A7.8

Thurrock Power

Concept Design of Causeway for Delivery of AILs

Statera Energy

APFP Regulations ref. 5(2)(q)

Project number: 60592577

Revision D: 11 February 2020

Quality information

Prepared by	Checked by	Verified by	Approved by
Prasanthi Mirihagalla Associate Director (Maritime)	Alan Stacey Technical Director (Maritime & Ports)	Alan Stacey Technical Director (Maritime & Ports)	Graeme Cook Associate Project Manager (Power & Energy)

Revision History

Revision	Revision date	Details	Authorized	Name	Position
A	09 July 2019	Incorporation of client comments		Graeme Cook	Associate Project Manager (Power & Energy)
B	30 September 2019	Location modified and berth dredging added.		Graeme Cook	Associate Project Manager (Power & Energy)
C	02 October 2019	Incorporation of client comments		Graeme Cook	Associate Project Manager (Power & Energy)
D	11 February 2020	Incorporation of client comments		Graeme Cook	Associate Project Manager (Power & Energy)

Distribution List

# Hard Copies	PDF Required	Association / Company Name

Prepared for:

Statera Energy

Prepared by:

Prasanthi Mirihagalla
Associate Director (Maritime)

AECOM Infrastructure & Environment UK Limited
Midpoint, Alencon Link
Basingstoke
Hampshire RG21 7PP
United Kingdom

T: +44(0)1256 310200
aecom.com

© 2019 AECOM Infrastructure & Environment UK Limited. All Rights Reserved.

This document has been prepared by AECOM Infrastructure & Environment UK Limited ("AECOM") for sole use of our client (the "Client") in accordance with generally accepted consultancy principles, the budget for fees and the terms of reference agreed between AECOM and the Client. Any information provided by third parties and referred to herein has not been checked or verified by AECOM, unless otherwise expressly stated in the document. No third party may rely upon this document without the prior and express written agreement of AECOM.

Table of Contents

1. Introduction

Statera Energy is planning for the development of a new power station (Thurrock Power) to be located to the north of the Tilbury Substation. Construction of the power station would require delivery of a number of abnormal indivisible loads (AILs) to the site.

Statera Energy has provided to AECOM a report prepared for them by Wynns Limited (titled "*Abnormal Indivisible Load to Proposed Thurrock Power Development*", Issue no.0) that considers options for transporting AILs to the Thurrock Power development site. This report identifies a potential option to transport the AILs by sea and river and to offload the AILs across the beach of the river foreshore.

AECOM has undertaken high level review of the proposal to offload large indivisible loads destined for the power station development from marine barge/vessels via the river "beach" and/or temporary causeway.

Following on, Statera Energy has appointed AECOM to undertake a concept design of a causeway for the delivery of blocks, transformers and other abnormal loads to Thurrock Power Site to support an application for a DCO.

1.1 This Report

This Technical Note (TN) defines the concept design that has been developed and sets out the basis upon which it has been developed. The volume of excavation (dredging) within the river required by this design is also estimated.

Concept stage general arrangement drawings are given in Appendix A. The purpose of the drawing is

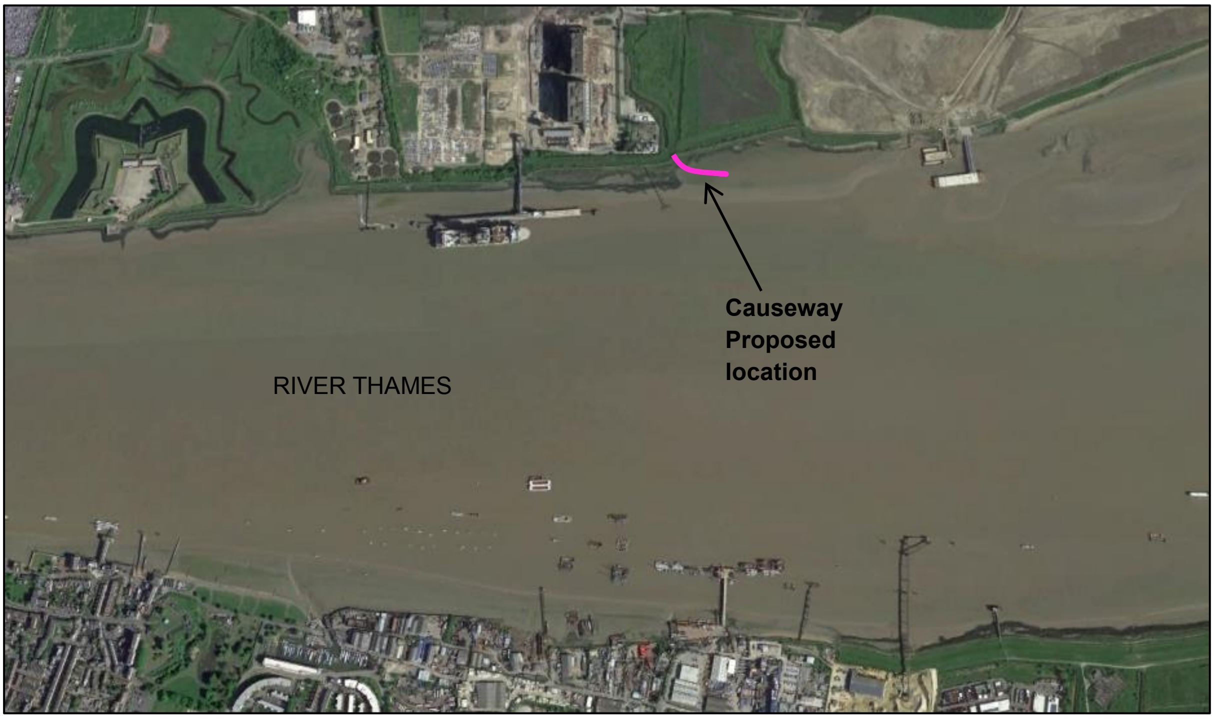
1. to be included in Statera Energy's DCO submission, and
2. to provide the basis for the project environmental consultants to assess the potential environmental impact of the causeway and the delivery operation.

2. Basis of Design

2.1 The Site

The location of the proposed causeway is shown in Figure 1 below. A topographic survey prepared for this project indicates the land forming the shoreline in this area is at approximately +4.3m AOD and a reinforced concrete flood defence wall is provided to a level of +6.48m AOD (based on Environment Agency data). The land immediately behind the flood wall is lower, at a level of around +3.0m AOD.

Figure 1 – Location of the proposed causeway



The foreshore at this location is initially at a gradient that is suitable for beaching the vessel. However, beyond a short distance from the shore the bed has been dredged for navigation purposes and therefore becomes significantly steeper and unsuitable for beaching a vessel. The causeway proposed by Wynns for this location is therefore curved in plan in order to accommodate both causeway and beached vessel within the area of acceptable foreshore gradient. This results in the beached vessel being positioned a safe distance from the navigation channel.

The PLA nautical chart indicates that for a causeway constructed in this location, both causeway and a vessel beached at the causeway head would be outside the main navigation channel.

2.2 Design Vessels

Winns (a specialist AIL transport contractor) has provided details of the specialist heavy lift barge that they anticipate they would use to deliver AILs to this location. The basic specification of this vessel - the Terra Marique - is included in Appendix C. The vessel is specially designed and designated for NAABSA (Not Always Afloat But Safely Aground) berthing and is therefore able to beach onto a suitably prepared river bed. Key features of this vessel are:

- the cargo deck (or “roadway”) can be adjusted while the vessel is beached, to lower the deck to a level only approximately 1m above bed level
- The stern of the vessel is fitted with opening doors and an adjustable ramp to allow wheeled loads to roll on and roll off (RoRo).

Vessels to the design of that proposed by Wynn’s are not common and it is therefore prudent to also consider alternatives that are more widely available. For this purpose the use of a dumb pontoon type barge towed by one or more tugs has also been considered. Such a barge is anticipated to be of broadly similar plan dimensions to the Terra Marique, but would offer less flexibility for unloading the AIL cargo. Such barges would commonly be provided with a ramp to allow wheeled cargo to be rolled off, however the deck level would not be adjustable. The causeway height above the bed level at the berth would therefore need to be greater in order to accommodate the greater deck height. The deck height is likely to be around 3m, requiring the causeway height above bed to be approximately 2.5m (after allowing for some height to be accommodated by the ramp).

The concept design for causeway and berth allows for accommodation of either the specialist vessel or pontoon barge.

2.3 Key Assumptions and Limitations

The proposed concept arrangement of the causeway and modifications to the existing flood defences have been developed based on following assumptions:

- Location is within Area 1 as defined by the Wynn's report but with the precise location adjusted to accommodate the preferred on-land haul route.
- Conceptual layout of the causeway is broadly as indicated in Wynns report except that the top width is to be increased to 12.5m to allow greater flexibility to accommodate the swept path required by the AIL transport vehicles.
- The abnormal indivisible load would be transported to site in a specialist heavy lift barge such as the Terra Marique proposed by Wynns Limited or by a dumb barge and tug, as detailed above
- Position of the barge when beached to allow for sufficient depth of water at high tide to allow sufficient tidal window for the causeway to be above water at low tide.
- No site specific geotechnical information is available. AECOM has obtained from the BGS archive details of boreholes located in the general area of the site, taken from the British Geological Society (BGS) archive website. However this borehole data can only be used as a general guide to the geotechnical strata to be encountered as its applicability to this specific site is limited and uncertain.
- The geotechnical data held by the Environment Agency has not been received in time to inform this package of work so AECOM assumed a credible worst case scenario for geotechnical conditions at the location to conduct stability checks on two cross sections of the causeway, and for sizing a gabion wall at the waterside end.
- No cross currents or waves loads were considered in the stability checks of the causeway or the gabion. These will need to be considered in later stages of design development.
- A 1:3 (vertical: horizontal) slope is assumed for the sides of the causeway.
- Bathymetry at the site is taken from PLA Nautical Chart 337.
- Ground levels and existing flood defence levels are as described in Section 2.1 above.
- A conservative layout of infrastructure required (and hence not necessarily the most economic design or what would actually get built) has been adopted for the causeway arrangement at this stage in the absence of site specific geotechnical data.
- Should the ground conditions prove to be significantly worse than assumed at this stage, the concept allows for options to improve stability, e.g. ground improvement or soil replacement.
- Minimum width of the causeway provided is 12.5m to allow for the AIL load and swept path of the AIL transport vehicle.
- A high level structural stability check (only) has been performed on existing river wall opening and potential flood defence gate arrangement and high level sizing of pre-cast concrete pad running surface at this stage.
- Drawings indicate a conservative arrangement so that the environmental assessment can be compliant with the "Rochdale Principle" by recognising that the actual extents are not yet known but demonstrating that the conservative potential impact has been assessed.
- Existing river wall will be demolished between existing movement joints and a new flood defence wall will be constructed to minimise the effects from new flood defences on the stability of the existing structure.
- Nett transport weight of the abnormal indivisible load is taken to be 325 tonnes as specified in the Wynns report.
- AILs will be transported using either SPMTs or flat top trailers, as defined in the Wynns report. A configuration for the flat top trailer option has been received from Wynns Limited (see Appendix B).

2.4 Safety in Design

AECOM has undertaken a Designer's Hazard Assessment to inform development of the concept design. Key hazards identified include working over water and in tidal water. The concept has been developed to minimise the risks arising from these hazards by facilitating construction from the shore, and avoiding or minimising the need to use major floating plant for causeway construction (other than dredging of berth/beaching pocket) or to place material under water.

Output from the AECOM design hazard assessment is included in Appendix D.

2.5 Environmental Mitigation

In developing the concept design, AECOM has sought to minimise the likelihood of the causeway structure causing significant scouring of the existing foreshore, in order to mitigate the risk of damaging the inter-tidal habitat beyond the footprint of the causeway itself.

The Thurrock Power project team includes environmental specialists that are assessing the potential environmental impact of the works and will recommend potential mitigation and/or enhancement features if appropriate.

3. Operation

As shown on the general arrangement drawings in Appendix A, abnormal indivisible loads (AILs) (heavy engines for example) will be delivered by sea using a heavy lift barge and offloaded using the causeway.

The sequence of operation would be as follows:

1. Prior to arrival of the barge, the gate installed within the flood defence wall will be opened to permit vehicles to pass through the opening.
2. The barge vessel will arrive at the site during a high tide and will position itself above the required beaching location. As the tidal water level falls, the barge will settle onto the prepared area of river foreshore at the required location (the berth beaching pocket). The barge will be made secure. If necessary, two buoys will be provided to assist with the use of winching to achieve final precise positioning of the vessel.
3. When the tidal water level has dropped sufficiently to fully expose the causeway a mobile crane will travel down the causeway to one of the crane pads adjacent to the barge. This crane will assist with deployment of the barge ramp to form a transition between the barge and the causeway. (Note: this crane will not lift the AIL loads)
4. Unless already on the vessel, a SPMT (Self-Propelled Modular Transporter) or flat top trailer will travel down the causeway and onto the barge deck, and the AIL secured to the SPMT or trailer.
5. The SPMT or trailer will travel over the vessel ramp onto the causeway, along the causeway, through the gate in the flood defence wall, and onward via a permanent haul road to the power station construction site.
6. The crane will dismantle the barge ramp and re-stow on the vessel, before returning to shore along the causeway.
7. The vessel will await the rising tide and, when the water level is sufficiently high, re-float and sail away from the site.
8. The gate in the flood defence wall will be closed to keep the flood defence line watertight.

This process will be repeated for arrival of the heavy lift barge. The flood defence wall gate will remain closed between barge arrivals, thereby ensuring that the flood defence is maintained at all times except at the times of receiving an AIL delivery. AIL deliveries and barge arrivals will be pre-planned well in advance and will avoid forecast storms and tidal surges and would therefore not be planned for times when it would be necessary for the flood defence gate to remain closed.

The operational availability of the causeway, allowing for a one-hour window at high tide to manoeuvre the vessel onto and off the berth area, has been assessed and is estimated to be approximately 90% of the high tides being operable.

4. Structure

4.1 Key Parameters

Key parameters of the causeway design are summarised in Table 1.

Table 1. Key Parameters

Parameter	Definition
Max. Barge draught	3.5m
Under Keel-Clearance	0.5m
Upper Causeway level	+4.3m OD
Lower Causeway level	+1m OD
Causeway Length	181m

4.2 Causeway

The causeway is provided with a minimum crest width of 12.5m which is sufficient to accommodate the dimensions of the anticipated AIL and its swept path. The causeway crest falls away from the shore at a longitudinal gradient of approximately 1:40 maximum, in order to comply with the maximum gradient requirements of typical SPMTs and heavy lift flat top trailers. At the outer end of the causeway, two crane pad areas are provided to accommodate the crane required to assemble the barge ramp structure.

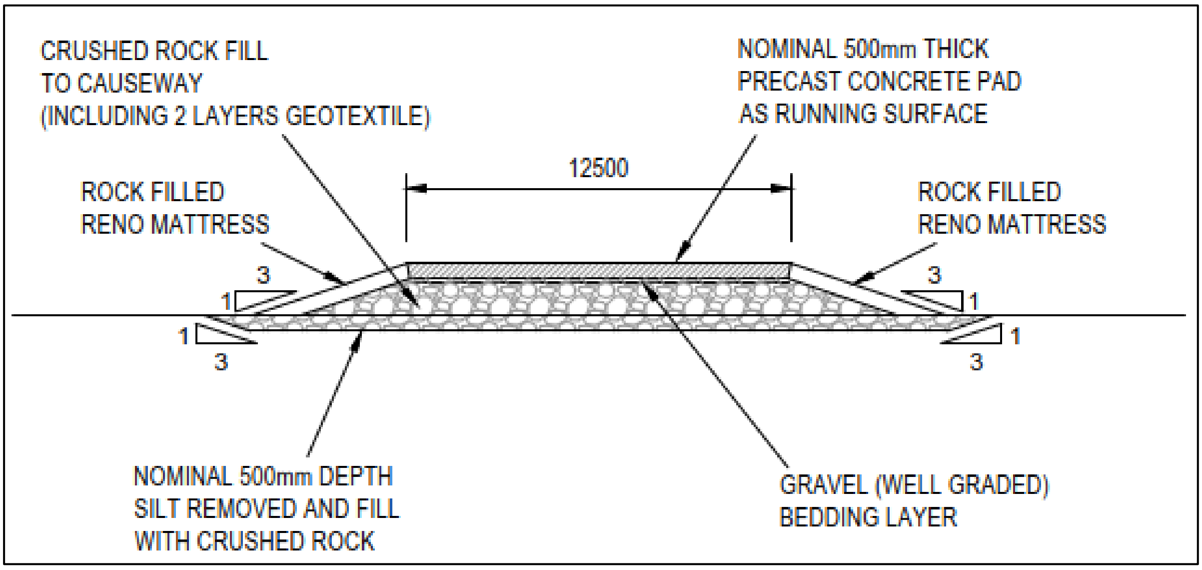
To construct the causeway, the very soft foreshore sediment will be removed at low tide and backfilled with crushed rock fill placed on a geotextile (to prevent the rock sinking into the bed material below). The causeway is then formed from further crushed rock aggregate, reinforced by one or more further layers of geotextile.

The longitudinal sides of the causeway will be formed to a stable slope and protected from erosion by tidal currents by rock filled reno-mattresses or suitably sized rock riprap.

At the river end of the causeway, a gabion wall is provided in order to retain the causeway material and to provide a nominally vertical face adjacent to the beached barge.

The causeway crest will be protected against erosion by tidal currents by rock filled gabions or, if necessary to provide an improved running surface for the SPMT and trailer vehicles, by precast concrete pads. Both options will facilitate some local adjustment of the running surface between AIL deliveries if necessary to compensate for local differential settlement in the underlying river bed.

Figure 2 Typical cross section of Causeway structure



4.3 Flood Defence Wall Modification

The landward end of the causeway will tie into the existing ground level immediately in front of the reinforced concrete flood defence wall. A length of this existing wall will be broken out and reconstructed to incorporate a gated opening to provide a clear opening of sufficient width to permit the AILs to be driven through the wall.

A sufficient length of the existing river wall will be demolished (between existing movement joints) and a new flood defence wall will be constructed accommodating a flood gate to a design approved by the Environment Agency (EA). The flood gate will consist of a slot in barrier system with removable posts. This will enable a clear and unobstructed opening for trailer access to deliver abnormal indivisible loading.

At the end of the power station and LTC's construction period, if the Environment Agency's preference is to keep the slot-in barrier system it will allow them to maintain the gates without the need for heavy lifting operations that would otherwise need with mechanical gate systems.

If the Environment Agency would require the gates to be replaced with a reinforced concrete river wall this could be accommodated in the design by providing couplers (base and sides) to fix the reinforcement and to concrete the opening to fill the opening flush with the existing river wall.

It is acknowledged that the position of the retained panels either side of the opening will need to be monitored for differential settlement, and stabilised if necessary.

4.4 Preparation of River Bed for Beaching of Barge

The delivery barge is specially designed to be safely beached onto the river bed however the bed must be prepared to be suitable for safe beaching. Preparation will include removal of high spots, infilling of any large low spots and removal of any hard spots or foreign materials found at the surface. This preparation will be undertaken over an area extending slightly larger than the barge in order to allow for some flexibility and adjustment in the precise position of the barge. In addition, the beaching area must be re-profiled to be sufficiently level, and will be reduced in level (by dredging) to optimise the beaching level relative to the tidal range (approximately -1.77m AOD).

4.5 Retention of Causeway

Although the principal use of the causeway is to facilitate the initial construction of the power station, it will remain in place throughout the life of the station in order to facilitate offloading of replacement plant (generators etc) if appropriate.

5. Construction Methodology

The anticipated construction method for the causeway and crane platform is by a backhoe working progressively outward from the river bank, replacing the excavated/dredged material with the crushed rock fill, laying the geotextile layers and completing the rock mound to the design level, prior to placing the precast concrete pads. To avoid the existing undrained cohesive soil below the causeway slipping under loading from the excavator, the excavator will form a working platform to support itself, as it advances. Geotextile/geogrid will be placed below the rock fill, and further geotextile/geogrid layers placed within the rock fill layer, to raise the tensile strength and assist with spreading the load.

The anticipated dredging method for the beaching pocket is by a floating marine dredging plant. A decision on the optimum dredging plant will be made at a later stage, as this depends on several environmental and economic factors including the availability of dredgers within the London area at the time the works are to be constructed. Feasible dredging plants are Backhoe dredger, trailer suction hopper dredger, cutter suction dredger. Use of a water injection dredger may be feasible subject to further engineering studies into the properties of the material to be dredged. Use of a backhoe dredger mounted on a floating barge is currently considered to be the most likely. Dredged material would be disposed of to a licensed disposal area within the Thames estuary or, if the material is contaminated, to land (likely to be the nearby site currently receiving spoil from the Thames Tideway Tunnel development works).

6. Estimate of Required Dredging Volume

6.1 Basis of Estimation

The volumes are estimated based on the concept design shown in the drawing THPP-ACM-ZZ-XX-DR-MT-00001. Dredging is required for two purposes:

- To remove (and permit replacement of) soft material from below the causeway footprint, and
- To reduce the bed level at the berthing location (and to form stable side slopes to this area).

The design dredging level is defined as 0.5m below the riverbed level (see Figure 2 above), hence a layer of 0.5m metres of the top layer of the silt shall be removed from the river bed. Lateral slopes applied for dredging in silt for the temporary works are 1V:5H (1 vertical to 5 horizontal). Natural riverbed slopes at the riverbank adopt slopes up to 1V:14H which gives an idea of the expected natural slope of the works exposed to the tides and currents action along the design life of the causeway. 1V:3H as stated in the initial approach (Figure 2 Typical cross section) is considered unstable, especially in an area subject to strong tidal currents as the Thames estuary.

The volume of the dredged area is reliant on the height of the causeway material required on top of the river bed to ensure a 1V:40H slope. The causeway being sloped on either side at 1V:3V therefore that the height of the material on top of the river bed also affects the width and in turn the width for the dredged amount contributing to the dredged volume. Spot points along the arced causeway axis, interpolated from the navigational points (in Chart Datum), were used to find the material required on top of the river bed that at that distance from the gabion would result in an appropriate height for the 1V:40H slope. These measurements were taken up from the gabions location, river bed level 0m AOD, to the Mean High Water [MHW] mark and then onto the +5m AOD at the flood wall location.

Volumes defined as excavations are those landwards from the MHW mark-up to the top of the floodwall line.

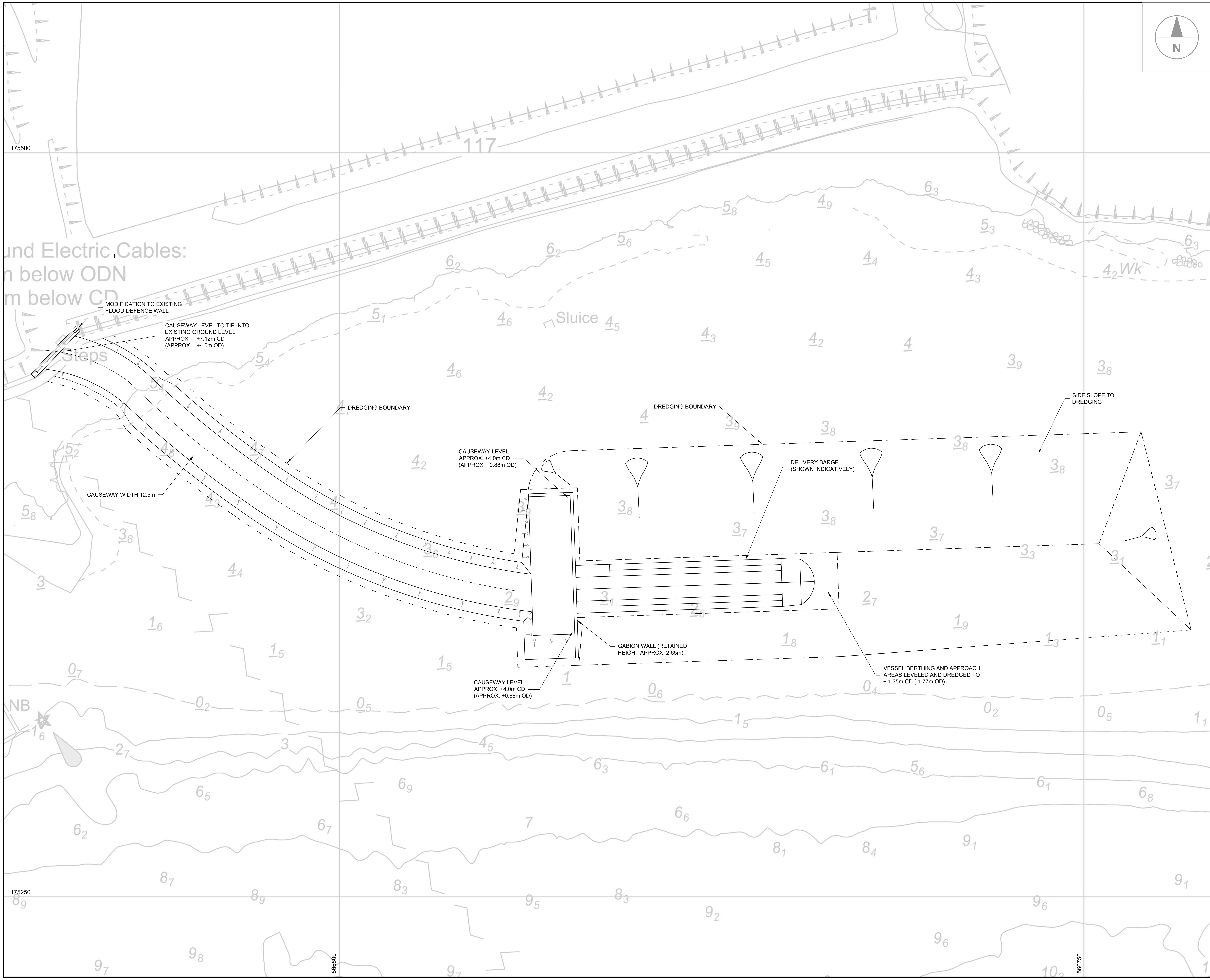
6.2 Dredge Volume Estimate

The total dredging and excavating quantity including the grounding pocket, is estimated to be 16,100m3. Included within that estimate is dredging for removal of existing soft material below the causeway structure estimated to be 2,914m3. Excavation volume landward of the MHW mark included in these figures is 220m3.

Appendix A - Concept Design Drawings

Project Management Initials: Designer: ORIG Checked: CHK Approved: APPR Drawn: PDV ISO A1 594mm x 841mm
Revision: x01.1

Last saved by: PAUL.BARTON(2019-09-13) Last Plotted: 2019-09-13
Filename: \\ba-wip-002\WPP\5 Projects\60592577 - Thurrock\CAD\THPP-ACM-ZZ-XX-DR-MT-00001_P02



This drawing has been prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent. Do not scale this document. All measurements must be obtained from the stated dimensions.

AECOM

PROJECT

THURROCK POWER PLANT

CLIENT

STATERA ENERGY LIMITED

CONSULTANT

AECOM Limited
Midpoint, Alencon Link
Basingstoke
Hamphire, RG21 7PP
T:+44-1256 310200
www.aecom.com

NOTES

1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE NOTED. DO NOT SCALE.
2. PRIMARY LEVELS SHOWN ARE IN METRES CD, LEVELS IN BRACKETS ARE IN OD. OD IS 3.12m ABOVE CD.
3. DREDGING DESIGN LEVEL +1.35m CD TO ALLOW MANOEURVING WITH MEAN HIGH WATER NEAPS (MHWN).
4. DREDGING LAYOUT INDICATIVE BASED ON PLA CHART 337, DETAILED BATHYMETRY REQUIRED FOR DESIGN PURPOSES.
5. SIDE SLOPE FOR BEACHING POCKET IS APPROX. 1V:14H, MATCHING EXISTING NATURAL RIVERBED SLOPE TO THE SOUTH OF THE POCKET.
6. CAUSEWAY DREDGING BOUNDARY ALLOWS FOR A 0.5M DEEP DREDGING. GROUND INVESTIGATIONS SHALL BE UNDERTAKEN TO DEFINE THE CORRECT DREDGING DESIGN LEVEL..

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P02	13.09.19	BERTH LEVEL LOWERED TO +1.35m CD
P01	29.08.19	BERTH DREDGING ADDED

ISSUE PURPOSE / SUITABILITY

Initial Status or WIP

KEY PLAN

PROJECT NUMBER

60592577

SHEET TITLE

CAUSEWAY CONCEPT DESIGN REVISED LAYOUT AT LOCATION 1A

SHEET NUMBER

THPP-ACM-ZZ-XX-DR-MT-00001

Appendix B - Flat Top Trailer Configuration

Table 2 – Potential Flat Top Trailer Configurations 325te nett

Flat Top Trailer Details	
TRAILER NUMBER	16 Row
No. OF AXLES	16
TRAVELLING HEIGHT (M)	7.55
REDUCIBLE HEIGHT (M)	7.3
WIDTH (M)	5.1
NETT WEIGHT (te)	325
GROSS WEIGHT (te)	381
OVERALL LENGTH (M)	54.2
RIGID LENGTH (M) (EXCLUDING DRAWBAR)	26.5
AXLE WEIGHTS (te)	23.8
AXLE SPACINGS	15 x 1.6
OUTSIDE TRACK m	3.65
LATERAL SPACINGS	0.95
	1.16
	0.95
BLOCK LOADING GROUND PRESS T/M2	4.3

EACH TRAILER WILL BE ACCOMPANIED BY TWO TRACTORS, ONE PULLING, ONE PUSHING, EACH BETWEEN 40 AND 48 TONNES GROSS.

#· please note trailer details can be changed by hauliers for specific movements and configurations and are based on information available to us at this time.

Appendix C - Specialist Heavy Lift Barge Specification

THE TERRA MARIQUE

ROBERT WYNN & SONS LTD.
ESTABLISHED 1863

TERRA MARIQUE

The Terra Marique is a specialist heavy lift barge designed to carry abnormal indivisible loads. Its design has combined state-of-the-art technology with traditional marine and heavy transport engineering. The sea going barge has been developed to maximise the utilisation of UK and European ports, rivers and inland waterways.

There are a number of specific attributes that contribute to making the Terra Marique unique in the European shipping market, her hydraulic roadway and ballast system allow the vessel to offload on varying quay heights and riverbanks.

The Terra Marique has a specially strengthened hull to allow the vessel to beach land with minimal need for on site preparation, thus facilitating direct delivery to coastal and inland sites.

Terra Marique's ability to semi-submerge allows it to act as a mobile dry dock or ship lift and can transport smaller vessels, thus facilitating access to the UK and European inland waterway network without transhipping from sea passage.

Terra Marique is able to carry out tasks previously considered fraught with complications and expense.

Basic functions	: Heavy load transport Ro-Ro, Lo-Lo, Float-in, Float-out
Classification	: Lloyds Register of Shipping 100AT Barge UK coastal service LMC Limited self-manoeuvring capability LA and strengthened for loading and unloading aground. ES (+20% on all shell and deck plating) UK MCA Class IX (A) Vessel
Dimensions	
Length o.a.	: 80.0m
Beam mld	: 16.5m
Depth to coaming	: 8.5m
Depth to main deck	: 6m
Deadweight	: 2211Te
Design draft	: 1.6m to 4.8m dependant on cargo
Hold dimensions	
Length	67m
Width	: 9m
Roadway clear width	: 8.4m
Cargo deadweight	: 1350Te
Elevating roadway	: 3 sections, SWL 600Te each
capacity	: 400Te
Tank capacities	
Fuel oil	: 34m3
Lub. oil	: 4m3
S.W. ballast	: 2800m3
Performance	
Speed forward	: 4.75kn
Speed transverse	: 1.5kn
Bollard pull	: 5.0Te
Propulsion system	
Main drive	: 2 x 670 kW, Caterpillar 3508 B
Output	: 2 x 630 ekW @ 1500 rpm
Propulsion	: 4 x Pumpjets, 200kW each

Auxiliary equipment	
Harbour set	: 1 x Caterpillar 3304 NA
Output	: 1 x 50 ekW @ 1500 rpm
Ballast pumps	: 4 x 680 m3/hr
Deck lay-out	
Deck cranes	: 2 x Knuckle boom type
Capacity	: 10Te @ 14m
Spud poles	: 2 x 7.5m
Cargo winches	: 2 x 15 Te, electro-hydraulic driven
Mooring system	: 4-point type
Extra ramps	: 9 x 1m x 16.8m : 5 x 1m x 14m

Accommodation

1 x Air conditioned accommodation container for 3 crew members with toilet and galley

Terra Marique carries a 500Te towhead.

Whereas these particulars are believed to be accurate at the time of publication their accuracy is not guaranteed. It is therefore essential to confirm with owners the vessel's suitability for use in connection with any particular movement.

Shaftsbury House, High Street, Eccleshall, Staffs ST21 6BZ
Tel: +44 (0)1785 850411 Fax: +44 (0)1785 851866
robertwynnandsons.co.uk
Email: enquiries@robertwynnandsons.co.uk

Appendix D – Designer's Hazard Assessment

Menu | SiD Procedure | Instructions | Safety Review Check List | Safety Symbols | Residual Hazard & Risk Log | SiD DOCS | Example Sheet | Revision

AECOM

Concept Design - SiD Assessment

AECOM Project Name: Thurrock Power - AIL Offload Causeway

AECOM Project No: 60592577

Risk Rating (Probability x Severity)
1 to 4 (Low)
5 to 9 (Medium)
10 to 25 (High)

Probability	Severity: 5 - Catastrophic	4 – Critical	3 – Major	2 – Moderate	1 - Minor
5 – Frequent	25	20	15	10	5
4 – Probable	20	16	12	8	4
3 – Occasional	15	12	9	6	3
2 – Remote	10	8	6	4	2
1 - Improbable	5	4	3	2	1

Hazard and Risk Identification						Pre-mitigation assessment			Mitigation	Post-mitigation assessment				Output				
Item No.	Feature, element, structures, process or activity considered	Client's or other H&S Information used	Significant Design Hazards Identified	Design Risks Identified	Environment/Persons at Risk?	Severity	Probability	Risk Factor	Design input Control to Eliminate or Reduce Hazard and/or Reduce Risk	Has Selected Control created a new Hazard? (Y/N)*	Severity	Probability	Risk Factor	Output Residual Hazard to Residual Hazard Log	Output Residual Risk to Residual Hazard Log	Ownership	Output Residual Design Hazard Feedback Location	Closeout date for Output
1	AIL Offload Causeway	n/a	Underlying ground may have insufficient load bearing capacity resulting in instability or excessive settlement	No geotechnical data available	User (Operations stage)	4	4	16	Assume appropriate conservative parameters based on broader experience of River Thames foreshores at other locations. EA have borehole data immediately landside of existing river embankment at this site location: obtain for use in outline design stage.	NO	3	3	9	Underlying ground may have insufficient load bearing capacity resulting in instability or excessive settlement.	No geotechnical data available -obtain EA held data.	Client and Designer (Outline Design stage)	Residual Hazard & Risk Log	Preliminary Design stage
2	AIL Offload Causeway	n/a	Drowning	Working in or over water - construction within water body (River Thames	Construction stage personnel	4	4	16	Concept design to minimise need for construction in or over water and maximise extent to which the causeway can be constructed working out from the shore	NO	2	2	4					
3	AIL Offload Causeway	n/a	Drowning or being swept away by tidal currents	Construction within tidal water body (River Thames	Construction stage personnel	4	4	16	Concept design to minimise need for work to be undertaken underwater and maximise extent to which the causeway can be constructed during limited time windows of opportunity when low tide periods when the causeway and beaching area is above tidal water level	NO	1	2	2					
4	AIL Offload Causeway	n/a	Personnel or plant becoming trapped in very soft river foreshore mud/silt	Although river foreshore within causeway footprint may be stabilised and/or strengthened, personnel or plant may need to access adjacent unimproved areas of soft foreshore.	Construction stage personnel	3	3	9	Concept design to facilitate construction of causeway from within its own footprint and eliinate need to enter adjacent foreshore	NO	2	1	2					
5	AIL Offload Causeway	n/a	Damage to health from handling contaminated soil	Existing foreshore mud/silt may be contaminated from either previous uses of the area or by material carried on river tidal currents	Construction stage personnel	3	4	12	Desk study to identify likelyhood. Obtain samples of foreshore mud/silt during Outline Design Stage	YES	3	2	6	Damage to health from handling containated soil	Inadequate data on presence of contanination - Sample testing required (during Preliminary Design stage).	Client and Designer (Outline Design stage)	Residual Hazard & Risk Log	Preliminary Design stage
6 (new hazard created by 5)	AIL Offload Causeway - Site Data Collection	n/a	Drowning and/or entrapment in soft foreshore mud/silt	Need to access existing river forshore to collect soil samples for testing for contamination	Site investigation personnel	4	4	16	Site sample collection works to be pre-planned and subject to separate detailed hazard assessment.	NO	4	4	16	Drowning and/or entrapment in soft foreshore mud/silt	Need to access existing river forshore to collect soil samples for testing for contamination. Activity to be risk assessed and planned for safe execution accordingly (Preliminary Design stage)	Client and Designer (Outline Design stage)	Residual Hazard & Risk Log	Preliminary Design stage
7	AIL Offload Causeway	n/a	Direct damage to inter-tidal foreshore habitat	Construction activities may damage excessive areas of intertidal foreshore	Environment - intertidal foreshore habitat	2	4	8	Concept Design to minimise direct footprint area (to extent comptible with saft operation and construction).	NO	2	1	2					
8	AIL Offload Causeway	n/a	Indirect damage to inter-tidal foreshore habitat	Causeway (and/or construction activities) may result in unacceptable levels of indirect impact on intertidal foreshore (eg by causing eccesive scour and/or siltation upstream or downstream)	Environment - intertidal foreshore habitat	2	3	6	Concept Design to minimise disruption to tidal current flows	NO	2	2	4					
9	AIL Offload Causeway	n/a	Collision by passing shipping	The causeway and/or beached barge may be a hazard to safe navigation, resulting in collision by passing shipping.	Construction stage and Operations stage personnel and equipment	4	2	8	Consult with Port of London Authority (PLA). Outline design to incororate any navigation safety aids required by PLA.	NO	4	1	4					
10	AIL Offload Causeway	n/a	AIL driven off edge of causeway	SPMT/flatbed heavylift trailer vehicle could be driven off side of causeway; curved alignment of causeway accentuates this risk.	Operations stage operator (Specialist heavylift operator).	4	2	8	SPMT / heavylift trailers to be operated only by suitably experienced specialist heavylift operator. Causeway width is increased to be 25% greater than the minimum specified by specialist heavylify contractor. (Note: provision of effective upstand curb would conflict with other hazard/risks including increasing exposure to tidal current damage).	NO	4	1	4					
11	AIL Causeway - Modification of Existing Fllod Defence Wall	n/a	Insufficient data relating to existing flood defence wall to be partially demolished /broken out.	No other as built data available at Concept Design Stage.	Construction personnel	2	4	8	Top of wall level obtained from Environment Agency (EA). As-constructed data to be obtained from EA prior to Preliminary Design Stage.	NO	2	1	2					
12	AIL Causeway - Modification of Existing Flood Defence Wall	n/a	Collapse of existing flood defence wall	Uncontrolled collapse of wall during demolition. Compromised stability of remaining adjacent sections of the wall during construction / demolition operations. Loading from SPMT/ heavylift flatbed trailer induces differential settlement under remaining parts of the wall.	Construction personnel	3	3	9	Limits of demolition/ breaking out specified to coincide with existing movement joints in existing structure. Width of break-out is specified as 12.5m, more than 25% wider than the width of ground loaded by the SPMT /heavylift flatbed trailers, reducing risk of inducing defferential settlement below remaining existing wall.	NO	2	2	4					
13	AIL Causeway - Modification of Existing Flood Defence Wall	n/a	Heavy lifting of flood gate components	Operation to open and close the flood gate may require handling of heavy components.	Operations personnel	2	5	10	Flood gate is specified as a propriatory design consisting of components of limited size and weight specifically designed for safe manual handling.	NO	1	2	2					
14	AIL Causeway - Modification of Existing Flood Defence Wall	n/a	Need for further demolition if EA require reinstatement of reinforced concrete wall when causeway no longer required (following completion of power station construction). Hand vibration injury during breaking out of wall structure if new foundation has to be modified to accommodate new wall upstand without further demolition	Potential need to remove flood gate and reinstate reinforced concrete wall would give rise to need for further demolition or alternatively to need for drilling and scabbling to retro-fit wall upstand onto the new wall foundation.	Demolition/ (re-) construction personnel	2	3	6	New wall base concept design allows for design to accommodate retro-fitting of wall upstand (eliminating need for demolition) and can be designed for sockets to be cast in for future reinforcement to wall upstand (eliminating drilling/ breaking out).	NO	1	3	3					