Kent International Gateway, Maidstone, Kent

Flood Risk Assessment Addendum

Kent International Gateway Ltd

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Final
9T5496

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APPENDICES

1 INTRODUCTION

1.1.1 Since the production of the original Flood Risk Assessment (FRA), dated July 2007, in support of the proposed Kent International Gateway rail freight interchange development and the subsequent outline planning application submission in September 2007, there has been a scheme change.

1.1.2 This FRA Addendum has been prepared to assess the impacts of the scheme change and to take account of the relevant consultation responses that have been received and additional survey work that has been carried out since the submission of the application in September 2007.

1.1.3 This FRA Addendum should be read in conjunction with the original FRA, except for the following sections and paragraphs which are superseded by this Addendum.

(i) Section 3, paragraphs 3.1.1 and 3.1.3

(ii) Section 7, paragraph 7.1.4

(iii) Section 8 (All)

(iv) Section 10, paragraph 10.1.3

(v) Section 12, paragraphs 12.3.5 – 12.3.8 inclusive

(vi) Section 13, paragraphs 13.3.1 – 13.3.15 inclusive

(vii) Section 14, paragraphs 14.3.1, 14.3.2, and 14.3.4 – 14.3.8 inclusive

(viii) Section 15, paragraph 15.1.2

(ix) Section 16, paragraphs 16.1.1 and 16.1.2

1.1.4 Whilst not all sections of the original FRA have been amended or superseded, for consistency, this FRA Addendum adopts the same section headings for those that have.

1.1.5 The Appendices to this FRA Addendum supersede the original FRA Appendices E, F, G and J.

1.1.6 This FRA Addendum should be read in conjunction with the following drawings, included within Appendix F, that supersede all drawings referred to and included within the original FRA. The drawing reference numbers shown in brackets refer to the corresponding superseded drawings.

(i) 9T4125-FRA-01 (2005/180A-C7_15/02)

(ii) 9T4125-FRA-02 (2005/180A-C7_15/SW01)

(iii) 9T4125-FRA-03 (2005/180A-C7_15/SW02)

(iv) 9T4125-FRA-04 (2005/180A-C7_15/SW/03)

(v) 9T4125-FRA-05 (2005/180A-C7_15/FW01)

(vi) 9T4125-FRA-06 (2005/180A-C7_15/FW02)

(vii) 9T4125-FRA-07

(viii) 9T4125-FRA-08 & 09 (2005/180A-C7_15/03, 04 & SW04)

(ix) 9T4125-FRA-10, 11 & 12 (2005/180A-C7_15/03, 04 & SW05)

(x) 9T4125-FRA-13 & 14 (2005/180A-C7_15/03, 04 & SW06)

(xi) 9T4125-FRA-15

(xii) 9T4125-FRA-16

(xiii) 9T4125-FRA-17

1.1.7 This FRA Addendum should also be read in conjunction with the following documents.

(i) Supplemental Environmental Statement (SES)

(ii) Hydrogeological Impact Assessment (HIA) Addendum – *SES Appendix 10.2*

(iii) Hydraulic Report – *SES Appendix 10.3*

(iv) Agricultural Land Classification Report – *Further Information Document No.4*

2 SITE DESCRIPTION

2.1 General

2.1.1 The existing site layout is indicated on RH Dwg No. 9T4125-FRA-01, included within Appendix F.

3 PROPOSED DEVELOPMENT

3.1 General

3.1.1 The latest proposed development layout is indicated on the Illustrated Masterplan Ref.107N produced by PRC, included within Appendix A.

3.1.2 The latest proposed development schedule is included within Appendix B.

4 HISTORIC AND MODELLED FLOOD EVENTS

4.1 Fluvial/Tidal Flooding

4.1.1 An assessment of the hydraulic performance of each of the three existing watercourses has been carried out in consideration of both the pre and post development scenarios. The scope of the assessment and the results are contained within the Hydraulic Report, appended to the SES Chapter 10.

4.1.2 The Hydraulic Report confirms that, in the pre-development scenario, none of the three watercourses pose a flood risk to the site, up to the 1 in 100 year event (incl. a 20% allowance for climate change). It also confirms that, subject to the proposed Watercourse W2 culvert being sized as recommended, the proposed development will not increase the risk of flooding to the site or to other areas during the same event.

5 EXISTING LOCAL STRUCTURES

5.1 General

5.1.1 Each of the three existing watercourses has various associated culverts. All existing culverts are detailed in, and have been taking into consideration within, the Hydraulic Report.

6 ASSESSMENT OF FLOOD IMPACT

6.1 Fluvial/Tidal Flooding

6.1.1 The Hydraulic Report confirms that, in the post development scenario, none of the three watercourses pose a flood risk to the proposed development or other areas, up to the 1 in 100 year event, including a 20% allowance for climate change.

6.2 Surface Water

6.2.1 The implementation of the surface water drainage strategy described within Section 8 of this FRA Addendum will minimise flood risk associated with surface water run-off, up to and including the 1 in 100 year event, including a 20% allowance for climate change.

7 EXISTING DRAINAGE

7.1 Surface Water

7.1.1 Site inspections have confirmed that there are outfalls to Watercourses W1, W2 and W3 from the M20 highway drainage network. The existence of these connections has been confirmed by the acquisition of as built record drawings, prior to the construction of the CTRL, from the Highways Agency. Unfortunately, whilst confirming the routes of the pipework, attenuation structures, interceptors, etc., the drawings do not confirm pipe sizes or any flow control details. It is likely that such details would appear on accompanying schedules which the Highway Agency has been unable to provide. It should be noted that the majority of the pipe runs are actually keyed on the drawings as being filter drains. A copy of the relevant drawings is included within Appendix E.

7.1.2 A combination of visual and CCTV inspections have confirmed that the sizes of the highway drainage outfalls to Watercourse W1 are 300mm and 450mm diameter. These outfalls discharge to the south of the M20, at the downstream end of the existing culvert. As it has not been possible to either confirm the presence of any formal flow control devices or accurately assess the equivalent contributing area for the filter drain systems, the hydraulic model assumes maximum discharge rates equivalent to the full bore capacities of the respective pipes at nominal 1 in 100 gradients.

7.1.3 The record drawings confirm a single highway drainage outfall to the Watercourse 2 M20 culvert. Whilst there is a manhole at the outfall location, it should be noted that it lies in the hard shoulder of the M20, this has prevented the survey company from lifting it to confirm the pipe size. For the purposes of the hydraulic model, a discharge equivalent to the full bore capacity of a 450mm diameter pipe laid at a 1 in 100 gradient has been assumed at this stage.

7.1.4 An outfall from a highway drainage balancing pond to Watercourse W3, to the north of the M20, is also indicated on the record drawings. Due to motorway access restrictions, the survey company were unable to confirm the discharge arrangements/restrictions. For the purposes of the hydraulic model, a discharge equivalent to the full bore capacity of a 300mm diameter pipe laid at a 1 in 100 gradient has been assumed at this stage.

7.1.5 It should be noted that other connections to the watercourses in and around the M20 and CTRL are land drains apparently associated with the relevant embankments. For the purposes of the hydraulic model, flows from these land drains have been deemed to be included within the respective general greenfield catchments.

7.1.6 As agreed with the Environment Agency, an assessment of the existing greenfiled run-off from the site has been made using the Institute of Hydrology Report 124 (IH124) methodology. The input variables, including soil classification, have also been agreed with the Environment Agency.

7.1.7 Based on a gross site area of 112.27ha, the average (QBAR) grenfield run-off is calculated as being 408.5l/s. The rural run-off summary output from Micro Drainage is included within Appendix C. This equates to a rate of approx. 3.64l/s/ha.

8 PROPOSED DRAINAGE STRATEGY

8.1 Surface Water

8.1.1 The proposed surface water drainage strategy has been developed in consultation with the Environment Agency. In accordance with PPS25, the strategy is SUDS (Sustainable Urban Drainage Systems) based, relying on restricted greenfield equivalent discharges to the three watercourses with the balance of flows being attenuated on site..

8.1.2 The proposed impermeable areas have been split into three main catchments (1-3), in order to mimic the existing greenfield catchments as closely as possible. These three main catchments have then been split into sub catchments (A, B, C, etc), as necessary, to offer the most practical locations for attenuation devices based on the proposed layout, proposed/existing topography and the receiving watercourse locations. The proposed impermeable areas/catchments are indicated on RH Dwg Nos. 9T4125-FRA-02, 03 & 04 included within Appendix F.

8.1.3 In order to establish a greenfield equivalent run-off rate discharge allowance, the average rate of 3.64l/s/ha has been applied to each of the sub catchments, in lieu of the respective impermeable areas. Based on a total impermeable area of 58.35ha, a total overall restricted discharge of 212.4l/s from the development has been calculated. A summary of the individual catchment and sub-catchment discharge allowances is provided within Appendix C.

8.1.4 Whilst the site is indicted as being underlain by a major aquifer (Folkestone Beds), due to the significant cut and fill operation that will be required to facilitate the proposed development, percolation testing would not provide valid data at this stage and has not been carried out. The proposed drainage strategy at this outline stage therefore discounts the use of any infiltration SUDS techniques, relying entirely on attenuation.

8.1.5 Open attenuation features are proposed wherever practical, with cellular block underground storage tanks proposed for the areas where it is not. On the basis that the proposed main positive surface water drainage network will be offered to Southern Water and/or the Kent County Council for adoption, the proposed attenuation structures have been designed as off line facilities. In summary, there are a total of five off line detention ponds and five cellular storage tanks proposed. The proposed ponds and cellular storage structures are indicated on RH Dwg Nos. 9T4125-FRA-07, 08, 09, 10, 11, 12, 13 & 14 included within Appendix F.

8.1.6 The proposed attenuation devices have been designed to accommodate the 1 in 100 year event, plus a 20% allowance for climate change with the respective discharges being restricted to the average (QBAR) greenfield equivalent rate. The discharges will be regulated by a single hydrobrake flow control device, thus providing a robust attenuation provision at this outline stage. There will be an opportunity at the detailed design stage to introduce multiple complex controls, for say the 2, 30 and 100 year events, in order to reduce attenuation volumes, if required.

8.1.7 As well as providing the necessary attenuation capacity, it is intended that the ponds will also form water features. They will be clay lined and designed to hold a maximum 1.5m depth of permanent water. The ponds will have a total depth of 3.5m with the required attenuation volumes being accommodated from a depth of 1.5m up to a depth of 3.2m, providing a 300mm freeboard. The pond side slopes will vary, with gradients typically ranging between 1 in 3 and 1 in 7, offering potential for creating a diverse wetland habitat. In respect of the calculations, an average gradient of 1 in 5 has been used. A copy of the pond attenuation calculations is included within Appendix D.

8.1.8 The proposed cellular block attenuation structures will be lined and will be designed and constructed in accordance with the manufacturer's recommendations with a maximum effective depth of 2m and a minimum cover of 0.5m. A copy of the cellular block attenuation calculations is included within Appendix D.

8.1.9 The inter-modal area could potentially introduce other types of contaminant, over and above those normally associated with a service yard area. Furthermore, in order to address settlement concerns, it is proposed to construct the storage sections of the inter-modal area from permeable paving. Infiltration SUDS techniques will clearly not be appropriate for the inter-modal area so run-off from the impermeable sections will be drained via a traditional surface water drainage network, passing through a full retention interceptor/separator. The proposed permeable areas will require lining to prevent the potential migration of pollutants to the aquifer below, they will drain via a land drainage network connecting to the positive network serving the impermeable sections. As well as incorporating off line cellular attenuation, the inter-modal surface water drainage systems should also incorporate penstocks prior to the outfalls to the watercourse. This will allow the systems to be isolated in an emergency event.

8.1.10 It is envisaged that, subject to the results of percolation testing carried out after the cut and fill exercise, infiltration SUDS techniques such as swales, pervious paving, infiltration trenches, etc will be introduced into the detailed drainage strategy in an attempt to reduce the size of the cellular storage structures that fall within Catchment 3. The selection of infiltration SUDS will be sympathetic to both ground water quality and recharge.

8.1.11 The use of brown/green roofs has been considered, however, their use in respect of large warehousing units such as those proposed on this development will require significant structural design and therefore cost implications. It should also be noted that the drainage benefits of brown/green roofs in extreme design events, such as the 1 in 100 year, are not conclusive.

8.1.12 Rain water harvesting has also been considered. In this instance, based on the end use of the proposed units, it is unlikely to be appropriate.

8.1.13 As the site lies within a SPZ and there are groundwater abstraction points within the immediate vicinity serving the public drinking water supply only uncontaminated roof water run-off will be permitted to drain directly to ground. Surface water run-off from roads should pass through trapped gullies. Bypass interceptors/separators should be introduced in addition to trapped gullies for car parking and service yard areas.

8.1.14 All proposed outfalls to the watercourses will require formal discharge consents from the Environment Agency under the Land Drainage Act 1991.

9 PROPOSED ACCOMMODATION WORKS

9.1 Watercourses

9.1.1 The proposed watercourse accommodation works are indicated on RH Dwg Nos. 9T4125-FRA-08, 09, 10, 11, 12, 13 & 14 included within Appendix F.

9.1.2 In order to permit a reasonable degree of accessibility to the proposed development, it will be necessary to provide three vehicular crossings of the existing/diverted watercourses. In accordance with the Environment Agency culverting policy and comments received, it is proposed that these crossings will be of an open span variety in order to minimise flow restriction.

9.1.3 In order to accommodate the proposed inter-modal area, it will be necessary to culvert approx. 194m of Watercourse W2. Whilst it is recognised that large scale culverting is against the Environment Agency's culverting policy, it should be noted that the section of watercourse in question lies between two existing sections of culvert. The culvert immediately upstream runs beneath the M20 and CTRL and the culvert immediately downstream runs beneath the local railway line.

9.1.4 The existing culverts clearly already impose hydraulic restrictions on the watercourse. The Hydraulic Report considers these issues in detail.

9.1.5 With respect to maintenance and general access issues associated with the proposed culverting, it is proposed that access points (manholes) are provided at the junction between the existing and proposed culverts, either side of the inter-modal area, and at a minimum of two locations within the inter-modal area. An access point will also be provided at the change of direction to the south of the local railway line.

9.1.6 The potential ecological value of the section of watercourse to be culverted is discussed in detail within the Ecology Chapter of the ES and the SES. The key issues that need to be taken into consideration when assessing potential ecological losses are that the presence of culverts upstream and downstream will result in some 'sterilization' of this section of watercourse and the channel being man-made with a geo-textile lining.

9.1.7 With regard to the provision of ecological mitigation, it should be noted that the proposed meandering diversion of Watercourses W1, W2 (south of the local railway line) and W3 will provide an additional 145m of open channel. In addition, the creation of five off line detention ponds, that incorporate an element of permanent water, will provide significant wetland features offering further and more diverse ecological mitigation.

9.1.8 All works that affect the existing ordinary watercourses will require consent from the Environment Agency under the Land Drainage Act 1991.

10 CLIMATE CHANGE

10.1.1 The Hydraulic Report makes an allowance of 20% for climate change where appropriate within the watercourse models.

11 RESIDUAL RISKS

11.1.1 As previously stated, the proposed off line detention ponds have been designed to accommodate the 1 in 100 year event including a 20% allowance for climate change. In addition, they have also been designed with a minimum 300mm freeboard allowance and incorporate emergency overflow channels to the respective watercourses to cater for more extreme events.

11.1.2 The proposed culverting of Watercourse W2 will increase the risk of a blockage occurring and resultant associated flooding to the development. This will be mitigated for by the provision of a suitable number of access points along the length of the culvert together with the agreement and implementation of a suitable maintenance strategy.

APPENDICES