APPENDIX 9-1

CARBON CALCULATIONS

TII Carbon Assessment Tool

Embodied Carbon					Distance Assumptions
Material	Total no. Truck Loads	Truck type	TII Embodied Carbon	TII Traffic	Distance (km)
Material for Construction Phase	944	Truck		✓	39
Material for Restoration	8,942	Truck	✓	✓	39
Annual Excavation Material from the Proposed Development	2,857	Truck	✓	✓	12
Total					

TII Embodied Carbon Tool Inputs					
Category	Sub-Category	Material	Quantity (total operational life)	Unit	Embodied tCO2e
Series 600 - Earthworks	Fill to Structures	Filling - To Structures (average)	7,950,960	m3	31,407
Series 800 - Road Pavements - Unbound and Cement Bound Mixtures	Sand	Sand	714,286	tonnes	5,000
Series 800 - Road Pavements - Unbound and Cement Bound Mixtures	Sand	Sand	714,286	tonnes	5,000
Total					**41,407**

TII Transport Inputs		
Transport Type	Distance (km)	Transport tCO2e
HGV-All-Average	347,173	373
HGV-All-Average	34,284	37
HGV-All-Average	36,651	39
Total		**449**

Operational Water Use			
Water Use	Annual Water Consumption	Unit	Annual Emissions tCO2e
Water Use – UK Average	1,958,400	m3	292
Total			**292**

List of Assumptions

Embodied Carbon Assumptions			Traffic Assumptions		
Item	Description	Assumption	Item	Description	Assumption
Material Restoration Quantity (per annum)	Quantity of soil and stone material required for restoration is 4,417,200 tonnes (further details provided in Chapter 3: Description). For modelling purposes this has been converted into m3 through the following calculation 1 tonne = 1.8 m3 4,417,200*1.8m3 = 7,950,960m3	7,950,960	Material Brought to the Proposed Development	For modelling purposes, the average distance from four of the proximate city locations for transport of all construction materials for the site	39
Material Extraction Quantity (per annum)	Sand extraction will take place from an area measuring approximately 16.3 ha which will allow for the extraction of approximately 1,428,571 tonnes of material. It is proposed to construct a new chain-link perimeter fence on the eastern and northern boundaries of the extraction area. The site will be worked in 2 no. phases as described below: -Phase 1: The first phase of extraction of sand and gravel will allow for the extraction of approximately 714,286 tonnes of material. Extraction of sand during Phase 1 is anticipated to occur during years 1 to 10. -Phase 2: The second phase of extraction of sand and gravel will allow for the extraction of approximately 714,286 tonnes of material. Extraction of sand during Phase 2 is anticipated to occur during years 11 to 20.	714,286	Material Leaving the Proposed Development	For modelling purposes, the 12km average distance Roadstone trucks travel during quarry operation	12
Operational Water Usage for washing of aggregate	As detailed in Section 3.4.6 of Chapter 3 of the EIAR, water loss associated with washing is assumed to be 320m3/day based on the operational hours detailed in Section 3.5.5 of Chapter 3 of the EIAR. Therefore, based on a 6-day working week and a 51-week working year for a 20-year operational phase, this will result in a total of 1,996,800m3 of water used throughout the operational phase.	1,958,400	Truck Emission factor	Calculated from an HGV - All - Average emission factor as provided in the TII Carbon Tool	1.07296
Restoration Infill Material Emission Factor	Calculated from Earthworks - Average Fill to Structure emission factor as provided in the TII Carbon Tool. Please note, this is an assumed mixture of different material and therefore reflects a precautionary scenario.	3.95005	Number of Vehicle Movements (Construction Phase)	As stated in Section 13.3.1 of Chapter 13 of the EIAR the construction phase will last approximately 1 month (i.e., 4 weeks) with 11.5 hours per day weekday (07:00 to 18:30) and 8-hour day on a Saturday (08:00 to 16:00). Traffic movements for the site are as follows: › To / from the site per hour = 3.6 trucks (rounded to 4) › Loads to / from the site per weekday – (07:00 -18:30) 11.5 hours = 40.6 trucks (rounded to 41) › Loads to / from the site per Saturday – (08:00 -16:00) 8 hours = 28.3 trucks (rounded to 29) › Loads to and from the site per week (65.5 hours) = 236 trucks Therefore, there will be a total of 944 HGV trips during the construction phase.	944
Material Extraction Emission Factor	Calculated from Road Pavements - Unbound and Cement Bound Mixtures - Sand emission factor as provided in the TII Carbon Tool.	7.0	Number of Vehicle Movements (Operational Phase) - Excavated Material	As stated in Section 13.3.1 of Chapter 13 of the EIAR, traffic movements associated with the extraction of 1,428,571 tonnes of sand will equate to, based on uniform extraction over a 20-year period and the assumption that the sand will be extracted using 25 tonne trucks, 2,857 truck movements to / from the site per yea	2,857
			Number of Vehicle Movements (Operational Phase) - Restoration Material	As stated in Section 13.3.1 of Chapter 13 of the EIAR, traffic movements associated with the importation of 4,471,200 tonnes of infill material for restoration to the existing Roadstone Quarry site will equate to 8,942 truck movements to / from the site per yea	8,942
			Volume of Average Artic Truck	Traffic movements determined based on the average artic truck having a carrying capacity of 25 tonnes	25