'Thames Freeport' bid that includes the Port of Tilbury, it is considered likely that funding streams could be made available to enable it to be brought forward sooner rather than later alongside wider development in the local area. As such, PoTLL's view is that the TFGP needs to be brought forward in a way that recognises that there will be a range of development happening around it. As such, PoTLL considers that the DCO should provide for the detailed
1.5.2	Please explain the current status of the Tilbury Link Road project referred to by PoTLL in their RR [RR-023] including details of how advanced the scheme is and its relationship to the Proposed Development.	

Question Number	Question	PoTLL Response
		design of the access proposals contained within Work No. 12 to be approved by third parties; and would welcome a discussion with the Applicant as to who those approving bodies could be.
Draft Development Consent Order, Habitats and Navigation		
1.7.28 and 1.11.17	Schedule 2, P1, R17(1) – should this require a review to be carried out in addition to a report being submitted? Is there a role for the LPA (and/or other statutory bodies) to assess whether any of the alternatives identified meet the requirements? Against what criteria will this be judged? R17 (5) – has the phase to 'environmentally acceptable' been intentionally omitted from other parts of the requirement (e.g. subsections (3) and (5(a))? If so, please provide an explanation.	Given its position that the use of a causeway is not acceptable use of the river where alternatives could be possible, PoTLL considers that this draft Requirement should be substantially improved. Building on its suggestions in its Procedural Deadline D submission [PDD-007], considering the ExA's questions and further to some amendments that are understood to be supported by the Applicant, PoTLL considers that the requirement should be amended as follows (those track changes highlighted blue being those understood to be proposed by the Applicant):
	Following the 5 yearly reviews of access for AIL's as proposed in R17 of the dDCO, an alternative may be taken forward if it is considered 'environmentally acceptable'. Please explain what this means, and how an assessment of the alternative means is either captured in the ES or proposed to be undertaken to ensure that no significant effects are likely to occur.	(1) No later than five years from the commencement of operation of Work no.1, ~~Within five years from the date of final commissioning of the Work 1~~, the undertaker must carry out and submit a report of ~~the~~ a review of access options for transportation of ~~abnormal indivisible loads (~~AIL~~s~~) to or from Work no.1 in writing to the relevant planning authority, the review having been carried out in consultation with the Port Company. (2) A report submitted under sub-paragraph (1) must set out how the options considered perform against the tests set out in sub-paragraph (6). (3~~2~~) If an environmentally acceptable, permanent, feasible and economic alternative to the use of the causeway to be constructed as Work no.10 for AIL access is identified in the report submitted under sub-paragraph (1), then the undertaker must (a) submit applications for any consents required for that alternative

Question Number	Question	PoTLL Response
		AIL access and to decommission Work No.10 and reinstate the sea defence wall altered under Work No. 11 within 6 months of the date of the submission of the review;~~,~~ and (b) advise the relevant planning authority and the Port Company of the outcome of any applications under this sub- paragraph which were not determined by that ~~relevant~~ planning authority within five business days of the undertaker being notified of that outcome. (~~3~~4) Where all the consents applied for under sub-paragraph (3)(a) ~~required to create and/or use alternative AIL access~~ are granted, ~~the causeway to be constructed as~~ the undertaker must forthwith carry out the decommissioning of Work No. 10 ~~and the changes to the sea-defence wall to be carried out as Work 11~~ and reinstate the sea defence wall altered under Work No. 11, such works to be ~~must be decommissioned~~ carried out in accordance with those consents and a causeway decommissioning plan approved under requirement 18~~(3)~~. ~~Where all the consents required to create and/or use the alternative AIL access are granted, the causeway to be constructed as Work no.10 and the changes to the sea-defence wall to be carried out as Work no.11 must be decommissioned in accordance with requirement 18(34).~~ (~~4~~5) (a) Where the review undertaken under sub-paragraph (1) does not identify an environmentally acceptable, permanent, feasible and economic alternative to the use of the causeway to be constructed as Work no.10 for AIL access, or all of the necessary consents under sub-paragraph (3)(a) to create or use such an access are not granted, then the undertaker must carry out a subsequent review in consultation with the Port Company and submit it to the relevant planning authority within five years of the later of; (i) the submission of the review under sub-paragraph (1); or (ii) the undertaker notifying the relevant planning authority of the refusal of consent under sub-paragraph (~~3~~2)(b)~~,~~; (b) ~~where~~ Where the review undertaken under this sub-paragraph identifies an environmentally acceptable, permanent, feasible and

Question Number	Question	PoTLL Response
		economic alternative to the use of the causeway to be constructed as Work no. 10 for AIL access which was not identified in the previous review, sub paragraphs (23) and, (43) will apply as if the report had been submitted under sub-paragraph (1),). (c) Where a subsequent review undertaken under this sub-paragraph does not identify an environmentally acceptable, permanent, feasible and economic alternative to the use of the causeway to be constructed as Work no. 10 for AIL access, then a further review will be required at each five year interval as if the subsequent review had been submitted under sub-paragraph (1). (5) In this requirement, an environmentally acceptable, a permanent, feasible and economic alternative means: (a) that the alternative route is available and will remain so for the flexible generation plant's operating lifetime of Work No.1; (b) that transport of AIL via the alternative route is feasible and practicable, taking into account factors including but not limited to the physical characteristics of the AILs and the route (such as load limits and clearance), and that the terms of the agreement of landowners and having all of the consents required to create and/or use the alternative routeto use of the route are economically feasiblethe agreement of landowners and having all of the consents required to create and/or use the alternative route; and (c) that the alternative route costs no more than 10% more than the cost of shipment of AILs from the nearest port of delivery, berthing and unloading at causewayWork No. 10 at the time that the review is carried out the causeway; and (d) that the alternative route does not cause materially new or materially different effects to those reported in the environmental statement. . (6) In this requirement "AIL" means abnormal indivisible load.

Question Number	Question	PoTLL Response
1.7.29	Schedule 2, P1, R18 – please respond to the requests from IPs (including NE, the MMO and PoTLL) to be added to the list of consultees in R18.	PoTLL continues to consider that if a causeway is authorised by the DCO, then it should be a consultee on any decommissioning plan given its location adjacent to Tilbury2.
1.7.34	ES Chapter 2 [PDC- 015] and the OCoCP [APP-142] refer to the possibility of the construction of the proposed development being carried out in either one or three phases. Please explain whether, and if so how, this is taken account of in the dDCO.	In the context of the Lower Thames Crossing and London Resort proposals, PoTLL considers that this question is not only relevant to the dDCO but also to wider traffic impacts into Tilbury, if the phased approach means that impacts arise at the same time as peak construction flows at those other projects. Given the delays in the TFGP application to date, it would be expected that the project would only be able to take part in the next Contract for Difference auction, likely to be not until 2023. In either a single or three phase approach, this makes it more likely that cumulative traffic flows will occur and these should be fully taken into account on a likely worst case basis.
1.7.40	Please provide an update on discussions on protective provisions for the benefit of PoTLL, and provide a copy of the current draft.	Discussions between PoTLL and the Applicant have focussed to date on the key principles in relation to PoTLL being able to accept access during the construction period through Tilbury2 and around the proposals for AIL access; and progress has been made on these matters. As such, detailed discussions have not yet begun on the Protective Provisions, albeit that the Applicant has shared an initial draft which PoTLL has been considering. PoTLL's suggestions for its Protective Provisions are set out at Appendix 1 to this submission.
1.11.9	Can the Applicant signpost where AIL delivery times are secured in the application?	PoTLL appreciates that it is likely to be a practical reality that activity at the causeway will only be able to take place during high tide and that this will also affect delivery times and the number of movements. Furthermore,PoTLL accepts that given that the causeway's use is proposed for AILs, the number of movements is unlikely to exceed 60 over a 6 month period. Whilst PoTLL has agreed with the Applicant that the pNRA is sufficiently robust, its primary concern is that the mitigation measures are sufficiently secured, particularly given that they are directly relevant to the safe operation
1.11.11	Can the Applicant confirm whether the only activity on the causeway will be during high tide and signpost where this is secured in the application?	
1.19.1	It is not clear in the Preliminary Navigational Risk Assessment (PNRA) [PDC-052] that a worst-case scenario has been assessed. The PNRA states in Section 2.1 that there will be a maximum of 60 barge	

Question Number	Question	PoTLL Response
	deliveries over the 6-month period. Please can the Applicant confirm that the maximum number of barges has been assessed and comment on how the assessment represents a worst-case scenario.	of PoTLL's adjacent berth for vessels seeking to utilise its Construction Materials Aggregates Terminal. PoTLL understands that the Applicant will be putting forward a suggested DCO requirement to deal with securing the mitigation and the on-going development of the pNRA, which will involve both PoTLL and the PLA. This is an approach which PoTLL broadly supports, subject to the detailed drafting. It is vital, however, that any requirement sufficiently deals with construction, operation, maintenance and decommissioning of the causeway.
1.19.2	Please confirm where/how the six additional risk control measures, as detailed in Table 13 of the PNRA [PDC-052], will be secured.	
1.19.3	Please explain how the mitigation measures set out in the PNRA [PDC-052] are to be secured in the DCO.	
General Questions		
1.10.9	Please state whether any land within the Order Limits falls within the Order Limits of any other made DCO and, if so, how the applicant proposes to deal with this interaction in the dDCO.	Plots 01/01 to 01/04 are within the Order limits of the Port of Tilbury (Expansion) Order 2019. As such, the 'generic' powers within the front-end articles of the dDCO (e.g. street works), as well as the 'ancillary works' at the end of Schedule 1, would be able to be undertaken within those plots. This is not accepted by PoTLL, both in general terms and in terms of the protection of its statutory undertaking; and also in respect of its on-going ability to comply with the terms of its own DCO. As such, it is expecting that the Protective Provisions for its benefit within the dDCO should require PoTLL's consent to the use of the dDCO's non-land powers within these plots.
1.10.13	Please provide details of any temporary works permits the Applicant anticipates may be required for Work No 10 (causeway).	PoTLL confirms that it would expect to be consulted on these details by the Applicant when seeking to obtain any such consents.
1.10.14	The ExA notes that there has been no reduction in the limits of deviation for Work No 10 following the removal of Work No.9. Please provide further justification for the limits of deviation for Work 10 or updated Works Plans.	To limit potential impacts on ecology, hydrodynamics and navigation, the scope of Work No. 10 should take up as little space as possible. Given that the pNRA [PDC-050] and the Concept Design [APP-130] both demonstrate that much of the space currently within the limits of deviation would not be needed for works, as opposed to berthing of vessels, there is scope for these

Question Number	Question	PoTLL Response
		limits to be reduced.
Traffic and Transport		
1.17.1	What, if any, consideration has been given to the use of rail to transport construction material to and from the site?	PoTLL notes that Tilbury2 has an operational rail siding and by the end of 2021, its proposed Construction Materials and Aggregates Terminal will be fully operational. It is considered that these facilities could be utilised by the Applicant through agreement but this appears not to have been contemplated by the Applicant.
1.17.2	How does the Applicant propose to minimise the number of freight movements by road?	
1.17.3	Table 2.6 of ES Chapter 10 [APP-059] specifies a maximum design scenario whereby 10% of the construction workforce will arrive by car, with the remainder car sharing and travelling by minibus or coach. Please explain how this represents a worst-case scenario and signpost where this maximum parameter is secured in the dDCO.	As it has previously raised, PoTLL is concerned that this movement assumption is a large assumption to make and is not yet secured. PoTLL assumes that the Applicant's position will be that the Construction Worker Travel Plan will be able to manage this, such a Plan to include utilising the off-site car park at Arena Essex Raceway, near Lakeside that the Applicant has sought planning permission for from Thurrock Council. Until that planning permission is issued (the application for it was submitted in September 2020 and remains undetermined), which is on a site in the Green Belt and where Highways England has raised concerns about its appropriateness, it is considered that this assumption cannot be relied upon and therefore pre-commencement control will be required until appropriate provision is secured.
1.17.5	[Highways England] Please expand on the concerns raised in your RR [RR-016] in respect of additional vehicle movements during construction and safety at the 'Asda' roundabout.	PoTLL notes that the Asda Roundabout is the primary access pinch point to the Port of Tilbury and Tilbury2; and that its safe and efficient operation is a key concern for PoTLL and was the subject of significant debate in the Tilbury2 DCO examination and consequential works.
1.17.6	Does the Applicant envisage a role for PoTLL in the management of construction traffic within the Tilbury 2 site. If not, please explain.	PoTLL considers that it should have an approval role specified in the Construction Traffic Management Plan dDCO Requirement in relation to those aspects of the CTMP which will affect it. This is to ensure that the mechanisms that are put in place to manage deliveries and arrivals are compatible with the safe operation of Tilbury2.

Question Number	Question	PoTLL Response
		PoTLL also considers that it should have a consultation role in the development of the Construction Worker Travel Plan.
1.17.8	In light of the progression of the Lower Thames Crossing and London Resort NSIP projects, new information has become available. Can the Applicant indicate if this influences the ES Traffic assessments and their conclusions and if so, describe how?	PoTLL notes that the Transport Assessment and draft DCO for the London Resort project identify that improvements are required to the Asda Roundabout prior to that project's first gate opening in 2029. The London Resort proposals also seek to utilise the Port of Tilbury for consolidation, delivery and construction worker accommodation purposes prior to onward marine travel to the Resort, with associated HGV movements. It is also noted that Lower Thames Crossing have indicated to host authorities that a further consultation is likely to be undertaken in the coming months, which will provide more information on local construction traffic issues - which are likely to arise at the same time as the TFGP is being constructed. PoTLL considers that the Applicant should provide a full update indicating how the London Resort traffic information impacts upon the TFGP traffic flows during the construction period; and should be required to do so again once more LTC information becomes available to ensure adequate environmental information and cumulative assessment. This will reflect that the TFGP project is at the centre of an area of growth and development; and its environment and transport assessments should therefore reflect this - PoTLL considers that this information is currently high level, at best, in the current application material.

Appendix 1: PoTLL's Proposed Protective Provisions

1.The provisions of this Part of this Schedule have effect unless otherwise agreed in writing between the undertaker and the Port Company.

2. In this Part of this Schedule—

"accumulation" means any accumulation of silt or other material (including any materials used to construct the authorised development) which constitutes an impediment to navigation at the Port or at or in the approaches to the Port;

"the affected highways" means the A1089 St Andrews Road, Ferry Road, Fort Road, or the unnamed link road between Fort Road and the A1089 St Andrews Road;

"erosion" means any erosion of the bed or banks of the river or any quay or jetty or other structure of whatever nature within the Port;

"plans" includes navigational risk assessments, sections, descriptions, drawings, specifications, proposed method statements, vehicle movement profiles and hydraulic information including, but not limited to, information as the discharge of water and materials;

"the Port" means any land with the Port of Tilbury held by the Port Company for the purposes of its statutory undertaking;

"the Port Company plan" means the document certified as the Port Company plan by the Secretary of State for the purposes of this Order;

"the Port of Tilbury" means the harbour over which the Port Company has jurisdiction as is delineated on the Port Company plan and as may be amended from time to time, together with any quays, docks, river walls or other land held in connection with that harbour;

"specified work" means any work, activity or operation authorised by this Order and their associated traffic movements which may affect-

(a) the Port of Tilbury and the affected highways;

(b) access to, from and within the Port;

(c) streets within the Port;

(d) navigation to and from the Port of Tilbury;

(e) the Port's ability to carry out dredging to facilitate shipping access to the Port; and

(e) the functions of the Port Company as the statutory harbour authority for the Port of Tilbury, and

includes without limitation Work No. 10; and

"street" has the same meaning as in the 1991 Act.

3. (1) The undertaker must not exercise the powers conferred by articles 3 (Development consent etc. granted by the Order) including in respect of the permitted preliminary works, 5 (maintenance of authorised development), 11 (street works), 13 (temporary restriction of use of streets), 14 (access to works), 15 (traffic regulation), 17 (authority to survey and investigate the land), 18 (removal of human remains), 19 (compulsory acquisition of land), 22 (compulsory acquisition of rights), 25 (acquisition of subsoil only), 27 (rights under or over streets), 28 (temporary use of land for carrying out the authorised development), 29 (temporary use of land for maintaining the authorised development), 30 (statutory undertakers) and 35 (felling or lopping of trees and removal of hedgerows) in respect of the Port and the affected highways unless the exercise of such powers is with the consent of the Port Company.

(2) The undertaker must not in the exercise of the powers conferred by this Order prevent pedestrian or vehicular access to the Port, unless preventing such access is with the consent of the Port Company.

(3) Articles 20 and 23 shall not apply to the Port and any interests or rights held by the Port Company.

4. (1) At least 56 days before commencing the carrying out or maintenance of any specified work, the undertaker must submit to the Port Company plans of that work for its approval.

(2) Any approval of the Port Company under this paragraph—

(a) must not be unreasonably withheld;

(b) may be given subject to such reasonable requirements, conditions or restrictions as the Port Company may make for the protection of the Port and navigation to and from the Port and the approaches to the Port, including a requirement for the undertaker to carry out protective works at its own expense; and

(c) must not restrict the powers granted to the undertaker under this Order where such powers do not affect the Port or the affected highways.

(3) The undertaker must carry out any specified work and any protective works required under sub-paragraph (2)(b) in accordance with the plans approved under sub-paragraph (1) or settled under article 43 (arbitration).

(4) If the Port Company fails to express its refusal or approval of any plans or arrangements within 30 days after they have been delivered to it under sub-paragraph (1) and the Port Company has not requested an extension of time to give its consent from the undertaker prior to the expiration of the 30 days which the undertaker has granted, acting reasonably, the Port Company is deemed to have refused them.

(5) If the Port Company fails to express its approval of any plans or arrangements delivered to it under sub-paragraph (1) at the expiration of the extension of time granted by the undertaker under sub-paragraph (4), such a request is deemed to have been refused by the Port Company.

(6) The undertaker must inform the Port Company in writing of the intended start date and the likely duration of the carrying out of a specified work at least 30 working days prior to the commencement of the first specified work.

5. (1) If during the construction of a specified work or after the completion of that work and wholly or partly in consequence of its construction there is caused or created an accumulation or erosion the undertaker, if so requested by the Port Company acting reasonably, must remedy such accumulation or erosion to the extent attributable to such construction and, if it refuses or fails to do so as soon as reasonably practicable, the Port Company may itself cause the work to be done and may recover the reasonable cost of doing so from the undertaker.

(2) For the purposes of sub-paragraph (1)—

(a) in the case of an accumulation, the remedy must be its removal; and

(b) in the case of erosion, the remedy must be the carrying out of such reconstruction works and other protective works or measures as Port Company reasonably requires.

6. In exercising the powers conferred by the Order in relation to the affected highways or any street through the Port, the undertaker must have regard to the potential disruption, delay or congestion of traffic which may be caused, and seek to minimise such disruption, delay or congestion so far as is reasonably practicable. The undertaker must not at any time prevent or unreasonably impede access by emergency service vehicles to the Port.

7. (1) Where the undertaker carries out any works to the affected highways or street within the Port it must make good any defects in those works notified to it by Port Company within the period of three months after the date of its removal from occupation of that area of highway or street.

(2) The undertaker may, at its sole discretion and in place of carrying out any works to remedy any defects under sub-paragraph (5), pay to Port Company a sum equal to the cost to Port Company of carrying out the required works as calculated by Port Company (acting reasonably).

8. Any person duly appointed by Port Company for this purpose may at all reasonable times, on giving to the undertaker such notice as may in the circumstances be reasonable, enter upon and inspect any part of a specified work; and the undertaker must give to such person all reasonable facilities for such inspection and, if the duly appointed person is of the opinion that the construction of the work poses danger to any property of the Port or person within the Port, the undertaker must adopt such measures and precautions as may be reasonably practicable for the purpose of preventing any damage or injury.

9. (1) The Port Company may any at time close the Port and exclude access by the undertaker (including access under any power granted by this Order, under any access right howsoever acquired and as provided for in any agreement between the undertaker and Port Company) where the Port Company reasonably considers that it necessary to do so in response to a request from an emergency service or government agency, any emergency or accident, or an imminent threat to the health or safety of persons or of damage to property.

(2) The Port Company must inform the undertaker of any closure of the Port as soon as reasonably practicable, including details of the location and extent of the closure and where known, the anticipated duration of the closure.

10. The Marine Operations Plan to be prepared by the undertaker under Requirement XX(5) must include, but is not limited to, the following matters-

(a) a deconfliction process for use of Work No. 10 and vessels navigating to and from and berthing at berths adjacent to Work No.10; and

(b) a prohibition on use of Work No. 10 within the period between 1 hour before and 1 hour after a scheduled departure or arrival of large vessels at berths adjacent to Work No. 10; and

(c) protocols for sharing of information between the Port Company and the undertaker to facilitate compliance with sub-paragraphs (a) and (b).

11. Where transhipment use of the Port by the undertaker is authorised by the Port Company (on such commercial terms as may be agreed), the undertaker may not commence such use unless and until a port passage plan in respect of that transhipment is approved by the Port Company.

12. (1) The undertaker is to be responsible for, and must make good to the Port Company all losses, costs, charges, damages and costs however caused, which may reasonably be incurred or occasioned to the Port Company by reason or arising in connection with-

(a) the perusal of plans, documents under Schedule 2 of this Order and this Part of this Schedule and the inspection of a specified work;

(b) the costs of alterations to aids to navigation owned by the Port Company, laying down moorings or buoys or carrying out any dredging operations in relation to either of those activities, as may be necessary in consequence of the construction of a specified work;

(c) any disruption to the flow of commercial terrestrial or marine traffic to, from and within the Port of Tilbury caused by the construction, maintenance, decommissioning or failure of a specified work and any marine or terrestrial traffic associated with it or by the undertaker

utilising the powers under article 36, which leads to a financial loss or penalty to the Port Company;

(d) the construction, maintenance or failure of a specified work, or the undertaking by the Port Company of works or measures to prevent or remedy danger or impediment to navigation, or damage to the Port arising from such construction, maintenance or failure; including but not limited to—

(i) any additional costs of dredging incurred by the Port Company as a result of the construction, maintenance, decommissioning or use of the specified work or the contamination of the riverbed caused by the construction, maintenance, decommissioning or use of the specified work; and

(ii) damage to any, street, plant, equipment or building belonging to the Port Company that is caused by the construction, maintenance or failure of a specified work; and

(e) any act or omission of the undertaker or its servants and agents while engaged in the construction, maintenance or use of a specified work.

(2) Without limiting the generality of sub-paragraph (1), the undertaker must indemnify the Port Company from and against all claims and demands arising out of, or in connection with, such construction, maintenance or failure or act or omission as is mentioned in that sub-paragraph.

(3) Nothing in this paragraph imposes any liability on the undertaker to the extent that any losses, costs, charges, damages, expenses, claims or demands referred to in sub-paragraph (2) are attributable to negligence on the part of Port Company or of any person in its employ or of its contractors.

(4) The Port Company must give to the undertaker notice in writing of any claim or demand for which the undertaker may be liable under this paragraph and no settlement or compromise of any such claim or demand may be made without the consent in writing of the undertaker.

13. The fact that any work or thing has been executed or done with the consent of the Port Company and in accordance with any conditions or restrictions prescribed by the Port Company or in accordance with any plans approved or deemed to be approved by the Port Company under this Part of this Schedule or under Schedule 2 of this Order or to its satisfaction or in accordance with any directions or award of any arbitrator does not relieve the undertaker from any liability under the provisions of this Part.

14. Save to the extent expressly provided for nothing in this Order affects prejudicially any statutory or other rights, powers or privileges vested in, or enjoyed by, the Port Company at the date of this Order coming into force.

15. With the exception of any duty owed by the Port Company to the undertaker, nothing in this Order is to be construed as imposing upon the Port Company any duty or liability to which the Port Company would not otherwise be subject.

16. Any difference arising between the undertaker and Port Company under this Part of this Schedule (other than any difference as to the meaning or construction of this Part of this Schedule) shall be resolved by arbitration under article [43] (arbitration).

Appendix 2: Tilbury2 Landscape and Ecological Management Plan

PORT OF TILBURY LONDON

PLANNING ACT 2008
INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

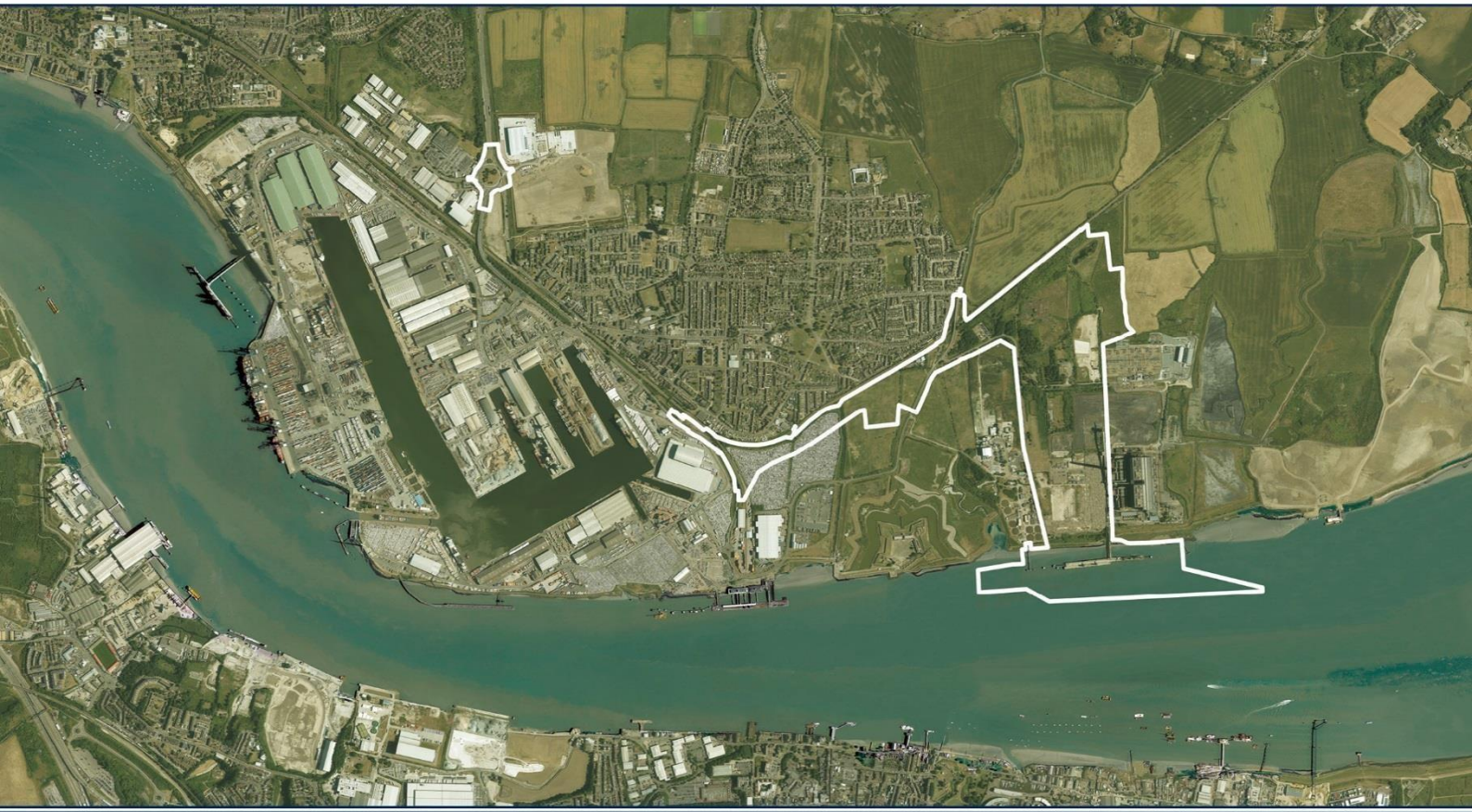
PROPOSED PORT TERMINAL AT FORMER TILBURY POWER STATION

TILBURY2

TR030003

LANDSCAPE AND ECOLOGICAL MANAGEMENT PLAN V3 – CLEAN

TILBURY2 DOCUMENT REF: POTLL/T2/EX/177



TILBURY2

CONTENTS

1.0 INTRODUCTION

SCHEME OVERVIEW

1.1 Port of Tilbury London Limited (PoTLL) is proposing a new port terminal on the north bank of the River Thames at Tilbury, a short distance to the east of its existing Port. The proposed port terminal will be constructed on largely previously developed land that formed the western part of the former Tilbury Power Station.

1.2 The project is known as “Tilbury2.” The proposed main uses on the site will be a Roll-on/Roll-off ("RoRo") terminal and a Construction Materials and Aggregates terminal ("the CMAT"), and associated infrastructure including rail and road facilities and revisions to the existing marine infrastructure. The CMAT will include stockpiling of construction materials and some processing of aggregates for the production of asphalt and concrete products. An 'infrastructure corridor' is proposed that will accommodate road and rail links to the existing rail and road network and an enhanced connection with the existing Port.

1.3 The project will require works including, but not limited to:

- creation of hard surfaced pavements;
- improvement of and extensions to the existing river jetty including creation of a new RoRo berth;
- associated dredging of berth pockets around the proposed and extended jetty and dredging of the approaches to these berth pockets;
- new and improved conveyors;
- erection of welfare buildings;
- erection of a single 10,200sq.m. warehouse;
- a number of storage and production structures associated with the CMAT;
- the construction of a new link road from Ferry Road to Fort Road; and
- formation of a rail spur and sidings.

1.4 The proposed volumes of import/export of RoRo units for the terminal exceed the threshold of 250,000 units stated in the Planning Act 2008 for throughput per annum. The Tilbury2 project therefore constitutes a Nationally Significant Infrastructure Project (NSIP).

1.5 The scheme also includes elements of retained habitat, proposed habitat creation and soft-landscaping, the management of which during operation is the subject of this Landscape and Ecology Management Plan (LEMP) document.

SCOPE AND PURPOSE

1.6 The LEMP covers the terrestrial areas of the site and intertidal or marine habitats falling within the Order Limits. A small area of such intertidal habitats will be disrupted during the construction phase. In the operational phase the current condition of undisturbed intertidal areas and the future condition of the disrupted areas will continue to be maintained by ongoing hydrogeomorphological processes. These processes are not anticipated to be disrupted by the proposals (see Environmental Statement Chapter 10 Terrestrial Ecology, and Chapter 11 Marine Ecology, document reference 6.1/APP-031). However, monitoring of the success of mitigation and compensation measures is proposed for defined areas of the intertidal zone and the LEMP covers this.

1.7 For all other areas, the purpose of the LEMP is to set out the general principles for management during operation of both existing terrestrial habitats and retained established planting and that which will be newly created within the Order Limits, in order that these perform their intended ecological and landscape functions during operation of the development. These functions are in part ameliorative (e.g. to screen views from sensitive receptors) and in part mitigation/compensation (e.g. to provide alternative habitat for species displaced by the development). Further information is provided in ES Chapters 9 and 10. Details of the construction of created habitats, including those within the Order Limits, are set out in the Ecological Mitigation and Compensation Plan (EMCP)[1].

1.8 Compliance with the LEMP will be a requirement of the DCO. As such, the Port operator must comply with all measures within it.

FUTURE POTENTIAL CUMULATIVE EFFECTS AND MITIGATION

1.9 Details of the mitigation and compensation measures to be implemented as part of the Tilbury2 scheme are set out in the EMCP document. The EMCP covers both on and off-site mitigation and compensation. The LEMP, by contrast, is specific to the Tilbury2 site. It focusses on management of the retained and proposed habitats within the Order Limits during the operational phase, including those which will serve to minimise and mitigate the predicted effects of the Tilbury2 proposals alone or in-combination with other future proposals.

1.10 As part of the environmental assessment process, a number of potential 'cumulative' projects have been identified, the environmental effects of which in relation to landscape and ecology could, in the future, interact with any net (i.e. not fully mitigated) effects of Tilbury2, creating the potential for cumulative environmental effects if not avoided or fully mitigated within those later schemes. A high level, qualitative, and proportionate Cumulative Effects Assessment of Tilbury2, based on the available data and knowledge at the

[1] The EMCP also deals with matters of mitigation (other than embedded design mitigation which has been employed to avoid impacts occurring in the first place, which is best considered as 'avoidance') and compensation, both on- and off-site. Mitigation includes *inter alia* the measures that will be taken, under licence where necessary and appropriate, to capture and relocate protected species and/or damage or destroy their habitats, or alternatively to prevent the spread of invasive non-native plant species (INNS) during the disturbance associated with construction activity. Compensation includes the measures that will be taken to provide alternative habitats for species displaced or translocated from the development zones, which in some cases is delivered within the development masterplan, in other cases on adjoining land within the DCO limits, and in still other cases will be delivered at locations that are entirely off-site. The future management of off-site compensation features is also dealt with in the EMCP.

date of assessment, with the proposed Tilbury Energy Centre (TEC) and Lower Thames Crossing (LTC) notified NSIP projects, has been undertaken. However, it is not the responsibility of the Tilbury2 project to mitigate these potential cumulative effects, in anticipation of projects that may never come forward and are yet to seek to avoid and mitigate their own effects. It would not be reasonable or practicable to design such mitigation before even the spatial and temporal parameters are fully known and in the absence of adequate detail for those proposed schemes being known.

1.11 Accordingly, the environmental impacts of those schemes will fall to be assessed, consulted on, designed out and/or mitigated by the proponents of those projects once adequate parameters and data of sufficient quality is available and ultimately considered by the relevant decision-makers as and when applications are progressed. Both the LTC and TEC Scoping Reports have identified Tilbury2 as a cumulative project that will be assessed as part of their Environmental Assessment process. This will allow these future proposals to fully take account of the detailed design of Tilbury2, the proposals in this LEMP and in the EMCP document, any on-going monitoring and the design of the proposed landscape and ecological mitigation associated with these cumulative projects.

1.12 That said, given that the Tilbury2 EIA process has identified at a high level the potential for cumulative effects, if or when these projects are brought forward, and where those impacts have not been avoided or designed out, then there will be potential for landscape scale mitigation as part of those projects, thus ensuring that the cumulative effects that could arise are properly addressed in the wider spatial environment, taking account of landscape and ecological character zones and habitat types.

2.0 RETAINED ECOLOGICAL & LANDSCAPE FEATURES

2.1 The baseline condition of the retained features of ecological interest is described in detail within ES Chapter 10: Terrestrial Ecology, and set out in the associated Figures and Appendices. Features of landscape interest are defined within the ES Chapter 9: Landscape Character and Visual Amenity and associated Figures and Appendices.

2.2 This LEMP is concerned only with the management and/or monitoring of those ecological and landscape features that will remain on completion of construction. These are as illustrated on Figure 9.9 (Landscape Strategy) of the Environmental Statement and at Figure 1 (On-Site Ecological Mitigation and Compensation) of this LEMP and annotated with the boundaries of the various management compartments discussed at Section 4 of this document.

RETAINED PARTS OF EXISTING ECOLOGICAL AND LANDSCAPE DESIGNATIONS

2.3 The Order Limits encompass a number of non-statutory ecological designations. The 'Tilbury Marshes' Local Wildlife Site (LoWS) is a 39.8ha designation which overlaps with the infrastructure corridor but is in large part located to the south of it. Of the 5.3ha of this LoWS within the Order Limits, up to 3.4ha will be subject to permanent DCO use, with a further 0.1ha to be used only temporarily during construction and restored for wildlife[2] post-development. The restored area will revert to common land and be subject to associated reinstated grazing rights, and therefore falls outside the scope of this LEMP. A further area of 1.35ha serves as replacement common land and will not be subject to any permanent or temporary construction use, and therefore also falls outside the scope of this LEMP.

2.4 The 'Tilbury Centre' LoWS will be removed during construction. Most of the 'Lytag Brownfield' LoWS will also be removed but a small (0.7ha) area will be retained in the northern edge of the Green Belt land. This comprises management compartment 7 as described in Section 4 of this LEMP.

2.5 An area of approximately 7.8ha of designated Green Belt land north-east of the CMAT and rail spur will also be encompassed within the Order Limits. This comprises compartments 5, 6 and 7 as described in Section 4 of this LEMP.

RETAINED HABITATS / LANDSCAPE FEATURES

2.6 Terrestrial and intertidal habitat and landscape features that will be retained through the construction and operation of the development include the following Section 41 (S41) Habitats[3], as described further within Chapter 10 of the ES:

- Open Mosaic Habitats on Previously Developed Land (0.3 ha);

[2] Specifically restored to Coastal and Floodplain Grazing Marsh priority habitat type. For an account of the change in these calculated figures since the production of the ES, please refer to the response to FWQ 1.2.8 and 1.2.9; and to tabulated response to FWQ 1.2.10 provided within the Applicant's Deadline 2 submission document.

[3] Species and habitats of principal importance in England pursuant to the obligations levied by the Natural Environment & Rural Communities Act, 2006 (section 40-42).

- Hedgerows (c.180m); and
- Ponds (1 no.); and
- Intertidal habitats, ie. Coastal Saltmarsh (0.6ha) / Intertidal Mudflat (3.8ha).

2.7 Other non-S41 retained habitat features include:

- Drainage ditches (c.1005m);
- Tree lines (c.950m);
- Scrub (0.1-0.5ha); and
- Other grassland (c.2.5ha).

3.0 NEWLY CREATED HABITATS / LANDSCAPE FEATURES

NEW HABITATS / LANDSCAPE FEATURES

3.1 New habitat creation forms part of both the On-Site Ecological Mitigation and Compensation Strategy (see Figure 10.13 of the ES, and also Figure 1 of this document) and the Landscape Strategy (see Figure 9.9 of the ES, as updated by the Technical Note presented at Appendix E). It is a condition of this LEMP that these features are constructed and managed in accordance with this LEMP and as indicated on Figure 1. Further details of the processes of construction of these new habitats are set out in the EMCP. This LEMP deals only with their aftercare and management.

3.2 Newly created or restored habitat features include the following S41 Habitats (Habitats of Principal Importance further to section 41 of the NERC Act 2006) or ecologically similar equivalents:

- Open Mosaic Habitat on Previously Developed Land;
- Coastal and Floodplain Grazing Marsh;
- Lowland Mixed Deciduous Woodland / Hedgerows[4];
- Ponds (2 no.);
- Reedbed; and
- Intertidal habitats (Coastal Saltmarsh / Intertidal Mudflat)[5].

3.3 Other newly created habitat and landscape features will include the following:

- Wet ditches (suitable for water voles);
- Dry ditches (including surface water / highway drainage attenuation); and
- Scrub and woodland planting.

NEWLY CREATED FEATURES FOR PROTECTED SPECIES

3.4 The species of ecological interest identified in the assessment of baseline conditions are described in detail within the ES Chapter 10: Terrestrial Ecology, and associated Figures and Appendices.

3.5 In addition to the ditches and ponds above, which will provide habitat for water voles, and scrub intended to provide some measure of replacement habitat for displaced nesting birds, a number of other species will require specific provision of new ecological features as follows:

[4] Non-S41 but ecologically very similar habitats will be created through screen planting and other scrub creation

[5] Discussions are ongoing with the Environment Agency about the possibility of creating new intertidal habitats within the Order Limits. Details of habitat creation would be presented within the EMCP, but no on-going management of these habitats is deemed necessary due to their being maintained by hydrogeomorphological processes and thus this does not form a management compartment within the LEMP.

- Artificial sett creation for badger;
- Suitable grassland habitat for translocated reptiles, and;
- Replacement bat roosts (bat boxes).

4.0 HABITAT & LANDSCAPE MANAGEMENT MEASURES

GENERAL MEASURES

4.1 The following measures apply to all management prescriptions outlined in Section 4.

Works to retained trees

4.2 All tree inspections and arboricultural works indicated in the following sections of this LEMP are to be carried out by an approved member of the Arboricultural Association. The results of inspections and interventions should be documented in writing.

4.3 Where and to the extent that materials and workmanship are not fully specified they are to be in accordance with good prevailing arboricultural practice or the current British Standard with reference to:

- BS 3998: Recommendations for tree work;
- BS 4428: Code of practice for general landscape operations.

New planting

4.4 Aftercare and establishment works are to be carried out by an approved landscape contractor in accordance with good horticultural practice or the current British Standard with reference to:

- BS 4428: Code of practice for general landscape operations;
- BS 7370: Grounds maintenance;
- BS 8545: Trees: from nursery to independence in the landscape – recommendations.

4.5 Three broad aftercare and establishment periods for new planting are identified below, these are not mutually exclusive and a programme of monitoring will be necessary to ensure the landscape objectives are met.

Short term (1-5 years). The initial establishment period will require more frequent maintenance operations. Replacement planting and remedial works will be carried out and planting sundries maintained in good condition.

Medium term (5-10 years). As the planting establishes during this period, less frequent maintenance will be required. Initial thinning may be necessary to ensure planting thrives without competition.

Long term (10-25 + years). As the planting matures, continual monitoring (see Section 5) will inform a rolling maintenance programme, to ensure that effective maintenance is carried out at the appropriate time to meet health and safety requirements.

4.6 During the Short Term (initial establishment) period, inspections shall take place annually in October/November to determine the effectiveness of the

establishment and aftercare provisions to that point, paying particular attention to:

1. Planting disease, damage or death;

2. Vandalism;

3. General appearance and condition;

4. Any invasive or non-native species;

5. Any evidence of protected species (such as nesting birds).

4.7 If required, the LEMP will be revised and forthcoming maintenance operations adjusted accordingly.

4.8 Reviews will continue to take place beyond the initial 5 year period subject to an assessment of the prevailing conditions on site as part of the 5 year LEMP review (see Section 5). These shall also identify any necessary remedial works on planting affecting publicly accessible areas. Safety issues reported by the public shall also be investigated as soon as practically possible and remedial works undertaken as necessary.

Works to ditches and ponds

4.9 Maintenance works to adopted highways drains, including the swales proposed to run adjacent to the link road along the infrastructure corridor, are anticipated to fall within the responsibility of the adopting authority. They are thus not addressed here, albeit that some of the same principles will apply, and they are expected to form some degree of mitigation and compensation function (e.g. against losses of dry grassed ditch within current grazing land).

4.10 Management works to controlled watercourses, including diverted sections of the 'main rivers' of Pincock's Trough, Chadwell Sewer, Chadwell Cross Sewer and East Dock Sewer will need to be carried out in accordance with approvals from the Environment Agency pursuant to their protective provisions in the DCO.

4.11 Management of ditches created with ecological or landscape objectives overriding in the design can be carried out without recourse to permitting regimes and thus fall fully within the ambit of this LEMP. Standard best practice procedures shall apply to such activities[6,7], and species-specific guidance shall be taken into account where relevant, such as for water vole[8,9].

[6] For example: Essex County Council Flood and Water Management Team, (November 2014). *Guide to Ordinary Watercourse Maintenance.* [Accessed from: https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/Watercourse-regulation/Documents/ditch-maintenance.pdf]

[7] Buisson *et al.* (2008). *The Drainage Channel Biodiversity Manual: Integrating Wildlife and Flood Risk Management*. Association of Drainage Authorities and Natural England, Peterborough.

[8] Strachan, Moorhouse & Gelling, (2011). *Water Vole Conservation Handbook*, 3rd edition. WildCRU.

[9] Dean, Strachan, Gow and Andrews, (2016). *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series)*. Eds. F Mathews & P Chanin. The Mammal Society, London.

Maintenance of operational mitigation measures

4.12 The success of on-site mitigation and compensation for both landscape effects and ecological effects will be dependent not just on aftercare and management, but also on ensuring the value of retained and created habitats is not compromised by negative influences arising due to proximity to the operational Tilbury2 development.

4.13 Chapter 10 of the ES includes assessments of the impacts of noise, dust and lighting on retained and new habitat features, taking into account outputs from the studies reported on in Chapters 15-18 and the embedded mitigation proposed in those chapters.

4.14 The Operational Management Plan (OMP) submitted with the DCO application sets out measures to ensure the embedded mitigation commitments referred to in the ES, and relied upon in the Chapter 10 assessment, are upheld in respect of ground and surface water quality, noise and dust. These measures are assumed to be in place for the purpose of this document and are not repeated here. The requirement for non-obtrusive lighting and minimal overspill into retained areas adjoining the operational site is also set out in Chapters 9 and 10 of the ES and similarly reflected in the lighting designs included in the Preliminary Lighting Strategy at Appendix 9.J of the ES. Again, for the purpose of this document it is assumed that a lighting scheme in general accordance with the Preliminary Lighting Strategy is in place as is required by the DCO and that maintenance of embedded mitigation (such as cowls) will fall within standard operational management of the site.

Invasive Non-native Species (INNS)

4.15 Chapter 10 of the ES, and the CEMP, set out the baseline position as regards INNS and the measures that will be taken to identify and control INNS through the construction phase. In the post-construction phase, vigilance for INNS will form part of the annual walkover surveys set out in section 5 of this LEMP, and where identified, appropriate controls will be put in place to ensure control and eradication, in line with prevailing best practice standards and legal requirements.

MANAGEMENT BY COMPARTMENT

4.16 Figure 1 attached shows the location of the retained and newly created habitats relative to the development, and also indicates the boundaries of the nine compartments under which management measures are grouped. Each management compartment is briefly described below and the prescriptions for it outlined:

Compartment 1

Summary Description

4.17 This comprises a belt of retained mixed deciduous and coniferous trees forming a visually important screen at the western edge of the development. Key tree species are Monterrey pine, white poplar, London plane, weeping willow and ash. The compartment also includes an adjoining drainage ditch which is to be re-profiled in much of its southern section to meet surface water drainage requirements. In the northern part of the compartment, adjoining

Station Approach Road, this ditch comprises a retained section of established watercourse (Pincock's Trough) that supports water voles, although the westernmost end of this will be affected by diversion and culverting works. Contained within this compartment will be bat boxes on mature trees installed as compensatory provision for the loss of a minor common pipistrelle roost in an existing building (Building B7 as referred to in ES Chapter 10).

Management Objectives

4.18 Maintain structure as a screen of mature mixed deciduous/coniferous trees and shrubs to ameliorate visual effects, in particular on views towards the Tilbury2 site from the west. This will serve the complementary function of maintaining a sheltered tree-line for bat foraging, with mature and over-mature trees being likely to develop features suitable for bat roosting, and dense vegetation offering suitable habitat for bird nesting. Retain/enhance existing macrophyte vegetation in ditch/Pincocks Trough where possible and encourage its expansion along re-profiled channel to encourage water voles and other species. Ensure bat roosting provision is maintained.

Management Prescriptions

i) Inspect retained mature trees annually in autumn and after major storms to identify structural defects, including dead or broken branches, cracks, decay and root decay. Where representing a potential health and safety hazard or a significant risk to tree health, remove any dead, dying or diseased wood, broken branches and stubs at the earliest opportunity ensuring due regard is had to the possibility of bat roosts and nesting birds, and seeking specialist ecologist advice where in any doubt and aiming at all times to ensure no net reduction in nesting/roosting opportunities. All pruning/cutting of mature trees to be carried out in accordance with Arboricultural Association leaflet 'Mature Tree Management'[10].

ii) Maintain and/or enhance screening function of existing vegetation through periodic (e.g. biannual) and targeted autumn/winter coppicing and pruning interventions by a qualified arboriculturalist, ensuring due regard is had to the possibility of bat roosts when working with mature/over-mature trees and seeking specialist ecologist advice where necessary.

iii) During operation (i), identify and mark sapling or young trees for recruitment and undertake any measures necessary to promote their vigorous growth (e.g. 'haloing'). Consider planting of some coniferous species if no seedling recruitment observed.

iv) Prevent excessive overshading of retained/re-profiled ditch systems by cutting back over-hanging woody vegetation annually each autumn.

v) Assess development of macrophyte vegetation in ditches at five-yearly intervals and put into effect staggered cut-back/clearance operations where vegetation deemed to be too dense than optimum for water voles and/or affecting surface water drainage function. All maintenance to be carried out in accordance with current best practice to minimise

[10] Arboricultural Association (2005). LEAFLET 8 Mature Tree Management.

effects on ecology and ensure legal compliance in respect of protected species such as water vole[11,12].

vi) Check bat boxes at least annually in accordance with the terms of any prevailing licence and related monitoring requirements. Thereafter, ground-based checks will be sufficient to ensure they remain *in-situ* with any replacements put into effect to ensure continued compensatory provision.

Compartment 2

Summary Description

4.19 This comprises a length of retained wet ditch and some adjacent verge and planted trees immediately to the south of Substation Road and at the northern edge of the Ro-Ro terminal. The ditch supports water voles (at least at times) and the verges have some botanical interest (e.g. bee orchid).

Management Objectives

4.20 Ensure retention of existing interest as far as possible through maintaining current mowing regime and ensuring ditch management continues to provide habitat suitable for water voles. Work towards enhancing value of this compartment as providing an east-west conduit across the Tilbury2 site for bats.

Management Prescriptions

i) Maintain and/or enhance existing tree planting via targeted interventions by a qualified arboriculturalist, ensuring due regard is had to the possibility of bat roosts when working with mature/over-mature trees and seeking specialist ecologist advice where necessary.

ii) Prevent excessive overshading of retained/re-profiled ditch systems by cutting back over-hanging woody vegetation annually each autumn.

iii) Mow verge grasslands annually in February and again in October, with all arisings removed to encourage low fertility species-rich grassland and maintain conditions favourable to species such as bee orchid.

iv) Assess development of macrophyte vegetation in ditches at five-yearly intervals and put into effect staggered cut-back/clearance operations where vegetation deemed to be too dense than optimum for water voles and/or affecting surface water drainage function. All maintenance to be carried out in accordance with current best practice to minimise

[11] For example: Essex County Council Flood and Water Management Team, (November 2014). *Guide to Ordinary Watercourse Maintenance.* [Accessed from: https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/Watercourse-regulation/Documents/ditch-maintenance.pdf]
[12] Natural England and DEFRA (28 March 2015). *Water voles: surveys and mitigation for development projects*. [Accessed from: https://www.gov.uk/guidance/water-voles-protection-surveys-and-licences]

effects on ecology and ensure legal compliance in respect of protected species such as water vole[13,14].

Compartment 3

Summary Description

4.21 This comprises a strip of land between the new rail siding and the Tilbury2 site boundary with Network Rail land to the north. Other than provision for a 3m access track adjoining the siding (which also encompasses an easement for buried infrastructure) and a noise-attenuation barrier, the rest of this land will be given over to dense scrub planting to provide a visual screen, and a length of wet ditch designed to provide habitat for water voles and other wetland flora and fauna. Pockets of the S41 habitat 'open mosaic habitat on previously developed land' are also anticipated to survive closer to the Network Rail boundary.

Management Objectives

4.22 Encourage development of a dense screen of mature deciduous scrub to ameliorate visual effects, in particular on views towards the Tilbury2 site from the north and north-west. This will serve the complementary function of maintaining a linear scrub belt with lee-sides and edges for bat foraging, and a dense structure suitable for nesting birds such as linnet and possibly nightingale. Steer maturation of the created ditch habitat towards a condition favourable for water voles, with scrub/ditch interface suitable for Cetti's warbler.

Management Prescriptions

i) Encourage development of dense impenetrable scrub through interventions during establishment period to replace failures and encourage dense growth down to ground level, including through periodic pruning and coppicing in autumn/winter, whilst being mindful to minimise scrub growth and related leaf-fall issues close the London-Southend railway, in line with Network Rail guidance[15].

ii) Encourage the development of dense macrophyte vegetation in ditch, including common reed, but also species such as *Glyceria* to encourage water voles and other wetland species. Thereafter assess development of macrophyte vegetation at five-yearly intervals and put into effect staggered cut-back/clearance operations where vegetation deemed to be too dense than optimum for water voles. All maintenance to be carried out in accordance with current best practice

[13] For example: Essex County Council Flood and Water Management Team, (November 2014). *Guide to Ordinary Watercourse Maintenance.* [Accessed from: https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/Watercourse-regulation/Documents/ditch-maintenance.pdf]
[14] Natural England and DEFRA (28 March 2015). *Water voles: surveys and mitigation for development projects*. [Accessed from: https://www.gov.uk/guidance/water-voles-protection-surveys-and-licences]
[15] Network Rail. *Vegetation Management Explained.* (PEIR consultation response document).

to minimise effects on ecology and ensure legal compliance in respect of protected species such as water vole[16,17].

iii) Prevent excessive overshading of retained/re-profiled ditch systems and open mosaic habitats by cutting back over-hanging/colonising woody vegetation annually each autumn, except where conflicting with landscape screening objective.

Compartment 4

Summary Description

4.23 This comprises a strip of land on the outer radius of the new rail siding and separating the CMAT from the habitat compensation area and Green Belt land within the Order Limits to the north-east. Parts of this land will be given over to scrub planting to provide a visual screen and also to combat airborne transport of fugitive dust emissions from stockpiled aggregates. Other areas are likely to comprise retained, translocated or newly created representations of the S41 habitat 'open mosaic habitat on previously developed land'.

Management Objectives

4.24 Encourage development of a mixed boundary strip of hedgerow, scattered scrub and early-succession habitats to provide a buffer between the CMAT and the compensation habitats to the north-east, while also offering some bird nesting habitat. In other areas, encourage the development of sparsely vegetated artificial substrates including rail clinker, sands and gravels from marine dredged origin and possibly elements of PFA and/or Lytag to replicate brownfield conditions and secure representations of open-mosaic habitats on previously developed land.

Management Prescriptions

i) Encourage development of continuous linear representations of dense scrub or hedgerow reflecting finalisation of uses on the adjoining CMAT in order that such vegetation can perform a useful function in capturing airborne dust, should that be necessary.

ii) In other areas, assess brownfield substrates annually and ensure maintenance as sparse vegetation with a high proportion of lichens, annual plants and low cover of grasses or woody vegetation, including by cutting back of overshading/colonising woody vegetation. Where necessary to arrest processes of succession, periodic mechanical disturbance and compaction should be employed on no more than 25% of the extent of such habitats within the compartment.

[16] For example: Essex County Council Flood and Water Management Team, (November 2014). *Guide to Ordinary Watercourse Maintenance.* [Accessed from: https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/Watercourse-regulation/Documents/ditch-maintenance.pdf]

[17] Natural England and DEFRA (28 March 2015). *Water voles: surveys and mitigation for development projects*. [Accessed from: https://www.gov.uk/guidance/water-voles-protection-surveys-and-licences]

Compartment 5

Summary Description

4.25 This compartment contains the majority of the compensatory wetland habitat installed in advance and/or under the DCO as a ready receptor for water voles, including concentric rings of multiple ditch channel extending in total to around 2.5km of ditch and two new ponds with surrounding reedbed. Small representations of open mosaic habitat may also be created in the central area (between the ponds and the innermost rings of ditch), possibly using substrates translocated from the Lytag Site. Retained ditch, hedgerow/scrub and coarse grassland habitats along the eastern and southern boundaries are also included. The land lies within the Green Belt.

Management Objectives

4.26 Much of the habitat in this area is planned to be established in advance of construction by means of a separate but parallel planning consent for the concentric rings of ditches[18], in order that adequate size and maturity of receptor habitat for water voles will be available prior to the translocation of animals from development areas. If advanced construction is not possible, it will be constructed as a requirement of the DCO. Further details will be set out in the EMCP. The management objectives falling under this LEMP are to continue the development of the created habitats to optimise their value and carrying capacity for water voles (and other species using the same habitats), and to work towards complete replication of lost reedbed habitat.

Management Prescriptions

i) Encourage the development of dense macrophyte vegetation in ditches, this to be rich in foodplant species such as *Glyceria* to maximise value to water voles. Thereafter assess development of macrophyte vegetation at five-yearly intervals and put into effect staggered cut-back/clearance operations where vegetation deemed to be too dense than optimum for water voles. Particular attention to be paid to the potential presence of INNS, and if present then measures taken to remove/control them. All maintenance to be carried out in accordance with prevailing best practice to minimise effects on ecology and ensure legal compliance in respect of protected species[19].

ii) Encourage the development of dense reedbed around ponds and in the central part of the compartment aiming to achieve 0.5ha cover (consistent with anticipated extent of losses to the proposals). Thereafter assess development at five-yearly intervals and put into effect staggered cut-back/clearance operations where reed thatch is adjudged to be too dense. All maintenance to be carried out in accordance with prevailing best practice to minimise effects on

[18] Thurrock Council planning reference 18/00893/CONDC.

[19] For example: Essex County Council Flood and Water Management Team, (November 2014). *Guide to Ordinary Watercourse Maintenance.* [Accessed from: https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/Watercourse-regulation/Documents/ditch-maintenance.pdf]

ecology[20] and ensure legal compliance in respect of protected species such as water vole[21].

iii) Assess brownfield substrates annually and ensure maintenance as sparse vegetation with a high proportion of lichens, annual plants and low cover of grasses or woody vegetation, including by cutting back of overshading/colonising woody vegetation. Where necessary to arrest processes of succession, periodic mechanical disturbance and compaction should be employed on no more than 25% of the extent of such habitats within the compartment.

Compartment 6

Summary Description

4.27 This compartment comprises the previously installed and now maturing compensatory wetland habitat constructed by RWE for water voles, as well as the surrounding terrestrial area that was intended by them to serve as receptor habitat for reptiles from part of the former power station site. The recent grazing of this area has ceased and following repair of the surrounding reptile fencing, reptile hibernacula features have been installed and this grassland is being allowed to continue to develop an appropriate structure in order that it can accommodate a proportion of the reptile population needing to be moved from the Tilbury2 development. Further details are set out in the EMCP. The wetland habitat will be left as existing as it can no longer be used to receive water voles having already been colonised. This compartment is also the intended location for the artificial badger sett and this LEMP assumes that this has become occupied in the course of mitigation activities as set out in the EMCP and pursuant to a licence from Natural England, should it be required. The land lies within the Green Belt.

Management Objectives

4.28 Encourage development of suitable tussocky grassland structure in the land areas to maximise reptile carrying capacity, and thereafter maintain in optimum condition, allowing some limited development of bramble or woody scrub to provide shelter, scrub-interface conditions and sun-traps. Maintain waterbody as an open water feature with broad and dense bands of emergent vegetation around the margins. Encourage maturation of scrub planting around and on top of artificial badger sett to continue to integrate this with its surroundings.

Management Prescriptions

i) Inspect grassland areas every three to five years to assess sward structure and scrub development and address excess of either with management interventions, to include localised hand strimming in relation to the former and hand cutting in relation to the latter. Operations to be carried out in accordance with prevailing best practice at all times to avoid impacts on reptiles or nesting birds and ensure legal compliance.

[20] Hawke, C. J. & Jose, P. V. (1996). *Reedbed Management for Commercial and Wildlife Interests*. RSPB, Sandy.
[21] Natural England and DEFRA (28 March 2015). *Water voles: surveys and mitigation for development projects*. [Accessed from: https://www.gov.uk/guidance/water-voles-protection-surveys-and-licences]

ii) Assess development and condition of macrophyte vegetation around pond at five-yearly intervals and put into effect staggered cut-back/clearance operations where vegetation deemed to be too dense than optimum for water voles. Particular attention to be paid to the potential presence of INNS, and if present then measures taken to remove/control them. All maintenance to be carried out in accordance with prevailing best practice to minimise effects on ecology and ensure legal compliance in respect of protected species[22], particularly water vole[23].

iii) Ensure establishment of scrub on and around artificial badger sett, including replacement of planting failures if required and appropriate and/or coppicing to encourage dense growth habit and structure. All work to be carried out in cognisance of legal provisions related to an occupied sett, in accordance with best practice[24,25] and taking advice from specialist ecologists where in any doubt.

Compartment 7

Summary Description

4.29 This compartment comprises an area of open mosaic habitat adjoining the existing London-Southend railway and a strip of existing dense scrub to the south of it. The open mosaic habitat forms the only part of the Lytag Brownfield Local Wildlife Site (LoWS) that will be retained.

Management Objectives

4.30 Maintain dense scrub as an element of continuity of this habitat and its associated interest for nesting passerine birds, including species of conservation concern such as linnet.

Management Prescriptions

i) Assess open mosaic habitat resource annually and ensure maintenance as sparse vegetation with a high proportion of lichens, annual plants and low cover of grasses or woody vegetation, including by cutting back of overshading/colonising woody vegetation. Where necessary to arrest processes of succession, periodic mechanical disturbance and compaction should be employed on no more than 25% of the extent of the habitat within the compartment.

ii) Maintain scrub belt on a no (or low) intervention basis, albeit whilst being mindful to minimise excessive growth close to and potential leaf fall onto the London-Southend railway, in line with Network Rail guidance[26]. Assess condition at five-yearly intervals and put into effect

[22] For example: Essex County Council Flood and Water Management Team, (November 2014). *Guide to Ordinary Watercourse Maintenance.* [Accessed from: https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/Watercourse-regulation/Documents/ditch-maintenance.pdf]
[23] Natural England and DEFRA (28 March 2015). *Water voles: surveys and mitigation for development projects*. [Accessed from: https://www.gov.uk/guidance/water-voles-protection-surveys-and-licences]
[24] Natural England (June 2009). *Interpretation of 'Disturbance' in relation to badgers occupying a sett.*
[25] Natural England and DEFRA (29 March 2015). *Badgers: protection and licences. What you must do to avoid harming badgers and when you'll need a licence*. [Accessed from: https://www.gov.uk/guidance/badgers-protection-surveys-and-licences]
[26] Network Rail. *Vegetation Management Explained.* (PEIR consultation response document).

staggered cut-back/coppicing operations where necessary to prevent succession to secondary woodland and shading out of dense structure near ground-level.

Compartment 8

Summary Description

4.31 This compartment comprises the eastern part of the infrastructure corridor between Chadwell Cross Sewer and Fort Road and which is currently part of the Tilbury Marshes LoWS. For reasons of logic and convenience, the compartment as shown on Figure 1 encompasses land anticipated to be adopted and managed by the highways authority (Thurrock Council), but the prescriptions below do not apply to that adopted land. A variety of habitats will be created in this compartment, some ancillary to other functions (e.g. highways drainage) and some in order to serve a specific landscape and/or ecology function (e.g. dense planting to screen views of the road and rail infrastructure from Tilbury Fort). Representations of scrub, dry ditches (grassed swales), wet ditches, and sparsely vegetated habitats of an essentially brownfield nature will be created. Further details relating to planting are given at Appendix E.

Management Objectives

4.32 Encourage development of a dense and broad screen of mature deciduous scrub to ameliorate visual effects, in particular on views towards the infrastructure corridor from the open common land and the heritage asset of Tilbury Fort to the south. This will serve the complementary function of maintaining a linear scrub belt with lee-sides and edges for bat foraging, and a dense structure suitable for nesting birds such as linnet and possibly nightingale. Steer maturation of the created ditch habitat towards a condition favourable for water voles, with scrub/ditch interface suitable for nightingale and Cetti's warbler.

Management Prescriptions

i) Encourage development of dense impenetrable scrub through interventions during establishment period to replace failures and encourage dense growth down to ground level, including through periodic pruning and coppicing in autumn/winter, whilst being mindful to minimise excessive growth close to and leaf fall onto the London-Southend railway, in line with Network Rail guidance[27].

ii) Encourage the development of dense macrophyte vegetation in ditch, including common reed, but also species such as *Glyceria* to encourage water voles and other wetland species. Thereafter assess development of macrophyte vegetation at five-yearly intervals and put into effect staggered cut-back/clearance operations where vegetation deemed to be too dense than optimum for water voles. All maintenance to be carried out in accordance with current best practice

[27] Network Rail. *Vegetation Management Explained.* (PEIR consultation response document).

to minimise effects on ecology and ensure legal compliance in respect of protected species such as water vole[28,29].

iii) Prevent excessive overshading of retained/re-profiled ditch systems and open mosaic habitats by cutting back over-hanging/colonising woody vegetation annually each autumn, except where conflicting with landscape screening objective.

Compartment 9

Summary Description

4.33 This compartment comprises the western part of the infrastructure corridor between Ferry Road and Chadwell Cross Sewer and north of the Fortland Distribution Park. For reasons of logic and convenience, the compartment as shown on Figure 1 includes some land anticipated to be adopted and managed by the highways authority (Thurrock Council), and the prescriptions below do not apply to that land. The compartment encompasses the retained landscape screening bund at the northern edge, which has associated interest for reptiles and brownfield invertebrates, as well as new habitat created to the south of it, including lengths of wet ditch, dry ditches (grassed swales), pockets of brownfield habitat and woodland and scrub screen planting.

Management Objectives

4.34 Encourage development of a dense and broad screen of mature deciduous scrub transitional to woodland to ameliorate visual effects, in particular on views from the infrastructure corridor southwards over the Fortland Distribution Park. This will serve the complementary function of maintaining a linear scrub/woodland belt with lee-sides and edges for bat foraging, and a structure suitable for nesting birds. Steer maturation of the created ditch habitat towards a condition favourable for water voles, with brownfield habitats to represent an extension of the interest found at the edges of and on the pre-existing bund.

Management Prescriptions

i) Encourage development of dense woodland/scrub screen through interventions during establishment period to replace failures, encourage dense growth down to ground level and select standards for growing on to maturity, including through periodic pruning and coppicing in autumn/winter, and being mindful to minimise excessive growth close to and leaf fall onto the London-Southend railway, in line with Network Rail guidance[30].

ii) Encourage the development of dense macrophyte vegetation in ditch, including common reed, but also species such as *Glyceria* to encourage water voles and other wetland species. Thereafter assess development of macrophyte vegetation at five-yearly intervals and put into effect staggered cut-back/clearance operations where vegetation

[28] For example: Essex County Council Flood and Water Management Team, (November 2014). *Guide to Ordinary Watercourse Maintenance.* [Accessed from: https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/Watercourse-regulation/Documents/ditch-maintenance.pdf]
[29] Natural England and DEFRA (28 March 2015). *Water voles: surveys and mitigation for development projects*. [Accessed from: https://www.gov.uk/guidance/water-voles-protection-surveys-and-licences]
[30] Network Rail. *Vegetation Management Explained.* (PEIR consultation response document).

deemed to be too dense than optimum for water voles. All maintenance to be carried out in accordance with current best practice to minimise effects on ecology and ensure legal compliance in respect of protected species such as water vole[31,32].

iii) Prevent excessive overshading of retained/re-profiled ditch systems and open mosaic habitats by cutting back over-hanging/colonising woody vegetation annually each autumn, except where conflicting with landscape screening objective.

iv) Assess brownfield substrates annually and ensure maintenance as sparse vegetation with a high proportion of lichens, annual plants and low cover of grasses or woody vegetation, including by cutting back of overshading/colonising woody vegetation. Where necessary to arrest processes of succession, periodic mechanical disturbance and compaction should be employed on no more than 25% of the extent of such habitats within the compartment.

Compartment 10

Summary Description

4.35 This compartment comprises the intertidal habitats south of the seawall, which contain coastal saltmarsh and intertidal mudflat. A small area (of approximately 0.035ha) will be subject to works relating to construction of the marine infrastructure and installation of a surface water outfall to the Thames; and subsequent ecological mitigation and compensatory measures as described in the EMCP (section 8). The intertidal habitats represented within this compartment are otherwise to be retained *in situ*.

Management Objectives

4.36 The habitats here will continue to be maintained by coastal hydrogeomorphological processes, and no need for management is anticipated following creation and establishment of the intertidal habitats, as described within the EMCP.

Monitoring

i) Monitor the habitat creation works so as to determine whether the measures are working as anticipated, i.e. that reinstated saltmarsh vegetation on the course of the outfall pipe is recovering and that the newly installed groynes are working to retain and accrete fine sediments, and that saltmarsh vegetation is colonising this area (see EMCP section 13). Monitoring will take the form of botanical surveys and fixed-point photography. Should this monitoring determine the need for further intervention during the establishment phase, this will fall under the remit of the EMCP. Following the establishment phase, it

[31] For example: Essex County Council Flood and Water Management Team, (November 2014). *Guide to Ordinary Watercourse Maintenance.* [Accessed from: https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/Watercourse-regulation/Documents/ditch-maintenance.pdf]
[32] Natural England and DEFRA (28 March 2015). *Water voles: surveys and mitigation for development projects*. [Accessed from: https://www.gov.uk/guidance/water-voles-protection-surveys-and-licences]

is anticipated that condition of the habitats will be maintained by ongoing hydrogeomorphological processes.

5.0 MONITORING & REVIEW

GENERAL

5.1 Management of the areas covered by this LEMP will continue for the life of the development, unless and as agreed otherwise by Thurrock Borough Council in consultation with Natural England. As the habitats develop, the LEMP will need to be reviewed. The measures set out in this section will also be kept under review as other developments in the vicinity of Tilbury2 that will affect the ecological proposals contained within this LEMP are brought forward. This will be informed by the results of regular monitoring of the condition of the habitats, and by relevant species monitoring. Details of this are set out below.

ANNUAL WALKOVER

5.2 All management compartments and their constituent habitats will be subject to an annual walkover inspection by a suitably qualified ecologist. This inspection will be additional to those discussed under the previous sections (e.g. as required to ensure establishment of tree and shrub planting and the maintenance of appropriate condition in retained mature trees at Sections 4.2 - 4.8 above and the monitoring in Compartment 10) and will be in addition to any follow-up monitoring surveys or inspections required by the applicable protected species licences (i.e. for bats, water voles or badgers) and/or further to the agreed post-translocation protocols for reptiles.

5.3 The objective of the annual walkover will be to assess the condition of retained and created habitats against target objectives, including those for the individual management compartment and (where relevant) the requirements of protected species licences and approved translocation strategies.

5.4 Following the walkover inspection, an annual monitoring report will be produced detailing any remedial actions or interventions determined to be necessary in order to meet the relevant species or habitat objectives. Examples may include:

- Scrub control or cutting back of adjoining scrub where threatening to overshade open mosaic habitats;
- Cutting and removal of reed or other dense macrophyte vegetation to prevent build up of thatch and drying out of watercourses/waterbodies;
- Disturbance interventions to create or maintain bare ground for annual plants, other early succession species and thermophilic invertebrates;
- Addressing any INNS noted to have colonised the site.

FIVE-YEARLY SURVEY AND REVIEW

5.5 The performance of the retained and created habitats in relation to their target objectives, including in providing alternative habitat for key species impacted by the development, will be assessed by means of more involved surveys at five-yearly intervals, the first to be undertaken five years after the cessation of construction or habitat creation activities in all management compartments.

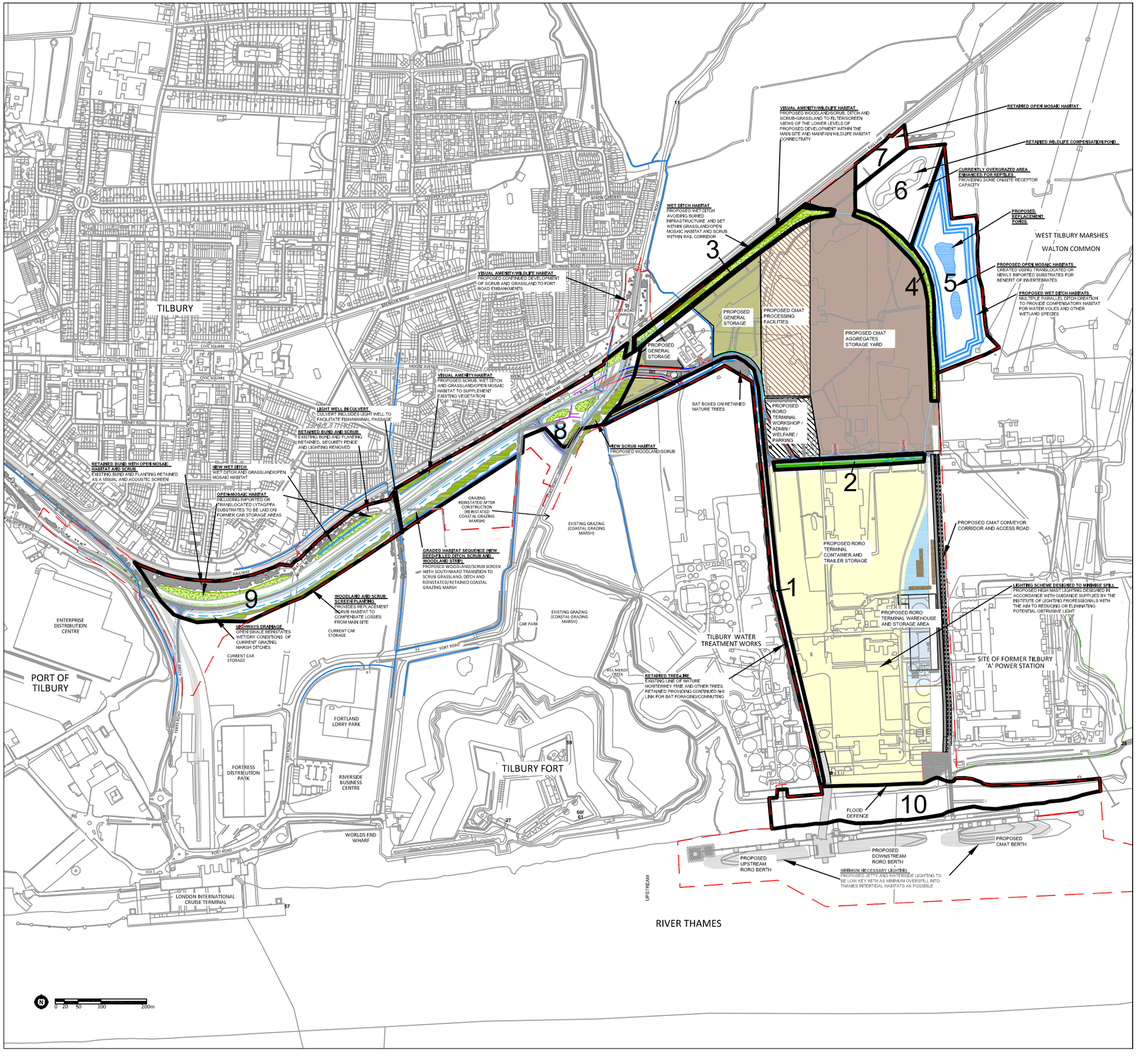
5.6 The following surveys, at minimum, will be included in the five-year reviews:

- Protected species surveys: bats, badger, water vole, reptiles;
- Breeding birds survey, with particular focus on any use of the management compartments by nightingale, Cetti's warbler and barn owl;
- Botanical surveys, focusing on early season surveys of open mosaic habitats on previously developed land and including sampling of lichens;
- Intertidal habitat surveys, to map extent of saltmarsh cover, and record the species composition of the areas affected (including translocated turves and any new areas of colonisation);
- Invertebrate surveys.

5.7 The results of the surveys will be analysed in order to identify any revisions to the management prescriptions deemed to be required in order to meet the objectives for each compartment and/or address any problems. Revised prescriptions would then be produced to guide the next five years. This information would be presented as a 'Five Year Monitoring Report' to be shared with relevant stakeholders, including Thurrock Council, Natural England, the Environment Agency and any others deemed relevant. Feedback and suggestions from these stakeholders would be used to guide the next five-year plan.

5.8 Nothing in paragraphs 5.5 to 5.7 precludes PoTLL seeking to change the prescriptions set out in this LEMP prior to the end of each five year period. Such changes would be able to take place with the approval of Thurrock Council, in consultation with Natural England.

FIGURE 1



ORDER LIMITS

PROPOSED ROAD

PROPOSED RAIL ACCESS & SIDINGS PROVISION

PROPOSED NOISE BARRIER

PROPOSED NEW WATERBODIES FOR WILDLIFE HABITAT

PROPOSED NEW WET DITCHES FOR WILDLIFE HABITAT

PROPOSED SURFACE WATER/ HIGHWAY DRAINAGE ATTENUATION

PROPOSED DIVERTED WET DITCH/DRAIN

EXISTING DITCH RETAINED

PROPOSED NEW SCRUB/ GRASSLAND/OPEN MOSAIC HABITAT

PROPOSED NEW SCRUB/ WOODLAND

EXISTING VEGETATION RETAINED

PROPOSED ARTIFICIAL BADGER SETT (LOCATION NOT SHOWN)

1 MANAGEMENT COMPARTMENT AND NUMBER

REV	DATE	DESCRIPTION

DRAWING TITLE
LEMP- Management Compartments (Rev A)

SCALE 1:8264 @ A3	DRAWN BC	LEMP FIG.1
DATE JUL 2018	CHECKED DW	

TILBURY2

APPENDIX E

Technical Note

DAVID JARVIS ASSOCIATES

Prepared by:	**Jim Meadowcroft**	Date:	**9th March 2018**
Project	**Tilbury 2**	Ref:	**2500**
For:	**Port of Tilbury**	Page:	**1 of** 9
Subject:	**Recommended Width of Deciduous Planting to Achieve Visual Screening**		

General

This technical note has been prepared in order to provide additional clarification in respect of the Landscape Strategy (ES Appendix 9.9 Document Reference AS-027) as it is secured in the Landscape and Ecological Management Plan (LEMP), as updated for Deadline 1 (Document Reference PoTLL/T2/EX/42).

The southern urban edge of Tilbury in this location comprises a mix of two storey residential property and the mainline railway. Deciduous trees and scrub line the railway on either side. This vegetation provides a modest degree of visual screening of the urban edge to views from the south of Tilbury, where the upper levels of housing tend to remain visible.

The rail-side vegetation also provides visual screening from the ground floor of housing at the southern margins of Tilbury, specifically London Road, Elizabeth Close, Edinburgh Mews, The Beeches and Bown Close. First floor views from these properties are often much more extensive, occurring through and over gaps in the rail side vegetation to passing trains, Tilbury Marshes, Tilbury Fort and Gravesend.

Closer to the Fort Road railway bridge, tall conifer trees predominate and completely screen views in either direction. Scattered scrub elsewhere within the Tilbury Marshes adds to this effect, which is recorded in the submitted LVIA (Appendix 9.C, viewpoints 13A and 56). Urban development further to the west, including two storey housing within Tilbury and the lower levels of development within the Port of Tilbury, is screened by a combination of tall fencing, hedging and vegetated bunds.

Proposed Development and Landscape Mitigation

The infrastructure corridor will create a new southern urban edge to Tilbury. In the absence of mitigation the route, including its road and rail traffic, will be visible to a wide range of visual receptors including occupiers of residential property in Tilbury, users of roads and public rights of way and visitors to the area including Tilbury Fort. The corridor would also affect the landscape character of the Tilbury Marshes and the contribution it makes to the setting of Tilbury Fort.

In order to reduce the landscape and visual impact of the corridor as well as the existing urban edge, the recommended landscape mitigation that forms part of the LEMP introduces a mix of native tree and scrub and shrub planting. The planting width and species mix will vary according to location and will meet the following criteria:

- provide visual screening of road traffic during the winter season;
- incorporate proposed ecological mitigation as defined in the Landscape Strategy and LEMP;

- reduce the visual impact of proposed acoustic barriers;
- screen the upper levels of road and rail traffic as viewed from residential property;
- be sympathetic to the landscape character of the Tilbury Marshes;
- reduce potential harm to the setting of Tilbury Fort;
- from the point of view of people using the corridor, screen detracting elements and provide an attractive and interesting travelling experience; and
- reduce the extent of urban development in view south of the route.

The proposed planting would also provide a measure of additional screening to views from residential property at the southern margins of Tilbury to other aspects of built development in the locality. These include the water treatment works and proposed container storage and warehousing within the main site.

The section of the corridor passing immediately north of Tilbury Fort is more open to views and has been assessed in the submitted LVIA as requiring the greatest width of planting mitigation. The landscape strategy in this location is to create a 30 metre deciduous margin south of the road, planted so as to achieve a transition from woodland to scrub, scrub grassland, an ecological mitigation ditch and a grazed marsh margin.

Proposed planting will reflect ecological mitigation requirements and will contain native species characteristic to the locality and of local provenance where these are available. The proposed species are listed in the Table below.

Table: Proposed Plant Species

Item	Species	English Name	Predicted height at maturity (m)[1]
1	Acer campestre	Field Maple	7
2	Alnus glutinosa	Common Alder	16
3	Crataegus monogyna	Hawthorn	8
4	Cornus sanguinea	Dogwood	2
5	Hedera helix	Common Ivy	n/a
6	Ligustrum vulgare	Privet	3
7	Prunus spinosa	Blackthorn	3
8	Rosa canina	Dog Rose	3
9	Rubus fruticosus	Bramble	2
10	Salix caprea	Goat Willow	8
11	Salix cinerea	Grey Sallow	8
12	Salix fragilis	Crack Willow	14
13	Sambucus nigra	Elder	4

In selecting primarily deciduous species it is recognised that a significant depth of vegetation is required to achieve all year-round visual screening. The sole evergreen component is ivy, selected as a climber to conceal acoustic screen fencing from views from residential property, and which will have no effect on its noise attenuation properties. Bramble would also be used to provide additional screening and similarly would have no effect on noise attenuation. Both of these plants will provide food for wildlife. The

[1] Predicted heights based on recorded heights of existing vegetation within the Tilbury 2 site or minimum mature heights defined by the Royal Horticultural Society.

remaining plants include some relatively fast growing species as well as others which have a dense branching habit, such as hawthorn. To assess the depth requirement a number of assumptions have to be made, these are outlined below.

Depth of Planting

General

To achieve a visual screen of proposed development the following considerations apply:

1. Height of screening required and rates of growth.
2. The growing conditions.
3. The form, density and habit of proposed planting over time.
4. Management and long-term aftercare.

Visual screening requirements range from the minimum i.e. capable of providing substantive screening of the infrastructure corridor and associated road and rail traffic during the winter period; to the maximum- namely the entirety of proposed development and any significant existing detracting visual elements.

Height of Screening Required and Rates of Growth

Available views towards the infrastructure corridor from locations within Tilbury and the Tilbury Marshes would be from broadly similar elevations to the proposed road and rail traffic.

The highest-level views are also the most distant, associated with Gravesend at approximately 2.0-3.0 km distance. At this distance and height, views take in much of the wider context of Tilbury and adjoining development as well as the landscape beyond. The proposed infrastructure corridor would represent a relatively minor component of the view. Consequently, attention has been focussed on mitigating visual amenity in closer proximity, circa 1.0km from the corridor.

The effect on views is illustrated on the attached cross section. The section is taken broadly north-south from residential property in London Road, through the infrastructure corridor, Tilbury Marshes, Tilbury Fort and the Thames riverside. It more closely defines the broad parameters of screening associated with the landscape strategy.

From the perspective of residential occupiers, available views from first floor level would, following construction completion, be through or over mainline railway vegetation to the upper levels of roadside lighting, taller road vehicles and rail traffic above acoustic fencing. Other elements such as ditches and new planting, north of the proposed rail cord, may also be visible to a greater or lesser extent.

As proposed planting establishes the acoustic fencing would be obscured by proposed ivy and bramble growth and this in turn by intervening proposed woodland and scrub planting. By the time the planting reaches approximately 6 metres high it will begin to screen or filter residual views of traffic and highway lighting. Full screening during the growing season would be achieved once the planting reaches 7.5 metres high, with heavily filtered or substantively screened views during the winter period depending on the presence or absence of the existing rail side vegetation.

Mitigation planting south of the corridor reflects a graduated approach from reed fringed grazing marsh ditch to grassland/scrub, leading to scrub and then woodland and a roadside hedge. The planting design in this location combines substantive winter screening with ecological mitigation and reflects a sympathetic approach to the landscape character of the Tilbury Marshes.

Substantive winter screening of the corridor and the existing urban context beyond would occur within approximately 28 years of planting, assuming a very conservative average growth rate of 0.25m per

annum and planting approximately 0.5m high at time of planting. Faster growth rates are more likely to occur however and a significant level of screening should be achieved 5-10 years after planting.

The speed at which screening will occur is defined by the size of plants at the time of planting and their respective growth habits. Whilst larger, more mature plants will achieve a more significant visual effect sooner at an early stage, it is a less suitable approach in purely horticultural terms. Younger plants establish more rapidly and require less support infrastructure than the equivalent mature or semi-mature specimens. Consequently, it is anticipated that proposed planting will be mainly comprised of smaller nursery stock (typically 45-120cm height) with larger specimens mainly reserved for other areas where specific amenity or maintenance considerations are identified.

Growing Conditions

At present little is known about existing soil profiles within the infrastructure corridor, their physical characteristics and groundwater quality and levels[2]. That said, field survey has identified a wide range of deciduous and coniferous tree and scrub species growing within the site and adjoining land. As such, it is reasonable to assume that the growing conditions will be suitable for the proposed species.

Form, Density and Habit over Time

The plant species selection described above takes into account the need to incorporate densely branched species that retain this characteristic into maturity, such as hawthorn and blackthorn.

Management and Long-Term Aftercare

Proposed management and aftercare will reflect combined landscape and ecological functions as described in the LEMP (ES Appendix 10.P, clause 4.34), namely to develop habitat and retain screening within the constraints imposed by the former. This will include the removal of tree guards after establishment.

[2] T2 EIA Chapter 16.0: Water Resources and Flood Risk

Examples

The effectiveness of a 30m depth of deciduous planting can perhaps be best judged by example. The photographs below demonstrate the winter screening effects of mature tree planting at these depths. For comparison a 5.0m wide tree belt is shown first.

1. 5 metre wide tree belt. Original planting approximately 1.0m centres, wide mix of species, becoming narrow in form due to overcrowding. Housing beyond and the sky clearly visible.

2. Mature tree belt, 30 metres wide and containing a high proportion of crack willow. Some thinning and pollarding evident. A reasonably high level of screening has been achieved though the sky remains visible and (upon closer inspection) the outlines of a large building beyond. Ivy growth contributes to the screening effect.

3. Mature tree belt on a bund, 30 metres wide, containing a broad mix of species including the occasional isolated conifer. Planting density approximately 2.0m centres, no thinning observed. This achieves a substantive screen above the bund. Heavily filtered views of a large industrial building beyond.

4. Mature tree belt, 30 metres depth with an edge shrub layer (predominantly dogwood). Wide mix of species on sloping ground where thinning has taken place. The scrub layer provides a good measure of lower level screening. The thinned tree belt permits filtered views beyond.

Conclusions

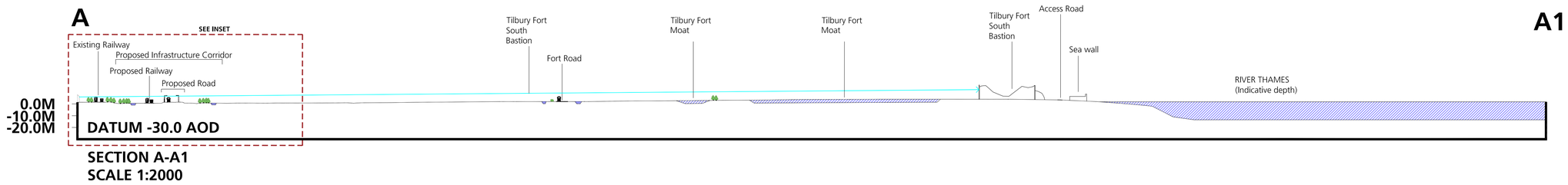
A 30-metre depth of deciduous tree and scrub planting will be capable of providing a substantive visual screen to lighting and road and rail traffic using the infrastructure corridor. Examples of representative views are presented at ES Appendix 9.5 (viewpoints 56 and 62).

The screening effect has been assessed during the winter period, reflecting the 'worst case' and making due allowance for planting sizes, growth rates and local conditions, supported by examples and cross section analysis. Full screening would be achieved during the growing season.

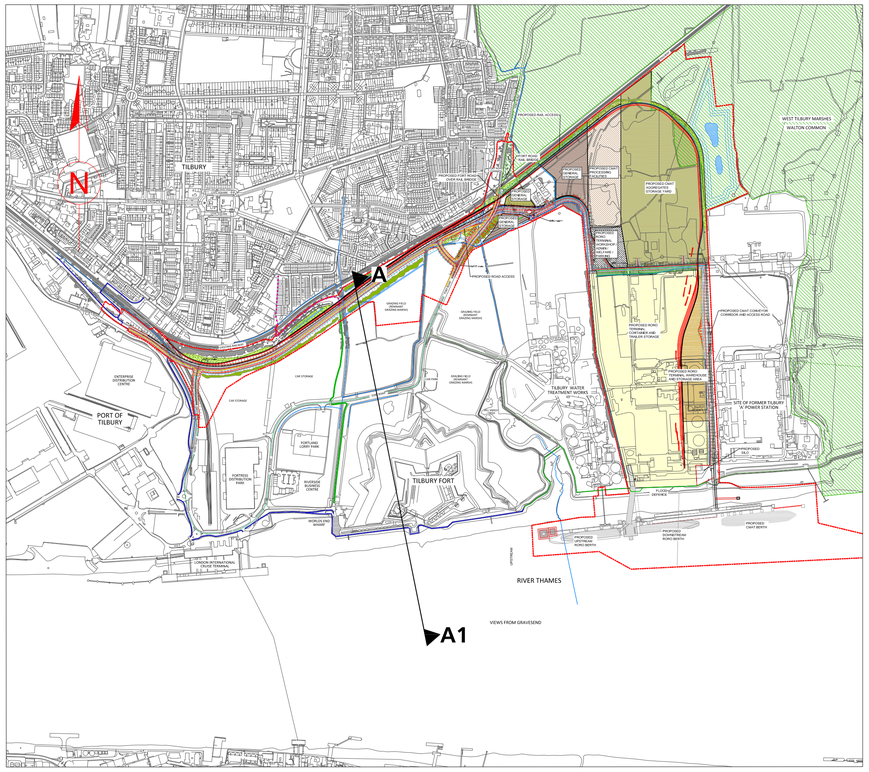
The level of screening recommended is considered necessary and appropriate to meet the relevant criteria described above.

KEY

VIEW LINE 4.5M
(FROM FIRST FLOOR)



SECTION A-A1
SCALE 1:2000



SECTION A-A1 - Location Plan
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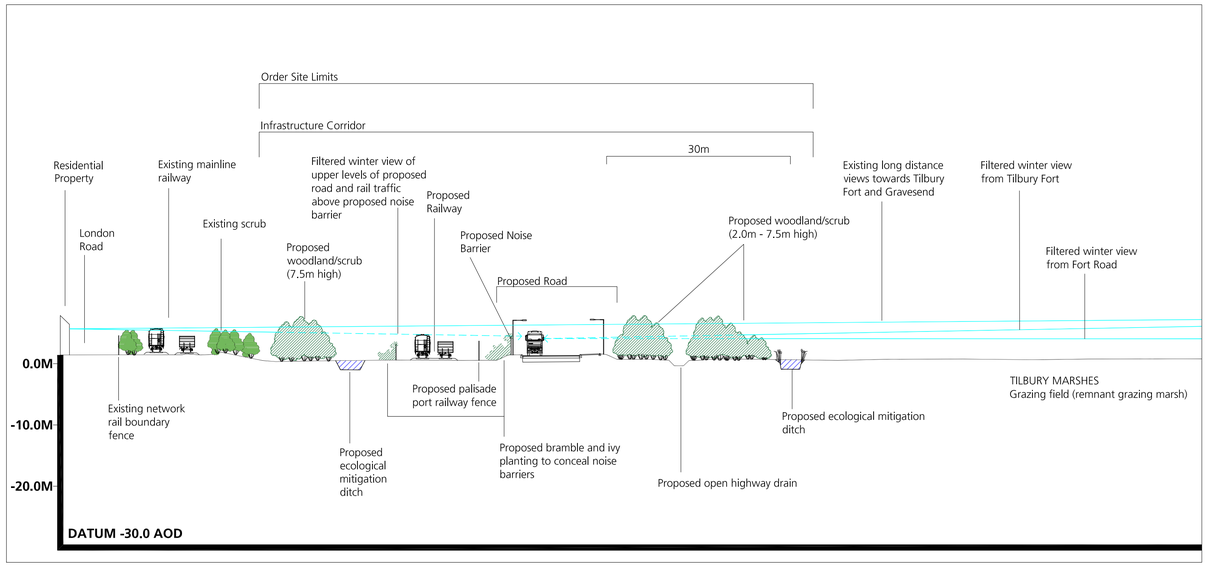


SECTION A-A1
SCALE 1:500

REV | DATE | DESCRIPTION

DRAWING TITLE
Visibility from London Road

SCALE	DRAWN	DRAWING Nº
1:2000 @ A1	JL	FIGURE 9.10
DATE FEB 2018	CHECKED JM	

TILBURY2

Appendix 3: Tilbury2 Drainage Strategy (Relevant Extracts)

PORT OF TILBURY LONDON

PLANNING ACT 2008
INFRASTRUCTURE PLANNING
(APPLICATIONS: PRESCRIBED FORMS AND PROCEDURE) REGULATIONS 2009
REGULATION 5 (2) (a)

PROPOSED PORT TERMINAL AT FORMER TILBURY POWER STATION

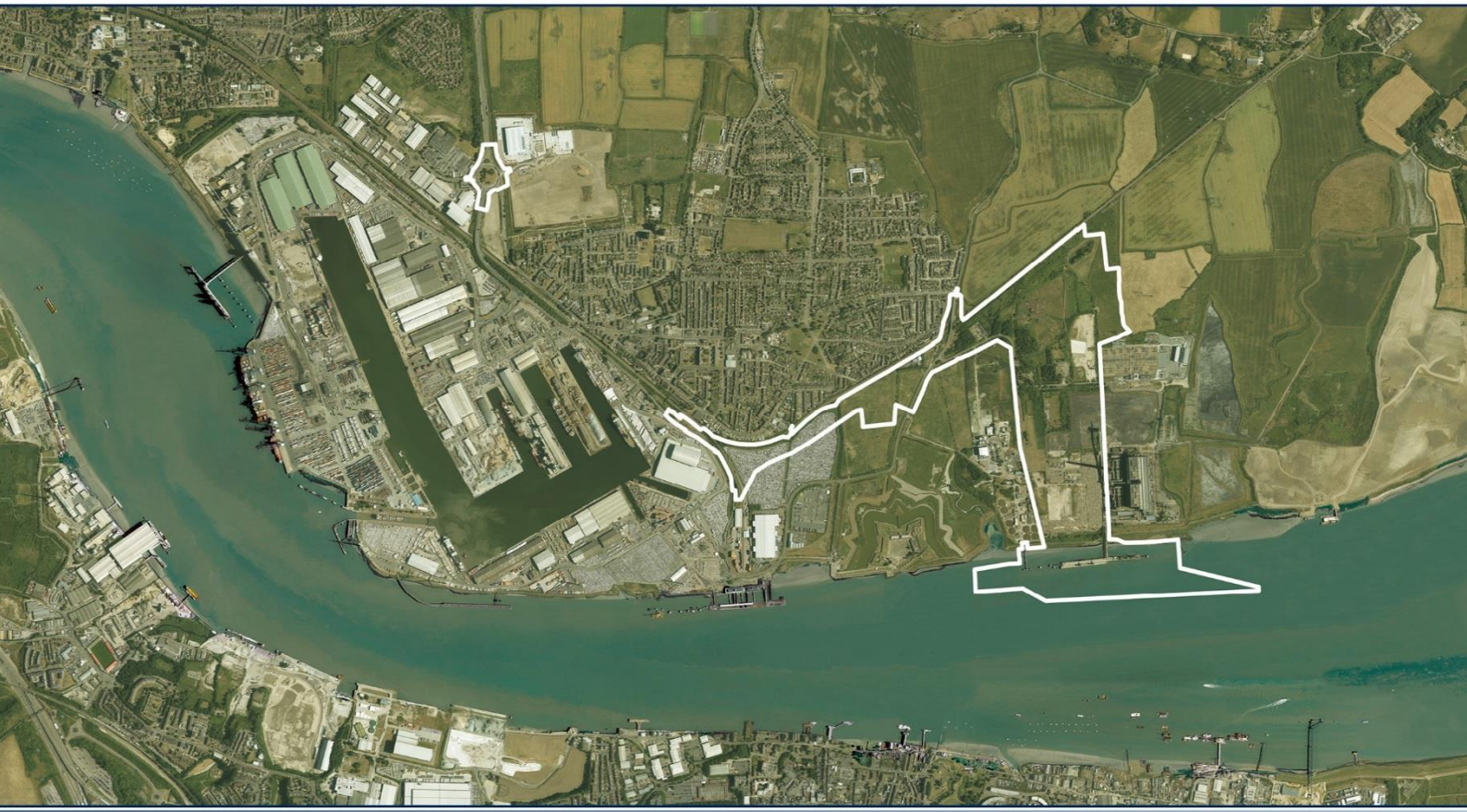
TILBURY2

TR030003

VOLUME 6 PART B

ES APPENDIX 16.E: DRAINAGE STRATEGY

DOCUMENT REF: 6.2 16.E



TILBURY2

Notice

This document and its contents have been prepared and are intended solely for Port of Tilbury London Limited's information and use in relation to supporting the outline planning applications for the Tilbury 2 Development.

Atkins Ltd. assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

This document has 57 pages including the cover (excluding Appendices).

Document history

Job number: 5153187			**Document ref: 6.2 16.E**			
Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
P01	Draft for Comment	BW / PS	PL / CW	DH	SR	11/05/17
P02	Draft for PINS submission	PS	AH	DH	SR	18/09/17
P03	For Stakeholder Discussion	PS	AH	DH	SR	02/10/17
P04	DCO submission	AH	DH	DH	SR	27/10/17

Client signoff

Client	Port of Tilbury London Limited
Project	Tilbury 2 Development
Document title	Drainage Strategy
Job no.	5153187
Copy no.	1
Document reference	6.2 16.E

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Tables

Figures

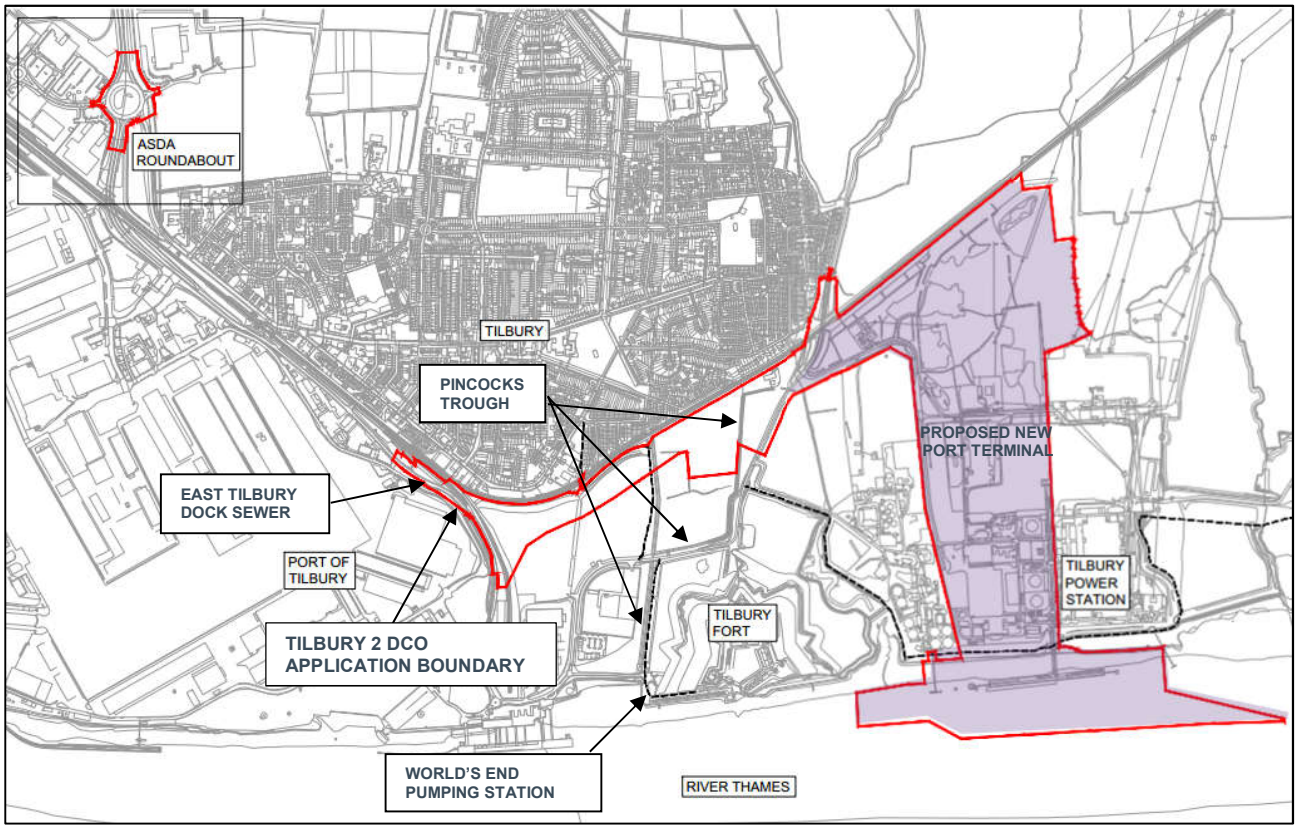
1. Introduction

Atkins has been commissioned by Port of Tilbury London Ltd (PoTLL) to produce a drainage strategy for the proposed development of a new port facility at the former RWE Tilbury Power Station, on the Thames Estuary in Essex. The redevelopment of the site is known as Tilbury 2, and will consist of two elements;

- **Proposed new port terminal:** comprising of a dock for shipping, offices, welfare facilities, construction materials and aggregates terminal (CMAT), local access roads and hard standing for storage,
- **Surface access road / rail links:** to provide road access and rail freight to the port terminal.

The Tilbury 2 development boundary is shown in Figure 1-1 below.

Figure 1-1 Tilbury 2 Development



The objectives of this report are to:

- Produce an outline surface water drainage strategy for the proposed new port terminal and the surface access road /rail link in accordance with relevant national and local planning policies. The surface water strategy for the new port terminal area maximises the amount of developable land in accordance with the client's brief.

- Produce an outline foul water drainage strategy based on PoTLL's proposed land use and estimated numbers of staff.

This drainage strategy forms part of the Development Consent Order (DCO) submission and will be secured by the DCO.

2. Site Overview

2.1. Existing Site

2.1.1. Existing Site Description

The existing site area consists of 15ha of brownfield land to the south of the site associated with the former RWE owned Tilbury Power Station (Plant A). The northern 30ha of the site is predominantly greenfield land, with the north-east of the site extending into the West-Tilbury Marshes. The new port terminal site is bound to the south by the River Thames Estuary; to the north by the London, Tilbury and Southend (LTSR) Railway; to the east by the former Tilbury Power Station (Plant B); and to the west by Anglian Water's Tilbury Water Recycling Centre (TWRC). The former Tilbury Power Station (Plant B) is still owned by RWE and does not form part of this development.

The site of the improved surface access road / rail link extends between the existing A1089 Ferry Road and Fort Road and is bound to the north by the LTSR railway. The proposed road / rail link requires a new overbridge at Fort Road, and will cross two existing watercourses, flowing north to south, and new local diversions and culverts will be required. In addition, the road alignment will require some protection/diversion of existing Anglian Water statutory services. The surface access road/rail link is currently greenfield land, except the western section which is currently a POTLL General storage area.

The existing Tilbury Power Station (Plant A) has a number of underground foundations/obstructions, which are proposed to be retained upon redevelopment. The location of such obstructions, have been considered when developing the site layout, site levels and the drainage strategy for the redevelopment.

2.1.2. Existing Surface Water Drainage System

The site of the former Tilbury Power Station (Plant A) has an existing surface water drainage system as shown by the RWE Services Plan (Drawing number: UKP/TILB/038/AP6). This is described below and illustrated in Figure 2-1 and Figure 2-2.

1. The northern area of the site discharges to an unnamed ordinary watercourse, adjacent to the Northern Access Road. The outfall discharges to the local marsh land ditches, which connect to Pincocks Trough sewer. This discharges via gravity/pumping to the River Thames at the Worlds End outfall. The outfall has a gravity outlet fitted with flap valves that in tide locked circumstances are closed. Pump discharge occurs during tide lock events.[1] This existing catchment is estimated to be approximately 53ha.

   As the existing catchment drains to the local marsh land ditches, these will attenuate the flows and therefore the existing peak flow rate discharging to unnamed ordinary watercourse, is considered minimal. A number of these existing marsh land ditches cross the new development area and will need to be removed as part of the works. Compensatory biodiversity measures will be provided (as discussed in the Terrestrial Ecology Chapter of the Environmental Statement of the DCO application).

2. The southern area of the site discharges to a surface water ditch on the western perimeter of the site, which then discharges by a gravity pipe to a pumping station located in Tilbury Power Station (Plant B) and pumped to the River Thames. This existing catchment is estimated to be approximately 11ha.

[1] **JBA Consulting:** *Tilbury Integrated Flood Strategy PS/2015/994* (Jan. 2017)

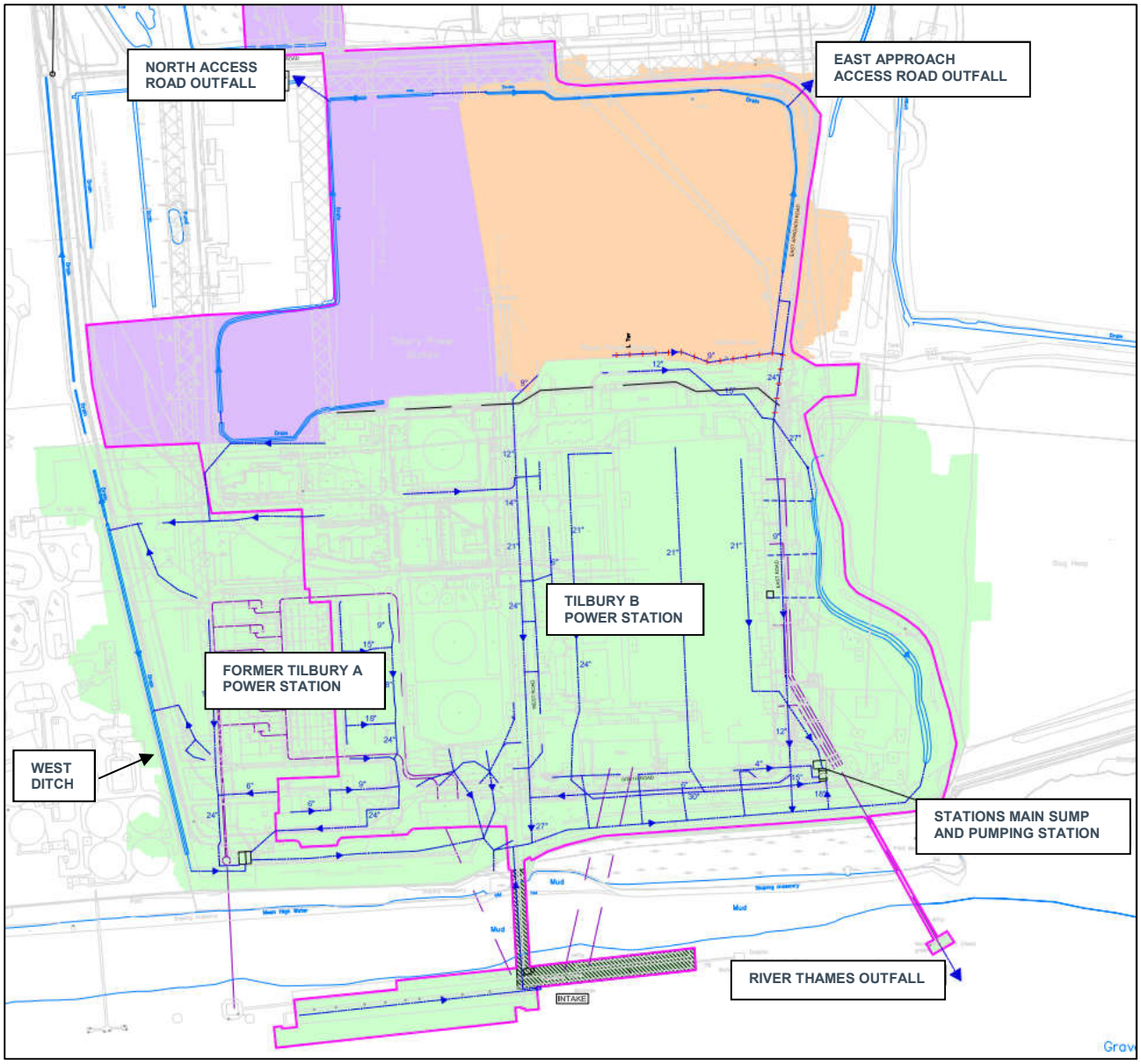
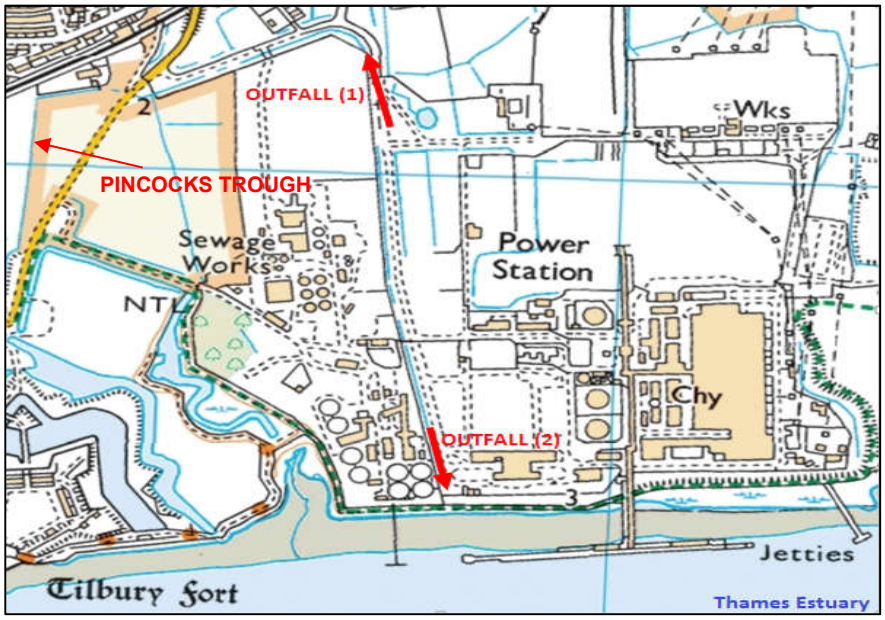


Figure 2-1 Existing Drainage System (Extract from the Drainage Plan Document 03.04.02)

The proposed road and rail connection between Ferry Road and Fort Road is on mostly greenfield land, which has no positive surface water drainage provision. The western section of the road however crosses an existing Port of Tilbury owned car storage area. The land take of this car storage area will be reduced as part of the works. The car storage area drains via a sustainable drainage (SuDS) system comprising of swales and a pond, with an attenuated outfall draining southwards.

The existing rail link has no drainage provision within the existing Port Area.

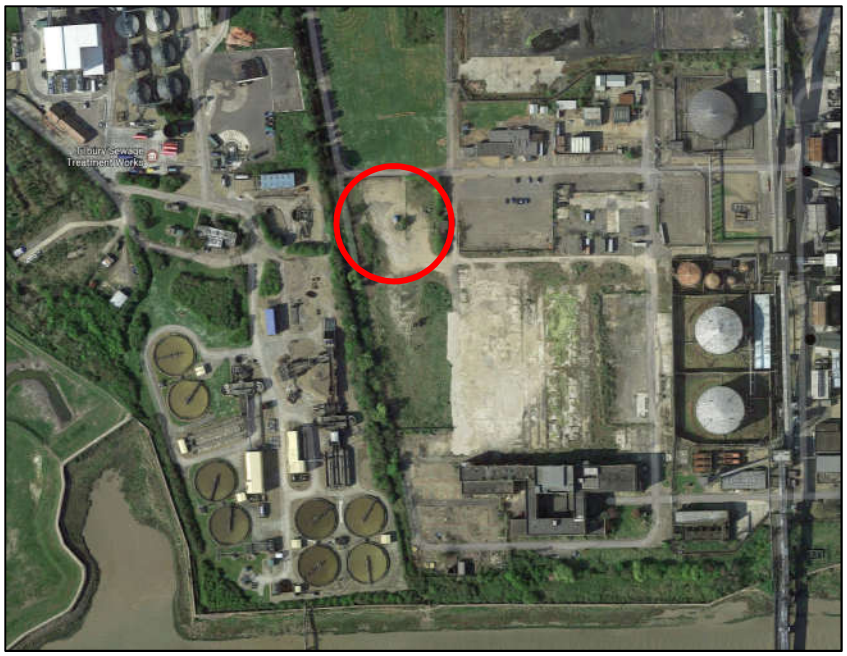
Figure 2-2 Existing Outfalls[2]



2.1.3. Existing Foul Water Drainage System

Based on the RWE Tilbury Power Station Site Services Plan[3] (Drawing number: UKP/TILB/038/AP6) existing foul water sewers managed sewerage from Tilbury Power Station Plant A. The foul flows discharged via a pumped system directly to Anglian Water's TWRC, located to the west of the site. The existing pump station is highlighted in Figure 2-3 below.

Figure 2-3 Pump station location



[2] *Contains OS data © Crown copyright and database right (2017)*

[3] **RWE**: *Tilbury Power Station Site Services Plan - UKP/TILB/038/AP6* (2015)

Based on information from RWE on the existing site services[4], the foul water sewerage system was designed to convey trade effluent and foul water arising from up to 800 Full Time Equivalent (FTE) employees to the treatment works. The existing foul water discharge rates have been calculated, and are shown in Table 2-1 below. The calculation below allows for 90 litres per person per day (in accordance with the Loads and Flows manual[5]) and provides a total flow rate for 800 FTE employees.

Table 2-1 Estimate of foul flows from former Tilbury power station

Flow Description	Flow Rate (l/s)
Average Dry Weather Flow (DWF) (90 l/p/d x 800 persons)	0.833
Peak Foul Flow (6 x DWF + 10% infiltration)	5.5

The area of the proposed surface access improvement works currently includes existing minor roads and a railway. There are no known foul water connections within this area.

2.2. Proposed Development

An outline plan for the proposed development is included in Appendix A.

2.2.1. Proposed New Port Terminal

The proposed new port terminal comprises of the following:

- A Roll-on/Roll-off (RoRo) berth; for berthing of vessels and unloading of freight.
- Areas of hard standing; for storage of containers and trailers.
- Bulk aggregates terminal including new and improved conveyors; for unloading, processing, and aggregate stockpiling.
- Improvements to existing internal land access; for the internal road network and for access to the remaining RWE Power Station B.
- Creation of hard surfaced pavements; primarily for vehicular access and car parking.
- Erection of buildings; including staff welfare, offices, security, customs, maintenance buildings, and plant refuelling building.
- Creation of new silo building; for storage of cement and crushed aggregate products.
- Creation of new warehouse structure
- New rail sidings; for loading and unloading of freight containers, steel and aggregate trains.

2.2.2. Surface Access Road / Rail Link

The proposed new port Surface Access Road/Rail link comprises of the following:

- Formation of a new rail spur and sidings to serve the new port terminal.

A new link road from Ferry Road (A1089) to Fort Road including associated changes to local highways and rights of way.

- Extension to the existing Fort Road over rail bridge to accommodate the new rail spur and Fort Road into Tilbury2.

[4] **RWE:** *Tilbury Power Station Surplus Land: Site Information – Site Services – Tilbury VDR Ref 03.03.01* (2015)

[5] **British Water Code of Practice**: *Flows and Loads 4 – Sizing Criteria, Treatment Capacity for Sewage Treatment Systems* (2013)

3. Policy Context

3.1. National Planning Policy (Drainage)

The National Planning Policy Framework (NPPF)[6] sets out the Government's spatial planning policy on development and flood risk. Where a new development is proposed, the policy aims to make it safe, whilst ensuring that it does not increase flood risk elsewhere and, where possible, reduces flood risk overall.

Flood risk includes the statistical probability of an event occurring and the scale of the potential consequences. The risk is estimated from historical data and expressed in terms of the expected frequency of a rainfall event of a given magnitude. The 10year, 50year and the 100year flood have a 10%, 2% and 1% chance of occurring in any given year respectively. Climate change is increasing the intensity of these events and current guidance is to make an allowance for this be adjusting the peak rainfall characteristics to mitigate for this.

The DEFRA 'Non-Statutory Technical Standards for Sustainable Drainage Systems[7] provides legislation for the use of SuDS systems to reduce flood risk and improve water quality from development sites where practical. This document states the following applicable standards:

Flood Risk outside the development

- *Policy S1*

  "Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g. the sea or a large estuary) the peak flow control standards (S2 and S3) and volume control technical standards (S4 and S6) need not apply.

Peak flow control

- *Policy S2 (greenfield developments)*

  "For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event."

- *Policy S3 (previously developed sites)*

  "For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event."

Volume control

- *Policy S4 (greenfield developments)*

  "Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event"

- *Policy S4 (previously developed sites)*

[6] **Department for Communities and Local Government**: *National Planning Policy Framework* (2012). [Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf]

[7] **Department for Environment, Food and Rural Affairs:** (March 2015)

"Where reasonably practicable the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event."

- *Policy S6*

  "Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with S4 or S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk"

Flood risk within the development

- *Policy S7*

  The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event.

- *Policy S8*

  The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.

- *Policy S9*

  The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.

The standards also state requirements relating to structural integrity, designing for maintenance considerations and construction.

In summary, the DEFRA standard (which is national legislation) states that un-attenuated flows can be discharged to large tidal water bodies.

When discharging to other water bodies, there is a requirement to reduce peak flows to greenfield levels for greenfield developments, where reasonably practical. For previously developed sites, they should also aim to reduce peak flows to greenfield levels, but should never exceed pre-development run-off rates. Any planning application therefore needs to provide a strong argument if greenfield run-off rates cannot be achieved, why this is not possible, and to ensure that pre-development peak flow rates are not be exceeded.

In terms of run-off volume, there is also an aspiration to reduce flows to pre-development greenfield run-off volumes (for a 1 in 100 year 6 hour event), however if this is not possible, then they should not adversely affect flow risk.

The Department for Transport 'National Policy Statement for Ports'[8] is a National Policy Statement which provides the framework for future decisions on proposals for new port development. It explains to planning decision-makers the approach they should take to proposals. The issues regarding drainage are summarised below:

- the application is supported by an appropriate FRA;
- the Sequential Test has been applied as part of site-selection, as appropriate;
- the proposal is in line with any relevant national and local flood risk management strategy;
- a sequential approach has been applied at the site level to minimise risk by directing the most vulnerable uses to areas of lowest flood risk;
- priority has been given to the use of sustainable drainage systems (SuDS);

[8] **Department for transport**: *National Policy Statement for Ports (2012)*

- and in flood risk areas the project is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed over the lifetime of the development.
- the relevant pollution control authority is satisfied that potential releases can be adequately regulated under the pollution control framework;
- consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of the project may affect drainage systems;
- Site layout and surface water drainage systems should cope with events that exceed the design capacity of the system, so that excess water can be safely stored on or conveyed from the site without adverse impacts;
- The risk of impacts on the water environment can be reduced through careful design to facilitate adherence to good pollution control practice.

3.2. Local Development Policies

Local planning guidance for Tilbury 2 includes the Thurrock Council Planning Policies[9], Thurrock Local Development Framework[10], the Thurrock Council Level 2 Strategic Flood Risk Assessment (SFRA)[11], Thames Estuary 2100[12] and Essex[13] Sustainable Drainage Systems Guide.

Thurrock planning policy PMD15 (Flood Risk) outlines developments will be expected to incorporate SuDS to reduce the risk of surface water flooding, both to the site in question and to the surrounding area. Where the potential for surface water flooding has been identified, the document states that site specific Flood Risk Assessments should ensure that suitable SUDS techniques are incorporated as part of the redevelopment.

Thurrock planning policy PMD7 (Biodiversity, geological conservation and development) states that Thurrock Council will require development proposals to incorporate biodiversity or geological features into the design as far as possible. These may include green roofs, brown roofs and the creation of green corridors for wildlife.

The Thurrock Council SFRA[7] also requires that the post-development runoff should aim to achieve greenfield runoff rate wherever possible.

Essex[13] Sustainable Drainage Systems Guide also promotes the usage of sustainable drainage systems, and states that flows should be limited to 1 in 1yr (Q1) greenfield run-off rates (or to Q1 and Q100 run-off rates with long term storage) for all rainfall events, and if this cannot be achieved, a 50% betterment of the existing peak flow rates is a minimum requirement. It also states that greenfield flows should not be limited to 5l/s and lower flow rates can be achieved; attenuation systems should half drain in 24 hour (for a 1 in 10 year event); and attenuation should be sized for a minimum 1 in 30 year event and controlled exceedance would be permitted above these events. It provides further guidance on specific SuDS systems and that an urban creep allowance of 10% should be applied.

Therefore, as per the national guidelines, any planning application needs to provide a strong argument if greenfield run-off rates and the extensive use of SuDS cannot be achieved.

[9] **Thurrock Council Planning Policies**, Section *6. Policies for management of development* [Available at http://www.planvu.co.uk/thurrock/written/cpt6.htm] Part PMD15 & Part PMD7

[10] **Thurrock Council:** *Thurrock Local Development Framework* (2015). [Available at: https://www.thurrock.gov.uk/current-development-plan]

[11] **Scott Wilson:** *Thurrock Strategic Flood Risk Assessment – Level 2 Report* (2010) [Available at https://www.thurrock.gov.uk/sites/default/files/assets/documents/ldf_tech_sfra_level2.pdf)]

[12] **Environment Agency:** *Thames Estuary 2100 Plan – Managing flood risk through London and the Thames Estuary* (2012). [Available at: https://www.gov.uk/government/publications/thames-estuary-2100-te2100]

[13] **Essex County Council**: HA10 'Sustainable Drainage Systems; Design Guide (April 2016)

3.3. Climate Change

The NPPF identifies the need for new developments to mitigate against climate change in order that the development will not increase flood risk to the surrounding area. The NPPF guidance was updated by the Environment Agency (EA) in February 2016 with revised climate change factors for developments based on its anticipated design life. These are summarised in Table 3-1 below:

Table 3-1 NPPF Climate Change Adjustments for Peak Rainfall

	Total anticipated change for 2015 - 2039	Total anticipated change for 2040 - 2069	Total anticipated change for 2070 - 2115
Upper estimate	+10%	+20%	+40%
Central estimate	+5%	+10%	+20%

The guidance states that for flood risk assessments and strategic flood risk assessments, both the central and upper end allowances should be assessed, to understand the range of impact.

It is assumed that the climate change adjustment factor for the development will be +40%, corresponding to the upper-end estimate for climate change. I.e. the impact will be significant if the site was to flood.

4. Design Context

4.1. Information Reviewed

The following information has been review as part of undertaking this drainage strategy:

- RWE Tilbury Power Station Surplus Land Guidance: Drainage Report
- Jacobs Existing Surface Water Drainage Drawing (Drawing No. B1607403/TB/001)
- Jacobs Review of Existing Surface Water Drainage (Document No. BPP 04 F8)
- Tilbury Power Station Environmental Statement Surrounding Drainage Features Drawing
- RWE Active & Historic Services Drawing (Drawing No. UKP/TILB/038/AP6)
- RWE Tilbury Power Station Surplus Land Guidance: Existing Services Report
- RWE Active RWE and Third Party Services Drawing (Drawing No. MAP/TILB/068/AP5)
- JBA Integrated Flood Strategy (Document No. PS/2015/994) dated January 2017

4.2. Design Standards

The new surface water drainage system will be designed based on the following criteria from BS EN 752: 2008:

- No pipe surcharging in 1 in 2-year rainfall return period;
- Controlled surface flooding in 1 in 30-year rainfall return period to not adversely affect the operation of the port and no off-site flooding (as agreed with the Environment Agency)
- Consideration of a 1 in 100-year rainfall event to ensure that extreme flood flows are directed away from critical infrastructure, do not adversely affect port operations and do not affect offsite areas

The railway drainage is designed to NR/L3/CIV/005 – Network Rail Drainage Standard.

The drainage design is based on the following design standards:

- National Policy Statement for Ports, Department of Transport, Jan 2012
- Flood Estimation Handbook, Centre of Ecology and Hydrology,1999
- Flood Studies Report – Natural Environment Research Council, 1975
- HA10 ‘Sustainable Drainage Systems; Design Guide, Essex County Council, April 2016’
- Environment Agency – Flooding and Coastal Change, Flood risk assessments: climate change allowances Feb 19th 2016
- WrC Sewers for Adoption – 7th Edition: A design and construction guide for developers
- BS EN 752: 2008 – Drain and Sewer Systems Outside Buildings
- CIRIA C753 – The SuDS Manual
- Department of Environment, Food and Rural Affairs (DEFRA) Sustainable Drainage Systems – ‘Non-Statutory Standards for Sustainable Drainage Systems: March 2014’
- CIRIA C635 – Designing for Exceedance in Urban Drainage – Good Practice
- BS EN 858-2:2003 - Separator systems for light liquids (e.g. oil and petrol)
- British Water’s Code of Practice; Flows and Loads – 4; Sizing Criteria, Treatment Capacity for Sewage Treatment Systems for Full Time Staff Day Staff
- Environment Agency (EA) Pollution Prevention Guidelines*
- Design Manual for Roads and Bridges – Volume 4
- BS EN 124: 2015 - Gully tops and manhole tops for vehicular and pedestrian areas
- Civil Engineering Specification for the Water Industry 7th Edition (CESWI) 2011 by WrC.

* EA PPG’s have been withdrawn and will be used to guidance only

4.3. Flood Risk Assessment

The Atkins Level 2 Flood Risk Assessment (5148146-ATK-REP-1007) provide assessments of the existing environmental and flooding constraints on the Tilbury 2 development. These documents also provide details of the environmental constraints and response to flooding in neighbouring areas to the Tilbury 2 development including the West Tilbury Marshes. The key findings of this report are summarised below:

- The proposed new port terminal development is classified as “Water Compatible Development” based on the Technical Guidance to the National Planning Policy Framework.

- Tidal flooding (up to a 1:1000 year event) is mitigated against by the existing concrete flood defences on the Thames river frontage but otherwise to be at high risk of tidal flooding if a breach or overtopping of the flood defences occurs.

- The only fluvial flood risks in the Tilbury area are related to the River Mardyke and the Stanford Brook, however as the Tilbury 2 development is not in the floodplain of either of these watercourses, the fluvial flood risk is considered to be low.

- Groundwater flood risk to the development is considered to be low due to the introduction of large areas of hardstanding as part of the development. The groundwater flood risk is considered moderate during the construction phase due to the possibility of encountering ground water during excavation, therefore additional mitigation measures will be required.

- The large quantity of hardstanding to be constructed as part of the Tilbury 2 development has the potential to increase pluvial flood risk to the surrounding area. To mitigate the impact on the current runoff regime surface water attenuation and storage proposals need to be considered in the drainage strategy.

- Channels and ditches in the West Tilbury Marshes, towards the north-east of the proposed new port area, provide surface water storage during tide-locking of the outfalls.

A level 3 Flood Risk Assessment has also been undertaken by AECOM and is included in the Environmental Assessment of the DCO application. The conclusions are summarised below:

Outcome of the breach model

- Comparison of the existing (baseline) and post development breach model results within the site indicate that there will be a change to the residual risk as a result of the proposed development. For the majority of the site the change is positive, i.e. a reduction in flood depth, which is reflective of the proposed increase in site levels compared to the existing, or neutral i.e. there will be no change in flood depth from a future breach. Some localised areas within the proposed CMAT and Ro-Ro storage areas of the site are shown to have a slight increase in flood depth as a result of the development.

- Off site -Comparison of the existing (baseline) and post development breach model results for the areas surrounding the site indicate that there may be a change to the residual risk as a result of the proposed development. For the large majority of these areas (Tilbury town and the flood storage areas) the change is positive, i.e. a slight reduction in flood depth, or neutral i.e. there will be no change in flood depth a future breach as a result of the proposed development. The exception is a field located to the east of Fort Road which is shown to experience a minor increase in flood depth (up to 140mm).

Mitigation to manage the residual risk

- The impact of the proposed development in relation to the residual risk in the unlikely event of a failure in the existing flood defences on the development site is largely positive as it is likely to reduce the flood depth off site for the majority of the surrounding areas.

- Within the site -The post development scenario to the site itself shows either no change or a positive change to the residual risk for the majority of the site. The small parts of the site which are shown to have an increase in flood risk form part of the proposed CMAT area which will be used to handle and process bulk construction materials and the Ro-Ro storage areas which will be used to store trailers and containers. These types of uses are classed as either ‘Less Vulnerable’ or ‘Water Compatible’ which is an appropriate use for Flood Zone 33. To manage the residual risk to the site itself it is recommended that a Flood Emergency Plan is developed for the whole site to establish a procedure to reduce the potential for future users of the site being exposed to the flood hazard as a result of a potential breach on the site.

- Off site -The potential increase in flood depth to within the field to the west of the development site is not considered significant given that the very localised nature of the increase could mean it is the result of model inaccuracies. Mitigation measures are not considered necessary for any off site areas.

The drainage strategy considers the above FRA findings.

4.4. Sustainable Drainage Systems

Sustainable Drainage Systems (SuDS) will be used across the proposals to manage surface water in accordance with current best practice. SuDS work through mimicking natural drainage systems, reducing runoff and peak flows from a site and reducing the risk of flooding. In addition to reducing flood risk, SuDS can also improve water quality, and provide biodiversity and amenity benefits.

The SuDS Manual[14] states that flows should preferably be managed in accordance with the below hierarchy:

i. Use surface water runoff as a resource
ii. Manage rainwater close to where it falls (at source)
iii. Manage runoff on the surface (above ground)
iv. allow rainfall to soak into the ground (infiltration)
v. Promote evapotranspiration
vi. Slow and store runoff to mimic natural runoff rates and volume
vii. Reduce contamination of runoff through pollution prevention and by controlling the runoff at source
viii. Treat runoff to reduce the risk of urban contaminants causing environmental pollution.

Infiltration has been discounted from this assessment due to the likely impermeability of the alluvium underlying the site. It will also be constrained by the depth of the groundwater (a 1m freeboard is required from the base of any infiltration system) and more notably the extent of contamination. It is therefore considered that it is unlikely that infiltration is a viable option to drain the site, except potentially for the CMAT area if a porous surface is incorporated. The potential for infiltration will be assessed during the detailed design stage when further geo-technical studies have been undertaken.

The SuDS Manual states that it is preferable to manage rainfall close to where it falls using prevention and source control methods. Prevention methods such as green roofs, permeable surfaces and rainwater harvesting reduce the quantity of peak runoff entering the surface water system whilst source controls such as ponds (preferred) and tanks provide localised attenuation, reducing the need for large site-wide attenuation features.

Thurrock planning policy also states that development proposals should incorporate biodiversity or geological features into the design as far as possible. These may include green roofs, brown roofs and the creation of green corridors for wildlife.

SuDS also provide significant benefits to enhance Water Quality, and the SuDS Manual states the following recommendations should be considered to improve Water Quality as part of drainage proposals:

[14] **Woods Ballard, B, et al.** *The SuDS Manual.* CIRIA C753, (2015)

- Pollution Prevention - stopping contaminants mixing with run-off (e.g. road sweeping, bunds for oil tanks and controlling sediment)
- Interception - capturing the first 5mm/hour of rainfall for frequent small events that cause the most pollutant instances
- Treatment - Implementing SuDS systems (in series where required) to treat runoff
- Maintenance and remedial work - to remove captured pollutants and maintain system performance

As well as traditional known primary pollution sources (such as hydro-carbons and chemical spillages), SuDS can also protect and improve Water Quality emulating from the following secondary pollution sources:

- Atmospheric deposition (from air pollution)
- Traffic – exhausts (Polycyclic aromatic hydrocarbons [PAHs], unburnt fuel and particles from catalytic converters)
- Traffic – wear and corrosion (tyre abrasion and vehicle corrosion)
- Leaks and Spillages (Leaks of engine, hydraulic and lubrication oil, de-icing fluids. Spillages when refuelling and accidental occurrences)
- Litter/animal faeces
- Vegetation/landscape maintenance (leaves, grass cuttings, and herbicides and pesticides)
- Soil erosion (from adjacent landscaped areas)
- De-icing activities (such as rock salt)
- Cleaning activities (washing of vehicles, windows, bins and pressure washing surfaces)

A detailed review of suitable SuDS options has been undertaken for the proposed new port terminal considering various benefits including source control, attenuation and water quality benefits. The results are shown in Appendix D. Each of these systems has been considered as to whether they are appropriate for inclusion within the proposed new port terminal, and discussed further in Section 6.

4.5. Management of Exceedance Flows

For rainfall events that exceed the drainage design up to and including the 1 in 100 year storm event plus 40% climate change allowance, any surface water flooding should be fully contained and managed within the boundaries of the site and not flood areas downstream. The profile of the site determined via a topographical survey shows that the proposed port site falls west towards the boundary at Station Approach Road, making this area more vulnerable against flooding caused by exceedance flows beyond 100 year storm events. Any exceedance flows will be controlled in a manner that will avoid flooding of property or vulnerable areas, plus ensure that depths and velocities involved are safe. The adjacent Anglian Water SWT is also a key concern when considering exceedance flows.

A number of design principles and planning techniques can utilise topography and landscape features, including bunds, roads and kerb features to safely route overland flows away from any development. These can provide additional above-ground storage and ensure water does not pond or affect safety on the principal access routes of the site. Trees and other forms of dense vegetation can also be implemented around the surrounding land. Collectively, these are capable of storing surface water and reducing the peak flow rate from high return period events. The drainage system has been designed to convey flood water away from any sensitive and offsite areas.

The detailed design of the development must take account of guidance in Table 13.1 of DEFRA's Flood Risk Assessment Guidance for New Development: Phase 2[15]. Low hazard overland flows are generally considered to be those with a depth of less than 250mm and a velocity less than 0.5m/s. Further guidance is also provided in CIRIA C635, Designing for Exceedance[16].

[15] **DEFRA**, 2005: Flood Risk Assessment Guidance for New Development: Phase 2: Framework and Guidance for Assessing and Managing Flood Risk for New Development.

[16] **Publication C635**: Designing for exceedance in urban drainage - good practice, CIRIA (2006)

4.6. Tidal Considerations

For surface water discharging directly to the River Thames, there is a risk of a storm coinciding with a high tide event, which will 'tide lock' the outfall.

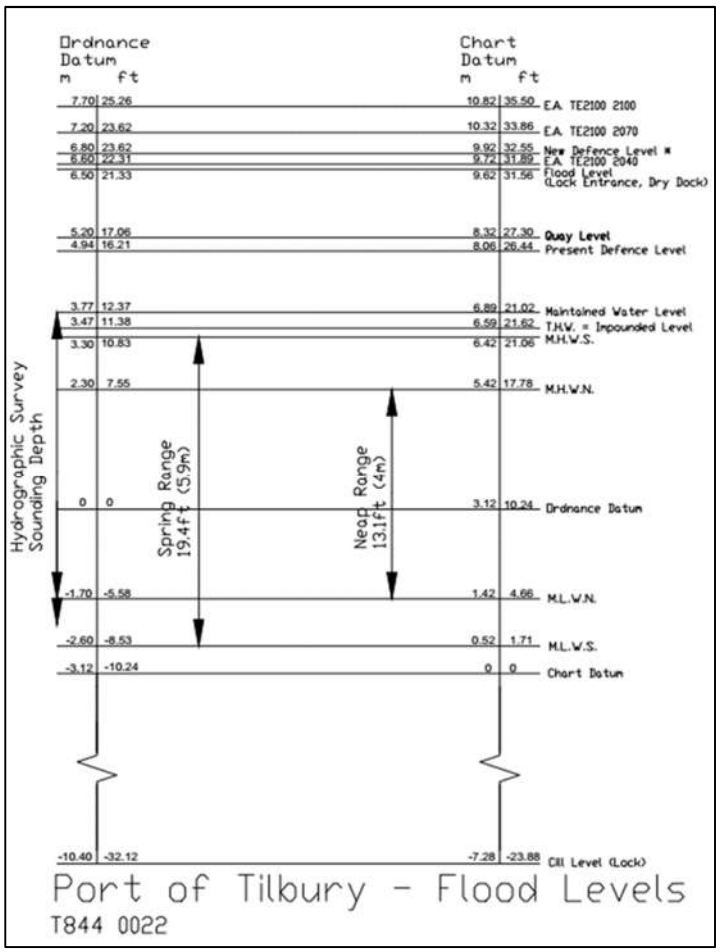
The Mean High Water Spring tide level has been selected as an appropriate tide level to interpret 'high tide'. The Mean Spring High Water Level at Tilbury is expected to be 3.3m AOD and the Mean Neap High Water Level is expected to be 2.3m (see **Figure 4-1**). These figures have been increased by 0.755m to account for the anticipated sea level rises.[17] Hence a modified Mean Spring High Water Level is expected to be 4.1m AOD with a range of 5.9m, and a modified Mean Neap High Water Level is expected to be 3.1m AOD with a range of 4m.

The spring range has a higher high tide level and a lower low tide level than the neap range. The network will be modelled for both the spring and neap ranges to ensure that both the maximum high tide level and the maximum low tide level are accounted for in the design.

Higher high water levels such as a 1 in 5 year tidal surge event were also considered, however this has been discounted due to the very low compound probability of both a low probability Tidal Surge event occurring during the same 6 hour time period as a low probability Rainfall Event.

The outfall will be provided with two flap valves and a penstock (manual or automated), in line with Environment Agency requirements.

Figure 4-1 Port of Tilbury Flood Levels



[17] **Environment Agency** 'Flood risk assessments: climate change allowances' Table 3, sea level allowance for each epoch in millimetres (mm).

It is anticipated that the level of the outfall for the drainage network discharging to the River Thames will be in the region of 0m to -1.5m AOD. The exact level will depend on the final solution selected to counteract any settlement, which will be derived pursuant to the DCO. The design presented in this drainage strategy, is based on an outfall level of -0.866m for the reasons explained in section 6. Approval of the outfall will be agreed through the operation of the Environment Agency's protective provisions.

4.7. Design Principles Summary

4.7.1. New Port Development

The drainage strategy is based on the following design principles:

1. Guidance in the 'Sustainable Drainage Systems; Design Guide[13], states that surface water discharge from the proposed development should be limited flows to greenfield runoff rates to the surrounding ditches/watercourses. Further hydraulic studies may be undertaken in subsequent design stages, to determine if the local ditches/water courses can accept flows larger than greenfield run-off limits without increasing the flood risk. If this is the case, then Thurrock Council/EA will be approached to determine if larger peak flows can be discharged pursuant to the DCO.
2. In line with national statutory legislation, flows will be unattenuated to the River Thames (which is a large tidal water body).
3. The drainage system will make allowance for the control of flood water in large (1 in 100 year + climate change) rainfall events to ensure that there is no-flood risk to adjoining properties or unacceptable operational restrictions on the site.
4. The area designated as the RoRo Terminal will be 100% impermeable. This area is intended for storage of containers and trailers, and these are conventionally large paved areas. A layout for the paved area is provided in the DCO submission, however this may vary in the future, therefore maximum flexibility for future changes needs to be accounted for in the drainage strategy, by capturing pollution and improving water quality from the whole hard standing area (as far as reasonably practical).
5. The CMAT area of the site is proposed to have two operational uses. A proportion of the area will be hard standing and the remainder will be used for aggregate storage. The CMAT design will be undertaken by the occupier, who will design their own drainage system to maximise infiltration and must discharge any additional flows to the site wide drainage system at Greenfield run-off levels. Any attenuation will be provided within their own site area. They will also be responsible for controlling all pollution and siltation within their site area, in accordance with the Operational Management Plan developed for the DCO application, to ensure that the outflow to the site wide system, meet acceptable water quality criteria.
6. The proposed RoRo Jetty and southern portion of the access ramp will discharge directly and unrestricted to the River Thames Estuary. In the pre-development case, rain would fall directly into the Estuary, therefore the pre-development regime is not being changed.
7. The design will make allowance for the handling of hazardous materials that will enter/be stored in the new port area subject to controls of any hazardous substance consent secured at detailed design stage, and to control other potential pollution sources (such as from hydrocarbons). No fuelling from the pontoon (this will be undertaken from the river under PLA controls), or maintenance will be undertaken on the ships that dock at the Jetty, and pollution will be controlled on the jetty by deploying spill kits.
8. The drainage system will maximise the usage of sustainable drainage systems, control pollution and enhance water quality from run-off, as far as reasonable practical.
9. The design will make allowance for anticipated rates of settlement of the RoRo concrete hard paving and any other areas.
10. The existing ponds and drainage ditches in the centre of the proposed terminal site will be re-routed to enable construction of the proposed RoRo and bulk storage areas, and backfilled. Any associated mitigation measures are provided elsewhere as indicated in the terrestrial ecology section of the Environmental statement. This includes compensatory measures including new ponds and ditches, which will provide compensatory measures.
11. Any proposed or retained swales/ditches are proposed to be unlined, unless there is a risk that they will mobilise contamination in the ground, contaminate the groundwater, or are in areas of high groundwater.
12. The adjacent RWE Power Plant B has its own standalone surface water drainage system which does not connect to the Tilbury 2 site. If the site is redeveloped in the future, this will continue to be the case.
13. RWE has a legal right to discharge into the Tilbury 2 foul pumping station during the demolition of the RWE Power Plant B. This has been allowed for in the drainage strategy.

14. It is anticipated that rainfall falling on the Cement Silo loading area and vehicle wash flows will be treated as trade effluent. A permit will be obtained for this, and the discharge will be agreed through the operation of Anglian Water's protective provisions.
15. The design will make allowance for the location of other existing and proposed utility requirements
16. Any foul drainage emulating from ships docking at the port, will be tankered away and taken off-site for disposal.
17. The redevelopment is not considered to be Critical National Infrastructure.
18. The design makes no allowance for any temporary construction drainage or control of siltation during the construction phase, which will be developed and designed by the Contractor in accordance with the Construction Environmental Management Plan (CEMP).

4.7.2. Surface Access Road / Rail Link

The drainage strategy is based on the following design principles/assumptions:

1. The proposed road to be constructed between Ferry Road and Fort Road will be offered for adopted by the local highways authority. It has therefore been designed to adhere to the standards prescribed in the Design Manual for Roads and Bridges (DMRB)[18], as well as the Essex Highways Design Guide[19].
2. The proposed road to be constructed as part of the surface access improvements will be a single carriageway with one lane in each direction, with a footway This will be adopted by the local highways authority (Essex County Council).
3. The new rail link is currently proposed to be positively drained, however following further investigations of the ground conditions in later design stages, it is possible that this could be omitted in future (to match the existing railway which is being removed which has no drainage provision). The RoRo area will require positive drainage to the ballasted track, which is abounded by concrete pavement.
4. As per the proposed Tilbury2 site, surface water discharges from the road and rail link will be limited flows to greenfield runoff rates to the surrounding ditches/watercourses (based on Q1 greenfield run-off rates for all rainfall events). Further hydraulic studies may be undertaken in subsequent design stages, to determine if the local ditches/water courses can accept flows larger than greenfield run-off limits without increasing the flood risk. If this is the case, then Thurrock Council/EA will be approached to determine if larger peak flows can be discharged pursuant to the DCO. Maintenance issues with attenuating flows requiring flow devices smaller than 75mm will also be addressed, and flows may need to be increased from small catchments
5. The proposed railway sidings and spur that are to be constructed as part of the surface access improvements will be an extension of existing PoTLL rail sidings and therefore will not be adopted by Network Rail.
6. The proposed rail spur will be ballasted throughout, except within the new terminal where there will be vehicle crossings, adjacent to the Maritime Warehouse and up to the railhead to allow plant to drive over the tracks. The new level crossing will be composite surfacing panels laid over ballasted track.
7. The ground water level along the Surface Access Road/Rail Link is currently unknown. Further investigations will be undertaken as part of the site investigation. Any proposed swales are therefore proposed to be unlined, unless they are located in contaminated ground.
8. The design makes no allowance for any temporary construction drainage or control of siltation during the construction phase, which will be developed and designed by the Contractor in accordance with the controls set out in the CEMP.

[18] **DRMB** http://www.standardsforhighways.co.uk/ha/standards/dmrb/

[19] **Essex County Council:** *Essex Design Guide (2013)* [Available at http://www.essexhighways.org/Highway-Schemes-and-Developments/Adoptions-and-Land.aspx]

5. Consultation

The following meetings have been undertaken with the Statutory Authorities in respect of this drainage strategy (see Appendix C for meeting minutes):

- 26th May 2017 – Thurrock Council
  - To discuss preliminary drainage proposals
- 15th August 2017 – Essex County Council (acting on behalf of Thurrock Council) and Environment Agency
  - To discuss developed drainage proposals
- 22nd September 2017 – Anglian Water
  - To discuss findings of pre-development application and foul drainage proposals

This drainage strategy has been developed to address the comments raised in these meetings.

Essex County Council (letter dated 18th October 2017 - reference ECC/PoTL2/Pre App) and the Environment Agency (letter dated 18th October 2017 – reference AE/2017/122092/01-L01) have also provided comments on the Drainage Strategy as part of the informal consultation. Responses to their comments are also included in Appendix C.

Anglian Water raised no specific objections to the proposals.

Essex and Suffolk Water do not have any drainage infrastructure in this area. They however been consulted on potable water supplies for the port, which is not affected by this drainage strategy.

6. Proposed New Port Terminal - Drainage Strategy

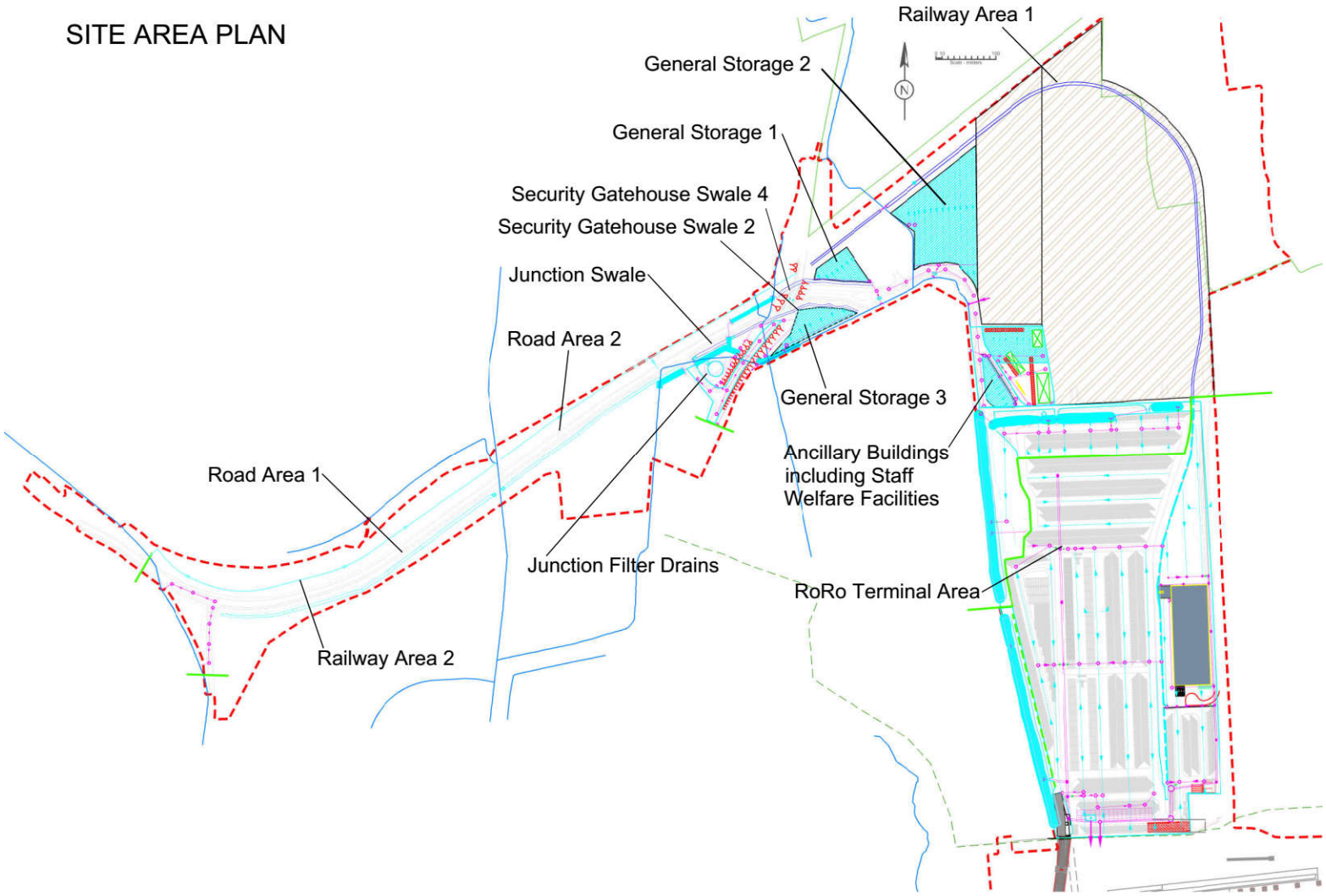
6.1. Details of Development

The proposed new port area comprises of 4 zones, which will all have different operational functions, therefore placing different constraints on the surface water drainage strategy. A description of each of the development zones is summarised in Table 6-1 below and Figure 6-1.

Table 6-1 Description of Proposed New Port Development Zones

Zone	Description of Primary Use
RoRo Terminal	• Roll-on-roll-off (RoRo) terminal to be used predominantly for the storage and handling of shipping containers and trailers. • The area will be subject to high loading from the containers and plant. • Surface water runoff may be contaminated by hydrocarbons leaking from containers / associated vehicles and therefore treatment of runoff will be required. • There is also potential for contamination from leaks or spillages of materials or liquids stored in the RoRo terminal.
Ancillary Buildings / General Storage Areas	• Buildings associated with the administration and operation of the port including offices, customs areas, maintenance workshops and staff welfare facilities. • Car parking for the port's staff and car parking for cruise liner passengers. • General storage areas
CMAT	• It is assumed that approximately half of the area will be used for the storage and stockpiling of aggregates including the associated conveyors to offload aggregates from the ships • The remaining area will be hardstanding associated with the processing and batching of aggregates. • Surface water runoff from the aggregate stockpiling may be contaminated by suspended solids and therefore treatment may be required. • Design to be undertaken by operator in future design stages
RoRo berth and Pontoon	• RoRo berth and pontoon to allow ships to dock at the new port. This will be within the marine environment. • No fuelling or maintenance activities will be undertaken on berthed ships.

Figure 6-1 RoRo Terminal Drainage Strategy



6.2. Surface Water Runoff Calculations

The Lead Local Flood Authority (LLFA) are Thurrock Council and local legislation stipulates that surface water discharges from new developments is restricted to the greenfield rate of runoff wherever possible, unless it is discharged to a large water body (such as the River Thames).

To inform the surface water drainage strategy, greenfield runoff rates have been calculated based on the IH124 method for small catchments and Microdrainage Software Suite, restricting flow to Q1 levels at all rainfall events. This applies to all discharges to the local ditches/watercourses, but excludes the River Thames outfall which will have an unrestricted outflow. Maintenance issues regarding restricting flows requiring small diameter pipework (<75mm diameter) will be agreed with Thurrock Council / Environment Agency in the detailed design and some flows from small catchment may need to be increased.

Calculated greenfield runoff rates for each of the development zones are included in Appendix B and are summarised in Table 6-2 below:

Table 6-2 Proposed New Port Terminal Greenfield Runoff Rates

Description	Area (ha)	Greenfield Runoff Rate [Q1] (l/s)	Notes
RoRo Terminal	24	51.91	-
Ancillary Buildings / General Storage Areas	4.5	9.69	
Security Gatehouse	0.87	1.89	
CMAT	22.65	48.79	Calculation includes the area of the proposed rail spur to the east of Fort Road.
RoRo berth and Pontoon	n/a	n/a	Rate not calculated due to the assumption direct, unrestricted discharge to the Thames Estuary will be permitted

6.3. Sustainable Drainage Systems

A detailed review of suitable SuDS options has been undertaken for the proposed new port terminal considering various benefits including source control, attenuation and Water Quality benefits and the results are shown in Appendix D and are also summarised in Table 6-3 below. Each of these systems has been considered as to whether they are appropriate for inclusion within the proposed new port terminal. The table identifies the SuDS solutions that are considered suitable for the project as part of the Drainage Strategy.

Table 6-3 Proposed New Port Terminal - SuDS Options

SuDS Technique	Description	Notes		
		Description	Is SuDS Technique Suitable?	
Ponds	Permanent pool of water that provides attenuation and treatment of surface water runoff.	CMAT	✓	Ponds as well as providing Water Quality benefits are cheaper to construct and maintain than attenuation tanks. They do not however provide any interception storage. Ponds can also act as containment to capture spilt pollution. Ponds ideally located away from any contaminated land, due to the risk of contaminants leaching into the pond, or lined appropriately. Ponds could be suitable for use within the port area for providing attenuation and treatment of the surface water, however this would result in a significant loss of land which is required for container storage and port operations. They have therefore been discounted for the RoRo and Ancillary Buildings areas.
		RoRo Terminal	X	
		Ancillary Buildings / General Storage Areas	X	
Attenuation Storage Tanks	Generally, below ground temporary storage of surface water before infiltration, controlled discharge or re-use. Common types of tanks include oversized pipes and geocellular tanks.	CMAT	✓	Tanks are more difficult to maintain than open drainage features, such as ponds or swales, and do not provide any increased water quality treatment, amenity or biodiversity. Tanks do not provide any interception storage. Tanks will result in the excavation, management and disposal of potentially contaminated soils, and existing structures (predominately the A Power Station foundations) are a significant constraint. Tanks however can be readily integrated underneath roads / car parking areas, although they are likely to be expensive due to the high loading. If tanks are designed to withstand appropriate loadings, they will have the benefit of not decreasing useable land in the port area, which is a significant benefit for the RoRo area of the site.
		RoRo Terminal	✓	
		Ancillary Buildings / General Storage Areas	✓	
Wetlands and Bio-retention Systems	Shallow, often vegetated, landscape depressions that temporarily store, filtrate, infiltrate and/or convey flow further downstream in a controlled manner.	CMAT	✓	Bio-retention systems have been shown to be effective in improving water quality and therefore could be utilised as part of a “treatment train” to improve water quality prior to discharge to the existing watercourses. The systems do not provide any interception storage unless lined. The use of such systems may reduce the requirement for conventional treatment devices such as oil interceptors and therefore help reduce operational costs. As infiltration is currently not being considered, bio-retention would be for surface water attenuation and treatment only. Bio-retention systems (as ponds) however require a significant land take, which would not then be useable by the port. They have therefore been discounted for the RoRo and Ancillary Buildings areas.
		RoRo Terminal	X	
		Ancillary Buildings / General Storage Areas	X	
Filter drain	Linear drains or trenches filled with permeable material, often with piped drainage in the base.	CMAT	X	Filter drains can be used to drain roads, rail tracks or areas of hardstanding, and can provide some attenuation and limited treatment (mainly settlement of solids) of surface water runoff. Filter drains are however susceptible to siltation and will clog over time, and will need to be replaced periodically. Filter drains provide limited interception storage. Filter drains would not be suitable in areas where they would be likely to be covered over such as the areas to be used for container storage within the RoRo terminal. Filter drains are also unlikely to be suitable for use within the CMAT area, as this area is proposed to be used for aggregates and therefore the runoff is likely to contain a high concentration of fine particles, which could block the filter media and therefore lead to reduced serviceability. Filter drains could be utilised on the boundaries of the RoRo terminal; however, their benefits are considered minimal.
		RoRo Terminal	X	
		Ancillary Buildings / General Storage Areas	X	
Swales & ditches	Shallow, flat-bottomed, usually vegetated opened channels designed to attenuate,	CMAT	✓	Swales can provide significant treatment and can improve the quality of surface water run-off. They can also provide interception storage. A number of existing ditches existing on the site, which could be reutilised. As infiltration is not currently being considered as an option for disposal of surface water, swales are only being currently considered for conveyance and attenuation of surface water.
		RoRo Terminal	✓	

SuDS Technique	Description	Notes		
		Description	Is SuDS Technique Suitable?	
	infiltrate and convey flow.	Ancillary Buildings / General Storage Areas	X	Swales or ditches could be utilised along access roads and to drain small areas of hardstanding (due to their limited hydraulic capacity). There is insufficient room within the Ancillary Buildings area.
Green roofs	Vegetated roofs that reduce runoff volume and rate.	CMAT	X	Green roofs provide treatment as the rainwater percolates through the green roof substrata (including physical, biological and chemical treatment through the soil and root up-take zone), and they also provide interception storage. Green roofs do require additional maintenance over conventional roofs, and the structure may need to be strengthened to accommodate additional loading from green roof. Green roofs could be considered for the Ancillary Buildings, and can provided on pre-fabricated buildings.
		RoRo Terminal	X	
		Ancillary Buildings / General Storage Areas	✓	
Rainwater harvesting and re-use	Larger-scale collection of rainwater for attenuation or for reuse in appropriate ways (e.g. toilet flushing or irrigation).	CMAT	X	Rainwater Harvesting can contribute to more sustainable means of water management; however these methods are often not classed as rainwater attenuation due to the possibility of rainwater harvesting tanks being full and then a storm event occurring resulting in no further attenuation. Rainwater Harvesting does not improve the quality of rainwater overflowing and entering the downstream drainage system. The systems can however provide interception storage, if designed on regular daily demand for non-potable water. Rainwater harvesting could be utilised within the port's Ancillary Buildings for non-potable water applications, however due to the low occupancy is this is considered unviable.
		RoRo Terminal	X	
		Ancillary Buildings / General Storage Areas	✓	
Pervious pavements	Inflow of water from surface into underlying structure. Thus, allowing temporary storage, infiltration and/or controlled discharge further downstream.	CMAT	X	Pervious paving can be integrated into areas subject to low vehicle loading such as car-parking areas. They attenuate peak flows and provide significant amounts of storage. They also filtrate silt and attached pollutants, provide biodegradation of organic pollutants (such as petrol and oil) and absorption of pollutants. They also provide settlement and retention of solids. They can provide interception storage if they do not serve areas outside of the permeable paving. Pervious pavements are not be suitable for use within the RoRo Terminal or Bulk Storage Area due to the high anticipated loading. They could however be utilised for other areas of the site that are subject to lower vehicle loading, such as the Ancillary Buildings, and General Storage areas.
		RoRo Terminal	X	
		Ancillary Buildings / General Storage Areas	✓	
Trees	Trees are an effective means of intercepting rainfall, transpiration and increased infiltration of the surrounding soil. They can be used for supplementary purposes in reducing the peak flow rate for	CMAT	X	The usage of trees on the development is limited due to the industrial nature of the site and large amounts of hardstanding. The retained trees along the western perimeter of the site are away from the drainage system and to the west of an existing ditch. Tree pit drainage is therefore not considered suitable for the project.
		RoRo Terminal	X	
		Ancillary Buildings / General Storage Areas	X	

SuDS Technique	Description	Notes		
		Description	Is SuDS Technique Suitable?	
	high level return periods.			
Soakaway, infiltration basins and trenches	Excavations filled with void-forming material enabling temporary storage and gradual infiltration into underlying soil.	CMAT	X	Infiltration provides treatment through the percolation of the underlying soils between the base of the system and groundwater level (which should be not less than 1m). They can also provide interception storage. Infiltration solutions have not been considered due to the low soil infiltration rates, potential high ground water levels and contamination. The CMAT however could have a porous surface which could potentially infiltrate, to mimic the previous greenfield land, if ground conditions permit. Infiltration rates could be confirmed as part of site investigation works through soakaway testing and SI studies on the GWL depth and extent of contamination.
		RoRo Terminal	X	
		Ancillary Buildings / General Storage Areas	X	
Detention basin	Dry depressions designed to store water for a specified retention time and quantity.	CMAT	X	Detention basins provide the gravitational settlement of particle pollutants, and some filtration through base vegetation and underlying soils with biodegradation and photolytic breakdown during the drying process between runoff events. They can also provide interception storage. Detention basins are not suitable for use within the port area due to the loss of useable land (as Ponds above).
		RoRo Terminal	X	
		Ancillary Buildings / General Storage Areas	X	
Proprietary Treatment Systems	Proprietary treatment systems to improve Water Quality. Performance varies depending on the system implemented and manufacturer	CMAT	✓	Proprietary systems could be implemented to improve water quality, where other natural forms of Water Quality improvement are not possible. They could also be implemented in the CMAT area to remove sediment (such as proprietary silt removal systems). These systems are considered unviable in the RoRo Terminal area due to the low flow capacity of the proprietary units, and therefore the excessive number of units required to cover the area.
		RoRo Terminal	X	
		Ancillary Buildings / General Storage Areas	✓	

6.4. Drainage Strategy

6.4.1. RoRo Terminal

To determine the optimum drainage solution, a number of different drainage strategies were assessed to drain the RoRo pavement. The options were focused on maximising the amount of water that can gravitate to the River Thames.

It was considered that the use of high capacity slotted drainage channels would be the most beneficial way of draining the concrete surface, as they can withstand the heavy-duty port loadings and can flow long distances before an outlet is required. They keep the rainwater near the surface hence raising the depth of the overall drainage system.

The drainage design in this strategy accounts for when the tidal level in the River Thames is higher than the outfall level of the drainage network, and is nearing the Finished Surface Level of the site, by providing on-site attenuation (and possibly a pumping station).

Improving the water quality from the run-off was also a key concern and therefore natural SuDS solutions such as swales were given priority over traditional piped systems.

The following strategies were assessed, which provide a background to the preferred solution adopted:

- Draining the surface using high capacity channel drains, discharging to a series of swales (4 no) located along both the eastern and western boundaries
  - this has been discounted as the swales would need to be more than 17m wide, due to the significant size of the catchment.
- Draining the surface using high capacity channel drains, discharging to concrete channels located along the eastern and western perimeters
  - this has been discounted as the concrete channels would also need to be significant in size and provide no water quality or biodiversity benefits
- Draining the surface using a traditional gully and pipework system
  - this has been discounted due to the significant number of gullies and pipework required will make the drainage system deeper, will not permit a gravity discharge, and provides no water quality benefits.
- Draining the RoRo pavement using channel drains discharging to a series of culverts laid at shallow gradients (1 in 1000).
  - This has the most benefits and avoid the need for excessively wide swales or concrete channels, but has been discounted as a standalone solution, as it provides no water quality or bio-diversity benefits.

Having accounted for these options, the proposed drainage strategy for the RoRo Terminal is shown in Figure 6-2 and drawing 5153187-ATK-ZZ-XX-DR-UT01050 (Appendix E), and is summarised below.

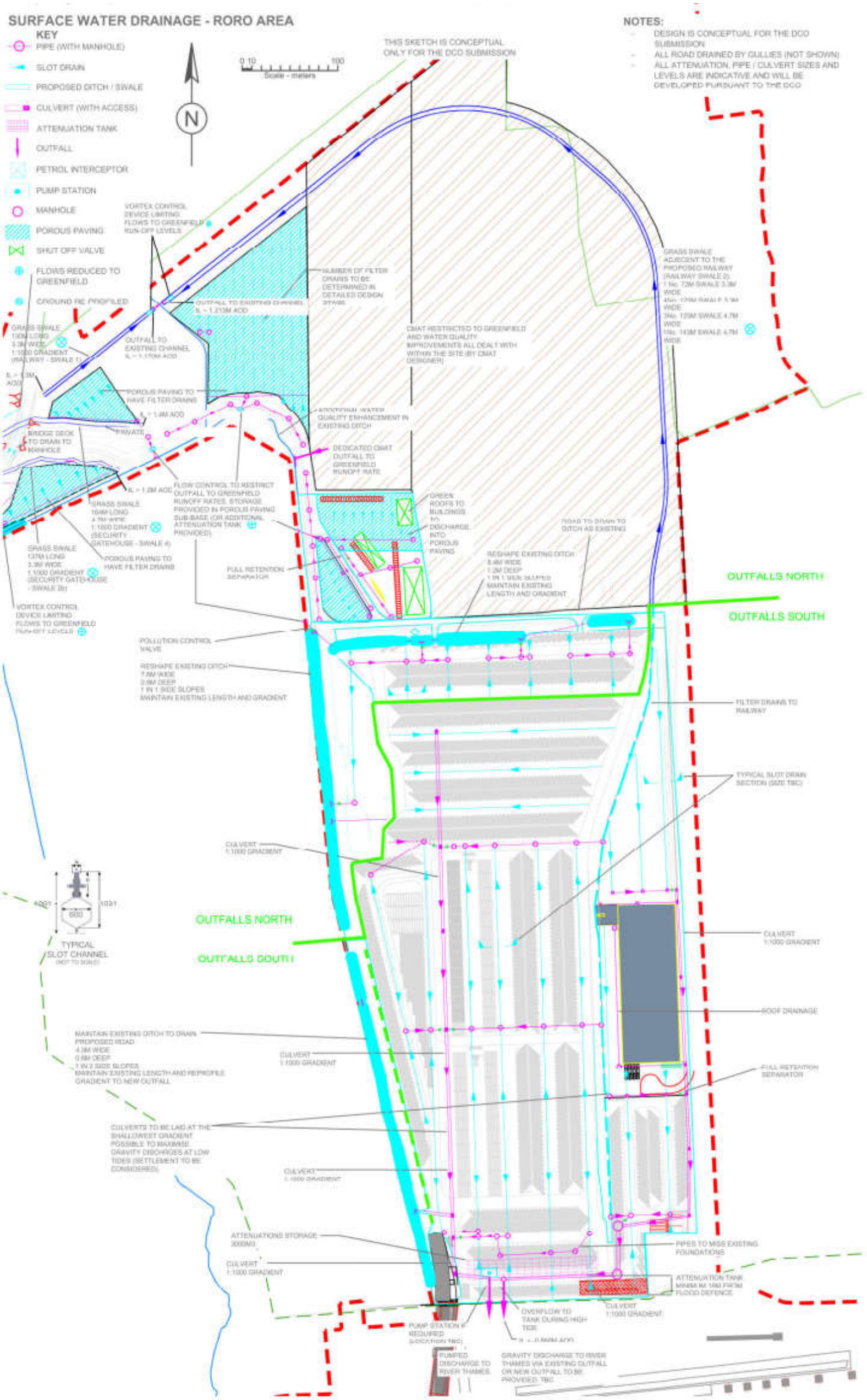
- In order to keep the drainage system discharging to the River Thames as shallow as possible and to utilise the existing ditches around the pavement, the catchment has been split into 2 segments.
- The northern area of the RoRo pavement is proposed to drain via high capacity channel drains, and discharge to the existing ditches to the west and north of the RoRo pavement. These have been enlarged, as far as practical, to provide attenuation, and discharges to the northern watercourses at Q1 greenfield run-off levels. This will promote biodiversity and Water Quality treatment within the existing ditches.
- The southern area of the RoRo will also be drained by high capacity channel drains, with some areas discharging via pipework, and other areas discharging directly into two culverts laid in a north to south direction (which avoid the existing underground obstructions). The railway within the RoRo pavement will also connect into this system. The culverts will be laid as shallow as possible, allowing for the potential settlement of areas of the site. The two culverts will connect together in the south portion of the site, and have a gravity outflow to the River Thames during low tides. During high tides rainwater will be attenuated within the culvert system and an attenuation tank, and may require a pump station to reduce the amount of storage required. This will be dependent on the final solution to overcome any potential settlement and will be derived pursuant to the DCO.

- A series of hydraulic models have been run with the drainage system being as flat and shallow as possible (with an outfall level to the River Thames of approximately +0.2m AOD), and for an increased depth and steeper gradients to allow for settlement (with an outfall level of approx. -1.881 mAOD). The results indicate that an attenuation tank in the region of 3000m^3 being required. The hydraulic calculations presented in this report are based on an outfall level of -0.866 m AOD, which is located above the highest neap tide (accounting for Climate Change), which is considered a reasonable amount of additional fall to allow for any settlement solution. The final solution will be pursuant to DCO and may require an additional pump station/enlarged attenuation tank, if further falls are required to the slotted drainage channels/culverts/pipework systems. Approval of the outfall will be agreed through the operation of the Environment Agency's protective provisions.
- The outfall will have two flap valves and a penstock (manual or automated), in line with Environment Agency requirements.
- The hardstanding surrounding the cement silo in the south east corner of the site will also discharge to this system. This excludes the hardstanding where the trucks are loaded, which is proposed to discharge to the foul drainage system and will be treated as trade effluent. A permit will be obtained for this, and the discharge will be agreed through the operation of Anglian Water's protective provisions.
- The existing ditch to the west of the RoRo pavement will also be enlarged as much as practical, to provide further attenuation for the southern area of the RoRo pavement, to promote biodiversity and improve water quality.
- The existing ditches will be unlined unless there is a risk of any contamination in the ground being mobilised, or if there are high groundwater levels, This will be determined by further site investigation tests to be undertaken in detailed design in liaison with the EA, pursuant to the DCO. The pollution of the run-off entering the ditches will be controlled as described in Section 6.5.

A factor of interception will be provided by the pervious paving, green-roods and swales, and will be maximised as far as practical, in line with CIRIA C753 . As no infiltration is proposed (except potentially in the CMAT area), it is not possible to restrict the volumetric run-off from the development. All discharges to the River Thames will be unrestricted with no interception (except in the small catchment draining to the existing enlarged ditch) or volumetric control provided.

Hydraulic calculations for this system based on the scenario highlighted above (for both the spring and neap tides) is provided in Appendix F.

Figure 6-2 RoRo Terminal Drainage Strategy



6.4.2. Ancillary Buildings / General Storage Areas

The proposed drainage strategy for the Ancillary Buildings (including Staff Welfare Facilities), and General Storage Areas are shown in Figure 6-3 and drawing 5153187-ATK-ZZ-XX-DR-UT01051 (Appendix E), and is summarised below.

This area of the site will consist of several pre-fabricated buildings which will be pre-fitted with green roofs, to enhance the water quality of the run-off. Car parking areas will consist of porous paving. The refuelling area will consist of concrete hardstanding and will be drained using a traditional piped drainage system, which will pass through a Full Retention Oil Interceptors to BS EN 85820, and will be constructed and maintained in accordance with the Control of Pollution (Oil Storage) (England) Regulations 2001. There will also be a vehicle wash which will discharge to the foul drainage system.

The above areas will connect via a pipework system, which will discharge to the existing ditch (which is privately owned by the Port), to the west of the area, at Q1 Greenfield run-off levels. Attenuation will be required to restrict flows and will consist of storage in the porous pavement, and an underground geocellular storage tank (if required).

The General Storage Areas are proposed to be drained with Porous Pavements and the Security Gatehouse to the terminal area are proposed to discharge to swales These will discharge at Q1 Greenfield run-off levels to the above existing ditch.

All porous Pavements are proposed to be lined, unless ground conditions permit the usage of infiltration and this will not mobilise contamination. The potential for infiltration will be assessed during the detailed design stage when further geo-technical studies have been undertaken.

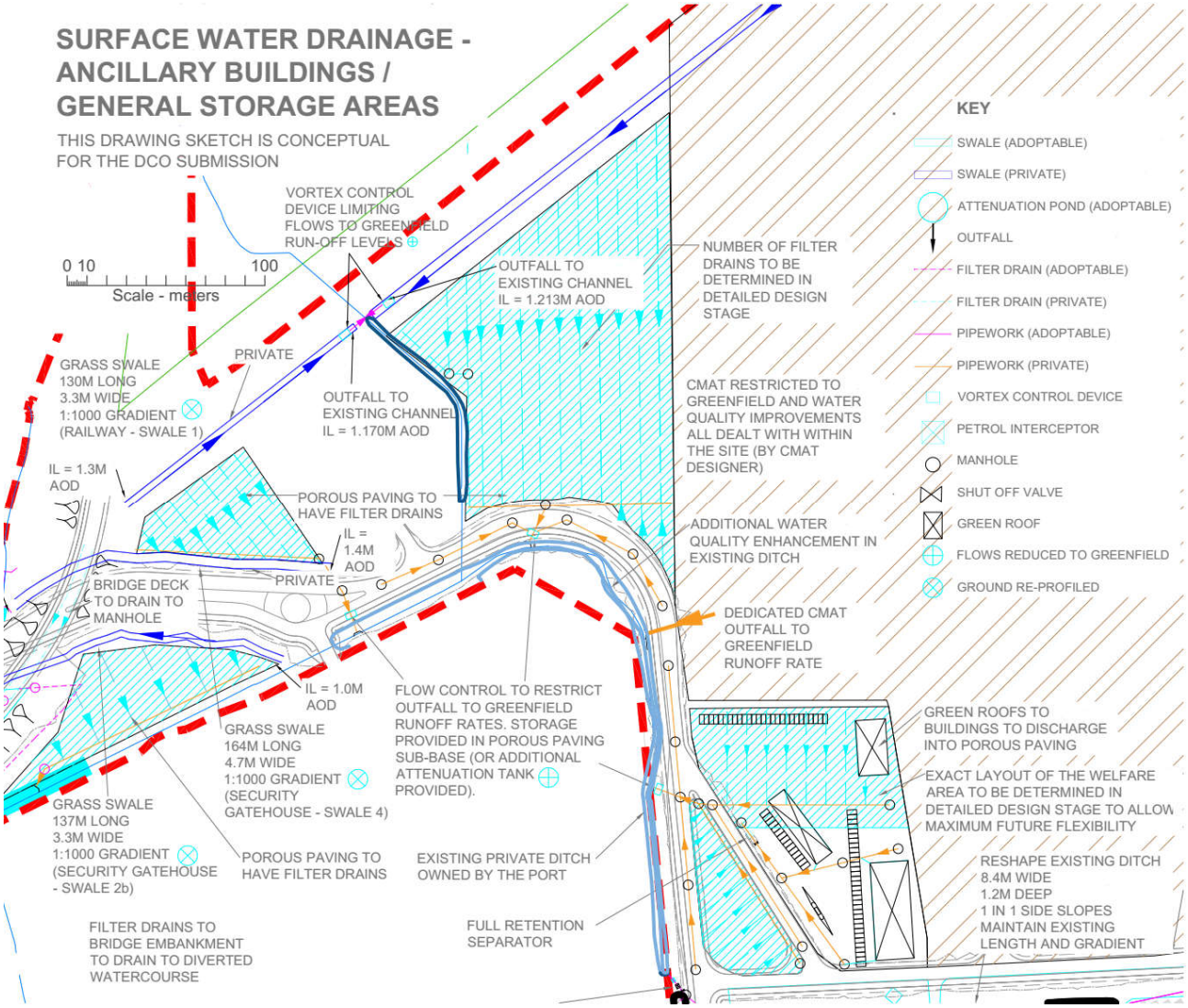
There is insufficient room to drain the roadway from the Security Gatehouse to the RoRo pavement, using swales, and therefore the road will be drained by traditional pipes and gullies. This will also discharge to the existing ditch at Q1 Greenfield run-off levels. This ditch is wide and shallow, and will have minimal flows after the development, and hence will provide Water Quality enhancements as the runoff will pass through the vegetation, as per the other swales on the development.

The existing ditch could also potentially be blocked off with a weir, to provide some attenuation to this northern area of the site. This would be in lieu of some of the storage highlighted above, and will be investigated further in future design stages.

Hydraulic calculations for this system are provided in Appendix F.

[20]**British Standards Institute:** *Separator systems for light liquids, BS EN 858:2002 (2002)*

Figure 6-3 Ancillary Buildings and General Storage Areas Drainage Strategy



6.4.3. CMAT

The surface water drainage design for the CMAT area will be undertaken by the operator in the future, however it has been determined that the following principles must be adhered to:

The aggregate stockpile area will consist of a granular surface, which will infiltrate into the ground (if ground conditions permit). Any other run-off will be intercepted by perimeter ditches, before discharging via a series of ponds, to provide both attenuation, control any siltation and to provide water quantity improvements. There will be paved area consisting of offices, which will also discharge to ponds mentioned above.

The flow from CMAT area will then be discharged at Q1 greenfield run-off rates and discharge to the existing ditch to the west of the site area (which is privately owned by the Port).

A series of covered conveyors will transport aggregate to the CMAT area. It is considered that these do not pose any additional pollution risk to the underground drainage system.

The railway around the eastern and northern perimeter of the CMAT area will drain via an oversized swale, which will discharge to the ordinary unnamed water course (to the east of the UKPN substation) at Q1 Greenfield run-off levels.

6.4.4. RoRo Berth and Pontoon

The RoRo berth and floating pontoon is not proposed to have a formal drainage system, and any rainwater falling on the floating berth will discharge directly into the River Thames. Any pollution will be controlled by deploying local spill kits.

6.5. Strategy for Water Quality and Pollution Control

Due to the proposed land uses of the port area, there is potential for the surface water to be contaminated with both hydrocarbons and suspended solids. These contaminants could have a detrimental effect on receiving watercourses and therefore treatment is proposed prior to discharge.

For the RoRo Terminal, some treatment will occur in the existing ditches which are being retained and enlarged to the north and west of the pavement. The vast majority of the pavement will however drain through a piped and culvert system, prior to be discharged into the River Thames. It is proposed to split the entire RoRo catchment into zones, with each zone having a petrol interceptor (sized in accordance with BS EN 858[21]), and a shut-off valve, to aid the containment of any accidental spillages. The zones have been proposed to minimise the extent of catchment area drained to each petrol interceptor, and to allow standard unit sizes to be provided. The railway within the RoRo terminal will also be drained into these controlled zones.

It is proposed that water quality enhancements will be provided by Petrol Interceptors, which will catch silt up to 250μm, and come in a larger range of sizes. These will be fitted with oil and silt alarms. For areas that drain to the existing enlarged ditches to the North and West of the RoRo pavement, some further treatment will also be provided within the vegetation within the ditches. The existing ditches also drain the existing roadway to the north (which is being retained) and will provide some further treatment within the vegetation.

The RoRo Terminal catchment is too large to provide further viable water quality improvements using natural pollution control measures, such as swales. Any ponds or basins would also be significant in size and take up a substantial amount of critical terminal space (see the SuDS matrix in Section 6.3). Hydrodynamic and vortex separator were also investigated, which remove silt in the range of 63 to 250μm, and further enhance water quality. However even the largest unit available (the 'Downstream Defender' from Hydro International), would result in over 30 units being required for the RoRo pavement, and more sub-zones created. It is considered impractical to divide the RoRo pavement into so many zones and there are no other practical means of removing small diameter silt for such a large catchment (such as by using porous paving, which is not suitable for the port loading and heavy usage), to provide further marginal water quality improvements.

Any hazardous material containers will be identified and will be inspected on a regular basis to identify any leaks / spills as soon as possible; if any leaks are found then a bunded trailer (or similar device) will be immediately be deployed to contain any spillages. The shut-off valves within the zoned drainage areas also act as further protection to potentially contain any spillages, and to allow liquids to be removed and treated as required. This is to ensure that any leaks / spills cannot enter the ground / groundwater underlying the Site and will not be directly discharged to surface water.

A cement silo is located towards the south of the RoRo area, where cement will be pumped directly from ships, and stored. This will then be loaded onto trucks, which will transport the cement away. A small area where the trucks are loaded will have a concrete apron, which is proposed to discharge to the foul drainage system and will be treated as trade effluent. A permit will be obtained for this, and the discharge will be agreed through the operation of Anglian Water's protective provisions.

The Ancillary buildings will consist of green-roofs, and car parking and general storage areas will be served by porous paving, which will both enhance water quality. The fuelling facility will have a Full Retention Interceptor to capture any oil spillages.

The site roadways within the terminal area (outside the RoRo pavement) are proposed to discharge to swales, which will be designed for Water Quality improvements, in line with DMRB[18] or CIRIA C753[14]

[21] **British Standards Institute:** *Separator systems for light liquids, BS EN 858:2002 (2002)*

The CMAT designer will design a drainage system to control any siltation, pollution and enhance Water Quality. This will be undertaken in the future as is expected to consist of a series of a granular paved surface, cut-off drainage ditches and a series of ponds as required), in accordance with the Operational Management Plan. The perimeter railway will be drained by swales, which will enhance water quality.

For the RoRo Berth and Pontoon, any pollution will be controlled by deploying spill kits, which will be stored locally. No fuelling or maintenance within PoTLL's control will be undertaken on the ships that dock at the Jetty.

6.6. Management of Exceedance Flows

The conceptual drainage system has been hydraulically modelled using the Microdrainage Windes Software, to demonstrate that there is no risk to adjacent properties in an extreme 1 in 100 year (plus climate change) rainfall event. A field located to the east of Fort road will experience a minor increase in flood depth (up to 140mm) as indicated in the FRA. The FRA states that the potential increase in flood depth to this field is not considered significant given that the very localised nature of the increase could mean it is the result of model inaccuracies. Mitigation measures are not considered necessary for any off site areas.

During a 1 in 100 year storm event (both plus climate change), there will be some flooding within the RoRo area, but this will be limited to avoid significantly disrupting the operation of the port. This will not be able to flow to the Anglian Water Tilbury Recycling Centre as the levels along the western perimeter (approximately +3m AOD) are higher than the RoRo pavement. Flooding levels with the RoRo area will be limited to approximately 250mm and 1.2m to the swales. Porous paving areas are proposed to be designed for a 1 in 100 year event (plus Climate Change), however if no offsite flooding occurs, this may be relaxed pursuant to the DCO.

The magnitude of flooding during an extreme event is indicated on drawings 5153187-ATK-ZZ-XX-DR-UT01050 and UT01051, in Appendix E. For the RoRo pavement, this is based on the design scenario highlighted in Section 6.3.1, with an outfall level to the River Thames of -0.866 mAOD. Any variation to the design to account for settlement pursuant to the DCO will limit flooding to a similar extent, to avoid significant disrupting the operation of the port and flowing into off-site areas.

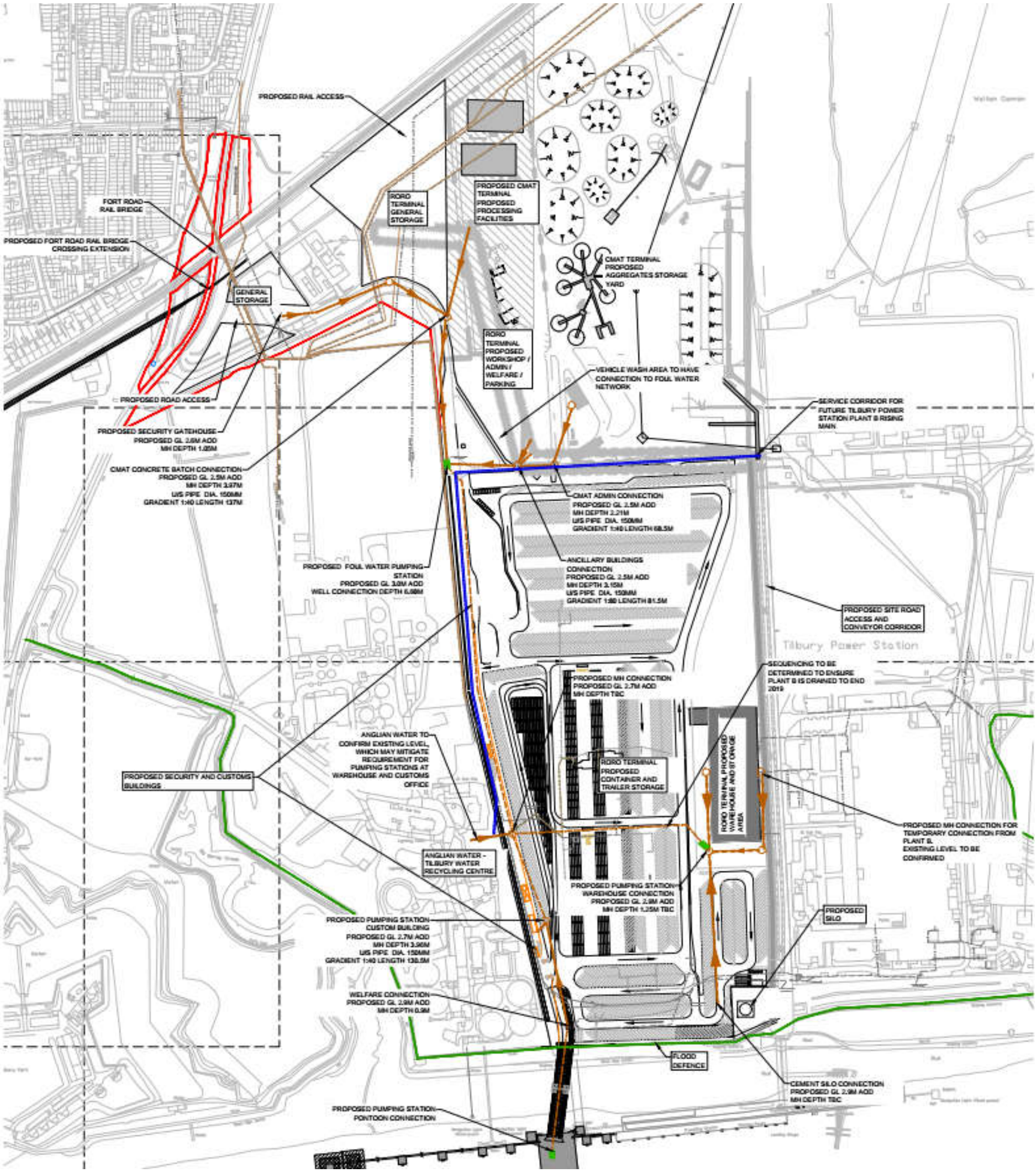
6.7. Foul Water Strategy

It is proposed that foul water will be pumped directly from the site to the Anglian Water TWRC as per the existing regime. A new foul water sewer system will be constructed to carry flow under gravity from the individual facilities to a new pumping station located adjacent to the staff welfare facilities and office, where it will be discharged to the Anglian Water TWRC.

Foul drainage systems from other buildings (such as the Warehouse), will either discharge by gravity to outfall to the Anglian Water TWRC, or will require intermediate lifting or pumping stations to avoid excessive depths. This will depend on the depth at the discharge point to the Anglian Water TWRC, which is currently unknown. This will be discussed further with AW pursuant to their protective provisions within the DCO.

The foul water strategy is indicated in Figure 6-4 and drawings 5153187-ATK-ZZ-XX-DR-UT01053 and UT01054 (Appendix G).

Figure 6-4 Foul Drainage Strategy



It is assumed that the proposed Tilbury 2 port will have the following employees:

- 100 staff working 24 hours per day in 3 No. 8 hour shifts for RoRo Terminal
- Warehouse 18 staff during day (06:00 to 18:00) and 4 staff overnight (18:00 to 06:00)
- UK Border Forces (UKBF) 6 staff (24 hours per day).
- 8 staff for RoRo booking in gate/security (24 hours per day).
- CMAT 30 staff 24 hour working.
- Proposed port will have no passenger facilities (i.e. restaurants, waiting rooms etc.)

This results in 166 total staff averaged over a 24 hour day.

There is also a legal agreement in place with the adjacent RWE Tilbury 'Plant B' power station to discharge foul flows to the Tilbury 2 site, during the temporary demolition stage of their power station (up to 2019). It has been estimated that this will consist of a work force of 40 persons.

The estimated foul flow rate is based on 90l/p/d (full time day staff) per staff member, in accordance with the loads and flows manual. Note that wastewater from docking ships will be collected by tanker and disposed of off-site, therefore these wastewater flows have been excluded from this drainage strategy. The estimated foul flows are summarised in Table 6-5.

Table 6-4 Estimated Foul Flows for Proposed New Port Terminal

Flow Description	Flow Rate (l/s)
Average Dry Weather Flow (DWF) (90 l/p/d x (166 + 40 persons))	0.208
Peak Foul Flow (6 x DWF + 10% infiltration)	1.416

As shown by the foul water flow estimates in Table 6-4, there is an anticipated decrease in foul flow because of the Tilbury 2 development due to a reduction in FTE employees working on the site.

Anglian Water has advised that there is sufficient capacity in their treatment works, via the pre-development application process.

The adjacent Tilbury Plant 'B' will secure their own agreement with Anglian Water, after the demolition is complete. A dedicated utility corridor route will be provided through the Tilbury 2 site to the Anglian Water TWRC.

The Cement Silo and Vehicle Wash flows are also proposed to discharge to the foul drainage system. This will be treated as trade effluent.

6.8. Maintenance

Drainage systems will be designed in accordance with BS EN 752[22] and CIRIA C753[14] and will regularly maintained in accordance with the guidance provided in this statement. For the SuDS system, this is illustrated in the SuDS Matrix contained in Appendix B. A full maintenance regime will be documented in the form of an Operation and Maintenance guide, at the detailed design stage.

[22] **British Standard** EN 752:2008 Drain and sewer systems outside buildings

7. Surface Access Road / Rail Link Drainage Strategy

7.1. Details of Development

The part of the development consists of a road from Ferry Road (A1089) to Fort Road, into the new port development. It also consists of a rail spur and sidings from the LTSR railway.

7.2. Runoff Calculations

Runoff rates for the road and rail corridors are summarised in Table 7-1 below (based on the same criteria as the New Port Terminal).

Table 7-1 Proposed Surface Access Greenfield Runoff Rates

Description	Area (ha)	Greenfield Runoff Rate [Q1] (l/s)	Notes
Proposed Road	3.46	6.97	-
Proposed Rail Corridor	2.24	5.63	-

7.3. Sustainable Drainage Systems

As per the surface water strategy for the proposed new port terminal, surface water runoff will be managed using SuDS devices, wherever possible. A review of suitable SuDS options has been undertaken for the surface access road/rail link; the results are shown in Appendix D and are summarised in Table 7-2 below. Each of these systems has been considered as to whether they are appropriate for inclusion within this element of the development.

The drainage system will be designed to DMRB standards.

The general description and notes on the benefits of each SuDS systems have not been included in Table 7-2, and are as per Table 6-3 for the Proposed New Port Terminal.

Table 7-2 Surface Access Road / Rail Link SuDS Options

SuDS Technique	Is SuDS Technique Suitable?	Notes
Ponds	Yes	Ponds would be a suitable method of attenuation as part of a SuDS 'Treatment Train' for attenuating and treating surface water runoff from the proposed road where attenuation is required. Sufficient space would be required to locate such features.
Attenuation Storage Tanks	No	Can be readily integrated adjacent to roads. Tanks are more difficult to maintain than open drainage features, such as ponds or swales, and do not provide any increased amenity or biodiversity, therefore open features such as ponds would be preferred to be used wherever practicable. Attenuation Storage Tanks are therefore no proposed.
Wetlands and Bio-retention Systems	Yes	Bio-retention systems have been shown to be effective in improving water quality and therefore could be utilised as part of a "treatment train" to improve water quality prior to discharge to the existing watercourses. As infiltration is currently not being considered, bio-retention is being considered for surface water attenuation and treatment only. Sufficient space would be required to locate such features.
Filter drains	Yes	Could be used throughout project to provide drainage to access roads, and also to the proposed rail sidings and spur (which is standard practice). Filter drains are however prone to siltation and considered undesirable compared to other SuDS systems.
Swales & ditches	Yes	Swales could be used to provide drainage to the new road. As infiltration is not currently considered as a viable option, the swales would be for conveyance and attenuation of surface water only. Swales also provide substantial benefits in improving the water quality of run-off, if designed appropriately. Swales could also be oversized to provide attenuation storage in lieu of ponds or wetlands.
Green roofs	No	No buildings proposed under the surface access/rail link
Rainwater harvesting and re-use	No	No buildings proposed under the surface access/rail link Highways are not considered appropriate sources of water for re-use (due to the pollution risks)
Pervious pavements	No	Pervious pavements have been successfully implemented for car parks and public spaces. However, these are not commonly used for heavily trafficked/loaded areas or road schemes and it is unlikely that the Local Authority would adopt these.
Trees	No	No trees are proposed along the surface access/rail link, in suitable locations to provide tree pit drainage.
Soakaway, infiltration basins and trenches	No	Soakaway solutions are currently not considered viable for the project, due to poor infiltration characteristics, contamination and high groundwater levels. Further investigations may be undertaken as the design progresses.
Detention basin	Yes	Detention Basins would be a suitable method of attenuation as part of a SuDS 'Treatment Train' for attenuating and treating surface water runoff from the proposed road where attenuation is required. Sufficient space would be required to locate such features.
Proprietary Treatment Systems	No	Proprietary systems could be implemented to improve water quality from small localised areas including roofs. They would however need to meet the adopting authority's approval and it would be preferable to provide natural systems.

7.4. Drainage Strategy

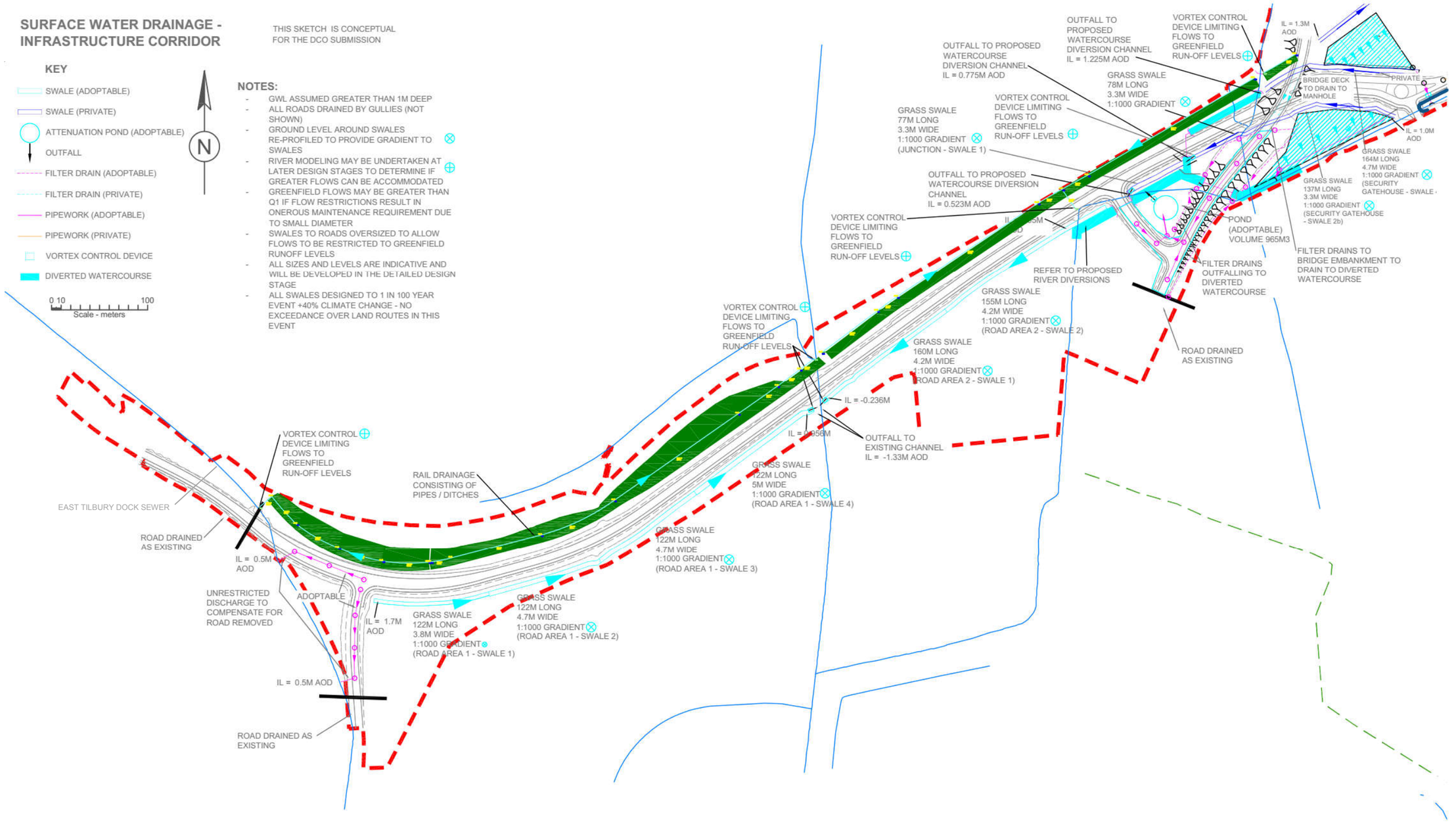
7.4.1. Proposed Road Link

A number of different options were considered to drain the roadway, which are summarised below and provide a background to the preferred solution adopted:

- Over-edge drainage discharging to a ditch located to the base of the road embankment, prior to discharging at Q1 greenfield run-off levels
  - The only viable space to provide a swale is to the south of the road, due to the rail track being located to the north. As there is a foot/cycle way to the south of the roadway, it is not possible to provide 'over the edge' drainage or drain the north extremity of the roadway southwards. It would also not be beneficial to locate this foot/cycle way to the north, as users would need to cross the carriageway. Over-edge drainage is therefore not deemed possible.
- Gully drainage with traditional pipework system and attenuation by a pond, prior to discharging at Q1 greenfield run-off levels
  - This has been ruled out as pipework does not provide water quality/biodiversity benefits and it would be more beneficial to utilise swales
- Gully drainage discharging to swales and attenuated by a pond, prior to discharging at Q1 greenfield run-off levels
  - The pond would require a significant footprint; therefore, it is considered more beneficial to oversize the swales to provide any attenuation storage

The proposed drainage strategy for the new road is shown in Figure 7-1 and on drawing 5153187-ATK-ZZ-XX-DR-UT01052 (included in Appendix E).

Figure 7-1 Surface Access Road / Rail Link - Drainage Strategy



The proposed solution is therefore to provide gullies along the kerbed roadway, discharging via pipework to swales to the south of the road. This will be designed in accordance with DMRB water quality enhancement criteria and to contain water in a 1 in 100 year event (plus Climate Change), prior to discharging to existing main rivers and ordinary watercourses at Q1 Greenfield run-off levels. The swales will be oversized to limit flows to greenfield levels, except the Fort Road Bridge and adjacent link road, which will discharge via an attenuation pond (designed to DMRB standards). Maintenance issues regarding restricting flows requiring small diameter pipework (<75mm diameter) will be addressed and agreed with the Environment Agency / Thurrock Council in the detailed design pursuant to the DCO. Some flows from small catchments may need to be increased.

It is assumed that the swales will be above the groundwater level, which has been measured as approximately 1.2m to 2.5m below ground level (based on preliminary investigations), and that the swales will be unlined (unless there is a potential to mobilise contamination or if the groundwater level is found to be higher). This is pending further investigations pursuant to the DCO, however this does not alter the effectiveness of the strategy.

A small proportion of the western end of the proposed infrastructure corridor will drain to the East Tilbury Dock Sewer (to the west of the site). It is proposed to discharge unrestricted flows to this sewer, as a portion of the existing Ferry Road will be removed and the overall catchment drained to this sewer will not be increased.

The amount of attenuation that is estimated to be required is illustrated in Table 7-3 below.

Table 7-3 Estimated Attenuation Required for Surface Access Road Link

Description	Area (ha)	Greenfield Runoff Rate [Q1] (l/s)	Estimated Storage Required (m^3)
Proposed Road Link	3.46	6.97	4518*

* - provided by oversized swales and a pond (pond volume approx. 965m^3)

Hydraulic calculations for this system are provided in Appendix F.

7.4.2. Proposed Rail Link

The rail spur will be privately owned by the Port of Tilbury, and is proposed to be drained using traditional railways drainage systems, such as filter drains or ditches/swales, in accordance with Network Rail Standards. Attenuation will be required to limit flows to Q1 greenfield run-off levels, and these will be provided through oversized pipes and ditches, as there is insufficient land available for attenuation tanks or ponds. The estimated attenuation volume is shown below in Table 7-4.

Table 7-4 Estimated Attenuation Required for the Rail Link

Description	Area (ha)	Greenfield Runoff Rate [Q1] (l/s)	Estimated Storage Required (m^3)
Proposed Rail Link	2.24	5.63	2849*

* - provided within pipework/swales

Where the proposed rail link utilises the existing rail corridor (to the west), it is assumed that there is adequate drainage and therefore no further drainage is proposed. The existing track drainage will be surveyed as part of the detailed design phase and remedial works such as jetting carried out where required.

Where the proposed rail spurs extend into the RoRo pavement area, it is proposed that the rail corridor is drained using conventional filter drains. As both the rail and the port area will be privately owned by the Port of Tilbury, the rail drainage will discharge to the port's surface water drainage system as described above.

Although the rail link is currently proposed to be positively drained, further investigations of the ground conditions will be undertaken in later design stages and controlled through the DCO, to determine whether it is possible that the drainage could be omitted.

Hydraulic calculations for this system are provided in Appendix F.

7.5. Strategy for Water Quality/Pollution Control

The proposed drainage for the road link will comprise of a SuDS based solution of oversized swales on the south side of the road.

The swales will be designed in accordance with DMRB[23], to improve water quality through filtration, adsorption, sedimentation and biological treatment of contaminants. In accordance with DMRB, depths of flows within the swales will be within the grass (100-200mm) in a 1 in 1 year storm (plus Climate Change) and the time of flow during a 1 in 10 year 24 hour storm will be more than 10 minutes. Hydraulic calculations demonstrating compliance with these standards are highlighted in Appendix F.

It is believed that an oil interceptor will not be required due to the swales providing the treatment highlighted above. No further pollution control measures are proposed. The Fort Road bridge will discharge via an attenuation pond designed to DMRB standards[18]. The pond location is indicated in Figure 7-1.

The rail drainage will be drained using filter drains or ditches/swales. Percolation through the ballast provides interception of contaminants, and catchpits within any filter drainage system or treatment within ditches/swales will provide additional protection. This is in line with common industry practice and Network Rail standards.

7.6. Management of Exceedance Flows

The swales draining the road and rail link have been designed to contain a 1 in 100 year (plus Climate Change) rainfall event.

7.7. Foul Water Drainage Strategy

There are no buildings or foul drainage requirement for the Road/Rail link.

The road and rail spur cross some existing Anglian Water foul water drainage infrastructure, which will require diversion/protection as part of the works. This has been discussed with Anglian Water and will be agreed through the Anglian Water protective provisions.

7.8. Maintenance

Drainage systems will be designed in accordance with DMRB[23] and Network Rail standards[24], and will regularly maintained in accordance with these guidelines.

A full maintenance regime will be documented in the form of an Operation and Maintenance guide, at the detailed design stage.

[23] **Design Manual for Roads and Bridges**: (2016)

[24] NR/L3/CIV/005 – Network Rail Drainage Standard

8. Summary

8.1. Overview

The conceptual drainage system has been designed in accordance with relevant standards and planning legislation, and maximises the usage of SuDS, improves water quality and controls pollution, as much a reasonably practical. It limits flows to Q1 Greenfield run-off levels when discharging to existing watercourses, although further studies may be undertaken in future design stages, to determine if a greater flow could be discharged without affecting flood risk. Maintenance issues from restricting flows using small diameter pipework will also be addressed and agreed with the Environment Agency / Thurrock Council, and some flows may need to be increased from small catchments. All discharges to the River Thames where flows are proposed to be unattenuated.

The conceptual drainage system has been hydraulically modelled, to demonstrate that there is no risk to adjacent properties in an extreme 1 in 100 year (plus climate change) rainfall event. During both a 1 in 30 and 1 in 100 year storm event (plus climate change), there will be some flooding within the RoRo port area, which is within acceptable depths, to avoid significant disruption to the operation of the port.

Drainage systems will be designed in accordance with relevant design standards, and will regularly maintained in accordance with these guidelines. A full maintenance regime will be documented at the detailed design stage.

A summary of the proposed drainage scheme is highlighted below.

8.2. Proposed New Port Terminal

Surface water drainage from the majority of the RoRo pavement (including the railway) is proposed to be drained through high capacity channel drains to keep the drainage system as shallow as possible. These will discharge to a pipe and culvert system, which connect together in the south of the site, and discharge by gravity to The River Thames during low tides, and be attenuated (and possibly pumped during high tide events. This will be dependent on the final solution to mitigate against any potential settlement. The outfall will have two flap valves and a penstock (manual or automated), in line with Environment Agency requirements. The drainage system has been conceptually designed with mean spring high and neap water tides coinciding with a 1 in 100yr rainfall event (plus Climate Change). The western extremity of the site will discharge to an existing ditch, which will be enlarged in size, and connect into the culvert system. The hardstanding where trucks are loaded from the cement silo (in the south-east corner of the site), will discharge to the foul drainage system, and will be treated as trade effluent.

The remainder of RoRo pavement will discharge via high capacity channel drains and flow northwards into existing enlarged ditches to west and northern perimeters of the pavement. This is to keep the drainage system flowing southwards as shallow as possible, and for the culverts not to extend to the northern extremity of the site. Attenuation will be provided in the existing ditches to limit flows to Q1 greenfield run-off rates, prior to discharging to the existing ditch privately owned by the Port, to the north. This ultimately discharges into the ordinary watercourse drainage system, that flows to the Worlds End pumping station. The existing ditches will be unlined unless there is a risk of any contamination in the ground being mobilised, or if there are high groundwater levels.

The entire RoRo pavement will be zoned with a petrol interceptor and shut valve, to each zone. This is to control pollution and enhance water quality (by capturing silt up to 250μm). The catchment is considered too large to provide any further water quality improvements using natural pollution control measures or hydrodynamic / vortex separators. Pervious paving and the usage of ponds/basin are also not feasible within the RoRo area.

Any hazardous material containers will be identified and will be inspected on a regular basis to identify any leaks / spills as soon as possible; if any leaks are found then a bunded trailer (or similar device) will be immediately be deployed to contain any spillages. The shut-off valves within the zoned drainage areas also act as further protection to potentially contain any spillages, to ensure that any leaks / spills cannot enter the

ground / groundwater underlying the Site and will not be directly discharged to surface water. This is subject to the controls of any hazardous substance consent secured at detailed design.

The Ancillary Buildings area will be pre-fitted with green roofs, to enhance the water quality of the run-off. Car parking areas will consist of a pervious paving system, to enhance water quality and provide attenuation. The refuelling area will consist of concrete hardstanding and will be drained using a traditional piped drainage system, which will pass through a Full Retention Oil Interceptor. These areas will discharge at Q1 Greenfield run-off levels to the existing ditch (which is privately owned by the Port) to the west, and attenuation will be provided in pervious paving system, and the form of cellular storage units, if required.

The General Storage Areas are proposed to be drained with Porous Pavements and the Security Gatehouse, using swales. The remainder of the roadway linking the Security Gatehouse to the RoRo pavement, will be drained using traditional pipes and gullies. These areas will also discharge at Q1 Greenfield run-off levels to the existing ditch (which is privately owned). Porous Pavements are proposed to be lined, unless ground conditions permit the usage of infiltration and this will not mobilise contamination. Water quality improvements will be provided in the above SuDS systems, as well as by the existing ditch, which will enhance water being drained from the roadway.

The above existing ditch could also be potentially blocked off with a weir, to provide some attenuation to the northern area of the site. This would be in lieu of some of the storage highlighted above, and will be investigated further in future design stages.

The CMAT area drainage design will be undertaken by the operator in the future, Run-off is expected to be intercepted by perimeter ditches, before discharging via a series of ponds, to provide both attenuation, control any siltation and to provide water quantity improvements. If a porous pavement was introduced in the CMAT area, an infiltration drainage solution could potentially be supplied if ground conditions permit. The paved area consisting of offices, will also discharge to ponds mentioned above. Flows will be discharged at Q1 greenfield run-off rates and discharge to the existing ditch to the west of the site area. The railway around the eastern and northern perimeter of the CMAT area will drain via an oversized swale, and also discharge to the ordinary unnamed water course at Q1 Greenfield run-off rates.

The RoRo berth and floating pontoon is not proposed to have a formal drainage system, and any rainwater falling on the floating berth will discharge directly into the River Thames (as per the existing regime for rainwater). Any pollution will be controlled by deploying local spill kits.

Foul water drainage will discharge to the existing Anglian Water TWRC via a new pumping station located next to the Welfare facilities. Remote facilities will either drain via gravity to the Anglian TWRC connection or have local pump/lifting stations, depending on the level at the outfall point to the Anglian Water facilities. Allowance has also been made for draining the adjacent Tilbury Power Plant B during the demolition stage. It is estimated that the foul sewerage flows will be lower than existing and Anglian Water have confirmed that there is sufficient capacity within their existing TWRC. A utility corridor will be provided to allow future flows from the adjacent Tilbury Power Plant B to discharge to the Anglian Water TWRC.

8.3. Surface Access Road and Rail Link

The proposed solution is to provide gullies along the kerbed roadway, discharging via pipework to oversized swales to the south of the road. An attenuation pond will be provided to the Fort Road bridge. These will be designed in accordance with DMRB water quality enhancement criteria and to contain water in a 1 in 100 year event (plus Climate Change), prior to discharging to existing main rivers and ordinary watercourses at Q1 Greenfield run-off levels.

The rail spur will be privately owned by the Port of Tilbury, and is proposed to be drained using traditional railways drainage systems, such as filter drains or ditches/swales. Discharges will be limited to Q1 greenfield run-off levels by oversizing the pipes and ditches.

Appendices

Appendix A. Tilbury 2 Development

DO NOT SCALE

N

ASDA ROUNDABOUT

05

02

03

TILBURY

PORT OF TILBURY

01

TILBURY FORT

TILBURY POWER STATION

RIVER THAMES

04

Millimetres 0 10 100

NOTES:

1. THIS PLAN SHOULD BE READ ALONGSIDE OTHER PLANS AND DOCUMENTS IN THE DEVELOPMENT CONSENT ORDER APPLICATION

KEY:

ORDER LIMITS

Rev.	Date	Description	By	Chk'd	App'd
P8	13/09/17	PINS REVIEW	JS	SR	SR
P7	07/07/17	UPDATES TO ORDER LIMITS BOUNDARY	JS	SR	SR
P6	12/06/17	UPDATES TO ORDER LIMITS BOUNDARY	JS	SR	SR
P5	16/05/17	FOR CONSULTATION	JS	SR	SR
P4	23/03/17	SCOPING REPORT	JS	SR	SR
P3	07/03/17	UPDATES TO ORDER LIMITS BOUNDARY	JS	SR	SR
P2	23/02/17	SCOPING REPORT	JS	SR	SR
P1	16/02/17	DRAFT FOR COMMENT	JS	SR	

Drawing Status: DCO SUBMISSION

Suitability: S0

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Client: PORT OF TILBURY LONDON

Project Title: TILBURY2

Drawing Title: GENERAL ARRANGEMENT PLANS
KEY PLAN
REGULATION 5(2)(o)

Scale	Designed	Drawn	Checked	Authorised
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Original Size	Date	Date	Date	Date
A1	16/02/17	16/02/17	16/02/17	16/02/17

Drawing Number: 5153187-ATK-ZZ-ZZ-SK-ZZ-0001

Revision: P08

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Millimetres 100 10 0

DO NOT SCALE

N

PROPOSED INFRASTRUCTURE CORRIDOR HIGHWAY

PROPOSED INFRASTRUCTURE CORRIDOR RAIL

NETWORK RAIL OPERATIONAL FENCING

PROPOSED TOUCAN CROSSING

EXISTING LONDON TO TILBURY RAILWAY

PROPOSED SECURITY FENCE

EXISTING RIVERSIDE RAIL SIDING TO BE CLOSED

FOR CONTINUATION SEE SHEET 2

NOTES:

1. THIS PLAN SHOULD BE READ ALONGSIDE OTHER PLANS AND DOCUMENTS IN THE DEVELOPMENT CONSENT ORDER APPLICATION.
2. DESIGN AND LOCATION OF EACH ELEMENT OF THE SCHEME SHOWN HERE FOR ILLUSTRATIVE PURPOSES ONLY.

KEY:

- ORDER LIMITS
- KEY EXISTING WATERCOURSES (SUBJECT TO DIVERSION AND/OR CROSSING)
- EXISTING PUBLIC RIGHT OF WAY
- EXISTING GREEN BELT
- PROPOSED NOISE BARRIER
- PROPOSED OPEN DRAINAGE
- PROPOSED WATERCOURSE CROSSINGS
- PROPOSED LANDSCAPING AND ECOLOGICAL MITIGATION
- PROPOSED SHARED CYCLE AND PEDESTRIAN FACILITY

KEY PLAN

DESIGN SHOWN HERE FOR ILLUSTRATIVE PURPOSES ONLY

Rev.	Date	Description	By	Chk'd	App'd
P8	16/10/17	DRAWING UPDATE	JS	SR	SR
P7	13/09/17	PINS REVIEW	JS	SR	SR
P6	12/06/17	FOR CONSULTATION	JS	SR	SR
P5	16/05/17	UPDATED DCO, ROAD AND ROAD LAYOUT	JS	SR	SR
P4	23/03/17	SCOPING REPORT	JS	SR	SR
P3	07/03/17	ORDER LIMITS BOUNDARY ADDED	JS	SR	SR
P2	23/02/17	SCOPING REPORT	JS	SR	SR
P1	16/02/17	DRAFT FOR COMMENT	JS	SR	

Drawing Status: DCO SUBMISSION

Suitability: S0

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Client: PORT OF TILBURY LONDON

Project Title: TILBURY2

Drawing Title: GENERAL ARRANGEMENT PLANS INFRASTRUCTURE CORRIDOR SHEET 1 OF 5 REGULATION 5(2)(o)

Scale	Designed	Drawn	Checked	Authorised
1:2,000	SR	JS	SR	SR
Original Size: A1	Date: 16/02/17	Date: 16/02/17	Date: 16/02/17	Date: 16/02/17

Drawing Number: 5153187-ATK-ZZ-XX-SK-ZZ-1001

Revision: P08

Scale 1:2000 (50m 0m 50m 100m)

USER: S0R3N46 Date: 21/10/17 09:50:54 File name: P:\GBEMO\WGE\Projects\Tilbury2\5153187-ATK\ZZ\XX\SK\ZZ-1001 P8.dwg

DO NOT SCALE

Millimetres 0 10 100

N

NETWORK RAIL OPERATIONAL FENCING

PROPOSED CMAT PROCESSING FACILITIES

PROPOSED GENERAL STORAGE

PROPOSED GENERAL STORAGE

PROPOSED GENERAL STORAGE

PROPOSED CMAT PROCESSING AREA

EXISTING PYLON

EXISTING OVERHEAD POWER CABLES

PROPOSED RAIL ACCESS ROAD

PROPOSED RAIL LINE

PROPOSED RAIL SIDINGS

EXISTING PYLON

PROPOSED RADIAL CONVEYOR

PROPOSED CMAT AGGREGATES STORAGE YARD

PROPOSED RORO TERMINAL WORKSHOP / ADMIN / WELFARE / PARKING

EXISTING OVERHEAD POWER CABLES

PROPOSED CONVEYOR

FOR CONTINUATION SEE SHEET 1

FOR CONTINUATION SEE SHEET 3

Scale 1:1500

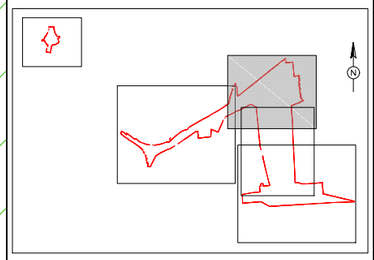
50m 0m 50m 100m

NOTES:

1. THIS PLAN SHOULD BE READ ALONGSIDE OTHER PLANS AND DOCUMENTS IN THE DEVELOPMENT CONSENT ORDER APPLICATION.
2. DESIGN AND LOCATION OF EACH ELEMENT OF THE SCHEME SHOWN HERE FOR ILLUSTRATIVE PURPOSES ONLY.

KEY:

- ORDER LIMITS
- KEY EXISTING WATERCOURSES (SUBJECT TO DIVERSION AND CROSSING)
- EXISTING GREEN BELT
- PROPOSED NOISE BARRIER
- PROPOSED OPEN DRAINAGE
- PROPOSED RAIL ACCESS ROAD
- PROPOSED INTERNAL ROADS
- PROPOSED LANDSCAPING AND ECOLOGICAL MITIGATION
- PROPOSED SHARED CYCLE AND PEDESTRIAN FACILITY
- PROPOSED STOCKPILE



KEY PLAN

DESIGN SHOWN HERE FOR ILLUSTRATIVE PURPOSES ONLY

Rev.	Date	Description	By	Chk'd	App'd
P3	16/10/17	DRAWING UPDATE	JS	SR	SR
P2	13/09/17	PINS REVIEW	JS	AH	SR
P1	12/06/17	FOR CONSULTATION	JS	AH	SR

Drawing Status: DCO SUBMISSION

Suitability: S0

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Client: PORT OF TILBURY LONDON

Project Title: TILBURY2

Drawing Title: GENERAL ARRANGEMENT PLANS CMAT SHEET 2 OF 5 REGULATION 5(2)(o)

Scale	Designed	Drawn	Checked	Authorised
1:1500	SR	JS	SR	SR
Original Size: A1	Date: 16/02/17	Date: 16/02/17	Date: 16/02/17	Date: 16/02/17

Drawing Number: 5153187-ATK-Z2-XX-SK-BH-1004

Revision: P03

USER: S0078646 Date: 21/10/17, 09:55:34 Filename: P:\GBBMC\WGE\Projects\Tilbury2\61714 FOTTL RoRo Terminal Design\7 WIP\Drawings\5 1 WIP\TO006 Bulk Materials Design\5153187-ATK-Z2-XX-SK-BH-1004.dwg

DO NOT SCALE

N

EXISTING FOOTPATH

EXISTING TREES ON BOUNDARY RETAINED

PROPOSED OPERATIONS PARKING

PROPOSED BOOKING IN GATES

PROPOSED BOOKING IN QUEUING AREA

EXISTING TREES ON BOUNDARY RETAINED

EXISTING FOOTPATH TO PASS UNDER PROPOSED BRIDGE

EXISTING PYLON

RETENTION OF EXISTING LANDSCAPING

EXISTING FLOOD WALL

RETENTION OF EXISTING LANDSCAPING

PROPOSED SILO AND COMPOUND AREA

PROPOSED WAREHOUSE

PROPOSED CONTAINERS ASSOCIATED WITH WAREHOUSE

PROPOSED RAIL SIDINGS

PROPOSED CONVEYOR

FOR CONTINUATION SEE SHEET 4

FOR CONTINUATION SEE SHEET 2

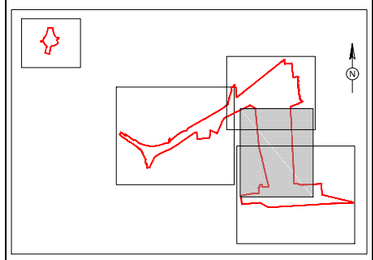
Millimetres 0 10 100

NOTES:

1. THIS PLAN SHOULD BE READ ALONGSIDE OTHER PLANS AND DOCUMENTS IN THE DEVELOPMENT CONSENT ORDER APPLICATION.
2. DESIGN AND LOCATION OF EACH ELEMENT OF THE SCHEME SHOWN HERE FOR ILLUSTRATIVE PURPOSES ONLY.
3. NUMBER AND LOCATION OF TRAILERS AND CONTAINERS SHOWN HERE FOR ILLUSTRATIVE PURPOSES ONLY AND DO NOT INDICATE ANY MINIMUM OR MAXIMUM CAPACITY FOR TILBURY 2.

KEY:

- ORDER LIMITS
- PROPOSED OPEN DRAINAGE
- PROPOSED CULVERTS
- PROPOSED TRAILERS AND CONTAINERS
- PROPOSED INTERNAL ROAD
- PROPOSED WORKSHOPS AND OTHER ANCILLARY BUILDINGS



KEY PLAN

DESIGN SHOWN HERE FOR ILLUSTRATIVE PURPOSES ONLY

Rev.	Date	Description	By	Chk'd	App'd
P2	13/09/17	PINS REVIEW	JS	SR	SR
P1	12/06/17	FOR CONSULTATION	JS	SR	SR

Drawing Status: DCO SUBMISSION

Suitability: S0

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Client: PORT OF TILBURY LONDON

Project Title: TILBURY2

Drawing Title: GENERAL ARRANGEMENT PLANS RoRo CONTAINER AND TRAILER YARD SHEET 3 OF 5 REGULATION 5(2)(o)

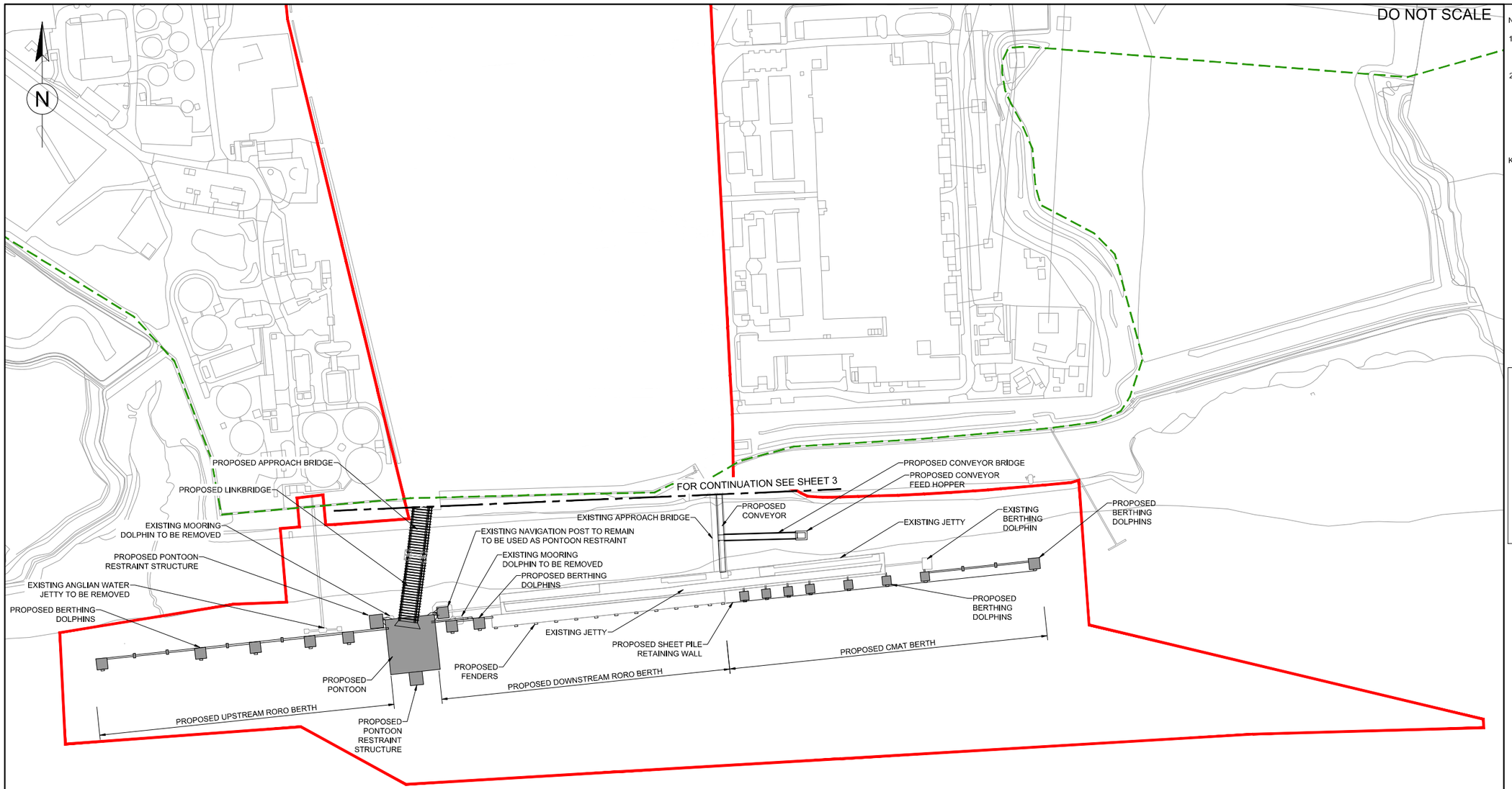
Scale	Designed	Drawn	Checked	Authorised
1:1500	AH	JS	SR	SR
Original Size: A1	Date: 18/05/17	Date: 19/05/17	Date: 25/05/17	Date: 12/06/17

Drawing Number: 5153187-ATK-Z3-XX-SK-RL-1002

Revision: P02

Scale 1:1500
50m 0m 50m 100m

USER: S0078648 Date: 21/10/17 09:53:10 Filename: P:\GBEMO\WGE\Projects\Tilbury2\61714 FOTTL RoRo Terminal Design\7 WIP\Drawings\5 1 WIP\TO005 RoRo Terminal Design\5153187-ATK-Z3-XX-SK-RL-1002.dwg

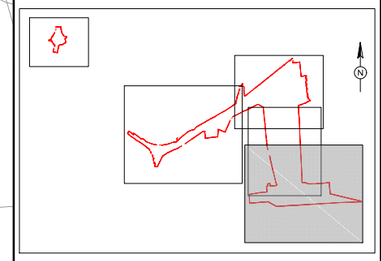


NOTES:

1. THIS PLAN SHOULD BE READ ALONGSIDE OTHER PLANS AND DOCUMENTS IN THE DEVELOPMENT CONSENT ORDER APPLICATION.
2. DESIGN AND LOCATION OF EACH ELEMENT OF THE SCHEME SHOWN HERE FOR ILLUSTRATIVE PURPOSES ONLY.

KEY:

- ORDER LIMITS
- EXISTING PUBLIC RIGHT OF WAY



KEY PLAN

DESIGN SHOWN HERE FOR ILLUSTRATIVE PURPOSES ONLY

Rev.	Date	Description	By	Chk'd	App'd
P2	13/09/17	PINS REVIEW	JS	AH	SR
P1	12/06/17	FOR CONSULTATION	JS	AH	SR

Drawing Status: DCO SUBMISSION
Suitability: S0

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Client: PORT OF TILBURY LONDON

Project Title: TILBURY2

Drawing Title: GENERAL ARRANGEMENT PLANS RoRo AND CMAT BERTH SHEET 4 OF 5 REGULATION 5(2)(o)

Scale	Designed	Drawn	Checked	Authorised
1:2000	AH	PV	AH	SR
Original Size: A1	Date: 15/05/2017	Date: 15/05/2017	Date: 25/05/2017	Date: 26/05/2017

Drawing Number: 5153187-ATK-Z4-XX-SK-RW-1003
Revision: P02

Scale 1:2000
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Appendix E. Surface Water Drainage Drawings

DO NOT SCALE

Millimetres 0 10 100

FLOW CONTROL TO RESTRICT OUTFALL TO GREENFIELD RUNOFF RATES. STORAGE PROVIDED IN POROUS PAVING SUB-BASE (OR ADDITIONAL ATTENUATION TANK PROVIDED).

FILTER DRAINS OUTFALLING TO PROPOSED POND

FILTER DRAINS TO BRIDGE EMBANKMENT TO DRAIN TO DIVERTED WATERCOURSE

ROAD DRAINED AS EXISTING

PAVING SUB-BASE (OR ADDITIONAL ATTENUATION TANK PROVIDED).

FULL RETENTION SEPARATOR

VORTEX CONTROL DEVICE LIMITING FLOWS TO GREENFIELD RUN-OFF LEVELS

POLLUTION CONTROL VALVE

RESHAPE EXISTING DITCH
7.6M WIDE
0.8M DEEP
1 IN 1 SIDE SLOPES
MAINTAIN EXISTING LENGTH AND GRADIENT

1 IN 100 YEAR + 40% CLIMATE CHANGE EVENT EXTENT OF SURFACE PONDING
MAX LEVEL 2.7M AOD
MAX VOLUME 1650M3

CULVERT 1:1000 GRADIENT

OUTFALLS NORTH

OUTFALLS SOUTH

1 IN 100 YEAR + 40% CLIMATE CHANGE EVENT EXTENT OF SURFACE PONDING
MAX LEVEL 2.8M AOD
MAX VOLUME 715M3

MAINTAIN EXISTING DITCH TO DRAIN PROPOSED ROAD
4.5M WIDE
0.6M DEEP
1 IN 2 SIDE SLOPES
MAINTAIN EXISTING LENGTH AND REPROFILE GRADIENT TO NEW OUTFALL

CULVERT 1:1000 GRADIENT

CULVERTS TO BE LAID AT THE SHALLOWEST GRADIENT POSSIBLE TO MAXIMISE GRAVITY DISCHRGES AT LOW TIDES (SETTLEMENT TO BE CONSIDERED).

CULVERT 1:1000 GRADIENT

CULVERT 1:1000 GRADIENT

PUMP STATION (IF REQUIRED)

OVERFLOW TO TANK DURING HIGH TIDE
IL = -0.866M AOD

PUMPED DISCHARGE TO RIVER THAMES (IF REQUIRED)

GRAVITY DISCHARGE TO RIVER THAMES VIA EXISTING OUTFALL OR NEW OUTFALL TO BE PROVIDED. TBC

NO FORMAL DRAINAGE TO PONTOON
- SPILL KITS TO BE IMPLEMENTED TO CONTROL POLLUTION

RESHAPE EXISTING DITCH
8.4M WIDE
1.2M DEEP
1 IN 1 SIDE SLOPES
MAINTAIN EXISTING LENGTH AND GRADIENT

OUTFALLS NORTH

OUTFALLS SOUTH

FILTER DRAINS TO RAILWAY

TYPICAL SLOT DRAIN SECTION (SIZE TBC)

Tilbury Power Station

CULVERT 1:1000 GRADIENT

ROOF DRAINAGE

FULL RETENTION SEPARATOR

ATTENUATION TANK MINIMUM 16M FROM FLOOD DEFENCE

CULVERT 1:1000 GRADIENT

River Thames
Gravesend Reach

1091 1031 600

TYPICAL SLOT CHANNEL
(NOT TO SCALE)

THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH DRAINAGE STRATEGY REFERENCE: 5153187-ATK-ZZ-ZZ-RP-D-0001 AND IS CONCEPTUAL ONLY FOR THE DCO SUBMISSION

KEY CONTINUED:

- PIPEWORK
- VORTEX CONTROL DEVICE
- ATTENUATION POND
- CATCHMENT BOUNDARY
- EXISTING DITCH
- GREEN ROOFS
- FLOWS REDUCED TO GREENFIELD
- GROUND RE-PROFILED
- RIVER DIVERSION
- RAILWAY DRAINAGE
- EXCEEDANCE

N

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:

CONSTRUCTION

Unknown buried services – refer to service plans and use cable avoidance tools before digging. Asbestos pipes – exercise extreme caution in their vicinity. Ground contamination exists.

MAINTENANCE/CLEANING

Multiple buried services including asbestos pipes. Consult services plans and host utility companies and use cable avoidance tools before digging.

DECOMMISSIONING/DEMOLITION

Multiple buried services including asbestos pipes. Consult services plans and host utility companies and use cable avoidance tools before digging. Ground contamination exists.

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement

NOTES:

- RIVER MODELING MAY BE UNDERTAKEN AT LATER DESIGN STAGES TO DETERMINE IF GREATER FLOWS CAN BE ACCOMMODATED
- GREENFIELD FLOWS MAY BE GREATER THAN Q1 IF FLOW RESTRICTIONS RESULT IN ONEROUS MAINTENANCE REQUIREMENT DUE TO SMALL DIAMETER PIPEWORK
- ROADS TO BE DRAINED BY GULLIES (NOT SHOWN)
- SWALES TO ROADS OVERSIZED TO ALLOW FLOWS TO BE RESTRICTED TO GREENFIELD RUNOFF LEVELS
- ALL ATTENUATION SIZES, PIPE / CULVERT / PIPE SIZES + LEVELS ARE INDICATIVE AND WILL BE DEVELOPED IN THE DETAIL DESIGN STAGE PURSUANT TO THE DCO

KEY:

- SLOT CHANNEL DRAIN OR CONCRETE OPEN DISH CHANNEL
- SWALE (ADOPTABLE)
- SWALE (PRIVATE)
- CULVERT
- ATTENUATION TANK
- OUTFALL
- PETROL INTERCEPTOR
- PUMP STATION
- MANHOLE + @ CULVERTS
- POROUS PAVING
- SHUT OFF VALVE
- FILTER DRAIN
- BRIDGE DRAIN

50m 0m 50m 100m
Scale 1:2000

Rev.	Date	Description	By	Chk'd	App'd
P1	20/10/17	DCO SUBMISSION	AH	DH	SR

Drawing Status: DCO SUBMISSION
Suitability: S0

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www.atkinsglobal.com

Client: PORT OF TILBURY LONDON

Project Title: TILBURY2

Drawing Title: DRAINAGE GENERAL ARRANGEMENT SHEET 1 OF 3

Scale	Designed	Drawn	Checked	Authorised
1:2000	AH	JG	DH	SR
Original Size: A1	Date: 06/07/17	Date: 06/07/17	Date: 16/10/17	Date: 16/10/17

Drawing Number: 5153187-ATK-ZZ-XX-DR-UT-1050
Revision: P 1

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Millimetres 100 10 0

THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH DRAINAGE STRATEGY REFERENCE: 5153187-ATK-ZZ-ZZ-RP-D-0001 AND IS CONCEPTUAL ONLY FOR THE DCO SUBMISSION

DO NOT SCALE

N

VORTEX CONTROL DEVICE LIMITING FLOWS TO GREENFIELD RUN-OFF LEVELS

OUTFALL TO EXISTING CHANNEL IL = 1.213M AOD

GRASS SWALE 130M LONG 3.3M WIDE 1:1000 GRADIENT

NUMBER OF FILTER DRAINS TO BE DETERMINED IN DETAILED DESIGN STAGE

OUTFALL TO PROPOSED WATERCOURSE DIVERSION CHANNEL IL = 1.225M AOD

IL = 1.3M AOD

OUTFALL TO EXISTING CHANNEL IL = 1.170M AOD

CMAT RESTRICTED TO GREENFIELD AND WATER QUALITY IMPROVEMENTS ALL DEALT WITH WITHIN THE SITE (BY CMAT DESIGNER)

RAILWAY SWALES
1 No. 72M SWALE 3.3M WIDE
4No. 125M SWALE 3.3M WIDE
3No. 125M SWALE 4.7M WIDE
1No. 143M SWALE 4.7M WIDE

GRASS SWALE 78M LONG 3.3M WIDE 1:1000 GRADIENT

POROUS PAVING TO HAVE FILTER DRAINS

IL = 1.4M AOD

VORTEX CONTROL DEVICE LIMITING FLOWS TO GREENFIELD RUN-OFF LEVELS

OUTFALL TO PROPOSED WATERCOURSE DIVERSION CHANNEL IL = 0.775M AOD

BRIDGE DECK TO DRAIN TO MANHOLE

EXISTING DITCH

DEDICATED CMAT OUTFALL TO GREENFIELD RUNOFF RATE

IL = 1.0M AOD

IL = 0.6M AOD

GRASS SWALE 164M LONG 4.7M WIDE 1:1000 GRADIENT

GRASS SWALE 137M LONG 3.3M WIDE 1:1000 GRADIENT

FLOW CONTROL TO RESTRICT OUTFALL TO GREENFIELD RUNOFF RATES. STORAGE PROVIDED IN POROUS PAVING SUB-BASE (OR ADDITIONAL ATTENUATION TANK PROVIDED).

GREEN ROOFS TO BUILDINGS TO DISCHARGE INTO POROUS PAVING

EXACT LAYOUT OF THE WELFARE AREA TO BE DETERMINED IN DETAILED DESIGN STAGE TO ALLOW MAXIMUM FUTURE FLEXIBILITY

ROAD TO DRAIN TO DITCH AS EXISTING

OUTFALLS NORTH

OUTFALLS SOUTH

RESHAPE EXISTING DITCH 8.4M WIDE 1.2M DEEP 1 IN 1 SIDE SLOPES MAINTAIN EXISTING LENGTH AND GRADIENT

FULL RETENTION SEPARATOR

VORTEX CONTROL DEVICE LIMITING FLOWS TO GREENFIELD RUN-OFF LEVELS

POLLUTION CONTROL VALVE

RESHAPE EXISTING DITCH 7.6M WIDE 0.8M DEEP 1 IN 1 SIDE SLOPES MAINTAIN EXISTING LENGTH AND GRADIENT

FILTER DRAINS TO RAILWAY

TYPICAL SLOT DRAIN SECTION (SIZE TBC)

1 IN 100 YEAR + 40% CLIMATE CHANGE EVENT EXTENT OF SURFACE PONDING MAX LEVEL 2.7M AOD MAX VOLUME 1650M3

CULVERT

REFER TO PROPOSED RIVER DIVERSIONS

FILTER DRAINS OUTFALLING TO PROPOSED POND

FILTER DRAINS TO BRIDGE EMBANKMENT TO DRAIN TO DIVERTED WATERCOURSE

ROAD DRAINED AS EXISTING

GRASS SWALE 155M LONG 4.2M WIDE 1:1000 GRADIENT

Walton Common

Tilbury Power Station

KEY CONTINUED:

- PIPEWORK
- VORTEX CONTROL DEVICE
- ATTENUATION POND
- CATCHMENT BOUNDARY
- EXISTING DITCH
- GREEN ROOFS
- FLOWS REDUCED TO GREENFIELD
- GROUND RE-PROFILED
- RIVER DIVERSION
- RAILWAY DRAINAGE
- EXCEEDANCE

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:

CONSTRUCTION

Unknown buried services – refer to service plans and use cable avoidance tools before digging. Asbestos pipes – exercise extreme caution in their vicinity. Ground contamination exists.

MAINTENANCE/CLEANING

Multiple buried services including asbestos pipes. Consult services plans and host utility companies and use cable avoidance tools before digging.

DECOMMISSIONING/DEMOLITION

Multiple buried services including asbestos pipes. Consult services plans and host utility companies and use cable avoidance tools before digging. Ground contamination exists.

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement

NOTES:

- RIVER MODELING MAY BE UNDERTAKEN AT LATER DESIGN STAGES TO DETERMINE IF GREATER FLOWS CAN BE ACCOMMODATED
- GREENFIELD FLOWS MAY BE GREATER THAN Q1 IF FLOW RESTRICTIONS RESULT IN ONEROUS MAINTENANCE REQUIREMENT DUE TO SMALL DIAMETER PIPEWORK
- ROADS TO BE DRAINED BY GULLIES (NOT SHOWN)
- SWALES TO ROADS OVERSIZED TO ALLOW FLOWS TO BE RESTRICTED TO GREENFIELD RUNOFF LEVELS
- ALL ATTENUATION SIZES, PIPE / CULVERT / PIPE SIZES + LEVELS ARE INDICATIVE AND WILL BE DEVELOPED IN THE DETAIL DESIGN STAGE PURSUANT TO THE DCO

KEY:

- SLOT CHANNEL DRAIN OR CONCRETE OPEN DISH CHANNEL
- SWALE (ADOPTABLE)
- SWALE (PRIVATE)
- CULVERT
- ATTENUATION TANK
- OUTFALL
- PETROL INTERCEPTOR
- PUMP STATION
- MANHOLE + @ CULVERTS
- POROUS PAVING
- SHUT OFF VALVE
- FILTER DRAIN
- BRIDGE DRAIN

50m 0m 50m 100m

Scale 1:2000

Rev.	Date	Description	By	Chk'd	App'd
P1	20/10/17	DCO SUBMISSION	AH	DH	SR

Drawing Status: DCO SUBMISSION

Suitability: S0

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Client: PORT OF TILBURY LONDON

Project Title: TILBURY2

Drawing Title: DRAINAGE GENERAL ARRANGEMENT SHEET 2 OF 3

Scale	Designed	Drawn	Checked	Authorised
1:2000	AH	JG	DH	SR
Original Size: A1	Date: 06/07/17	Date: 06/07/17	Date: 17/10/17	Date: 17/10/17

Drawing Number: 5153187-ATK-ZZ-XX-DR-UT-1051

Revision: P 1

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DO NOT SCALE

Millimetres 0 10 100

N

VORTEX CONTROL DEVICE LIMITING FLOWS TO GREENFIELD RUN-OFF LEVELS

GRASS SWALE 130M LONG 3.3M WIDE 1:1000 GRADIENT

OUTFALL TO PROPOSED WATERCOURSE DIVERSION CHANNEL IL = 1.225M AOD

IL = 1.3M AOD

GRASS SWALE 78M LONG 3.3M WIDE 1:1000 GRADIENT

VORTEX CONTROL DEVICE LIMITING FLOWS TO GREENFIELD RUN-OFF LEVELS

OUTFALL TO PROPOSED WATERCOURSE DIVERSION CHANNEL IL = 0.775M AOD

BRIDGE DECK TO DRAIN TO MANHOLE

GRASS SWALE 77M LONG 3.3M WIDE 1:1000 GRADIENT

IL = 0.6M AOD

OUTFALL TO PROPOSED WATERCOURSE DIVERSION CHANNEL IL = 0.523M AOD

VORTEX CONTROL DEVICE LIMITING FLOWS TO GREENFIELD RUN-OFF LEVELS

IL = 0.85M AOD

GRASS SWALE 137M LONG 3.3M WIDE 1:1000 GRADIENT

REFER TO PROPOSED RIVER DIVERSIONS

FLOW CONTROL TO RESTRICT OUTFALL TO GREENFIELD RUNOFF RATES, STORAGE PROVIDED IN POROUS PAVING SUB-BASE (OR ADDITIONAL ATTENUATION TANK PROVIDED).

GRASS SWALE 155M LONG 4.2M WIDE 1:1000 GRADIENT

FILTER DRAINS OUTFALLING TO PROPOSED POND

FILTER DRAINS TO BRIDGE EMBANKMENT TO DRAIN TO DIVERTED WATERCOURSE

ROAD DRAINED AS EXISTING

VORTEX CONTROL DEVICE LIMITING FLOWS TO GREENFIELD RUN-OFF LEVELS

GRASS SWALE 160M LONG 4.2M WIDE 1:1000 GRADIENT

IL = -0.236M

IL = 1.000M AOD

IL = 0.956M

OUTFALL TO EXISTING CHANNEL IL = -1.33M AOD

GRASS SWALE 122M LONG 5M WIDE 1:1000 GRADIENT

VORTEX CONTROL DEVICE LIMITING FLOWS TO GREENFIELD RUN-OFF LEVELS

ROAD DRAINED AS EXISTING

GRASS SWALE 122M LONG 4.7M WIDE 1:1000 GRADIENT

UNRESTRICTED DISCHARGE TO COMPENSATE FOR ROAD REMOVED

IL = 1.7M AOD

GRASS SWALE 122M LONG 3.8M WIDE 1:1000 GRADIENT

GRASS SWALE 122M LONG 4.7M WIDE 1:1000 GRADIENT

ROAD DRAINED AS EXISTING

ALL SWALES DESIGNED TO 1 IN 100YR EVENT (PLUS CLIMATE CHANGE) - NO EXCEEDANCE OVERLAND ROUTES IN THIS EVENT

THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH DRAINAGE STRATEGY REFERENCE: 5153187-ATK-ZZ-ZZ-RP-D-0001 AND IS CONCEPTUAL ONLY FOR THE DCO SUBMISSION

KEY CONTINUED:

- PIPEWORK
- VORTEX CONTROL DEVICE
- ATTENUATION POND
- CATCHMENT BOUNDARY
- EXISTING DITCH
- GREEN ROOFS
- FLOWS REDUCED TO GREENFIELD
- GROUND RE-PROFILED
- RIVER DIVERSION
- RAILWAY DRAINAGE
- EXCEEDANCE

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:

CONSTRUCTION

Unknown buried services – refer to service plans and use cable avoidance tools before digging. Asbestos pipes – exercise extreme caution in their vicinity. Ground contamination exists.

MAINTENANCE/CLEANING

Multiple buried services including asbestos pipes. Consult services plans and host utility companies and use cable avoidance tools before digging.

DECOMMISSIONING/DEMOLITION

Multiple buried services including asbestos pipes. Consult services plans and host utility companies and use cable avoidance tools before digging. Ground contamination exists.

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement

NOTES:

- RIVER MODELING MAY BE UNDERTAKEN AT LATER DESIGN STAGES TO DETERMINE IF GREATER FLOWS CAN BE ACCOMMODATED
- GREENFIELD FLOWS MAY BE GREATER THAN Q1 IF FLOW RESTRICTIONS RESULT IN ONEROUS MAINTENANCE REQUIREMENT DUE TO SMALL DIAMETER PIPEWORK
- ROADS TO BE DRAINED BY GULLIES (NOT SHOWN)
- SWALES TO ROADS OVERSIZED TO ALLOW FLOWS TO BE RESTRICTED TO GREENFIELD RUNOFF LEVELS
- ALL ATTENUATION SIZES, PIPE / CULVERT / PIPE SIZES + LEVELS ARE INDICATIVE AND WILL BE DEVELOPED IN THE DETAIL DESIGN STAGE PURSUANT TO THE DCO

KEY:

- SLOT CHANNEL DRAIN OR CONCRETE OPEN DISH CHANNEL
- SWALE (ADOPTABLE)
- SWALE (PRIVATE)
- CULVERT
- ATTENUATION TANK
- OUTFALL
- PETROL INTERCEPTOR
- PUMP STATION
- MANHOLE + @ CULVERTS
- POROUS PAVING
- SHUT OFF VALVE
- FILTER DRAIN
- BRIDGE DRAIN

50m 0m 50m 100m
Scale 1:2000

Rev.	Date	Description	By	Chk'd	App'd
P1	20/10/17	DCO SUBMISSION	AH	DH	SR

Drawing Status: DCO SUBMISSION
Suitability: S0

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Client: PORT OF TILBURY LONDON

Project Title: TILBURY2

Drawing Title: DRAINAGE GENERAL ARRANGEMENT SHEET 3 OF 3

Scale	Designed	Drawn	Checked	Authorised
1:2000	AH	JG	DH	SR
Original Size: A1	Date: 06/07/17	Date: 06/07/17	Date: 17/10/17	Date: 17/10/17

Drawing Number: 5153187-ATK-ZZ-XX-DR-UT-1052
Revision: P 1

USER: hard5136 Date: 23/10/17 14:09:40 File name: \\eastlondon.com\root\projects\GBELM\GBDE\Project\Tilbury2\616714 - PORTL ReRo Terminal Design\P1 WIP\Drawings\P1 1 WIP\TIO\12 Drawings\616714-ATK-ZZ-XX-DR-UT-1052.dwg

Appendix G. Foul Water Drainage Drawings

DO NOT SCALE

PROPOSED SECURITY GATEHOUSE
PROPOSED GL 2.6M AOD
MH DEPTH 1.05M

CMAT CONCRETE BATCH CONNECTION
PROPOSED GL 2.5M AOD
MH DEPTH 3.97M
U/S PIPE DIA. 150MM
GRADIENT 1:40 LENGTH 137M

FUTURE TILBURY POWER STATION PLANT B RISING MAIN

CMAT ADMIN CONNECTION
PROPOSED GL 2.5M AOD
MH DEPTH 2.21M
U/S PIPE DIA. 150MM
GRADIENT 1:40 LENGTH 68.5M

PROPOSED FOUL WATER PUMPING STATION
PROPOSED GL 3.0M AOD
WELL CONNECTION DEPTH 6.68M

ANCILLARY BUILDINGS CONNECTION
PROPOSED GL 2.5M AOD
MH DEPTH 3.15M
U/S PIPE DIA. 150MM
GRADIENT 1:80 LENGTH 81.5M

PROPOSED SITE ROAD ACCESS AND CONVEYOR CORRIDOR

PROPOSED MH CONNECTION
PROPOSED GL 2.7M AOD
MH DEPTH TBC

SEQUENCING TO BE DETERMINED TO ENSURE PLANT B IS DRAINED TO END 2019

ANGLIAN WATER TO CONFIRM EXISTING LEVEL, WHICH MAY MITIGATE REQUIREMENT FOR PUMPING STATIONS AT WAREHOUSE AND CUSTOMS OFFICE

PROPOSED SECURITY AND CUSTOMS BUILDINGS

RORO TERMINAL PROPOSED CONTAINER AND TRAILER STORAGE

RORO TERMINAL PROPOSED WAREHOUSE AND STORAGE AREA

PROPOSED MH CONNECTION FOR TEMPORARY CONNECTION FROM PLANT B.
EXISTING LEVEL TO BE CONFIRMED

ANGLIAN WATER - TILBURY WATER RECYCLING CENTRE

PROPOSED PUMPING STATION WAREHOUSE CONNECTION
PROPOSED GL 2.9M AOD
MH DEPTH 1.25M TBC

PROPOSED SILO

PROPOSED PUMPING STATION CUSTOM BUILDING
PROPOSED GL 2.7M AOD
MH DEPTH 3.96M
U/S PIPE DIA. 150MM
GRADIENT 1:40 LENGTH 130.5M

WELFARE CONNECTION
PROPOSED GL 2.9M AOD
MH DEPTH 0.9M

FLOOD DEFENCE

CEMENT SILO CONNECTION
PROPOSED GL 2.9M AOD
MH DEPTH TBC

PROPOSED PUMPING STATION PONTOON CONNECTION

Tilbury Power Station

River Thames
Gravesend Reach

N

Millimetres 100 10 0

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:

CONSTRUCTION

Unknown buried services – refer to service plans and use cable avoidance tools before digging. Asbestos pipes – exercise extreme caution in their vicinity.
Ground contamination exists.

MAINTENANCE/CLEANING

Multiple buried services including asbestos pipes. Consult services plans and host utility companies and use cable avoidance tools before digging.

DECOMMISSIONING/DEMOLITION

Multiple buried services including asbestos pipes. Consult services plans and host utility companies and use cable avoidance tools before digging.
Ground contamination exists.

It is assumed that all works will be carried out by a competent contractor working, where appropriate, to an approved method statement

NOTES:

1. LOCATION OF PROPOSED INFRASTRUCTURE AND STRUCTURES SHOWN INDICATIVELY.
2. ALL PIPE SIZES + LEVEL ARE INDICATIVE AND WILL BE DEVELOPED IN THE DETAIL DESIGN STAGE PURSUANT TO THE DCO
3. ALL PROPOSED LEVELS OF FOUL DRAINAGE PRELIMINARY - TBC

KEY:

- PROPOSED FOUL WATER PUMPING STATION
- PROPOSED FW MAIN
- PROPOSED FW MANHOLE
- PROPOSED FW RISING MAIN
- PROPOSED TEMPORARY FW MAIN
- PROPOSED SERVICE CORRIDOR FOR FUTURE TILBURY POWER STATION PLANT B CONNECTION
- EXISTING PLANT B NETWORK

50m 0m 50m 100m
Scale 1:2000

Rev.	Date	Description	By	Chk'd	App'd
P1	20/10/17	DCO SUBMISSION	AH	DH	SR

Drawing Status: DCO SUBMISSION
Suitability: S0

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Client: PORT OF TILBURY LONDON

Project Title: TILBURY2

Drawing Title: FOUL WATER DRAINAGE GENERAL ARRANGEMENT

Scale	Designed	Drawn	Checked	Authorised
1:2000	AH	JG	DH	SR
Original Size	Date	Date	Date	Date
A1	06/07/17	06/07/17	17/10/17	17/10/17

Drawing Number: 5153187-ATK-ZZ-XX-DR-UT-1053
Revision: P 1

USER: hardi196 Date: 23/10/17 15:47:03 File name: \\eastdns.com\root\GBELM\JOBS\Projects\Tilbury2\516174 - TOTAL Refits Terminal\Design\7.1 WP\TO\012 Drainage\516174-ATK-ZZ-XX-DR-UT-1053.dwg

DO NOT SCALE

Millimetres 0 10 100

N

PROPOSED RAIL ACCESS

FORT ROAD RAIL BRIDGE

PROPOSED FORT ROAD RAIL BRIDGE CROSSING EXTENSION

GENERAL STORAGE

RORO TERMINAL GENERAL STORAGE

PROPOSED CMAT TERMINAL PROPOSED PROCESSING FACILITIES

CMAT TERMINAL PROPOSED AGGREGATES STORAGE YARD

RORO TERMINAL PROPOSED WORKSHOP / ADMIN / WELFARE / PARKING

VEHICLE WASH AREA TO HAVE CONNECTION TO FOUL WATER NETWORK

PROPOSED ROAD ACCESS

PROPOSED SECURITY GATEHOUSE
PROPOSED GL 2.6M AOD
MH DEPTH 1.05M

CMAT CONCRETE BATCH CONNECTION
PROPOSED GL 2.5M AOD
MH DEPTH 3.97M
U/S PIPE DIA. 150MM
GRADIENT 1:40 LENGTH 137M

CMAT ADMIN CONNECTION
PROPOSED GL 2.5M AOD
MH DEPTH 2.21M
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GRADIENT 1:80 LENGTH 81.5M

PROPOSED FOUL WATER PUMPING STATION
PROPOSED GL 3.0M AOD
WELL CONNECTION DEPTH 6.68M

SERVICE CORRIDOR FOR FUTURE TILBURY POWER STATION PLANT B RISING MAIN

PROPOSED SITE ROAD ACCESS AND CONVEYOR CORRIDOR

Walton Common

Tilbury Power Station

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

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KEY:

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Scale 1:2000

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P1	20/10/17	DCO SUBMISSION	AH	DH	SR

Drawing Status: DCO SUBMISSION
Suitability: S0

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Scale	Designed	Drawn	Checked	Authorised
1:2000	AH	JG	DH	SR
Original Size: A1	Date: 06/07/17	Date: 06/07/17	Date: 17/10/17	Date: 17/10/17

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