Title: **Surface Water Management and Foul Drainage Design Philosophy Statement**

Project: **NK016315**
Prepared for: **Kemsley Sustainable Energy Plant**

Date: 13th December 2016

Our Ref: NK016315

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QUALITY MANAGEMENT

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Revision History

Rev.	Description
Rev A	Amended in accordance with landowners comments in clause 7.2.10
Rev B	Project description fuel stock capacity corrected.
Rev C	Design Addendum added. Appendix D, Appendix C contents replaced accordingly. 7.3.11; 7.3.2; 7.3.3 updated in accordance with Design Addendum.
Rev D	Section 7 – clauses 7.1, 7.2.1, 7.2.3, 7.2.4, 7.3.1.1, 7.3.1.2, 7.3.2, 7.3.3 and 7.3.4 amended. Section 8 – clause 8.1 amended. Section 9 – clause 9.1 amended. Appendix B – figures updated. Appendix C – WINDES microdrainage calculations updated. Appendix D – omitted.
Rev E	Appendix B – figures updated

CONTENTS

1 INTRODUCTION

1.1 The following report outlines the scheme design philosophy with respect to surface water, foul and process drainage for a proposed Sustainable Energy project to be constructed on the Swale Estuary at Sittingbourne in Kent.

2 PROJECT DESCRIPTION

2.1 The proposed project will comprise:

- A sustainable energy plant with a fuel stock capacity of 550,000 tpa.

The facility will use combustible non hazardous waste as the fuel source.

In addition to the main fuel store, treatment, boiler and turbine buildings, ancillary development will comprise access roads, parking, weighbridge, maintenance and office areas.

The current site layout is indicated on drawing figure 4.3D.

3 GROUND CONDITIONS/ADJACENT LAND

3.1 A phase II site investigation undertaken by RPS in July 2009 indicates that the geological strata beneath the site comprise:

(i)

(ii) Cohesive made ground to maximum thickness of 4.5m.

(iii) Cohesive alluvium to maximum thickness of 3.5m

(iv) London clays to maximum thickness of 5m.

These deposits overlay the solid geology associated with the Woolwich and Thanet sands and Cretaceous bedrock Chalk.

Historical site investigation information made available by the landowner indicates the following:

(i) The area of land to the north of the site was previously used to store coal. This area is indicated as hatched on the drawings. The made ground in this area retains a residual coal element.

(ii) The area to the south of the site forms the Kemsley Waste Disposal Site (KWDS). This landfill area has recently been capped with clay. An access track forms the northern boundary of the KWDS. It is understood that methane monitoring stations are located along the path. Furthermore it is believed that leachate from the KWDS is discharged to an existing ditch located on the development site.

It is proposed that the path is retained on its present line such that access is maintained post development.

4 GROUND WATER

4.1 The site investigation groundwater monitoring indicates wide spread seepage within the made ground and alluvium layers. It is likely that this represents a perched system. A deeper groundwater system (most likely in continuity with the Swale estuary) was encountered at a depth of 14m below existing ground level.

The London clay is classified as a non-aquifer. The Woolwich and Thanet sands are minor aquifers and the chalk bedrock is classified as a major aquifer.

5 EXISTING TOPOGRAPHY AND PROPOSED FINISHED LEVELS

5.1 The existing site slopes gently from west to east towards the Swale estuary.

The elevation at the western end is approximately 7.0m AOD and at the eastern boundary approximately 4.0m AOD. Finished floor levels for the proposed scheme are anticipated to be set to a level of 6.30m. Thus part of the site will be in cut and part will require upfilling.

6 ECOLOGICAL CONTEXT

6.1 A phase I Habitat and Scoping Survey and assessment was carried out by RPS in June 2009.

Much of the surrounding area to the north-east, east and south of the site is designated as SSSI, SPA and Ramsar notable for coastal grazing and salt marshes and intertidal habitat.

7 SURFACE WATER MANAGEMENT

7.1 Overall Philosophy

The current site generally comprises undeveloped marsh land (together with a stock pile area used by the adjacent paper mill). The construction and operation of the new development will therefore significantly increase the impermeable area of the site and hence the volume of the surface water run-off from the site and potentially the nature of the run-off in terms of its capacity to pollute receiving watercourses/bodies.

The overall philosophy for the design of the surface water drainage system for the site development is therefore to manage surface water discharge sustainably and at source and to ensure that discharged waters do not constitute a pollution risk.

This overall approach is in accordance with the requirements of Appendix F of PPS 25 (Development and Flood Risk). PPS 25 has now been superseded by Planning Policy Framework (NPPF) with particular reference to paragraph 9 of the Technical Guidance to the NPPF published in March 2012. It is anticipated that the pollution risks identified and mitigations proposed in this document will satisfy the requirements of the relevant planning consultees such as the Environment Agency and Natural England.

The Surface Water Drainage design is shown on drawing figure 4.25D. As shown on the drawing, it is proposed that all clean surface water from the site is discharged to receiving storage pond constructed on the site as shown on drawing figure 4.24D. The storage pond discharges this water under gravity to the tidal Swale estuary to the north east. The provision of the constructed pond will provide an effective and economic way of conveying water to the receiving swale during normal conditions with the added benefit of protecting the adjacent marsh land habitat from surface water run-off. The pond will also provide protection against flooding of the site during design rainfall and tidal events. This design proposal is assessed in detail below against the following criteria:

- Pollution/Aquifer contamination
- Flooding
- SUD's
- Climate change
- Water reclamation

7.2 Pollution/Aquifer Contamination

The operation of the facility exposes the surface water management system to pollution risk. The operations and activities which contribute to this risk together with the proposed mitigation measures to be implemented are outlined below.

7.2.1 Potential Polluting Activities/Sources

The following activities/operations require consideration.

(i) Waste water associated with the process.

(ii) Movement of lorries, loading shovels and cars.

(iii) Storage of fuel and operation of on site re-fuelling facility.

(iv) Fire suppression.

(v) Landscape top soil run-off

(vi) Discharge of leachate from adjacent KWDS land.

(vii) Exposure of contaminated land/creation of pathways in areas adjacent to the site.

7.2.2 Waste Water associated with the process

Refer to Section 8 for further details.

7.2.3 Movement of lorries, loading shovels and cars

Normal activity

Minor day to day fuel/oil spillages from car/lorry/loading shovel engines will be flushed into the yard and car park surface water drainage systems and treated through by-pass interceptors.

The by-pass interceptors will be alarmed for fuel and silt build up and to indicate when routine maintenance is required.

Lorry yard accident / exceptional fuel spillage/unloading spillages

Lorry or loading shovel impact or damage to fuel pumps could result in volumes of fuel/oil released sufficient to exceed the capacity of the interceptors. In these scenarios untreated contaminated water would be discharged directly to the storage pond. In order to deal with this an electrically operated closure valve will be provided so that contaminated water is retained in the storage pond such that it can be pumped to tanker for removal off site.

7.2.4 Production of Domestic Foul Waste Water

The energy plant will comprise areas of office space with associated welfare facilities. The domestic waste water produced shall be discharged to the foul system.

7.2.5 Fire Suppression

In the event of fire, the water required to suppress it will be stored in pits and sumps constructed within each building. Perimeter upstands and ramped access doors will prevent this water escaping to the external areas. Contaminated water contained within the fire water pits and sumps will be tested and disposed of off site.

7.2.6 Landscape Topsoil run-off

Surface water run-off from the landscape slopes will be collected by a series of land drains located at the base of the slopes and these will discharge the water into the storage pond.

7.2.7 Aquifer Contamination

As indicated in section 3.1, the ground conditions effectively preclude the use of infiltration drainage techniques. Thus the project presents no risk of contamination to the underlying aquifers.

7.2.8 Existing Ditch

(i) The location of an existing ditch on the western boundary of the site is shown on the drawings. The land owner has indicated that this ditch does not receive any leachate discharge from the adjacent KWDS. In order to accommodate the proposed scheme the ditch will be infilled and a new mitigation ditch constructed – see section 10.

7.2.9 Adjacent Area Pollution Pathways

The construction of the storage pond will require works (including excavations) in the potentially contaminated areas on the boundaries of the site.

Excavations for the pond are likely to encounter the made ground. It is intended however that the storage pond will be lined with clean site won clay placed to a depth of at least 300mm. Thus potential for the pond to act as a pathway for coal residue pollution is removed.

7.3 Flooding

The site will be exposed to the risk of flooding due to the following:

(i) Exceedance of the capacity of the below ground pipework, channel drains storage elements, etc., constructed as part of the works during design rainfall events.
(ii) Failure of the above ground superstructure drainage elements such as siphonic pipework and gutters as a consequence of (i) above.
(iii) Exceedance of available storage capacity as a result of design rainfall events coinciding with tidal events. This situation will result in the site becoming tide locked. Thus discharge to the adjacent Swale estuary or Milton Creek would not be possible during these periods.
(iv) Inundation of the site of seawater during extreme tidal events.

For the purposes of this report, flooding as a result of (i), (ii) and (iii) described above is defined as:

- Rainwater falling on the development site, entering the drainage system and subsequently crossing the site boundary at any location.
- Rainwater falling on the development site, entering the drainage system and subsequently entering buildings on the development site.

7.3.1 Capacity Exceedance

7.3.1.1 Basic Criteria for Design

The surface water drainage system shown on drawing figure 4.25D will be designed in accordance with the following basic criteria:

(i) All network pipework will be designed for no surcharging above pipe soffit for 1 in 2 year design storms.

(ii) The system shall be designed not to flood (as defined above) for 1 in 100 year +20% climate change design storms.

(iii) The site drainage serving the roofs and external areas will discharge freely to the storage pond for all rainfall events.

(iv) The drainage networks will be designed and flooding simulated using WINDES micro-drainage software. All drainage will generally be designed in accordance with BS EN 752-2008: Drain and Sewer Systems outside buildings and the recommendations outlined in the 7th Edition of Sewers for Adoption.

(v) The roof drainage for the various buildings comprising the facility shall be siphonic drainage systems designed to provide category 3 protection (as described in BS EN 12056:3) and a 25-year design life. The siphonic drainage systems and gutters will therefore be designed for 1 in 100 year return period storms.

For the main buildings, a single primary siphonic system is proposed. This will be designed to take rainfall intensities of up to 231mm/hr and discharge directly to the underground drainage system. Overflows will also be implemented such that in the event of an exceptional rainfall event or blockage the water can still be discharged from the gutter.

7.3.1.2 Additional Comments with respect to Capacity Exceedance

In addition to the basic criteria defined above, it should be noted:

- As indicated on the drawing slot, channel and kerb drains constructed close to the surface will be utilized to a considerable extent. This will ensure that the drainage is generally kept shallow thus avoiding expensive and potentially dangerous deep excavations and the perched water table at high level.

- Storage of run-off water in external areas through design of external levels/provision of raised kerbs, etc., has not been utilized given the nature of the facility (extensive buildings, limited yard areas, potential ash contamination).

The two points above will require that, in effect, the below ground pipework and high level slot and kerb drains are designed to convey 1:100 year rainfall volumes directly to the storage pond.

It is proposed that the pond is designed such that a 600mm freeboard is maintained in the 1:100 year +20% climate change rainfall event combined with the 1 in 100 year storm surge.

7.3.2 Coinidence of Design Rainfall and Tidal Events

The RPS Flood Risk Assessment states that the EA has confirmed that there are no runoff requirements entering the Tidal Swale Estuary. Due to the tidal nature of the outfall, the outfall from the proposed site will not have any impact on flood risk in the Tidal Swale Estuary.

7.3.3 Tidal Range

The normal tidal range at the outfall is provided in the UK Hydrographic Office Admiralty Tide Table Volume 1 2016. The nearest tabulated port is Grovehurst Jetty (within 200m of the proposed outfall). The normal tidal range (in m AOD) for this is give in Table 1.

LAT (m)	MLWS (m)	MLWN (m)	MHWN (m)	MHWS (m)	HAT (m)
-2.9	-2.3	-1.4	+1.8	+2.9	+3.4

Table 1: Tidal Range at Grovehurst Jetty (2000)

Where:

- MLWS: Mean Low Water Springs
- MLWN: Mean Low Water Neaps
- MHWN: Mean High Water Neaps
- MHWS: Mean High Water Springs
- LAT: Lowest Astronomical Tide
- HAT: Highest Astronomical Tide

Figure 1 shows the Tidal Cycle for Sheerness adjusted for Grovehurst Jetty (from UK Hydrographical Office Admiralty Tide Table) for the 1 in 200 year + 20% climate change event.

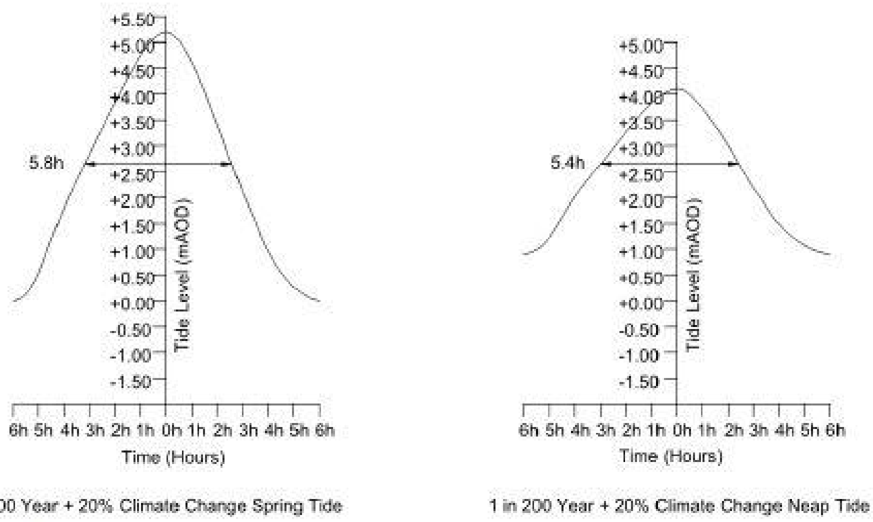


Figure 1: Tidal Cycles at Grovehurst Jetty

These show that if the outfall is set at a level of 2.65m AOD then the pond is tide locked for a maximum period of 5.8 hours (350 minutes). For Kemsley the total rainfall for a 360 minute 1 in 100 year rainfall event is 73.7mm (based on data from the Flood Estimation Handbook Version 3). Including 20% climate change this becomes 88.5mm.

The total equivalent impermeable area (taking 1.0 as a runoff coefficient for hardstanding and 0.3 as a runoff coefficient for softscape) of this is 3.4 hectares. The total area of the pond is assumed to be 5000m² taking the total equivalent impermeable area to 3.9 hectares.

This gives a total runoff volume during the 360 minute 1 in 100 year + 20% climate change rainfall event of 3500m³. The attenuation basin is therefore to be sized to meet this criteria.

7.3.4 Discharge

The design principles assume that the pond must fully empty before the outfall becomes tide locked again. Making the conservative assumption that no discharge occurs until the tide level falls below the invert of the outfall this means that the pond must discharge fully within a period of 6.2 hours. Over 6.2 hours this flow rate would be sufficient to drain 7700 litres indicating that this criteria will be met.

7.4 SUD's

With reference to NPPF and CIRIA SuDS Manual C753 a sustainable approach to the management of surface water drainage is to be adopted:

(i) The perimeter storage pond will be vegetated and will hold, slow down and contribute to treatment of the run-off water. The pond will prevent uncontrolled discharge water entering areas of land adjacent the site.

(ii) The water reclamation systems indicated, represent additional source control in addition to providing a useable resource.

The ground conditions comprising essentially cohesive impermeable strata to considerable depth and the presence of perched water table preclude the use of infiltration devices.

7.5 Climate Change

As indicated in preliminary discussions with the EA and as recommended in NPPF design peak rainfall intensities will be increased by 20% as a precaution against the effects of climate change.

8 PROCESS DRAINAGE

8.1 The following measures will be implemented to deal with waste process water generally. In the tipping hall and bunker it is not intended that any dedicated internal drainage is provided with all water draining into the bunker and soaking into the waste. The bottom ash hall will drain to the dedicated process drainage network in which effluent is collected, treated and recirculated inside the plant.

(i) Buildings or equipment areas where waste water is generated or the risk of spillage of fuel, oil, condensate etc. is present will be provided with internal building drainage as necessary.

(ii) It is envisaged that waste water associated with the boiler process will be recycled for slag cooling purposes.

(iii) Level entry doors will be provided with threshold channel drains discharging to the foul system. Perimeter upstands and ramped access to ensure all spillages, leaks, etc. remain with the building footprint.

9 FOUL DRAINGE

9.1 The foul drainage elements described in 7.2.1 (production of domestic foul waste, process driven waste water and refuelling.) will discharge (to rates agreed with the receiving sewer owners and/or the Water Authority) to the existing foul sewer located within Ridham Avenue. The remoteness of some of the areas requiring connection to the foul system (e.g. slag laydown area) will require that a pumping station and rising main are provided to discharge foul water to the receiving sewer at self cleansing velocities.

9.1.1 The new site foul drainage will be designed in accordance with BS EN 752, 7th Edition of Sewers for Adoption and the requirements of the Building Regulations.

10 ECOLOGICAL ENHANCEMENT

10.1 In order to compensate for infilling of the existing ditch located on the western boundary (see 7.2.10) it is intended to provide a new ditch slightly to the west of the existing ditch. The ditch is indicated on drawing figure 4.41D .

11 CONSTRUCTION PHASE POLLUTION CONTROL

11.1 Safeguards shall be implemented during the construction phase to minimise the risk of pollution and detrimental effects to the water interests around the site. The following general mitigation measures shall be implemented.

(i) Works on site shall generally follow the best practice guidelines outlined in Section 5 and 6 of CIRIA C532 – Control of Water Pollution from Construction Sites.

(ii) Temporary foul drainage to serve the contractors welfare facilities will be provided at the start of works on site.

(iii) Refuelling and maintenance of machines shall be strictly controlled and oil storage tanks confined to locations remote from the perimeter of the site. All leaking or empty oil drums shall be immediately removed from site.

(iv) Well constructed and designated storage areas shall be provided located more than 20m away from the site perimeter. Chemical or fuel storage shall comprise of impermeable boxes and appropriate bunding.

(v) On site concrete batching plants (if utilised) are to be located more than 20m away from the site perimeter. The washing out of any concrete mixing plant or cleaning of ready mix concrete tankers shall be strictly controlled. The effluent from such cleaning shall be tankered off site or suitably treated using sedimentation tanks before the run-off is discharged.

(vi) A strict waste management system will be incorporated to prevent the disposal of construction or domestic rubbish entering the adjacent marshland areas. Waste materials will be properly stored on site.

(vii) Fill material imported to upfill to site will be sourced with due regard to leachate characteristics to the approval of the EA and Natural England. It is anticipated that the storage pond required for the permanent works will be constructed in advance of the earthworks operations such that construction phase storage and settling pond capabilities are available from the start of the works, and to provide tidal innundation protection to the construction site.

APPENDIX A

Ground Investigation Report Extracts/Ground Water Level Extract

RPS	# BOREHOLE LOG	Borehole No. **BH1** Sheet 1 of 2

Project Name:	Kemsley Mill	Coordinates	Drilling Plant:	Casing Details		Hole Type
Project No.	JER4418	Northings: - Eastings: -	Start Date: 09/07/2009	Hole Diameter (mm)	Casing Depth (m)	BH
Location:	Sittingbourne, Kent	Ground Level: - m OD	End Date: 10/07/2009			Scale
Client:	E.ON		Logged By:			1:50

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Level (m AOD)	Depth (m)	Legend	Description Of Strata
		1.00	SPT	68/225mm (3,3,9,9,50)				Grey brown slightly gravelly silty SAND with occasional fill including metal, stone and bricks. Occasional bands of light brown clay with concrete. (MADE GROUND)
		2.00	U001			2.00		Firm to stiff grey slightly gravelly slightly sandy CLAY. Gravels are subangular to angular stone. (MADE GROUND)
		3.00	SPT	N=10 (1,1,2,2,3,3)				
		4.00	U002			3.85		Firm to stiff grey brown occasionally orange mottled CLAY.
	▼	5.00	SPT	N=12 (1,2,3,3,3,3)				
		6.50	U003					
		8.00	SPT	N=14 (1,2,2,4,4,4)		7.40		Stiff light grey CLAY. Occasional bands of sand present with depth.
		9.50	U004					
			Type	Results				

Depth scale: 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00, 5.50, 6.00, 6.50, 7.00, 7.50, 8.00, 8.50, 9.00, 9.50

Continued next sheet

Remarks:

Chiselling Details				Groundwater Notes		
Time Taken	Depth From (m)	Depth To (m)	Tool Used	Strike (m)	Casing Depth (m)	Level After 20 Mins (m)
				13.00	12.50	5.25

AGS

BOREHOLE LOG

RPS

Borehole No. **BH2**

Sheet 1 of 2

Project Name:	Kemsley Mill	Coordinates	Drilling Plant:	Casing Details	Hole Type
Project No.	JER4418	Northings: - Eastings: -	Start Date: 06/07/2009	Hole Diameter (mm) / Casing Depth (m)	BH
Location:	Sittingbourne, Kent	Ground Level: - m OD	End Date: 06/07/2009		Scale 1:50
Client:	E.ON		Logged By:		

Samples Depth (m)	Type	Results	Level (m AOD)	Depth (m)	Description Of Strata
					Grey slightly gravelly silty sand. Gravel is subangular flient, stone and stone ash. Occasional metal, bricks and bands of firm light brown clay. (MADE GROUND)
1.00	SPT	N=4 (1,1,1,1,1,1)			
2.00	SPT	N=10 (2,2,2,2,3,3)		2.00	Stiff light brown light brown slightly sandy CLAY. Occasional fragments of brick and concrete. (MADE GROUND)
3.00	U001				
4.00	SPT	N=9 (2,3,2,2,3,2)			
				4.60	Firm light grey orange mottled CLAY.
				5.00	Stiff light grey orange mottled slightly sandy CLAY.
6.50	SPT	N=25 (3,5,6,6,6,7)			
				7.80	Stiff grey CLAY.
8.00	U002				
9.50	SPT	N=24 (2,4,4,6,7,7)		9.50	Stiff grey CLAY with occasional sand. Sand bands present below 12.1m.

Water strike at 5.00 m.

Depth scale: 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00, 5.50, 6.00, 6.50, 7.00, 7.50, 8.00, 8.50, 9.00, 9.50

Continued next sheet

Remarks:

Chiselling Details

Time Taken	Depth From (m)	Depth To (m)	Tool Used

Groundwater Notes

Strike (m)	Casing Depth (m)	Level After 20 Mins (m)
14.50	14.50	5.10

AGS

BOREHOLE LOG

RPS

Borehole No. **BH3**

Sheet 1 of 2

Project Name: Kemsley Mill	Coordinates	Drilling Plant:	Casing Details		Hole Type
Project No. JER4418	Northings: - Eastings: -	Start Date: 13/07/2009	Hole Diameter (mm)	Casing Depth (m)	BH
Location: Sittingbourne, Kent	Ground Level: - m OD	End Date: 14/07/2009			Scale
Client: E.ON		Logged By:			1:50

Well	Water Strikes	Depth (m)	Type	Results	Level (m AOD)	Depth (m)	Legend	Description Of Strata
								Stiff brown slightly gravelly slightly sandy CLAY. Gravels are subangular to angular limestone and stone fill. Includes fill material such as glass and pottery. (MADE GROUND)
		1.00	SPT	N=6 (1,1,1,1,2,2)				
		2.00	SPT	65/225mm (2,2,5,10,50)		2.00		Dense dark grey slightly sandy SILT. Becomes clayey with depth. (MADE GROUND)
	▼	3.00	SPT	N=11 (2,2,2,3,3,3)		3.00		Stiff light brown orange grey mottled slightly sandy CLAY. Becomes grey with depth.
		4.00	U001					
		5.00	SPT	50/150mm (9,21,30,20)				
		6.50	U002					
						7.00		Dense grey slightly silty SAND.
		8.00	SPT	52/150mm (11,23,22,30)				
		9.50	U003					

Depth scale: 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50, 5.00, 5.50, 6.00, 6.50, 7.00, 7.50, 8.00, 8.50, 9.00, 9.50

Continued next sheet

Remarks:

Chiselling Details

Time Taken	Depth From (m)	Depth To (m)	Tool Used

Groundwater Notes

Strike (m)	Casing Depth (m)	Level After 20 Mins (m)
3.00	3.00	2.87
14.00	-	-

AGS

The Solid Geology is recorded as typically consisting of a veneer of the London Clay formation underlain by the Woolwich Beds.

The London Clay was proven as a grey clay with localised sand bands to 12.3m depth at BH1 and 14m depth at BH2. The London Clay was not encountered at BH3 with the Superficial Deposits underlain directly by the Woolwich Beds below 7m depth. This is supported by the high SPT 'N' values recorded within BH3, consistent with expectation for the Woolwich Beds. However, the associated high SPT 'N' values correlate very much with the latter one. The soils at BH3 between 7m and 14m may simply be a transition zone between the two formations.

A single plasticity test indicates a high plasticity index of 49 with a natural moisture content of 30%. A high shrinkage material is indicated.

4 no. standard penetration tests recorded uncorrected N values of between 14 and 29. The results are provided in *Appendix F* and indicate a trend of increasing value with depth from a firm consistency within the upper formation, gradually hardening to stiff with depth. These results correlate with the single triaxial test result of 97kPa (stiff).

6.1.4 Solid Geology – Woolwich Beds

The Woolwich Beds was proven as a grey silty sand to at least 20m depth.

3 no. particle size distribution tests indicate a variable material ranging from gap graded (consisting of silty fine sand) to poorly graded (consisting of slightly sandy very silty clay).

9 no. standard penetration tests all recorded uncorrected N values in excess of 50 indicating a very dense relative density. The results are provided in *Appendix F*.

The 2 no. shear box test within cohesive material gave an angle of shearing resistance of 14.5° and 15.5 ° associated with an apparent cohesion of 20kPa and 22kPa.

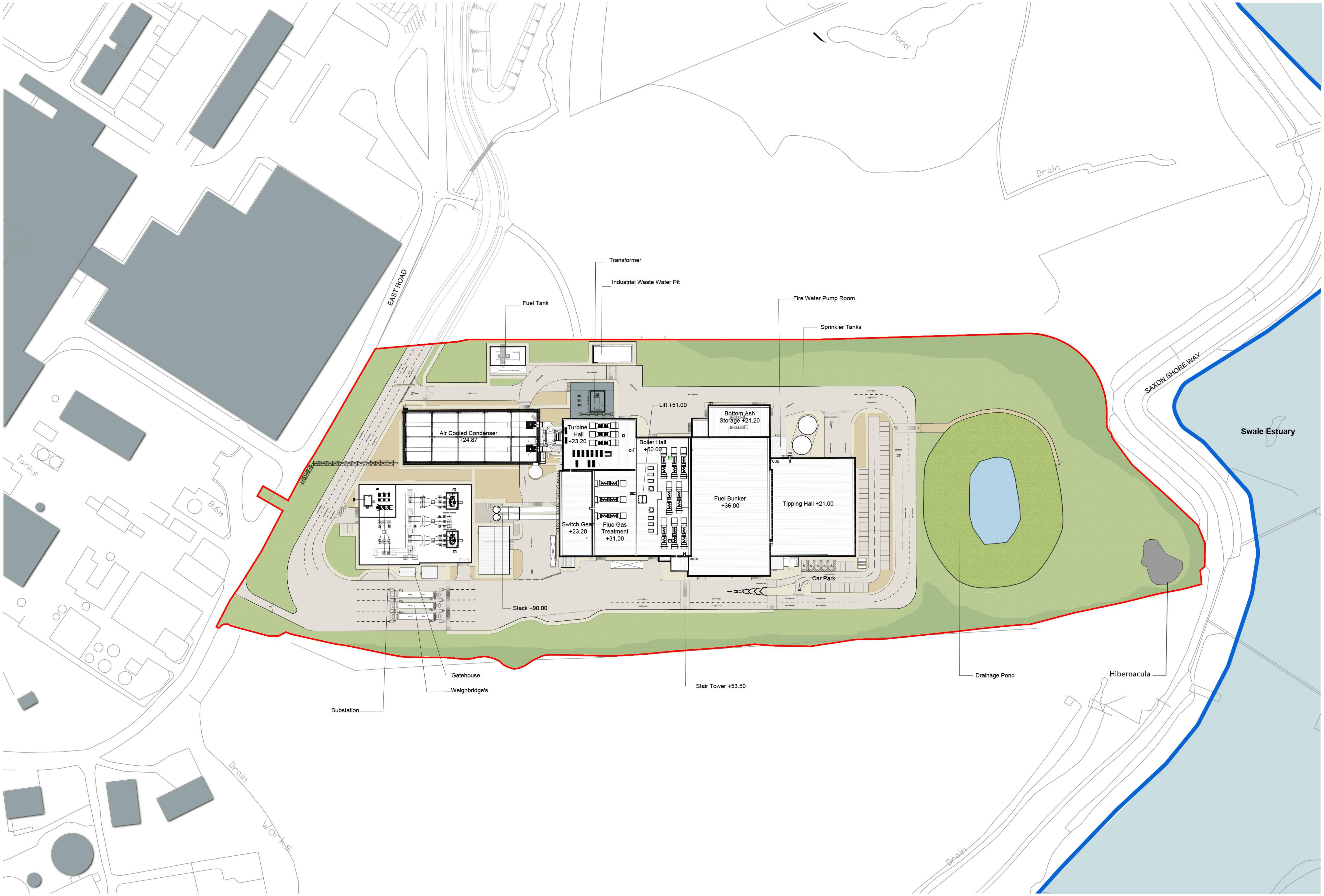
6.2 Groundwater

Groundwater seepages within the Made Ground or the upper Alluvium were recorded in most trial pits and boreholes. These are believed to be perched and characteristic of the variability of the material and the associated infiltrations. A deeper ground water body was encountered at 13 to 14.5 mBGL confined below the London Clay within the Woolwich Beds. All deeper strikes rose to about 5 m depth after 20mins (recorded as fast inflow).

Standing levels of the confined groundwater body were recorded between 3 and 4.7 mBGL. Standing levels of the perched groundwater body were recorded between 1.7 and 4.4 mBGL within the Made Ground or Alluvium.

APPENDIX B

Drawings



10m SCALE 1:1000

notes :

1. If this drawing has been received electronically it is the recipients responsibility to print the document to the correct scale.
2. All dimensions are in millimetres unless stated otherwise. It is recommended that information is not scaled off this drawing.
3. This drawing should be read in conjunction with all other relevant drawings and specifications.
4. Information based on drawing reference: OH8013-0202/62G105.

Note: Reference to OS of existing paper mill provided by St Regis Paper Mill in DWG format and topographical survey provided by Eon.

Land Ownership Boundary (blue line)	
Proposed Development Boundary (red line)	

Drawing for PLANNING purposes only

Content of drawing based on UMC drawing number AAK-04-20020002_UMG 0990. Reproduced with permission

rev	amendments	by	ckd	date
U	Site plan updated.	BC	TFH	5.09.18
T	Drawing updated to UMG current Site plan	PBR	TFH	26.06.18
S	Admin HVAC area roof added. Escape stairs amended to be un-enclosed stair.	JT	CMGD	28.02.17
R	Client logos updated. Steam export rack updated as per CNIM drawing. Gates and fences added. Escape stairs added at Tipping Hall, Car Park layout updated to suit. Footpath added at Fuel Tank. Entrance barrier removed. Admin HVAC area roof added. Escape stairs amended to be un-enclosed stair.	JT	CMGD	13.02.17
P	Labels added. Hatches updated.	MT	CD	20.01.17
N	Site Plan updated	JH	CD	09.01.17
M	Updated to suit current site layout received from EPC contractor	AE	JAT	16.11.15
L	Updated as per client comments 26.10.15.	MK	JAT	27.10.15
K	Updated to suit current building layout received from EPC contractor.	MK	JAT	19.10.15
J	Vehicle wash down area removed.	JAT	TP	24.02.15
H	Updated as per current comments.	CB	JAT	18.02.15
G	Logos confirmed.Site layout/access clarified	AJL	RS	28.06.13
F	Title block and roof layout updated	JAT	SG	24.10.12
E	E.ON logo added.	KRy	PRP	15.02.10
D	Roof plan updated. Transformer confirmed as external.	AJL	PRP	21.01.10
C	Surrounding site context and site gates added. Existing OS and colours altered.	SMG	PRP	08.12.09
B	Entrance Clarified. Red line boundary confirmed. Critical dimensions added.	AJL	PRP	02.12.09
A	Boundary confirmed, swale extent reduced	PRP	RS	19.11.09

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Client
Wheelabrator TECHNOLOGIES

Project Kemsley Sustainable Energy Plant

Title

Proposed Site Layout

Drawing Status	Date Created	Drawing Scale
Preliminary	November 2009	1:1000
Project Leader	Drawn By	Initial Review
RS	AJL	PRP

Drawing Number 16315 / A1 / P / 0100
Rev U

FIGURE 4.3D

notes :

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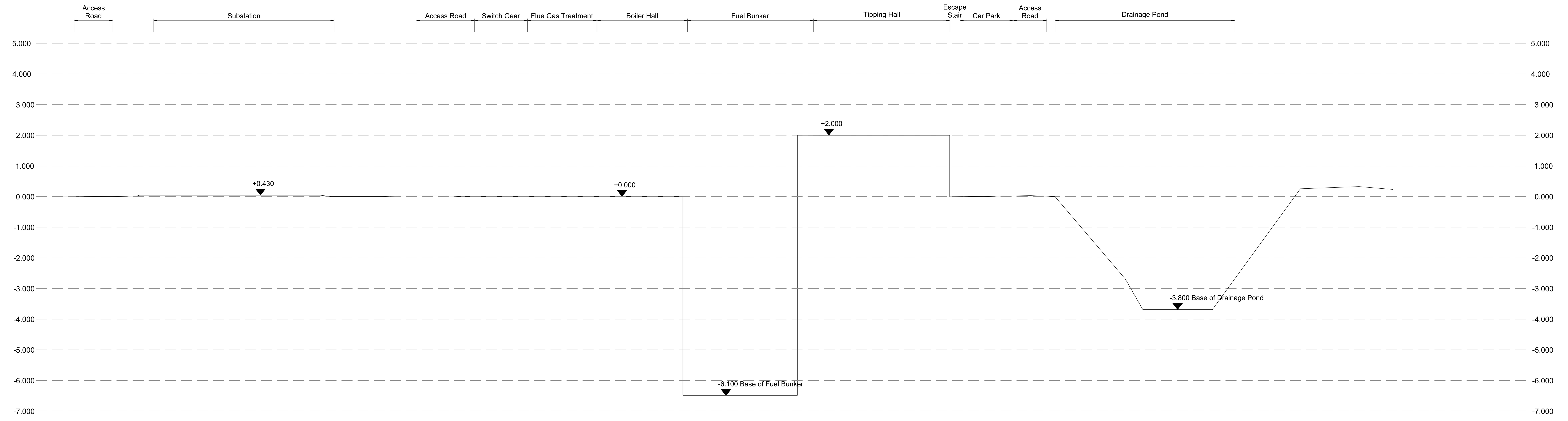
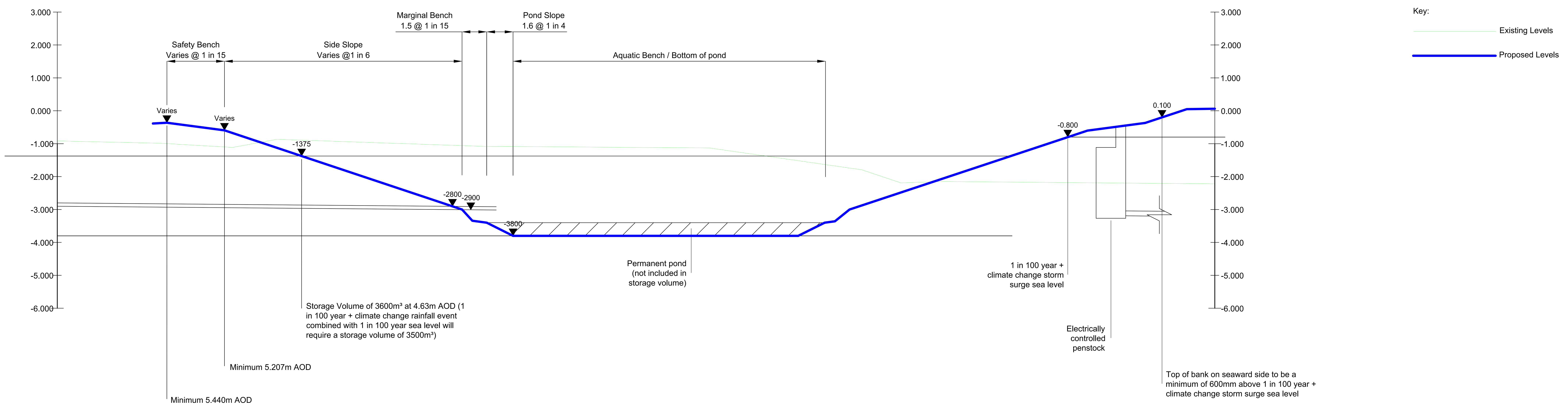


Section A-A
Scale 1:50 Vertical/1:500 Horizontal



Section B-B
Scale 1:50

Refer to RPS drawing 0600 for section line locations

Drawing for PLANNING purposes only

Content of drawing based on UMC drawing number AAK-04-2002002_UMG0910 and ARUP drawing number SK-005. Reproduced with permission

rev	amendments	by	ckd	date
J	Level lines darkened	BC	TFH	31.08.1
H	Levels revised to suit new levels	PBR	ET	17.07.18
G	Client logos updated. Section A-A title changed to Section B-B. New Section A-A added. Drawing title updated to Site Sections.	JT	CMGD	15.02.17
F	Updated to suit NMA 2016	JH	CMGD	11.01.17
E	Sections updated to suit latest UI design.	AJL	ST	26.07.13
D	**Logos confirmed.**	**AJL**	**PRP**	**03.03.10**
C	**Drawing figure added. Drawing updated to suit revised site layout.**	**AKC**	**ST**	**24/11/09**
B	**1. Existing ditch noted as infilled/culverted 2. Pond outfall pipe added. 3. Minor amendents**	**JDW**	**RM**	**04/11/09**
A	**Compensatory ditch indicated.**	**AKC**	**ST**	**29/10/09**

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Client: Wheelabrator Technologies

Project: Kemsley Sustainable Energy Plant

Title: Site Sections

Drawing Status	Date Created	Drawing Scale
Preliminary	October 2009	1:500
Project Leader	**Drawn By**	**Initial Review**
AWY	AKC	ST

Drawing Number: 16315 / A0 / 0250 Rev: J

1m SCALE 1:50
10m SCALE 1:500

Figure 4.24D

notes :

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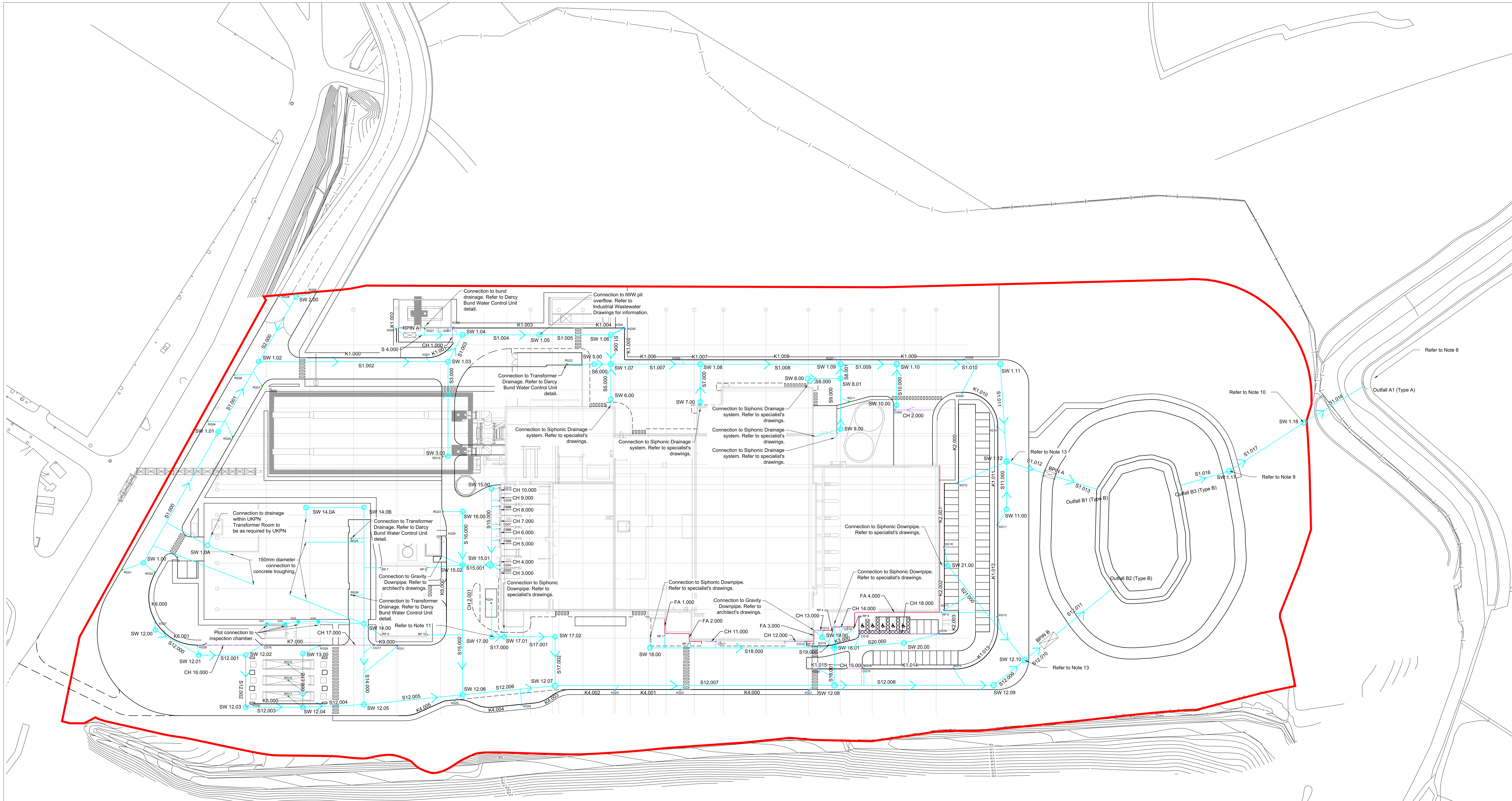
3. This drawing should be read in conjunction with all other relevant drawings and specifications.

Legend:

- Channel Drain
- Surface water sewer
- Surface water filter drain (perforated pipe)
- Kerb inlet drain
- Manhole
- RG01 Road Gully
- KG02 Kerb Gully
- CG03 Channel Gully
- BPIN Bypass Petrol interceptor
- RPIN Full Retention Petrol interceptor
- Headwall
- DP 1 Downpipe



Drainage Layout
Scale 1:500

1. This drawing to be read in conjunction with Surface Water Drainage Schedule (5025 20 02 00 22/AP G 0011), Surface Water Setting Out drawing (5025 20 02 00 22/AP G 0015), Drainage Construction Details (5025 20 02 00 22/AP G0091, 0092, 0093, 0096 and 0097), CNIM, MEP and structural drawings.
2. External pipes with cover less than 1.2m to have Class A3 pipe bedding, external pipes with cover greater than 1.2m to have Class S pipe bedding.
3. Upstream gully / channel connection pipe invert level to suit gully / channel connection detail.
4. All gully and channel connections to main drainage runs to be 100mm Ø unless stated otherwise.
5. Connection Points to building drainage pending confirmation from UMC.
6. Pipes, fittings and gully materials to be as per surface water drainage schedule (5025 20 02 00 22/AP G 0011). Those upstream of the 3 way valve or leading to the CNIM spill tank in the HCl/NaOH delivery area to be PVC-U with EPDM seals.
7. Discharge location and outfall design for outfall A1 to be confirmed with EA.
8. Manhole SW 1.17 to contain electrically controlled penstock or gate valve, rated to close when water levels in manhole SW 1.18 reach -3.3mASD (Hydoc UK ElectroSlide or similar approved). To be supplied with power as required by actuator and telemetry from level sensor in manhole SW 1.18. Comms to be routed back to Admin Block.
9. Manhole SW 1.18 to contain level sensor to monitor water level in manhole. To be supplied with power as required by sensor. Comms to be routed back to manhole SW 1.17.
10. Manhole SW 17.00 to contain three way valve to divert flows to containment tank during delivery process.To be supplied with power as required by actuator and comms from control panel mounted on external building wall (refer to MEP designer's drawings).
11. Landscape drainage to be determined upon completion of levels design.

Drawing for PLANNING purposes only

Content of drawing based on ARUP drawing number 20-02-00-22 APG 0001. Reproduced with permission

rev	amendments	by	ckd	date
J	Drawing updated to current site plan, drainage amended accordingly.	CW	DW	07.09.18
H	Client logos updated. Steam export rack updated as per CNIM drawing. Drainage philosophy updated. Outfall detail note removed. Electrical layouts removed. Site plan updated.	JT	CMGD	15.02.17
G	Drawing updated to suit new drainage layout.	JH	CMGD	18.01.17
F	Foul outfall drainage updated	LMA	ST	02.08.13
E	**Drawing updated to suit UI layout.**	**AJL**	**ST**	**11.07.13**
D	**Updated to suit revised site layout. Logos clarified.**	**AKC**	**RM**	**18/01/10**
C	**Drawing figure added. Updated to suit revised site layout.**	**AKC**	**ST**	**16/12/09**
B	**Minor amendments**	**JDW**	**RM**	**04/11/09**
A	**Compensatory ditch indicated.**	**AKC**	**ST**	**29/10/09**

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Client: Wheelabrator Technologies

Project: Kemsley Sustainable Energy Plant

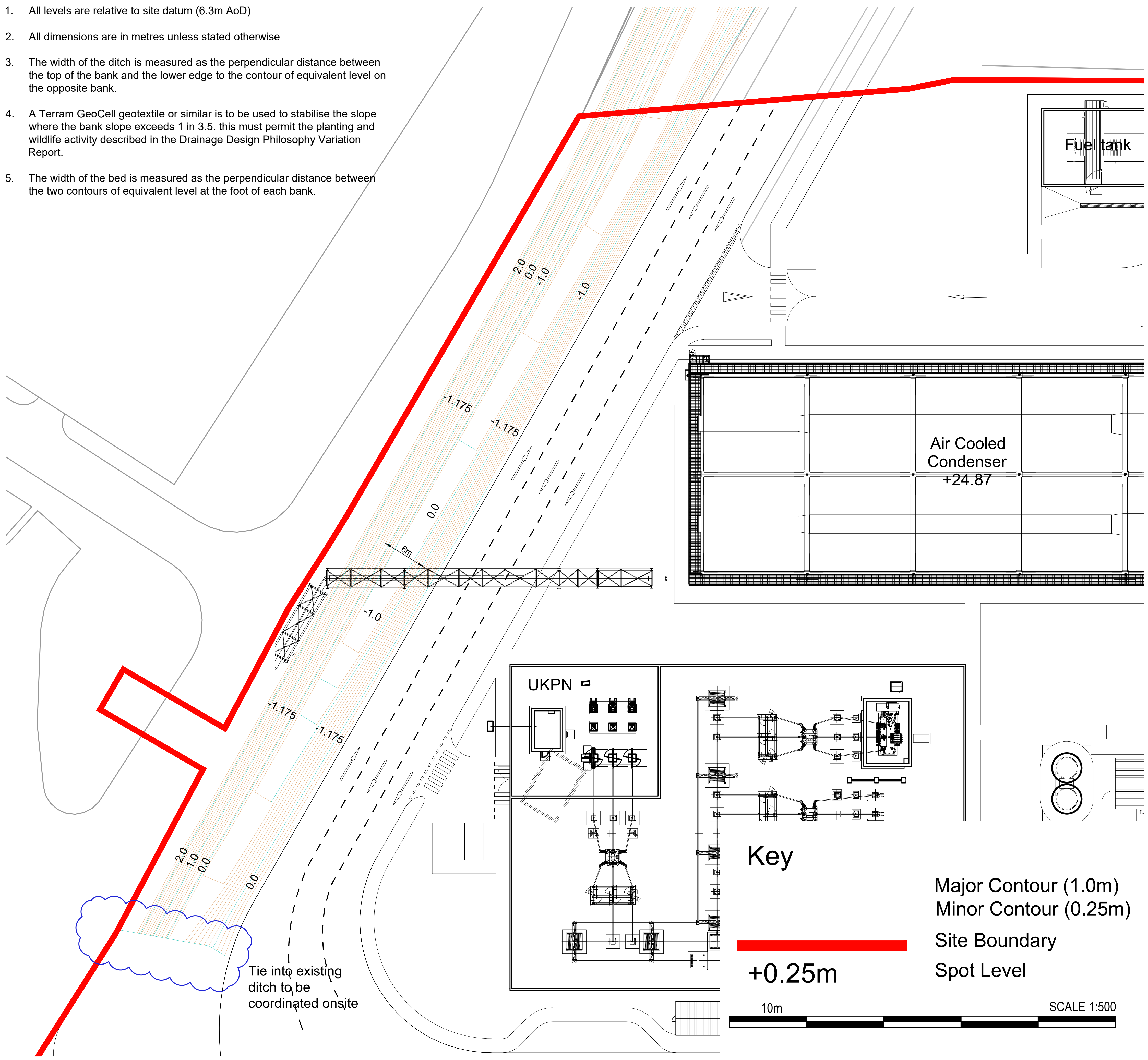
Title: Proposed Drainage Layout

Drawing Status	Date Created	Drawing Scale
Preliminary	September 2009	1:500
Project Leader	**Drawn By**	**Initial Review**
AWY	AKC	ST

Drawing Number: 16315 / A0 / 0301
Rev: J

Figure 4.25D

1. All levels are relative to site datum (6.3m AoD)
2. All dimensions are in metres unless stated otherwise
3. The width of the ditch is measured as the perpendicular distance between the top of the bank and the lower edge to the contour of equivalent level on the opposite bank.
4. A Terram GeoCell geotextile or similar is to be used to stabilise the slope where the bank slope exceeds 1 in 3.5. this must permit the planting and wildlife activity described in the Drainage Design Philosophy Variation Report.
5. The width of the bed is measured as the perpendicular distance between the two contours of equivalent level at the foot of each bank.



notes :

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Drawing for PLANNING purposes only

Content of drawing based on ARUP drawing number SK-001. Reproduced with permission

rev	amendments	by	ckd	date
B	Site Plan revised and updated!	PBR	ET	17.07.18
A	Client logos updated. Steam export rack updated as per CNIM drawing. Site layout updated. Key updated.	JT	CMGD	15.02.17

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Project: Kemsley Sustainable Energy Plant

Title: Proposed West Ecological Ditch

Drawing Status	Date Created	Drawing Scale
Preliminary	January 2017	1:500
Project Leader	**Drawn By**	**Initial Review**
TP	JH	CMGD

Drawing Number: 16315 / A3 / 0260 — Rev: B

Figure 4.41D

APPENDIX C

WINDES microdrainage results.

	B	C	E	N	O	P	Q	R	S	AD	AE
1	Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
3	1.000	1.00	30 minute 1 year Summer	0.077	-1.267	-0.133	0.000	0.33		12.7	OK
4	1.001	1.01	30 minute 1 year Summer	0.020	-1.557	-0.108	0.000	0.53		22.3	OK
5	2.000	2.00	30 minute 1 year Summer	-0.354	-1.775	-0.218	0.000	0.10		6.5	OK
6	1.002	1.02	30 minute 1 year Summer	-0.154	-1.795	-0.128	0.000	0.59		39.7	OK
7	3.000	3.00	30 minute 1 year Summer	-0.550	-1.885	-0.135	0.000	0.34		12.5	OK
8	1.003	1.03	30 minute 1 year Summer	-0.475	-2.102	-0.162	0.000	0.61		48.6	OK
9	4.000	RPIN A	30 minute 1 year Summer	-0.596	-1.645	-0.071	0.000	0.18		1.6	OK
10	1.004	1.04	30 minute 1 year Summer	-0.455	-2.147	-0.173	0.000	0.56		53.9	OK
11	1.005	1.05	30 minute 1 year Summer	-0.216	-2.231	-0.174	0.000	0.56		53.4	OK
12	1.006	1.06	30 minute 1 year Winter I+	-0.369	-2.330	-0.195	0.000	0.56		55.3	OK
13	5.000	5.00	30 minute 1 year Summer	-0.026	-1.421	-0.195	0.000	0.11		17.5	OK
14	6.000	6.00	30 minute 1 year Summer	-0.050	-1.342	-0.082	0.000	0.42		7.3	OK
15	1.007	1.07	30 minute 1 year Winter I+	-0.121	-2.359	-0.198	0.000	0.56		77.5	OK
16	7.000	7.00	30 minute 1 year Summer	-0.037	-1.316	-0.072	0.000	0.18		1.5	OK
17	1.008	1.08	30 minute 1 year Winter I+	-0.317	-2.444	-0.206	0.000	0.57		77.4	OK
18	8.000	8.00	30 minute 1 year Summer	-0.099	-1.789	-0.182	0.000	0.08		8.7	OK
19	9.000	9.00	30 minute 1 year Summer	-0.027	-1.824	-0.274	0.000	0.16		50.2	OK
20	8.001	8.01	30 minute 1 year Summer	-0.316	-2.378	-0.222	0.000	0.35		59.1	OK
21	1.009	1.09	30 minute 1 year Winter I+	-0.303	-2.573	-0.230	0.000	0.60		115.9	OK
22	10.000	10.00	30 minute 1 year Summer	0.010	-1.255	-0.065	0.000	0.27		4.5	OK
23	1.010	1.10	30 minute 1 year Winter I+	-0.354	-2.700	-0.301	0.000	0.40		117.5	OK
24	1.011	1.11	30 minute 1 year Winter I+	-0.506	-2.779	-0.281	0.000	0.49		127.4	OK
25	11.000	11.00	30 minute 1 year Summer	-0.469	-1.883	-0.214	0.000	0.18		20.6	OK
26	1.012	1.12	30 minute 1 year Winter I+	-0.700	-2.878	-0.306	0.000	0.48		136.3	OK
27	1.013	BPIN A	30 minute 1 year Winter I+	-0.752	-2.991	-0.227	0.000	0.70		135.8	OK
28	1.014	Outfall B1	480 minute 1 year Winter I	1.000	-3.206	-0.406	0.000	0.04		28.4	OK
29	12.000	12.00	30 minute 1 year Summer	-0.055	-1.518	-0.249	0.000	0.07		5.8	OK
30	12.001	12.01	30 minute 1 year Summer	-0.039	-1.608	-0.200	0.000	0.24		25.8	OK
31	12.002	12.02	30 minute 1 year Summer	0.272	-1.862	-0.162	0.000	0.43		27.8	OK
32	13.000	13.00	30 minute 1 year Summer	-0.097	-1.468	-0.170	0.000	0.14		7.4	OK
33	13.001	13.01	30 minute 1 year Summer	0.336	-1.734	-0.175	0.000	0.11		7.9	OK
34	12.003	12.03	30 minute 1 year Summer	0.272	-1.948	-0.126	0.000	0.63		34.6	OK
35	14.000	14.00	30 minute 1 year Summer	0.353	-1.213	-0.109	0.000	0.53		41.5	OK
36	12.004	12.04	30 minute 1 year Summer	0.226	-2.106	-0.246	0.000	0.36		71.1	OK
37	15.000	15.00	30 minute 1 year Summer	-0.060	-1.338	-0.068	0.000	0.21		1.1	OK
38	15.001	15.01	30 minute 1 year Summer	-0.063	-1.580	-0.076	0.000	0.13		1.1	OK
39	16.000	16.00	30 minute 1 year Summer	-0.441	-1.802	-0.158	0.000	0.19		7.0	OK
40	15.002	15.02	30 minute 1 year Summer	-0.405	-1.889	-0.113	0.000	0.48		18.4	OK
41	12.005	12.05	30 minute 1 year Summer	-0.565	-2.173	-0.146	0.000	0.78		107.4	OK
42	17.000	17.00	30 minute 1 year Summer	-0.229	-1.498	-0.068	0.000	0.22		1.7	OK
43	17.001	17.01	30 minute 1 year Summer	-0.183	-1.733	-0.209	0.000	0.20		25.1	OK
44	17.002	17.02	30 minute 1 year Summer	-0.187	-2.032	-0.208	0.000	0.21		25.1	OK
45	12.006	12.06	30 minute 1 year Summer	-0.549	-2.303	-0.196	0.000	0.65		131.6	OK
46	18.000	18.00	30 minute 1 year Summer	-0.247	-1.570	-0.123	0.000	0.08		1.4	OK
47	19.000	19.00	30 minute 1 year Summer	-0.034	-1.370	-0.136	0.000	0.02		1.2	OK
48	18.001	18.01	30 minute 1 year Summer	-0.248	-2.415	-0.240	0.000	0.28		39.2	OK
49	12.007	12.07	30 minute 1 year Winter I+	-0.615	-2.476	-0.174	0.000	0.60		167.8	OK
50	12.008	12.08	30 minute 1 year Winter I+	-0.794	-2.536	-0.113	0.000	1.00		163.0	OK
51	20.000	20.00	30 minute 1 year Summer	-0.206	-1.594	-0.188	0.000	0.30		48.9	OK
52	12.009	12.09	30 minute 1 year Winter I+	-0.857	-2.622	-0.171	0.000	1.00		188.8	OK
53	12.010	BPIN B	30 minute 1 year Winter I+	-0.664	-2.948	-0.276	0.000	0.60		188.5	OK
54	12.011	Outfall B2	30 minute 1 year Winter I+	-1.000	-3.025	-0.300	0.000	0.59		187.6	OK
55	1.015	X	480 minute 1 year Winter I	-1.000	-3.206	-0.406	0.000	0.01		1.7	OK
56	1.016	Outfall B3	480 minute 1 year Winter I	-1.000	-3.201	-0.401	0.000	0.01		1.6	OK
57	1.017	1.17	480 minute 1 year Winter I	-0.703	-3.196	-0.341	0.000	0.00		1.3	OK
58	1.018	1.18	480 minute 1 year Winter I	-1.381	-3.195	-0.225	0.000	0.00		0.0	OK

	B	C	E	N	O	P	Q	R	S	AD	AE
1	Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
3	1.000	1.00	30 minute 2 year Summer	0.077	-1.254	-0.120	0.000	0.42		16.0	OK
4	1.001	1.01	30 minute 2 year Summer	0.020	-1.539	-0.090	0.000	0.66		28.0	OK
5	2.000	2.00	30 minute 2 year Summer	-0.354	-1.754	-0.197	0.000	0.13		8.2	OK
6	1.002	1.02	30 minute 2 year Summer	-0.154	-1.766	-0.099	0.000	0.74		49.7	OK
7	3.000	3.00	30 minute 2 year Summer	-0.550	-1.873	-0.123	0.000	0.42		15.5	OK
8	1.003	1.03	30 minute 2 year Summer	-0.475	-2.067	-0.127	0.000	0.76		60.7	OK
9	4.000	RPIN A	30 minute 2 year Summer	-0.596	-1.642	-0.068	0.000	0.23		2.0	OK
10	1.004	1.04	30 minute 2 year Summer	-0.455	-2.116	-0.143	0.000	0.69		67.0	OK
11	1.005	1.05	30 minute 2 year Summer	-0.216	-2.201	-0.144	0.000	0.69		66.3	OK
12	1.006	1.06	30 minute 2 year Winter I+	-0.369	-2.292	-0.157	0.000	0.70		68.8	OK
13	5.000	5.00	30 minute 2 year Summer	-0.026	-1.415	-0.189	0.000	0.14		22.0	OK
14	6.000	6.00	30 minute 2 year Summer	-0.050	-1.332	-0.072	0.000	0.53		9.1	OK
15	1.007	1.07	30 minute 2 year Winter I+	-0.121	-2.322	-0.161	0.000	0.70		96.0	OK
16	7.000	7.00	30 minute 2 year Summer	-0.037	-1.312	-0.068	0.000	0.22		1.8	OK
17	1.008	1.08	30 minute 2 year Winter I+	-0.317	-2.408	-0.170	0.000	0.70		96.0	OK
18	8.000	8.00	30 minute 2 year Summer	-0.099	-1.784	-0.177	0.000	0.11		11.0	OK
19	9.000	9.00	30 minute 2 year Summer	-0.027	-1.810	-0.260	0.000	0.21		63.1	OK
20	8.001	8.01	30 minute 2 year Summer	-0.316	-2.358	-0.202	0.000	0.44		74.2	OK
21	1.009	1.09	30 minute 2 year Winter I+	-0.303	-2.526	-0.183	0.000	0.76		144.9	OK
22	10.000	10.00	30 minute 2 year Summer	0.010	-1.250	-0.060	0.000	0.34		5.6	OK
23	1.010	1.10	30 minute 2 year Winter I+	-0.354	-2.655	-0.257	0.000	0.49		146.7	OK
24	1.011	1.11	30 minute 2 year Winter I+	-0.506	-2.734	-0.235	0.000	0.62		159.1	OK
25	11.000	11.00	30 minute 2 year Summer	-0.469	-1.872	-0.203	0.000	0.23		25.9	OK
26	1.012	1.12	30 minute 2 year Winter I+	-0.700	-2.835	-0.263	0.000	0.60		170.2	OK
27	1.013	BPIN A	30 minute 2 year Winter I+	-0.752	-2.927	-0.163	0.000	0.88		169.5	OK
28	1.014	Outfall B1	480 minute 2 year Winter I	1.000	-3.176	-0.376	0.000	0.05		34.0	OK
29	12.000	12.00	30 minute 2 year Summer	-0.055	-1.510	-0.241	0.000	0.09		7.2	OK
30	12.001	12.01	30 minute 2 year Summer	-0.039	-1.594	-0.186	0.000	0.31		32.4	OK
31	12.002	12.02	30 minute 2 year Summer	0.272	-1.842	-0.142	0.000	0.54		35.0	OK
32	13.000	13.00	30 minute 2 year Summer	-0.097	-1.461	-0.163	0.000	0.17		9.2	OK
33	13.001	13.01	30 minute 2 year Summer	0.336	-1.728	-0.169	0.000	0.14		9.9	OK
34	12.003	12.03	30 minute 2 year Summer	0.272	-1.918	-0.096	0.000	0.79		43.4	OK
35	14.000	14.00	30 minute 2 year Summer	0.353	-1.195	-0.091	0.000	0.66		52.2	OK
36	12.004	12.04	30 minute 2 year Summer	0.226	-2.064	-0.204	0.000	0.45		88.7	OK
37	15.000	15.00	30 minute 2 year Summer	-0.060	-1.334	-0.064	0.000	0.26		1.4	OK
38	15.001	15.01	30 minute 2 year Summer	-0.063	-1.577	-0.073	0.000	0.16		1.4	OK
39	16.000	16.00	30 minute 2 year Summer	-0.441	-1.794	-0.150	0.000	0.24		8.8	OK
40	15.002	15.02	30 minute 2 year Summer	-0.405	-1.873	-0.097	0.000	0.60		22.9	OK
41	12.005	12.05	30 minute 2 year Summer	-0.565	-2.121	-0.094	0.000	0.97		133.3	OK
42	17.000	17.00	30 minute 2 year Summer	-0.229	-1.494	-0.064	0.000	0.28		2.1	OK
43	17.001	17.01	30 minute 2 year Summer	-0.183	-1.722	-0.198	0.000	0.26		31.6	OK
44	17.002	17.02	30 minute 2 year Summer	-0.187	-2.021	-0.197	0.000	0.26		31.6	OK
45	12.006	12.06	30 minute 2 year Summer	-0.549	-2.247	-0.140	0.000	0.81		163.8	OK
46	18.000	18.00	30 minute 2 year Summer	-0.247	-1.566	-0.119	0.000	0.09		1.7	OK
47	19.000	19.00	30 minute 2 year Summer	-0.034	-1.368	-0.134	0.000	0.03		1.5	OK
48	18.001	18.01	30 minute 2 year Winter I+	-0.248	-2.333	-0.158	0.000	0.33		46.7	OK
49	12.007	12.07	30 minute 2 year Winter I+	-0.615	-2.349	-0.047	0.000	0.71		200.0	OK
50	12.008	12.08	30 minute 2 year Summer	-0.794	-2.423	0.000	0.000	1.13		184.4	OK
51	20.000	20.00	30 minute 2 year Summer	-0.206	-1.578	-0.172	0.000	0.38		61.4	OK
52	12.009	12.09	30 minute 2 year Winter I+	-0.857	-2.535	-0.084	0.000	1.19		224.9	OK
53	12.010	BPIN B	30 minute 2 year Winter I+	-0.664	-2.901	-0.229	0.000	0.71		223.0	OK
54	12.011	Outfall B2	30 minute 2 year Winter I+	-1.000	-2.982	-0.257	0.000	0.70		221.7	OK
55	1.015	X	480 minute 2 year Winter I	-1.000	-3.176	-0.376	0.000	0.01		1.7	OK
56	1.016	Outfall B3	480 minute 2 year Winter I	-1.000	-3.167	-0.367	0.000	0.01		1.6	OK
57	1.017	1.17	480 minute 2 year Winter I	-0.703	-3.160	-0.305	0.000	0.00		1.5	OK
58	1.018	1.18	480 minute 2 year Winter I	-1.381	-3.158	-0.188	0.000	0.00		0.0	OK

	B	C	E	N	O	P	Q	R	S	AD	AE
1	**Pipe Number**	**US/MH Name**	**Event**	**US/CL (m)**	**Water Level (m)**	**Surcharged Depth (m)**	**Flooded Volume (m³)**	**Flow / Cap.**	**Overflow (l/s)**	**Pipe Flow (l/s)**	**Status**
3	1.000	1.00	30 minute 30 year Summe	0.077	-0.266	0.868	0.000	0.80		30.7	SURCHARGED
4	1.001	1.01	30 minute 30 year Summe	0.020	-0.373	1.075	0.000	1.18		49.8	SURCHARGED
5	2.000	2.00	30 minute 30 year Summe	-0.354	-0.657	0.900	0.000	0.21		13.6	SURCHARGED
6	1.002	1.02	30 minute 30 year Summe	-0.154	-0.669	0.998	0.000	1.41		95.0	SURCHARGED
7	3.000	3.00	30 minute 30 year Winter I	-0.550	-1.165	0.585	0.000	0.77		28.5	SURCHARGED
8	1.003	1.03	30 minute 30 year Winter I	-0.475	-1.230	0.710	0.000	1.43		113.6	SURCHARGED
9	4.000	RPIN A	30 minute 30 year Winter I	-0.596	-1.281	0.293	0.000	0.48		4.1	SURCHARGED
10	1.004	1.04	30 minute 30 year Winter I	-0.455	-1.313	0.660	0.000	1.32		127.6	SURCHARGED
11	1.005	1.05	30 minute 30 year Winter I	-0.216	-1.457	0.600	0.000	1.35		129.2	SURCHARGED
12	1.006	1.06	30 minute 30 year Winter I	-0.369	-1.581	0.554	0.000	1.42		139.0	SURCHARGED
13	5.000	5.00	30 minute 30 year Summe	-0.026	-1.377	-0.151	0.000	0.33		53.5	OK
14	6.000	6.00	30 minute 30 year Summe	-0.050	-1.214	0.046	0.000	1.29		22.1	SURCHARGED
15	1.007	1.07	30 minute 30 year Winter I	-0.121	-1.615	0.546	0.000	1.46		200.7	SURCHARGED
16	7.000	7.00	30 minute 30 year Summe	-0.037	-1.292	-0.048	0.000	0.53		4.5	OK
17	1.008	1.08	30 minute 30 year Winter I	-0.317	-1.785	0.453	0.000	1.47		201.4	SURCHARGED
18	8.000	8.00	30 minute 30 year Summe	-0.099	-1.755	-0.148	0.000	0.26		26.6	OK
19	9.000	9.00	30 minute 30 year Summe	-0.027	-1.737	-0.187	0.000	0.50		153.1	OK
20	8.001	8.01	30 minute 30 year Summe	-0.316	-1.895	0.261	0.000	1.02		173.2	SURCHARGED
21	1.009	1.09	30 minute 30 year Winter I	-0.303	-2.013	0.330	0.000	1.71		327.5	SURCHARGED
22	10.000	10.00	30 minute 30 year Summe	0.010	-1.221	-0.031	0.000	0.82		13.7	OK
23	1.010	1.10	30 minute 30 year Summe	-0.354	-2.195	0.204	0.000	1.14		337.0	SURCHARGED
24	1.011	1.11	30 minute 30 year Summe	-0.506	-2.320	0.179	0.000	1.42		367.5	SURCHARGED
25	11.000	11.00	30 minute 30 year Summe	-0.469	-1.808	-0.139	0.000	0.56		62.7	OK
26	1.012	1.12	30 minute 30 year Summe	-0.700	-2.477	0.095	0.000	1.42		400.8	SURCHARGED
27	1.013	BPIN A	30 minute 30 year Winter I	-0.752	-2.668	0.096	0.000	2.09		402.8	SURCHARGED
28	1.014	Outfall B1	480 minute 30 year Winter	1.000	-2.992	-0.192	0.000	0.10		68.3	OK
29	12.000	12.00	30 minute 30 year Summe	-0.055	-0.414	0.855	0.000	0.16		13.5	SURCHARGED
30	12.001	12.01	30 minute 30 year Summe	-0.039	-0.422	0.986	0.000	0.60		62.9	SURCHARGED
31	12.002	12.02	30 minute 30 year Summe	0.272	-0.517	1.183	0.000	1.00		64.4	SURCHARGED
32	13.000	13.00	30 minute 30 year Summe	-0.097	-0.604	0.694	0.000	0.40		21.3	SURCHARGED
33	13.001	13.01	30 minute 30 year Summe	0.336	-0.626	0.933	0.000	0.29		20.4	SURCHARGED
34	12.003	12.03	30 minute 30 year Summe	0.272	-0.640	1.182	0.000	1.52		83.0	SURCHARGED
35	14.000	14.00	30 minute 30 year Summe	0.353	0.159	1.263	0.000	1.18		92.9	FLOOD RISK
36	12.004	12.04	30 minute 30 year Summe	0.226	-0.724	1.136	0.000	0.80		156.0	SURCHARGED
37	15.000	15.00	30 minute 30 year Winter I	-0.060	-0.641	0.629	0.000	0.76		4.0	SURCHARGED
38	15.001	15.01	30 minute 30 year Winter I	-0.063	-0.670	0.834	0.000	0.95		8.4	SURCHARGED
39	16.000	16.00	30 minute 30 year Summe	-0.441	-0.610	1.034	0.000	0.39		14.1	FLOOD RISK
40	15.002	15.02	30 minute 30 year Summe	-0.405	-0.631	1.145	0.000	0.97		36.8	FLOOD RISK
41	12.005	12.05	30 minute 30 year Summe	-0.565	-0.825	1.202	0.000	1.73		238.5	FLOOD RISK
42	17.000	17.00	30 minute 30 year Summe	-0.229	-0.907	0.523	0.000	0.75		5.7	SURCHARGED
43	17.001	17.01	30 minute 30 year Summe	-0.183	-0.914	0.610	0.000	0.66		81.4	SURCHARGED
44	17.002	17.02	30 minute 30 year Summe	-0.187	-0.995	0.829	0.000	0.52		63.0	SURCHARGED
45	12.006	12.06	30 minute 30 year Summe	-0.549	-1.071	1.036	0.000	1.59		320.5	SURCHARGED
46	18.000	18.00	30 minute 30 year Winter I	-0.247	-1.535	-0.088	0.000	0.19		3.4	OK
47	19.000	19.00	30 minute 30 year Summe	-0.034	-1.360	-0.126	0.000	0.06		3.7	OK
48	18.001	18.01	30 minute 30 year Winter I	-0.248	-1.553	0.622	0.000	0.78		108.7	SURCHARGED
49	12.007	12.07	30 minute 30 year Winter I	-0.615	-1.612	0.690	0.000	1.66		466.5	SURCHARGED
50	12.008	12.08	30 minute 30 year Winter I	-0.794	-1.954	0.469	0.000	2.87		467.8	SURCHARGED
51	20.000	20.00	30 minute 30 year Summe	-0.206	-1.472	-0.066	0.000	0.92		148.5	OK
52	12.009	12.09	30 minute 30 year Winter I	-0.857	-2.169	0.282	0.000	3.11		589.5	SURCHARGED
53	12.010	BPIN B	30 minute 30 year Winter I	-0.664	-2.386	0.286	0.000	1.86		586.5	SURCHARGED
54	12.011	Outfall B2	30 minute 30 year Winter I	-1.000	-2.600	0.125	0.000	1.85		585.0	SURCHARGED
55	1.015	X	480 minute 30 year Winter	-1.000	-2.992	-0.192	0.000	0.02		4.1	OK
56	1.016	Outfall B3	480 minute 30 year Winter	-1.000	-2.909	-0.109	0.000	0.01		3.4	OK
57	1.017	1.17	480 minute 30 year Winter	-0.703	-2.844	0.011	0.000	0.01		1.8	SURCHARGED
58	1.018	1.18	480 minute 30 year Winter	-1.381	-2.824	0.146	0.000	0.00		0.0	SURCHARGED