G

Gravity

Smart Campus

Gravity LDO Environmental Statement

Volume 2 – Appendices

Appendix 2.2 LDO Environmental Baseline Technical Note

TECHNICAL NOTE

Job Name:	GRAVITY LDO
Job No:	49102-3001
Note No:	
Date:	16/12/2020
Prepared By:	Sophie Nioche / Sam Harper
Subject:	**GRAVITY LOCAL DEVELOPMENT ORDER ENVIRONMENTAL BASELINE / PARAMETERS**

1. Introduction

1.1 General

1.1.1 Following a report prepared in June 2020 to set out the case for adopting a Local Development Order (LDO) to deliver Gravity, it has been agreed that an LDO will be prepared for the full site. Given the scale of the site and the potential for significant adverse environmental effects, an Environmental Impact Assessment (EIA) is required to be prepared for the LDO.

1.1.2 Stantec has prepared this technical note to identify the parameters established by the existing planning consent and the associated Environmental Statement to understand the parameters set and assessed by the existing, extant planning consent.

2. Parameters established by the Previous Planning Consent and Environmental Statement

2.1 Introduction

2.1.1 The Gravity site, formerly known as Huntspill Energy Park, received planning permission for an Energy Park in November 2017 (the '2017 Planning Consent'). Prior to determination of that application it secured Enterprise Zone status in April 2017.

2.1.2 An EIA was undertaken for Huntspill Energy Park as follows:

- An Environmental Statement was submitted with the 2013 planning application in April 2013 (the '2013 ES');
- An Environmental Statement Update Submission in October 2013 (the '2013 ES Update'); and
- An ES Addendum submitted in June 2017 (the '2017 ES Addendum').

2.1.3 Maximum development thresholds, such as the quantum of floorspace by use, were set in order that the ES could test the maximum likely development potential and therefore be robust. These are set out below.

2.1.4 The application was supported by a Parameters Plan for those parts of the site for which planning permission was sought. The Parameters Plan is provided in **Appendix A.**

2.1.5 The Parameters Plan also detailed other uses which would be the subject of separate planning applications but are shown on the Parameters Plan for information. These other uses were land safeguarded for energy generating and leisure uses and for the re-instatement of a rail head.

2.1.6 Demolition of existing structures on the site and remediation works was subject to a separate planning application which was approved by SDC on 3 April 2012. These works were also considered in the EIA as they were considered integral to the overall project.

2.2 Land Uses

2.2.1 The consented scheme description is as follows:

- OUTLINE PERMISSION, in respect of the application of: BAE Systems (Property Investments) Ltd for an Energy Park, with all matters reserved apart from access, comprising: buildings with the following energy related employment uses: B1(a, b or c) buildings, B2 and B8 and includes the development of infrastructure comprising a 'green bridge', internal road system, footpaths, cycle routes and bridleways; public open space, landscaping and drainage along with associated works.
- FULL PERMISSION for a new road access onto the A39 and a B8 storage building comprising 1,858m² of internal floor space, with associated open storage and infrastructure comprising car parking, internal access road, landscaping, and associated works.
- The application site also includes land safeguarded for energy generating uses, leisure use, and for the re-instatement of a rail head.

2.3 Building Heights

2.3.1 Parameters for building heights were not clearly set out previously. Building heights were not set on either the Parameters Plan (**Appendix A**), or any of the other approved plans, or in Chapter 5 of the ES 'Description of Development'. Information on building heights is provided in the LVIA chapter of the ES (Chapter 6) as follows, where the testing of building heights was based on the following assumptions:

- The eaves of the B1, B2 and B8 units would rise to a height of 12m above ground level with the corresponding ridge roofs a maximum height of 15m. Considering topography, the highest would reach 20.85m AOD. The 'Zone of Visual Influence 'model was run based on the 15m high roof height of one of the B2/B8 units in the central area of the site; and

- Two storey office buildings either side of the site entrance which would reach a maximum height of 8m.

2.3.2 No heights were specified within the main ES for the uses identified on the safeguarded land, including those energy generating uses. A technical report was produced by AECOM in 2012 (**Appendix C**) which set out likely assumptions for energy generating building heights (including stack heights etc.) and that detail was considered within the Cumulative Effects Chapter (Chapter 15) of the ES. Further details are set out below in para 2.7.3.

2.4 Use Classes and Quantum of Floorspace

2.4.1 Outline Consent was granted for:

- B1a, b or c buildings (plot size circa 9 hectares with a maximum building floor area of 32,150m²);

- B2 buildings (plot size circa 15 hectares with a maximum building floor area of 43,600m²);

- B8 buildings (plot size circa 31 hectares with maximum building floor area of 99,462m²).

2.4.2 Full Consent was granted for:

- B8 building with a floor area of 1,858sqm

2.5 Transport

2.5.1 The transport movement thresholds, against which the ES was assessed, and which were established within the Transport Assessment established under the existing consent include total figures against the floor space for all of the consented 'B' use class as well as operational figures for the assumed traffic volumes associated with the energy generation uses specified for the safeguarded land (it did not include figures for the other safeguarded uses – rail or leisure). These thresholds are set out in the table below:

Land Use	AM			PM		
	Arrival (trips per 100m^2)	Departure (trips per 100m^2)	Two-way (trips per 100m^2)	Arrival (trips per 100m^2)	Departure (trips per 100m^2)	Two-way (trips per 100m^2)
B1a	193	32	225	33	176	208
B1b	68	6	74	7	54	61
B1c	79	37	116	14	54	69
B2	322	149	471	58	221	279
B8	259	221	481	238	330	568
CCGT*	56	0	56	0	56	56
Peaking Plant*	8	0	8	0	8	8
Biomass Plant*	39	12	51	12	39	51
Total	**1,026**	**457**	**1,482**	**361**	**939**	**1,301**

2.6 Safeguarded Land

2.6.1 The existing planning consent does not grant consents for the safeguarded land elements set out on the parameters plan. The ES states that separate full applications will be made in respect of the safeguarded land as follows:

- **Energy generating uses (38.74 hectares – 95.7 acres):** dependent upon their energy output, applications will be made to the Infrastructure Planning Commission (IPC) or its successor body if 50MW output or greater, or to Sedgemoor District Council if lower than 50MW;
- **Rail Reinstatement (5.4 hectares – 13.3 acres):** Land safeguarded to reinstate the redundant rail line from the north-west corner of the site and down the western boundary.
- **Leisure use (11.7 hectares – 28.9 acres)**: in respect of:
  - Two rugby pitches, associated changing rooms, car parking and relocation of an existing football pitch;
  - Minor alterations to the layout of an existing fishing club;
  - A new skate park;

2.7 Cumulative Assessment

2.7.1 This comprised an assessment of the cumulative effects of the proposals that fell outside the scope of the hybrid application, but were included in the parameters plan, either as land safeguarded for a specific purpose, or proposals that would comprise separate applications for full planning permission (as set out under 'safeguarded land' above).

2.7.2 The assumptions tested in the ES were based on the information provided in the Design and Access Statement and, for the energy generating uses, the information provided in the report 'Huntspill Energy Park Technical Report on Energy Generating Uses', provided as Appendix 2.2 of the ES.

2.7.3 This Report details the likely scale of the potential energy generating uses buildings across the various safeguarded plots E, J, K1 and K2, specified on the parameters plans. For plot E, the assumed use was Energy from Waste and included the following assumptions on the building key dimensions:

EfW Facility Element	Max Height (from FFL)*	Max Height (AOD)
Tipping Hall (FFL +41.0m AOD)	15.0m	56.0
Boiler House	43.0m	74.0
Turbine Hall and Air Cooled Condensers	20.0m	51.0
Stack	105m	136

*Note: * Finished Floor Level (FFL) assumed as +31m AOD unless otherwise stated*

2.7.4 For Plot J the assumed use was a Combined Cycle Gas Turbine and included the following assumptions on the building key dimensions:

Building	Grid Reference x	Grid reference y	Height	Length of x	Length of y
Condenser 1	332371	183642	26	47. 0	43.1
GT Hall 1	332431	183652	26	54.4	37.5
HRSG1	332503	183690	34	12.5	18.7
Condenser 2	332402	183575	26	46.4	44.0
GT Hall 2	332461	183585	26	53.3	38.7
HRSG 2	332533	183624	34	12.4	20.4
Switchyard	332384	183718	15	164.0	28.0

2.7.5 In addition to this detail the assumed stack height of the CCGT use was 65 metres.

2.7.6 For Plot K1 the assumed use was a Peaking Plant and included the following assumptions on the building key dimensions:

	Easting	Northing	Height m	Length m	Width m	Angle Degrees
OCGT block	334271	443384.9	3	11	26	57
Switch gear building	334298.2	443369.8	3	3	4	-29.5
Generator setup transformer building	334300	443344.5	4	11	6	-32.6
Fuel storage tank 2 for OCGT	334308.9	443385.8	5	5 (r)	-	-
Power control building	334311.9	443356.5	4	4	11	-34.9
Fuel storage tank 1 for OCGT	334323.7	443388.5	5	5 (r)	-	-

2.7.7 In addition to this detail the assumed stack height of the Peaking Plant was 15 metres.

2.7.8 For Plot K2 the assumed use was a Biomass Combined Heat and Power facility and included the following assumptions on the building key dimensions:

Building	**Building Height**	**Building Length**	**Building Width**
Wood fuel reception and storage.	45m	140M	73M
Boiler	45m	42m	30m
Turbine	20m	35m	30m
Offices / admin	20m	16m	8m
Workshops	10m	33m	11m
Substation etc.	4m	50m	25m

2.7.9 In addition to this detail the assumed stack height of the Biomass CHP was **50 metres**.

2.7.10 Images provided in Appendix D show examples of the abovementioned facilities.

2.7.11 This Report also assessed a broad range of associated environmental considerations including:

- Employment Generation
- Construction Impacts
- Operational Impacts
- Traffic Flows
- Air Quality

- Noise
- Lighting

2.7.12 The cumulative assessment set out in Chapter 15 of the original ES assessed all of these considerations and across the various topics of the ES (landscape / visual, ecology, Socio-economic, geo-environmental, flood risk, transport and access, air quality and noise) and demonstrated that, having assessed all of the effects of these various considerations, the proposals were acceptable.

2.7.13 In particular the buildings and stack heights were considered cumulatively and deemed to be acceptable. The ES for the LDO will take into account the previous cumulative assessments and their relative acceptability across all topics and draw conclusions accordingly.

2.7.14 No other schemes falling outside of the application boundary were identified through scoping as being required to be assessed as part of the Cumulative Impact Assessment.

3. Additional Considerations

3.1 An Increased LDO Boundary

3.1.1 The 2013 planning application boundary comprised a total area of 219.5 ha (542 acres). The Enterprise Zone boundary comprises an area of 249.4 ha (616 acres) and the overall LDO area, including all land in the control of This is Gravity Ltd, totals 263 ha (650 acres). A comparison plan is provided in **Appendix B**.

3.1.2 The additional land included within the LDO boundary will need to be considered in the EIA, including through the collection of relevant baseline data.

Current discharge of Planning Conditions

3.1.3 To date the majority of the conditions which have been discharged pursuant to the extant planning consent relate to the delivery of the link road. These include conditions linked to detailed design of the road and associated construction traffic arrangements. Further conditions regarding landscape and fencing details, for example, will need to be discharged shortly in association with the completion of the link road.

3.1.4 More strategically across the site, Stantec is currently in the process of discharging eleven site wide pre-commencement conditions relating to the extant planning consent. These conditions cover matters such as landscape management, design code, ecological management plans, security, and surface water drainage. Conditions 29 and 36, relating to the Strategic Design Code and the Strategic Landscape Management Plan respectively, have been discharged to date and it is intended that all of these remaining site wide pre-commencement conditions will be discharged by the end of 2020/ early 2021.

3.1.5 The information and data collected to enable the discharge of these planning conditions will be considered as part of the baseline review for the EIA topics. Clearly the remediation of the site over the last two years is an important part of the introductory narrative for any new ES and baseline position.

4. Next Steps

4.1 Next Steps for Stantec EIA team

- Provide this note to the Client to provide information on the parameters set by the previous consent, as requested.
- Once agreed to produce a Council version on the existing consent asap and to set out next steps.
- Full consideration of the Rochdale Envelope principles and application and inclusion in the ES.
- Consideration of the legal advice on the inclusion of the rail restoration for freight and passenger service options, avoiding the need for a separate DCO.
- Prepare a note to set out the proposed approach to EIA for the client and the EIA Technical Team to ensure a consistent approach across the EIA team. This is to be informed by scenarios/ concepts driven by the clean and inclusive growth vision for delivery of the EZ, and to take account and be fully integrated across disciplines. A key focus for the council will be economic and social value and this must be a robust part of the ES to frame and consider the environmental effects. A strategic approach to mitigation management will need to be considered as well as design quality as a response to reducing effects;
- Prepare a screening letter for submission in a format that can be adopted by SDC.

4.2 Matters to be Resolved

4.2.1 **Defining Parameters** – this will require Technical and wider Gravity team input to scenario/ concept plans to inform parameters. Scenario or concept plans will drive parameters that will be required for EIA Scoping. Concept plans will need to consider:

- Land Uses;
- Open Space;
- Access and Movement; and
- Building Heights.

4.2.2 **Legal Advice** – will be vital to ensure that the Rochdale Envelope principles are fully considered and set out.

4.2.3 **Project Description** – as well as the parameters plans, this will also be required for EIA scoping.

It will be necessary to agree through scoping how the ES deals with phasing. Build out will be driven by the market and occupiers so we cannot predict phasing, nor does the LDO want to be restricted by any phasing. The LDO is a marketing tool geared to attracting investment and there will be significant variation in occupier requirements. A plan, monitor and manage approach will be necessary together with a review period, say 5 years for the LDO, unless market conditions or implementation trigger an earlier review.

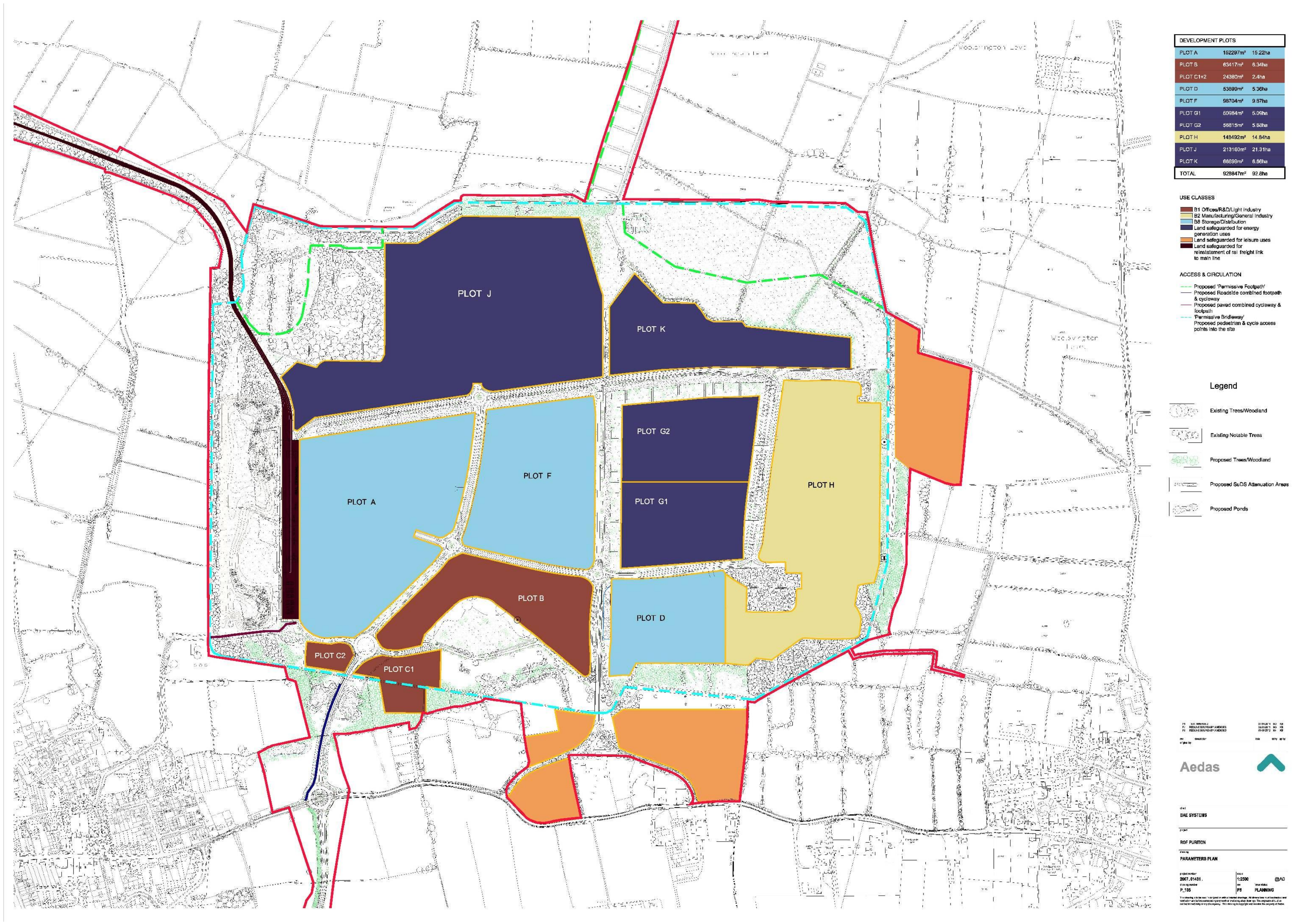
4.2.4 **EIA Programme** – it is noted that a Final ES is required in August 2021 for consultation on the LDO, to adhere to the overall timescales for adoption of the LDO by SDC. Therefore, the EIA programme is proposed as follows:

- **Parameter Plan fix** – December 2020/ Jan 2021

- **EIA Scoping Report preparation** – Jan/Feb 2021
- **EIA Scoping Report submission to SDC** – end Feb 2021
- **Statutory consultation on EIA Scoping Report** – March to early April 2021 (5 weeks)
- **Completion of Scoping Report and Adoption of Report as the EIA Scoping Opinion** – by end April 2021
- **Preparation of Environmental Statement** – March to July 2021

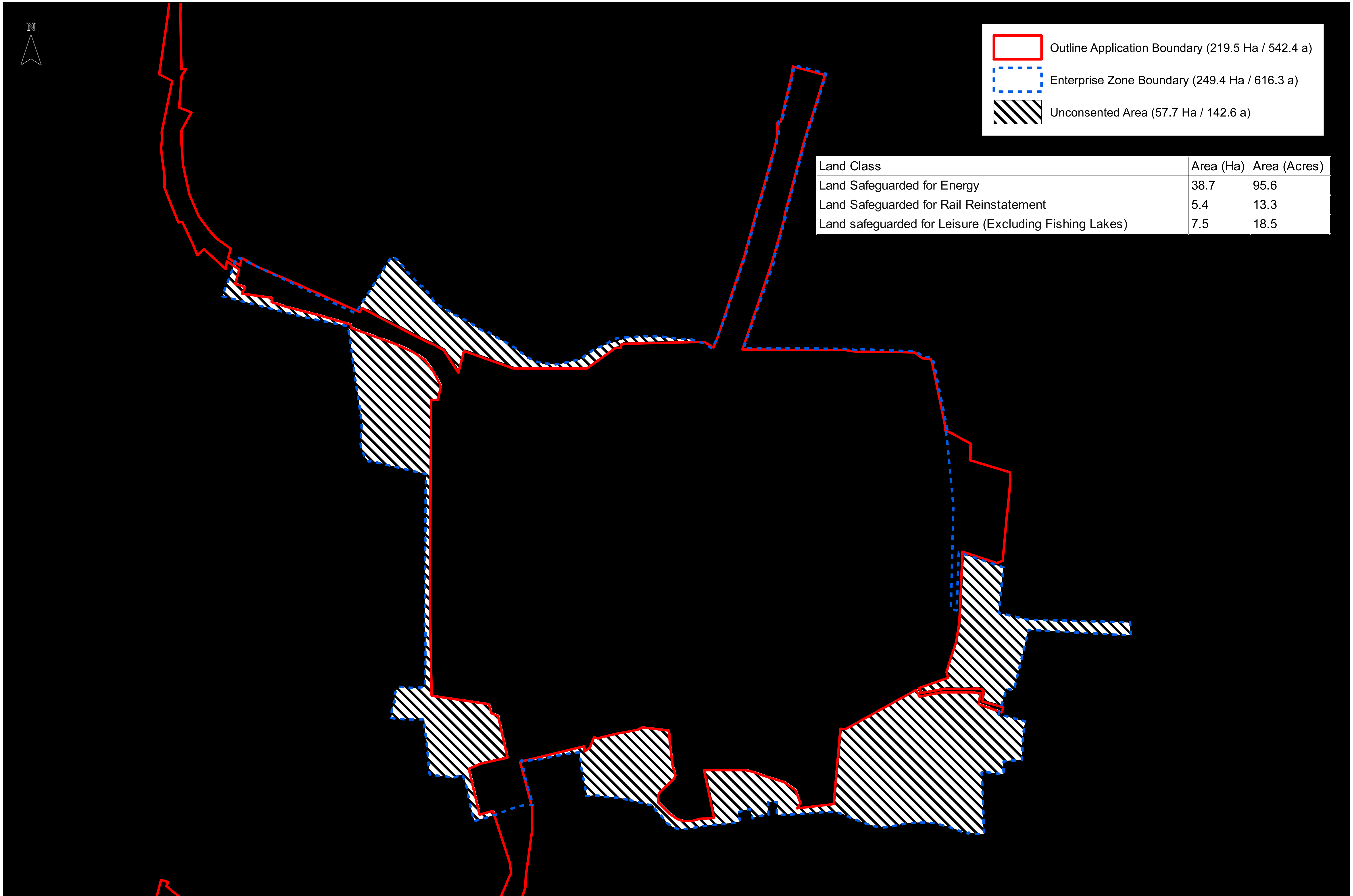
Appendix A

2017 Planning consent Parameters Plan


PLOT J
PLOT K
PLOT A
PLOT F
PLOT G2
PLOT G1
PLOT H
PLOT B
PLOT D
PLOT C2
PLOT C1
DEVELOPMENT PLOTS
PLOT A 152297m² 15.22ha
PLOT B 63417m² 6.34ha
PLOT C1+2 24380m² 2.4ha
PLOT D 53699m² 5.36ha
PLOT F 98704m² 9.87ha
PLOT G1 50984m² 5.09ha
PLOT G2 56815m² 5.68ha
PLOT H 148492m² 14.84ha
PLOT J 213160m² 21.31ha
PLOT K 66699m² 6.66ha
TOTAL 928647m² 92.8ha
USE CLASSES
B1 Offices/R&D/Light industry
B2 Manufacturing/General Industry
B8 Storage/Distribution
Land safeguarded for energy generation uses
Land safeguarded for leisure uses
Land safeguarded for reinstatement of rail freight link to main line
ACCESS & CIRCULATION
Proposed 'Permissive Footpath'
Proposed Roadside combined footpath & cycleway
Proposed paved combined cycleway & footpath
'Permissive Bridleway'
Proposed pedestrian & cycle access points into the site
Legend
Existing Trees/Woodland
Existing Notable Trees
Proposed Trees/Woodland
Proposed SuDS Attenuation Areas
Proposed Ponds
Aedas
client
BAE SYSTEMS
project
ROF PURITON
drawing
PARAMETERS PLAN
project number
2007.01481.
scale
1:2500
@A0
drawing number
P_105
rev
P8
issue status
PLANNING

Appendix B

Comparison Plan between 2017 Consent red line boundary and 2020 LDO site boundary



Land Class	Area (Ha)	Area (Acres)
Land Safeguarded for Energy	38.7	95.6
Land Safeguarded for Rail Reinstatement	5.4	13.3
Land safeguarded for Leisure (Excluding Fishing Lakes)	7.5	18.5

Client

This is Gravity Ltd.

Gravity

Outline Application and EZ Comparison Plan

0 0.5 1 km

Source: © Aedas Architects

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Figure 04	Rev A

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Appendix C

AECOM Report ‘Huntspill Energy Park Technical Report on Potential Energy Generation’ dated April 2012

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Huntspill Energy Park Technical Report on Potential Energy Generation

Prepared by:

Catherine Mackay
Principal Environmental Consultant

Checked by:

Simon Wheeler
Regional Director

Approved by:

Simon Wheeler
Regional Director

Rev No	Comments	Checked by	Approved by	Date
0	Draft issued to client for comment	CM		
1	Issued to client after amendments to report	CM	SW	24/04/2012
2	Issued to client after amendments to report	CM	SW	08/05/2012
3	Final issued to client	CM	SW	21/06/2012
4	Amended final issued to client	CM	SW	16/07/2012

Churchill House, Churchill Way, Cardiff, CF10 2HH
Telephone: 029 2035 3400   Website: http://www.aecom.com

Job No 60250424   Date Created March 2012

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1. INTRODUCTION

1.1 Report Context

BAE Systems have instructed AECOM to produce a technical report to support the outline application for redevelopment of the former BAE Systems facility to an Energy Park. Outline planning permission is sought for the employment uses on this redeveloped site and that Plots J, G (1 and 2) and K are safeguarded for future development for energy generation.

It is understood that further planning permissions will be required for these energy generation plots, and that "reasonable assumptions" must be made in order for the competent authority (Sedgemoor District Council) to adequately assess cumulative impacts. This will be outlined in the accompanying Environmental Impact Assessment (EIA). Therefore we have identified the potential types of energy generation within the Huntspill Energy Park, and have provided "reasonable assumptions" based upon consented schemes across the UK.

It is recognised that the individual energy facilities in these plots will be subject to different planning regimes dependent upon their generating capacity. For example, any energy generation over 50MW will require planning permission from the Planning Inspectorate under the *Planning Act 2008* (formerly under the Infrastructure Planning Committee (IPC)).

Each section of this report will outline the "reasonable assumptions" for each individual plot using an example scheme which has either been granted (or has an intention to grant) planning permission. The main environmental elements of consideration associated with the energy generation facilities are air quality and odour, noise and traffic, and these are all highlighted within each section. Other details regarding average duration of construction phase, appearance, employment benefits, general operations and specifications are outlined where available.

1.2 Site Description & Infrastructure

The former BAE Systems facility had no previous form of energy generation onsite. However, there are several overhead grid connections surrounding the site. In addition, the National Grid propose to upgrade the current 132kV line which crosses the site in a north-south direction to a 400kV transmission line to support the proposed Hinkley Point C nuclear power station.

1.3 Report Structure

The following sections outline the structure of this technical report:

Section 2 outlines the "reasonable assumptions" used for the outline EIA for Plot G2

Section 3 outlines the "reasonable assumptions" used for the outline EIA for Plot J

Section 4 outlines the "reasonable assumptions" used for the outline EIA for Plot K

Section 5 outlines the "reasonable assumptions" used for the outline EIA for Plot G1

In order to provide example "reasonable assumptions", information contained within these sections is solely derived from the Environmental Statement and supporting technical documentation which has been submitted in support of planning permission for the individual projects. AECOM is not responsible for determining the quality of this information, but as the schemes are granted, or have an intention to grant, it must be assumed that it was sufficient for the competent authority and statutory consultees to make informed decisions.

1.4 General Assumptions

The following general assumptions will apply to all plots:

- The finished floor levels for each of the plots proposed for energy uses will be identified through the Flood Risk Assessment, which will be submitted with the planning application;
- There is no restriction on planting or landscaping within the appropriate areas of the energy use plots unless specified;
- To calculate man years, the assumption of 20 man days in a month and 11 months in a year (to account for illness and leave) has been used (with the exception of Rookery South where the figure was provided in the Environmental Statement);
- Under Article 219 of UK Air Navigation Order (ANO) 2009, there is a mandatory lighting requirement for structures of 150m or more in height, however structures of lesser height may need to be lit if they constitute a hazard to air navigation. The Article 219 specification requires that medium intensity (2000 candela) steady red lights be mounted as close as possible to the top of the structure and at intermediate levels not exceeding 52m. Such lighting should be displayed at night and be visible from all directions. In addition, the location of a tall structure may also be a potential hazard to aviation. Comment should be sought from the Directorate of Airspace Policy (DAP) of the CAA for all proposals over 90m in height;
- The specific plot layout and therefore foundation design cannot be confirmed at present. Information regarding lifting equipment and construction plant has been limited although the following assumptions on plant can be made as follows:
  - Cranes for 100 ton units (such as turbines, boilers, etc) would probably be a 400-600te crawler;
  - Cranes for 50 ton units (such as a thermal power station currently under construction in Lincoln) would be with a 300te superlift crane; and
  - Appendix A provides specification and schematics for the Marchwood CCGT.
- It is assumed that construction periods will be similar to the schemes outlined in the following sections, where available; and
- There will be no requirement for any abstraction from the Huntspill River. Any water required for the energy uses will be taken from the mains supply.

2. PLOT G2 – ENERGY FROM WASTE

2.1 Type of Energy Generation

The size of Plot G2 and its proximity to a railway suggests that a medium scale thermal plant such as energy from waste would be suitable for this plot. The rail head does also provide opportunities for a biomass plant but for a 50MW facility would require a significantly larger fuel source as opposed to energy from waste.

2.1.1 Technology

Energy from Waste (EfW) is the process of creating energy in the form of electricity or heat using incineration, gasification or pyrolysis technology to combust a waste source and is a form of energy recovery. Older EfW processes produce electricity directly through combustion of the waste. More modern facilities produce a combustible fuel commodity, such as methane, methanol, ethanol or synthetic fuel. Modern incinerators reduce the volume of the original waste by up to 96%, depending upon composition and degree of recovery of materials such as metals for recycling and the ash for the construction industry.

There are a number of other new and emerging technologies that are able to produce energy from waste and other fuels without direct combustion. Many of these technologies have the potential to produce more electric power from the same amount of fuel than would be possible by direct combustion. This is mainly due to the separation of corrosive components (ash) from the converted fuel, thereby allowing higher combustion temperature, efficiently converting the fuel into a liquid or gaseous fuel.

An example of an EfW plant, operated by Veolia in Sheffield where 62% of waste collected from the surrounding area is taken to the Energy Recovery Facility (ERF) where it is burnt at temperatures of over 850°C in a specially controlled environment. The heat created from the process is converted to steam and used to generate heat and electricity. The ERF is designed to handle 225,000 tonnes of municipal solid waste a year. Up to 60MW of heat is supplied to over 140 buildings connected to the District Energy Network. The plant also generates up to 19MW of electricity for the National Grid; enough to power up to 19,000 homes.

2.2 Introduction to Scheme

2.2.1 Reasonable Assumption

Should the proposed energy generation capacity be over 50MW, this will require determination under the *Planning Act 2008* by the Planning Inspectorate. Therefore in order to provide reasonable assumptions, we are using the Covanta Rookery South Resource Recovery Facility (RRF), which has recently been issued a Development Consent Order (DCO) by the Secretary of State under the *Planning Act 2008*.

However for the purposes of the masterplan, the 12MW Billingham energy from waste scheme from energy developer O2N was used as this provided in depth schematics of a facility layout.

2.2.2 Site Description

The RRF is located at a former brick clay pit near Stewartby in Bedfordshire, and comprises of an Energy from Waste facility with an average gross/net electrical output of approximately 65/55 MW and a dedicated post-treatment Materials Recovery Facility (MRF). The total pit area is approximately 210ha and is subject to a Low Level Restoration Scheme (LLRS), although the application boundary for this project is 130ha. Therefore a large amount of ground works are required prior to construction commencing.

The EfW facility will be fuelled by 585,000 tonnes per annum of residual waste and will also act as a Combined Heat and Power (CHP) facility. The facility will generate sufficient electricity to supply approximately 82,000 homes. The post-treatment MRF is dedicated to the management of the Incinerator Bottom Ash (IBA) produced by the EfW facility and aims to recover approximately 90% of this material to a secondary aggregate for use in construction projects and ferrous/non-ferrous metals for recycling. Buildings referenced in this section can be identified in Figure 2.1 by numbers in brackets.

2.2.3 Scheme Specifics

The overall Rookery South scheme encompassed a larger site and therefore for the purposes of this reasonable assumption, only the EfW facility will be tested. It is recognised that there may be by-products although this will depend upon the technology and type of waste used. Therefore the MRF will be removed from the description of this reasonable assumption.

In addition, the Rookery South facility also included a rail head, although it was concluded that this would not be used for the scheme. However, due to the close proximity to the rail head at Huntspill, it is assumed that the rail head may be utilised for delivery of waste and also potential removal of by-products such as ash and metals. However, it is likely that the waste material for fuel will be brought in by road.

No water is expected to be extracted from the Huntspill River for the steam turbine. Steam and water is contained as a closed loop system within thermal generation. Water required for commissioning will be taken via the main supply.

2.2.4 Orientation

The assumption is that the proposed scheme will use the railhead. Therefore, the plant will be orientated with storage and hoppers towards the rail head with the remainder of the facility including the air cooled condensers and stack being located away from the rail head. Administration buildings and car parking will be located appropriately with no limitations on landscaping.

2.3 Project Description

2.3.1 Key Components

Principal plant buildings and their dimensions are as follows:

- The provision of a drainage channel on a realignment in substitution for a drainage channel that would otherwise be provided in Rookery South Pit;
- The extension of an attenuation pond to be constructed in Rookery South Pit;
- An underground connection to the electricity grid allowing the export and import of electrical power;
- Works for the creation of an upgraded site access and new junction on Green Lane, Stewartby and an improved entrance to the Marston Vale Millennium Park;
- Improvements to Green Lane between its junction with footpath 4 and Stewartby Lake including footway improvements; and
- Improvements to Green Lane level crossing including the installation of full automatic barriers.

Ancillary structures would include:

- Weighbridges and security gatehouses;
- Internal site roads and parking facilities;
- Workshops and stores;
- Landscaping, earth bunds and boundary treatments;
- Pipes for steam pass outs and for hot water pass outs within the application site;
- Habitat creation;

- The provision of footpaths and cycleways and footpath linkages; and
- Foul drainage provision, surface water management systems and water supply works.

Key dimensions of the overall facility area as follows:

Table 2.1 – Key Dimensions.

EfW Facility Element	Max Height (from FFL)*	Max Height (AOD)
Tipping Hall (FFL +41.0m AOD)	15.0m	46.0
Boiler House	43.0m	74.0
Turbine Hall and Air Cooled Condensers	20.0m	51.0
Stack	105m	136

*Note: * Finished Floor Level (FFL) assumed as +31m AOD unless otherwise stated*

Building widths and heights have been scaled from the planning figures submitted to the Infrastructure Planning Commission (IPC). The local dimensions of the facility are outlined here:

Table 2.2 – Building Dimensions

Building Number	Description	Height (m)	Length (m)	Width (m)
6	Tipping Hall	20	19	44.5
7	Refuse Bunker	36	10	38
8	Boiler House	38	33	34
9	FGT Area	32	20	32
13	Turbine Hall	15	19	22.5
19	Silos	23	10	31

2.3.2 Materials and Appearance

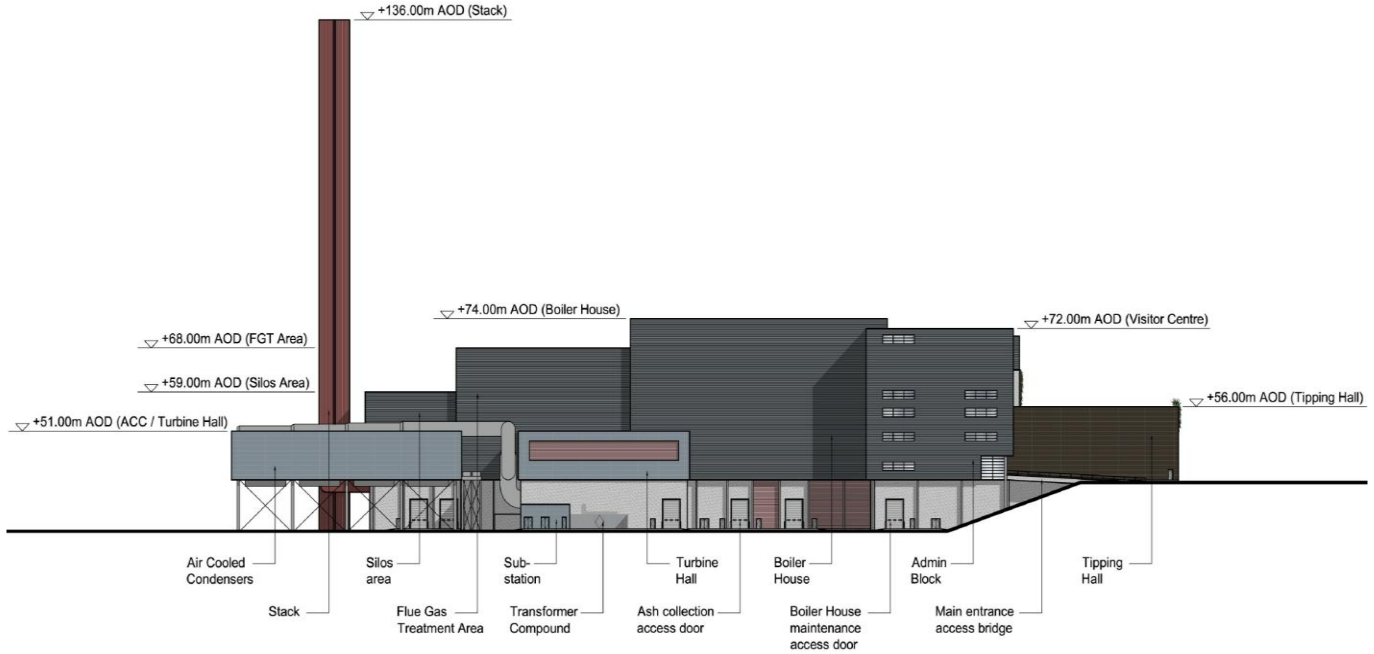
Below the datum the EfW facility will be clad in concrete, which provides a natural grey colour. Any entry or loading doors will be a mid-grey tone in keeping with the concrete. Above the datum, the main elements of the EfW building including the refuse bunker (7), boiler house (8), FGT area (9) and silos (19) are clad in profiled metal cladding, which will be dark grey in colour.

The stack will be clad in a terracotta coloured metal cladding, which will be consistent with the localised brick chimneys in Stewartby.

The administration area (15) will be clad in anthracite grey coloured profile cladding, whilst the other operational areas will be clad slightly differently as follows:

- Tipping hall (6) will be clad in grey brown colour – expressing the raw nature of incoming waste;
- Turbine hall (13) and air cooled condensers (14) are to be clad at high level in composite panels in height grey and the lower part in pre-cast concrete – expressing the "processed" output of electricity and heat; and
- Workshops and stores (10) to be clad entirely in light grey composite panels.

Figure 2.1 – Visualisation of Rookery South RRF



2.3.2 Employment Benefits

The proposed scheme would also be directly responsible for the creation of up to 80 permanent jobs (comprising 61 EfW operators site workers, 11 HGV drivers and one manager).

2.4 Construction Phase

2.4.1 Duration

The construction phases of this project were scheduled to last 39 months, and were limited to daylight hours of 07:00 to 19:00, Monday to Friday and 07:00 to 13:00 on Saturday. There is no timing breakdown of construction phases and therefore this includes the LLRS of the Rookery clay pit and reinstatement for a development platform.

2.4.2 Workforce

The 39 month construction phase includes a workforce of approximately 320 persons which is the equivalent of 1,040-1,300 person years of employment (variation in figures found within ES).

The highest volume of traffic occurs between months 20-28 and therefore the assumption is that this is the peak employment period.

2.4.3 Delivery of Process Plant

Details regarding the delivery of turbines and/or abnormal loads were not included within the Rookery South RRF Environmental Statement as these areas are subject to construction contracts, and therefore were to be agreed at the appropriate time. The traffic surveys undertaken as part of the Transport Assessment (Appendix 18.2) considered abnormal loads no larger than the maximum legal articulated vehicle size.

Preference is given to off-site fabrication and modular construction to minimise the requirement for abnormal loads. For example, boiler membrane walls are to be brought to site in large panels and welded *in situ*, although their installation will require heavy duty mobile cranes. Other process plant such as boiler sections, steam drums, steam turbine, process fans and compressors are to be delivered on loader and craned into position.

Large scale construction plant such as cranes and generation equipment are commonly modular and the likely nature of their transport will be infrequent through construction as they will be required at set times. This is often after enabling works.

For the Huntspill Energy Park it can be assumed that generation equipment can be delivered by road or rail head to site from Avonmouth Dock.

2.4.4 Construction Traffic

The following table outlines the predicted two-way construction vehicle movements per day (the LLRS movements have been excluded but these may incorporate the MRF):

Table 2.3 – Predicted two way traffic movements during construction

	Month	HGVs	Cars / LGVs
RRF Construction Movements (39 month period)	1	10	58
	2	6	94
	3	26	96
	4	68	130
	5	316	138
	6	308	178
	7-12	Average = 100 Min = 8 Max = 308	Average = 434 Min = 236 Max = 566
	12-19	Average = 100 Min = 8 Max = 308	Average = 434 Min = 236 Max = 566
	20-28	Average = 126 Min = 124 Max = 308	Average = 578 Min = 568 Max = 584
	29-39	Average = 4 Min = 2 Max = 6	Average = 298 Min = 58 Max = 528

2.4.5 Construction Value

The overall Rookery South RRF was valued at a construction cost of £45 million.

2.5 Operational Phase

2.5.1 Operation

The EfW facility will be operational 24 hours a day, 365 days a year. Deliveries of fuel are restricted to between 05:00 and 23:00, Monday to Saturday, excluding Christmas Day, New Years Day and Easter.

The MRF has operational hours of Monday to Friday 07:00 to 18:00 and Saturday 07:00 to 14:00.

The assumed plant availability is 89% (the allowance for planned and unplanned maintenance shutdowns).

2.5.2 Vehicle Movements

The following table outlines the type and number of predicted vehicle movements associated with the project based on the nominal capacity of 585,000tpa being delivered as per the operational hours above.

Table 2.4 – Predicted two way vehicle movements during operation

Summary of Total Vehicle Movements per day	In	Out	Total (2-way)
Vehicle collection vehicles	33	33	66
RCV / Roll on / Skip	50	50	100
Bulk loaders	59	59	108
Fuel in (HGVs)	8	8	16
Products exiting (HGVs)*	28	28	56
Sub Total HGV	178	178	356
Staff	67	67	134
Visitors	11	11	22
Maintenance	9	9	18
Total Movement	265	265	530

* products exiting include IBA, fly ash and metals

Further information including extracts from the ES and technical appendices can be found in Appendix A

2.6 Decommissioning

It is anticipated that the Rookery South RRF has an operational life span of 35 years. When decommissioned, the steel structure would be removed and recycled and pre-cast concrete broken and crushed for reuse.

It was anticipated that the decommissioning process would generate a similar level of operations associated with the construction phase.

2.7 Air Quality

The main EfW building has been included in the Rookery dispersion modelling. The stack is designed to ensure that the treated combustion gases are dispersed at a height and a velocity such that they have no significant impact on the surrounding area. The treated emissions are monitored by emissions monitoring equipment (26). The emissions which will be monitored continuously include the particulates SO_2 and NO_x, This provides readings of emissions to demonstrate that they do not exceed the Waste Incineration Directive (WID) limits and if there is adverse trending in the levels of emissions. The Rookery modelling has broken the building down into a number of elements to reflect the stepped nature of the building design, however, the heights of the individual sections has not been provided in the ES or Technical Appendix.

The engineering drawings provide a number of building layouts, which include the elevation of various building sections in mAOD.

The following processes were identified as being the main contributors to air quality:

Construction Phase

- Emissions of dust associated with on site construction activities;
- Emissions associated with traffic accessing the site during construction; and
- Emissions associated with the removal of asbestos from the conveyor.

Operational Phase

- Emissions arising from the combustion process in the EfW facility;
- Emissions from the diffuse sources connected with the IBA handling and
- Emissions associated with traffic accessing the site during the operation of the RRF.

2.7.1 Stack Parameters

The stack height assumed in the air quality assessment is 100 metres and the stack height given on the plans as 136 mAOD. As such, a base elevation for the site of 36 mAOD has been assumed to allow the calculation of the building heights. Building widths and heights have been scaled from the planning figures submitted to the Infrastructure Planning Commission (IPC).

Table 2.5 – Emissions

Parameter	Units	Value
Number of stacks		1
Number of flues		3
Flue diameter	m	1.8
Stack height (from base)	m	100
Gas temperature	Celsius	137
Volume flow rate	Nm^3/s	39.1
Volume flow rate	Am^3/s	48.3
Moisture content	%	18.88
Oxygen content	%	6.06

Table 2.6 – Parameter Concentrations & Mass

Parameter	Emission Concentration Limits (WID) (mg/Nm^3)		Mass Emissions (g/s)	
	Long-term	Short-term	Long-term	Short-term
$PM_{10}/PM_{2.5}$	5	10	0.196	0.391
NO_x	200	200	7.83	7.83
SO_2	15	50	0.587	1.96
CO	25	50	0.978	1.96
VOC	3	10	0.117	0.391
HCl	7.5	10	0.294	0.391
HF	0.5	1.0	0.0196	0.0391
Dioxins	7.0×10^{-8}	1×10^{-7}	2.74×10^{-9}	3.91×10^{-9}
Ammonia	3	10	0.117	0.391
Sum of Group 1 metals (Cd and Tl)	0.005	0.05	1.96×10^{-4}	1.96×10^{-3}
Sum of Group 2 metals (Hg)	0.01	0.05	3.91×10^{-4}	1.96×10^{-3}
Sum of Group 3 metals (Sb, AS, Pb, Cr, Co, Cu, Mn, Ni, V)	0.05	0.5	1.96×10^{-3}	0.0196
Arsenic	0.025	0.25	9.78×10^{-4}	0.0096
PAH (as Benzo[a]pyrene)	0.000088	n/a	3.44×10^{-6}	n/a
Chromium (VI)	0.00015	n/a	5.87×10^{-6}	n/a

Notes: Normalised /actual emissions are described in terms of the actual conditions at emission from the stack or in terms of normalised conditions.
Pollutant emissions rates are presented per flue
Emission of arsenic were separated out from the rest of the Group 3 metals as the project was subject to site specific emission limits

2.7.3 Vapour & Plume Visibility

Vapour or venting of steam from the stacks commonly occurs and is normally visible during the start-up procedure. This is necessary to protect the steam turbine and takes place for a relatively short period of time. Sometimes it can occur during emergency venting of steam, which is expected to occur infrequently. A release of steam will also be required upon commissioning.

The water vapour content of any plume from an EfW is dependent on the following:

- the fuel type to be used, i.e. black bag waste or processed waste (Refuse Derived Fuel (RDF)); and

- the level of pre-processing, i.e. sorting, recycling, composting etc undertaken to boost materials recovery or the fuels calorific value (CV).

The type of abatement plant to be used will also affect he moisture content of any resultant plume.

The Rockery facility comprised of both an EfW and Materials Recovery Facility (MRF). The MRF will process both household and business waste by recycling and composting where possible with the residue from the recovery process used in the EfW. The Rockery facility also utilised a dry flue gas abatement system. Both the pre-processing of the waste and use of a dry abatement system will affect the moisture content of the plume. Typically moisture vapour concentrations for EfW's are of the region of 13 – 19%.

The proposed Rookery facility has an anticipated moisture content of 18.88% H2O (20.4% if a semi-wet flue gas abatement was used) so this may be considered a conservative assessment for the majority of facilities. Based on the use of dry abatement system the mass of water emitted from the facility will be approximately 0.1199 kg per kg, while for a semi-dry process the mass emission would be 0.1296 kg per kg.

Based on the use of dry flue gas abatement the Rookery ES provided the following frequencies of visible plumes and plume lengths.

Table 2.7 – Plume Length & Frequency

Plume Length	Frequency (% of the year)
0m (no visible plume)	48%
0-50m	33%
50-100m	14%
100-150m	4.1%
150-200m	0.87%
200-250m	0.19%
250-300m	0.06%
Maximum	278m

Plume visibility analysis was undertaken which outlined that for over 98% of the time the plume would be less then 150m long. It should be noted that local conditions will affect the number and length of visible plumes from the facility dependent on local meteorological conditions including wind speed, temperature and relative humidity.

2.7.4 Abatement Methods

Generally thermal power stations in the UK use Selective Non-Catalytic Reduction (SNCR) for the control of nitrogen oxides and therefore emissions are kept within EU set limits. Other emissions can be controlled via careful control of combustion conditions along with the use of ammonia/urea injection (acid gas control), activated carbon injection to control the emission of metals and bag filters to reduce particulate/metal emissions.

No water is expected to be extracted from the Huntspill River for the steam turbine. Steam and water is contained as a closed loop system within thermal generation. Water required for commissioning will be taken via the main supply.

2.7.5 Emissions from Traffic

Peak construction traffic ranges between 114 – 546 LDVs and 546 to 248 HGVs over the life of the construction phase with higher HGV peak movements at the start of the construction process and a higher peak LDV flow towards the end of the construction period.

Operational traffic for the proposed facility consists of 154 LDVs and 366 HGVs.

2.7.6 Odour

EfW facilities may produce some odour from dustcarts delivering waste and storage of waste. Odour should be destroyed in the furnace assuming all combustion air is extracted from the tipping hall and waste bunker. Use of fast opening/closing doors/an airlock system and negative pressure within the tipping hall will minimise the potential for fugitive odour and dust effects. All waste should be delivered in sealed containers, or appropriate vehicles for the material being transported and should only be allowed to discharge their loads once within the tipping hall and the doors closed. In addition, the tipping hall should be kept under negative pressure. Secondary mitigation can be the use of water or deodorant sprays.

For Rookery South EfW this was actually scoped out of the Environmental Statement as the above operations were implemented, without the need for secondary mitigation.

2.7.7 Assessment of Significance and Mitigation Measures

Although there was an increase in traffic numbers during construction and operation, the impacts were not significant as concentrations of NO_2 and PM10 were predicted to be well below the air quality standards and therefore unlikely to result in any unacceptable impacts to air quality.

In relation to the combustion process, impacts on human health were assessed in the immediate vicinity of the facility whereas the study area for ecological receptors was 10km of the site. The results of the dispersion modelling demonstrated that emissions from the EfW facility for all substances would not be significant and it was considered highly unlikely that any air quality standards would be exceeded.

In relation to ecological features, dispersion modelling was undertaken considering impacts of acid deposition, nutrient nitrogen deposition, NO_x and SO_2 on the nine SSSIs which were within 10km of the site. It was predicted that there would be a marginal significant impact related to nutrient nitrogen deposition. However this was based upon modelling a stack height of 100m, and it was noted that an extension to 105m is likely to reduce these impacts to below 1% for the upper limit. Impacts upon the seven SSSIs were considered to be not significant whereas two SSSIs would have minor adverse impacts.

It was recognised that mitigation measures would have to be implemented to the storage and movement of the IBA to ensure that dust emissions do not result in nuisance of human and ecological receptors.

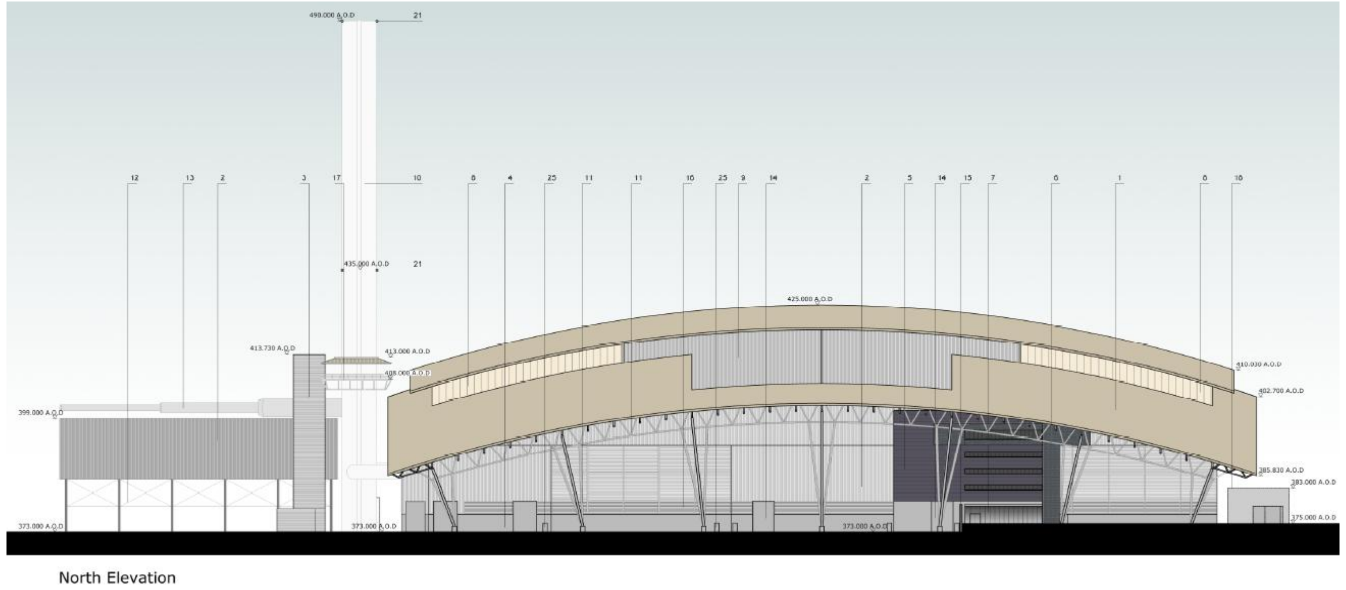
Other mitigation measures included a Construction Environmental Management Plan, wheel washing facilities, traffic management and ongoing air quality monitoring, which would be undertaken as part of the Environmental Permit.

2.8 Noise

2.8.1 Construction Phase

Limited information was provided with the Rookery South EfW Environmental Statement, therefore the Covanta Brig Y Cwm 65MW Municipal Solid Waste Resource Recovery Facility, which is a similar facility, has been used to provide reasonable assumptions.

Figure 2.2 – Visualisation of Brig Y Cwm RRF (north elevation)



Here, the construction noise assessment in the ES was separated into three phases; Ground Works, Piling and Pipeline Construction. Noise data used for noise predictions in each construction phase is summarised in Table 2.7 below.

Table 2.8 – Construction Noise

Ground Works	
Plant	**LAeq @ 10m taken from BS 5228 site prep**
Excavator - 71t	77
Dozer - 40t	80
Piling	
Plant	**LAeq @ 10m taken from BS 5228 site prep**
Precast Driven Piles	101
Pipeline Construction	
Plant	**Laeq @ 10m taken from BS 5228 site prep**
Excavator - 71t	77
Dozer - 40t	80
Pneumatic Breaker	83
Road Lorry (full)	80

2.8.2 Traffic

Construction traffic for the proposed facility is summarised in the table below.

Table 2.9 – Construction Traffic

Number of 2-way HGV movements	LWA (dB)
490	106

Operational traffic for the proposed facility is summarised in the table below.

Table 2.10 – Operational Traffic

AAWT	HGV %
808	68

2.8.3 Operational Noise

A combination of Covanta and RPS noise source data was used in the ES to establish the likely levels of operational noise from the production of both electrical and heat energy. Noise sources used in the ES predictions along with the sound transmission loss performance of the building envelope is summarised in the tables below.

Table 2.11 – Main Equipment Noise

Main Equipment	SWL (dB(A))	Location	Comments
Unloading Waste into Bunker	88	inside	
Unloading Hoppers	81	inside	
Combustion Fan	75-85	inside	
Conveyors	90	inside	
Residue and Ash Conveyor	78-80	inside	
Feed Water Pumps	85	inside	
Condensate Pumps	80	inside	
Vacuum Ejector	80	inside	
Air Compressors	90-95	inside	
Turbine	85 SPL	inside	Presume 1m outside acoustic enclosure
Chimney	93	inside	
Conveyor Drive Units	93	inside	
Shredder	93	outside	
Conveyor Drive Units	75	outside	
Stack Transformers	82	outside	Full load

Table 2.12 – Noise from ACCs

Air Condenser Unit - No. 15 fans	
Spectrum, octave band frequency	**Std heat exchange area and 15 std fans**
31.5 Hz	119 dB
63 Hz	117 dB
125 Hz	115 dB
250 Hz	110 dB
500 Hz	107 dB
1000 Hz	105 dB
2000 Hz	102 dB
4000 Hz	95 dB
8000 Hz	92 dB
A weighted sound power total	110 dB(A)

Table 2.13 – Building Envelope Noise

Building Envelope	
Building Facade	Rw 38 dB
Roof & Personnel Doors	Rw 25 dB
Separate Housing for Turbine	Rw 45 dB
Louvers etc.	Rw 0 dB
Fast Closing Doors	Rw 23-25 dB

2.8.4 Assessment of Significance

It was predicted that the highest level of noise would occur during construction, and principally from piling phases of the project, and also during construction of the access road, although this would be more localised. Worst case scenarios were tested such as the use of generators as opposed to mains electricity, and also the construction plant used. Predicted noise levels during construction would be below the significant effects thresholds for the nearest sensitive noise receptors (dwellings) and therefore considered to be not significant.

Operational noise will be constant throughout the day and night due to the 24 hour operation of the EfW although the MMF will only work during daylight hours. Due to the distance to dwellings it would be expected that the received noise would be broadband in nature and not have a distinct tonal quality. Further to assessment of the baseline and predicted impacts, it was considered that the impact during daytime operations would result in a 0.3 dB increase against the baseline and a 0.5 dB increase at night, and therefore this is considered not significant.

Impacts from vehicle noise on the access road were also predicted to be not significant due to an increase of less than 1dB during the day and 0.3dB in the night. More specific analysis was undertaken as set times of the day and the results still predicted a non significant impact. Impacts on the wider traffic network were considered negligible due to a predicted 3% increase in predicted traffic growth.

2.8.5 Mitigation Measures

Mitigation during construction required compliance with BS 5228:2009 and selection of quieter machinery, localised screening, controlled working hours and restricted delivery times and access routes.

Operational mitigation measures included implementation of the optimised design and layout of the plant to minimise acoustic disturbance to human health and ecology. Significant reductions can be achieved through building design, using quieter equipment and screening/attenuation of noisy plant. This is especially evident through reduction by design of the Air Cooled Condensers (ACCs) and it is stated within the ES that discussions with the manufacturers resulted in the ACCs being modified.

Consideration was given to the benefits of a 2m high bund surrounding the RRF, which is part of a landscaping strategy for the site.

2.9 Lighting

With respect to the Rookery South application, a Lighting Strategy was developed to provide the required level of illumination for safe operation of the RRF, whilst respecting the location of the application site. The strategy comprises an external lighting layout and consideration of the control of internal lighting in views from the surrounding area.

In accordance with the Institute of Lighting Engineers' Guidance Note for the reduction of obtrusive lighting GN01 (2005), the lighting and illumination impacts of the project are designed to comply with Environment Zone E2 (low district brightness within rural/small village locations). Whilst providing adequate luminance for the various tasks which occur on the development, the Lighting Strategy is proposed to minimise the effects to local receptors, whether human or ecological.

2.9.1 Railway sidings

In terms of guidance there are various documents including railway standards, British Standards, CIBSE standards, etc. Railway and British Standards would usually have a higher priority that CIBSE but there is a lot of cross reference between these documents. There are a number of different standards for railways e.g. Network Rail has their own standards.

The CIE standard for *Lighting of Outdoor Work Places* makes reference to lighting requirements based on different areas, task and activities (section 5.2).

2.9.2 Stack Aviation Lighting

With respect to the Rookery South project, the stack will be lit with three medium intensity red obstruction lights in compliance with regulations and in agreement with Cranfield Airport, which will include one high level light positioned within 1m of the top of the stack and two mid-level lights facing west.

3. PLOT J - COMBINED CYCLE GAS TURBINE

3.1 Type of Energy Generation

Given the size of Plot J and proximity to the high voltage overhead transmission line, it has been suggested that a larger scale thermal plant would be appropriate in this location. Technology such as Combined Cycle Gas Turbine (CCGT) would be suitable for this plot.

3.1.1 Technology

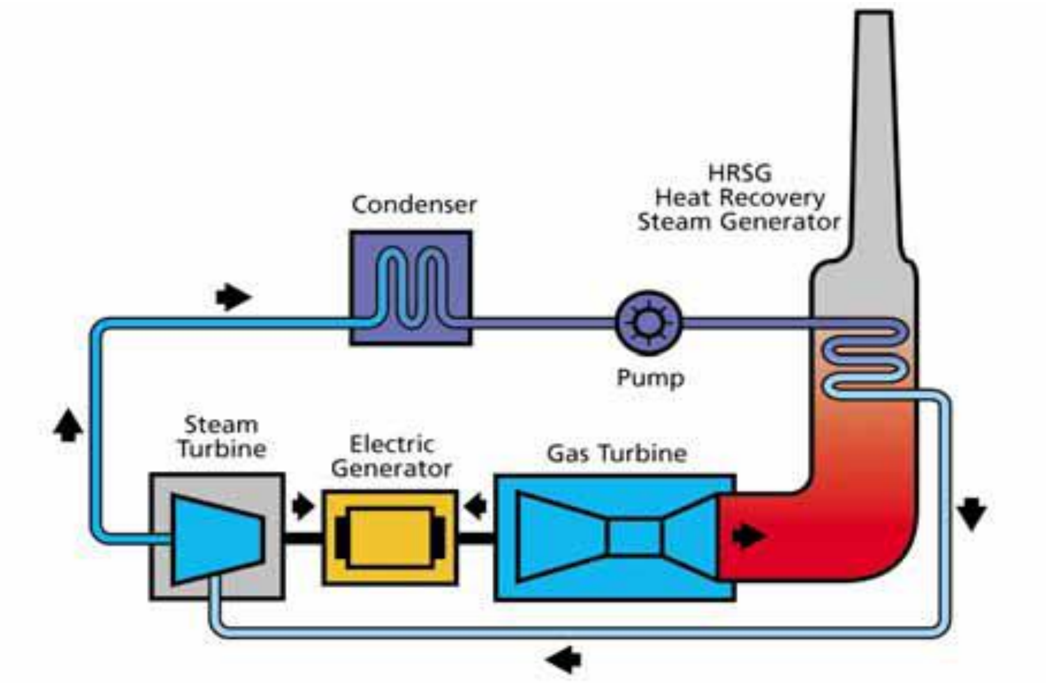
The term ‘combined cycle’ refers to the use of two processes to produce electricity. The burning of natural gas is the first. The recovery of heat from the waste gases to produce steam to drive a steam turbine is the second. Together, these processes capture much more of the energy in the gas. Combined-cycle plants can achieve efficiencies of 60% whilst producing limited emissions.

Gas is mixed with filtered, compressed air and burned. The hot combustion gases expand, driving the gas turbines. This in turn drives generators to produce electricity. The hot exhaust gases from this process contain significant amounts of recoverable energy. The gases are passed through the heat recovery boiler to produce steam. The high pressure steam is then used to drive a steam turbine which generates further electricity for the grid. The waste gases are expelled to the atmosphere via the stack.

The spent steam is then passed through a condenser. The condensate is then cycled back through the heat recovery boiler. The condenser may either require large quantities of cooling water (which is typically drawn from local surface waters) or may include Air Cooled Condensers (ACCs). ACCs condense the steam to water and feed it back through to the turbines in a closed loop system without the need for abstraction.

There are several operational CCGTs throughout the UK and typically operate at 800MW and above.

Figure 3.1 – Typical CCGT Configuration



3.1.2 Associated Infrastructure

Natural gas is supplied via pipeline which is connected to the National Transmission System (NTS). Dependent upon the ground conditions, the pipe will either be drilled using pipe-jack or Horizontal Directional Drill (HDD) technology or open-cut trenches. Pressure Reduction Stations (PRS) or Above Ground Installations (AGIs) may be required to pump the gas to the power station along the route.

Other associated infrastructure required includes a substation and grid connection. Given the close proximity of a high voltage connection, a small off take will be required.

It is currently not possible to confirm the length or route of the associated pipeline or grid connection due to the premature nature of this specific project at Huntspill Energy Park.

3.1.3 Planning Regime

As the proposed energy generation is over 50MW, this will require determination under the *Planning Act 2008* by the Planning Inspectorate. This application will also take account of the gas pipeline and grid connection.

3.2 Introduction to the Scheme

3.2.1 Reasonable Assumption

The scheme that is proposed to be used as a reasonable assumption is the 800MW Severn Power CCGT power station, located in Newport, South Wales. The scheme was given Section 36 consent by the Department of Trade and Industry in 2009, and is currently operational.

Figure 3.2 – Photomontage of the Severn Power CCGT Station

3.2.2 Site Description

The Severn Power CCGT station is located on the site of a former coal fired power station, and is approximately 6ha in size. The power station is located on a peninsular at the confluence of the River Usk and Severn Estuary. The site is surrounded by national, European and international designations including the River Usk SSSI and SAC, Gwent Levels SSSI and the Severn Estuary RAMSAR, pSAC and SPA.

Adjacent to the CCGT is an operational coal fired power station called Uskmouth, which is currently owned by SSE.

3.3 Project Description

3.3.1 Key Components

Section 3.1.1 provides an outline of the CCGT technology.

3.3.2 Building Dimensions

The following table outlines the building dimensions:

Table 3.1 – Building Dimensions

Building	Grid Reference x	Grid reference y	Height	Length of x	Length of y
Condenser 1	332371	183642	26	47. 0	43.1
GT Hall 1	332431	183652	26	54.4	37.5
HRSG1	332503	183690	34	12.5	18.7
Condenser 2	332402	183575	26	46.4	44.0
GT Hall 2	332461	183585	26	53.3	38.7
HRSG 2	332533	183624	34	12.4	20.4
Switchyard	332384	183718	15	164.0	28.0

3.3.3 Materials and Appearance

Any elements of the power station buildings were clad in two different shades of green, a darker green up to 2m in height and then a lighter green above. The exceptions were the grey stacks and visible pre-cast concrete.

3.3.4 Orientation

The orientation of a CCGT plant is often related to the location and proximity of the gas pipeline. In the case of Severn Power, the AGI brought the gas pipeline onto site and is approximately 100m away from the gas turbine halls. The remainder of the CCGT plant is often laid out in a linear fashion behind the turbine hall/stack towards the ACCs.

There is no restriction on landscaping and this should be possible throughout the CCGT layout as appropriate although no tree planting will be possible on the pipeline route from AGI to the power station.

3.4 Construction Phase

3.4.1 Duration

The construction phase of the Severn Power project lasted for 30 months, and was limited to the daylight hours of 07.00 to 19.00 Monday to Friday and 07.00 to 13.00 on Saturday.

Several piling rigs were present for approximately four to six months at the start of the construction period, once ground enabling works had commenced. Cranes of various heights were employed to assist in construction of the taller structures. In the case of the ACC’s the cranes were constructed inside the facility and screened to a certain degree. Other cranes were used for the construction of the stacks but again were present for short periods of time.

3.4.2 Workforce & Construction Value

It was proposed that a total of 400 workers would be onsite at peak construction times. Studies were undertaken to demonstrate that the local housing stock could accommodate such a temporary influx. In addition, to minimise impact to the local village of Nash, a temporary park and ride scheme was implemented during construction, and a strict time period of deliveries had to be adhered to.

The estimated man years for this 30 month construction phase are 1090 man years.

The value of the project was estimated at £650 million.

3.4.3 Traffic

The highest predicted construction traffic (including predicted HGVs occurs in 2008 with the number of construction-related vehicle movements being predicted at 260 per day). The operation of the proposed development will result in far fewer traffic movements than those associated with the construction, and are estimated to be in the order of 44 per day. A large proportion of these movements will be due to the 25-30 staff operating the plant and, therefore, the majority of journeys will be local. The maximum number of vehicles arriving at site during each shift change will be less than 25.

Table 3.2 – Traffic Movements

Type of vehicle	Cars	LGV	HGV	Total
Construction-related vehicles only	188	38	34	260
Proposed station vehicles only	40	2	2	44

3.4.4 Abnormal Loads

The ES outlined the potential for up to 70 two-way abnormal load movements over the 30 month construction period. The following information is taken from the Severn Power CCGT project which outlines the component and weight of the abnormal load and time during the construction phase. No details are provided on dimensions or measurements of the abnormal loads and are therefore assumed to be the maximum legal articulated lorry size.

Table 3.3 – Construction Traffic Components

Component	Approximate Weight (tonnes)	Approximate delivery month during construction period
H Turbine (per train)	1 x 52	13
E Turbine (per train)	1 x 185	13
Condenser	1 x 122	15
Gas Turbine	1 x 330	13
Gen.Stator	1 x 295	14-16
Gen/Rotor	1 x 56	14-16
Gen.Transformer	1 x 280	14-16
Hp drum	1 x 105	14-16
Boiler modules	21 x (50-106)	15-17
Filterhouse modules	2 x 39	15-18
Diffuser	4 x 8.5	19

A Transport Management Plan was agreed with the Highways Agency which outlined the route of the abnormal loads and a commuted sum was agreed for any improvements to the highways resulting from increased construction traffic.

The technical appendices of the Transport Chapter of the Severn Power CCGT ES are contained within Appendix B.

3.4.5 Lifting Equipment & Construction Plant

Information regarding cranes and lifting equipment has been gained from the construction of Marchwood CCGT power station. The main crane used to lift the boiler unit modules was a Demag CC2800 (600 ton Crawler Crane) with a 90 metre boom and backmast Superlift capacity of 300 ton on the tray. The trailing crane used was a Liebherr LR 1280 (300 ton) Crawler Crane.

Appendix A provides specification and schematics on the cranes used at Marchwood as an assumption.

3.5 Operational Phase

3.5.1 Commissioning

Commissioning the two CCGT units lasted approximately four months, in which time higher than average emissions of nitrogen oxides were present but this was temporary. CCGT are often called “peaking plants” as they can respond quickly to times of peak demand in the energy network, and can start up promptly. This is the opposite to “base-load” plants such as coal, energy from waste and biomass.

3.6 Decommissioning

It is anticipated that the Severn Power CCGT has an operational life span of 35 - 40 years. When decommissioned, the steel structure would be removed and recycled and pre-cast concrete broken and crushed for re-use.

It was anticipated that the decommissioning process would generate a similar level of operations associated with the construction phase.

3.7 Air Quality

Emissions to air from point sources comprise of:

- Emissions from the main stack (flue gases containing carbon dioxide, carbon monoxide, oxides of nitrogen, traces of particulate matter and volatile organic compounds when gas firing);
- Emissions from safety vents on the natural gas system;
- Emissions of carbon dioxide from steam condenser/de-aerator; and
- Emissions of steam from de-aerator/steam vents.

Apart from the emissions of flue gas from the main stack all other point source emissions are minor and have no impact on the environment.

Under certain infrequent weather conditions, the gaseous discharges from the chimney may be visible. Additionally at start-up, under certain weather conditions, a faint brown haze may be seen.

The CCGT plant will emit approximately half the quantity of CO_2 per unit of electricity produced compared to existing fossil fuel plant, while the use of natural gas will result in negligible SO_2 emissions. In addition, the use of a gas turbine, HRSG and condensing steam turbine results in the highest efficiency of fuel usage and thus minimises the quantities of carbon dioxide emitted compared with other combustion techniques.

3.7.1 Stack Parameters

The following table outlines the stack parameters for this example CCGT. The mass release at the emission limit value is based on the normalised volumetric value (referenced to 273K, 11% O_2). Discharge parameters from CCGT power station have been provided by the design firm Mott MacDonald. The hours of operation have been assumed to be continuous throughout the year (8,760 hours). However, it is anticipated that the proposed station would operate approximately 7,884 hours per year.

Table 3.4 – Stack Parameters

Parameters	CCGT Power Station (Stack 1)	CCGT Power Station (Stack 2)
Grid reference (x,y)	332515, 183704	332545, 183637
Hours of operation per year (hr)	8,760	8,760
Stack height (m)	65	65
Inner stack diameter (m)	7	7
Exit velocity (m/s)	17	17
Efflux volume (m^3/s)	654	654
Efflux temperature (°C)	100	100
NO_x (as NO_2) average emission rate (g/s)	32.7	32.7

When operating on natural gas the plant will utilise a dry low NO_x, (DLN) combustion system which is considered best practice as the dry low NO_x burners reduce the peak flame temperature.

Emissions of NO_x are not expected to exceed an hourly average of 50mg/rn³ as NO (24.4 ppmv) (at standard reference conditions of 15% oxygen, dry, 0°C, 1013 bar a) during normal full load operation on gas fuel, with no water or steam injection. The exhaust flow and emission rate will depend on the throughput of gas and air in the gas turbine, as these are functions of ambient temperature, pressure and load.

3.7.2 Emissions from Traffic

The ES states that the existing air quality in the vicinity of the site is less than 40% of the air quality objective of Newport with pollutant concentrations predicted to decline in future years. It goes on to state that given that background air quality would be expected to increase by less than 2% as a result of the additional construction-related vehicles, air quality in the vicinity of the site was predicted to meet all relevant air quality objectives prior to development, during construction and following the operation of the CCGT Severn Power Station.

3.7.3 Odour

No odour issues are associated with gas CCGT as such no significant issues would be anticipated from these plants.

3.7.4 Assessment of Significance

It was considered that impacts to air quality from construction plant and equipment would be moderately significant. Impacts during commissioning and testing were considered negligible. Dust can be controlled through appropriate mitigation measures and therefore the impact from dust was classed as negligible.

Additional contributions from traffic during construction and operation were also predicted to have a minimal impact upon the air quality in the area.

Impacts from nitrogen deposition on ecological features and designated sites were predicted to not exceed any critical levels. Impacts on human health were also predicted to not exceed the limit value for human health impacts.

It was recognised that the CCGT will be regulated and monitored by the environmental permit and will be using Best Available Technology to ensure that emissions are minimised.

3.7.5 Vapour & Plume Visibility

During start-up of the gas turbines and in combination with certain meteorological conditions, emissions of NO_x can contribute to a slight visible haze caused by the formation of nitrogen dioxide (NO_2).

Like the Rookery EfW and Nevis Power Biomass Plant both these facilities will use air cooled condensers (ACC) rather than hybrid or mechanical draft cooling towers. Due to the low water vapour content of natural gas no visible plume was anticipated from the Seven Power CCGT and, as such, no plume assessment was undertaken and the ES stated that this was anticipated to not have any significant impact upon human health or ecosystems.

3.8 Noise

The principal sources of noise during operation of a CCGT plant are:

- Air inlets;
- Gas turbines;
- Exhaust stack;
- HRSGs;
- Steam turbine plant;
- Air-cooled condenser;
- Generators; and
- Transformers.

The noise will be of a steady nature. There may be some tonal content due to the transformers. The best available technology and operating techniques will be addressed in the plant design to ensure appropriate noise attenuation measures. These are likely to include:

- High performance splitter silencer to the gas turbine inlet providing maximum attenuation at high frequencies, and abatement of the compressor whine in particular;
- High performance close fitting or spaced-off acoustic cladding on walls of the HRSG;
- High performance silencer to the outlet of the HRSG, tuned to attenuate low frequencies from the gas turbine exhaust. An additional primary silencer may be required in order to reduce noise radiated from the boiler walls;
- High performance acoustic insulation to the gas turbine inlet ductwork downstream of the inlet silencer, to reduce duct noise breakout in this area;
- The turbine building walls and roof to incorporate acoustic panelling possibly comprising a double skin with plasterboard and an absorbent infill. The inner skin to be perforated to gain maximum absorption benefit within the turbine building;
- Within the turbine building, the gas turbine to be housed inside its own acoustic enclosure. The acoustic enclosure will be of ‘heavy’ construction with acoustic doors;
- ‘Low noise’ trims used on noise generating steam valves and acoustic lagging on pipe work used extensively;
- Ventilation systems serving the turbine building, admin/control building and equipment enclosures to be fitted with silencers to attenuate ventilation fan noise and internal machinery noise;
- Air-cooled towers likely to have a combination of low speed (low noise) fans and inlet/discharge silencers; and
- Intermittent sources such as start-up and emergency steam vents to be fitted with proprietary diffuser/absorptive silencers.

The principal sources of intermittent noise will be the operation and testing of safety valves. This will be an infrequent occurrence. Testing of these valves will be during daylight hours. Silencers will be installed to minimise this source of noise.

3.8.1 Construction Noise

Construction activities are assumed to take place with normal construction plant and auger piling plant. Percussion piling methods will not be employed. The construction plant complement is set out in the following tables with the reference noise level data for noise prediction purposes.

Item of plant or activity	Source of Noise Data	Reference	Reference Noise Level dB LAeq,t	Number of Items	On-time %	Effective noise level dB LAeq,1h
Diesel Generator, 15 kW	DEFRA	4 86	65.5	2	100	68.5
Angle Grinder (Grinding Steel), 3.75 kW, 105 kg	DEFRA	4 93	80.7	2	100	83.7
Road Lorry (Full)	DEFRA	6 21	80.6	10	100	90.6
					Total	**91.4**

Table 3.6 - Items of plant to be used on site for concrete breaking and general site clearance; (6 months – SPL at 10m)

Item of plant or activity	Source of Noise Data	Reference	Reference Noise Level dB LAeq,t	Number of Items	On-time %	Effective noise level dB LAeq,1h
Breaker mounted on Wheeled Backhoe, 74 mm dia / DEFRA	DEFRA	1 2	92.1	2	100	95.1
Hand-held Pneumatic Breaker	DEFRA	1 6	83.5	4	100	89.5
Tracked Excavator (Loading Dump Truck), 228 kW, 44 DEFRA	DEFRA	1 10	85	4	100	91
Articulated Dump Truck (Dumping Rubble), 250 kW DEFRA	DEFRA	1 11	80.2	4	100	86.2
					Total	**97.7**

Table 3.7 - Items of plant to be used on site for piling and general site activities; (3 months – SPL at 10m)

Item of plant or activity	Source of Noise Data	Reference	Reference Noise Level dB LAeq,t	Number of Items	On-time %	Effective noise level dB LAeq,1h
Tracked Excavator, 72 kW, 16 t	DEFRA	2 5	76.4	4	100	82.4
Dozer, 179 kW, 28 t	DEFRA	2 11	79	3	100	83.8
Crawler Mounted Piling Rig, 150 kW, 35 t	DEFRA	3 21	79.4	2	100	82.4
Mobile Telescopic Crane, 280 kW, 100 t	DEFRA	4 41	71.1	2	100	74.1
					Total	**87.9**

Table 3.8 - Items of plant to be used on site for piling and general site activities; (16 months – SPL at 10m)

Item of plant or activity	Source of Noise Data	Reference	Reference Noise Level dB LAeq,t	Number of Items	On-time %	Effective noise level dB LAeq,1h
Tracked Excavator, 107 kW, 22 t	DEFRA	4 64	74.9	4	100	80.9
Dumper, 56 kW, 5 t	DEFRA	4 7	77.4	3	100	82.2
Large Lorry Concrete Mixer, 216 kW	DEFRA	4 21	77	3	100	81.8
Concrete Pump + Concrete Mixer Truck (idling)	DEFRA	4 26	75.1	2	100	78.1
Diesel Generator, 15 kW	DEFRA	4 86	65.5	2	100	68.5
Angle Grinder (Grinding Steel), 3.75 kW, 105 kg	DEFRA	4 93	80.7	5	100	87.7
Road Sweeper, 70 kW	DEFRA	4 90	75.9	2	100	78.9
Road Lorry (Full)	DEFRA	6 21	80.6	10	100	90.6
Mobile Telescopic Crane, 315 kW, 80 t	DEFRA	4 39	76.7	2	100	79.7
					Total	**93.8**

Table 3.9 - Items of plant to be used on site for mechanical erection and commissioning; (11 months – SPL at 10m)

Item of plant or activity	Source of Noise Data	Reference	Reference Noise Level dB LAeq,t	Number of Items	On-time %	Effective noise level dB LAeq, 1h
Diesel Generator, 15 kW	DEFRA	4 86	65.5	2	100	68.5
Angle Grinder (Grinding Steel), 3.75 kW, 105 kg	DEFRA	4 93	80.7	2	100	83.7
Road Lorry (Full)	DEFRA	6 21	80.6	10	100	90.6
					Total	**91.4**

3.8.2 Noise from Traffic

See section 3.4.3 for traffic data

3.8.3 Operation

Definitive noise data for the operation of the Severn Power Station was not yet available when the ES was being compiled so the reference noise level data used was based on figures for broadly similar (unspecified) CCGT power station sites from a distance of 100m. No further data in relation to sources is available within the ES.

Table 3.11 – Operational Noise

Item of plant or activity	Source of Noise Data	Reference	Reference Noise Level dB LAeq,t	Number of Items	On-time %	Effective noise level dB LAeq,1h
Air-Cooled Condensers	TBC	Pe 1	56	2	100	59
HRSG -B (HRSG not enclosed)	TBC	Ba 3	63	2	100	66
GT Inlet (including some T/X noise) - 1	TBC	So 1	58	2	100	61
					Total	**67.8**

3

3.8.4 Assessment of Significance & Mitigation Measures

Further to baseline noise and vibration baseline surveys, it was deemed that noise from construction would be compliant with the requirements of BS 5228 and that limited impact would be had on human health and the adjacent ecosystems. Worst case scenarios of construction noise would be from the piling phases but this would be minimised due to the use of continual flight auger piles as opposed to percussive, and also limited to set times of the year to avoid disturbance to the migratory fish populations in the River Usk.

It was recognised that impacts to human health, mainly the residents of Nash Village would experience a slight adverse impact but that the noise from construction would not be audible.

During normal steady state operation of the CCGT, the ES stated that adverse off-site impacts were no likely due to design implementations. However commissioning and start-up of the plant would have some short term noise impacts although these would be temporary.

3.9 Lighting

3.9.1 Stack Aviation Lighting

With respect to the Severn Power CCGT project, the 65m stack was lit with medium intensity red obstruction lights in compliance with regulations due to the proximity to Bristol and Cardiff airports, the flight path along the Severn Estuary and also proximity to Newport Port.

AECOM understand that there are normal and standby fluorescent lighting on all gantry levels and emergency lighting on ladder tops and feet. The normal lighting is switched on and off as required.

3.10 Carbon Capture & Storage

In response to the publishing of EU Directive 2009/31/EC, the UK Government (DECC) issued its document “Towards Carbon Capture and Storage: Government Response to Consultation” and DECC’s consultation document entitled “Guidance on Carbon Capture Readiness and Applications under Section 36 of the Electricity Act 1989”, any gas-fired power station has to be designed to be Carbon Capture Ready (CCR).

CCR is in the process of building new combustion plant so that it can be economically retrofitted with carbon capture technology, and linked via appropriate transport routes to long-term storage, when the technology becomes technically and economically viable.

This will be considered by any future developer at Huntspill Energy Park although there is yet to be a power station consented and/or operational in the UK where this has been applied.

4. PLOT K - PEAKING PLANT

4.1 Type of Energy Generation

Given the size of Plot K and proximity to the CCGT, a peaking plant such as an Open Cycle Gas Turbine would be appropriate.

4.1.1 Technology

A peaking plant is a gas or diesel fired backup power station that operates when there are high levels of demand for electricity (peak demand) or shortfalls of electricity supply. Due to the increasing reliance on renewable technologies in the UK (such as wind) it is important that a backup power supply is available for when these technologies cannot produce the required output.

Modern peaking plants benefit from catalytic convertor systems reducing emissions of NOx into the atmosphere. The thermodynamic efficiency of simple-cycle gas turbine power plants ranges from 20 to 42%, with between 30 to 42% being average for a new plant.

A peaking plant is anticipated to run between 100–300 hours during the year. This equates to 4.2–12.5 days over a whole year.

4.2 Introduction to Scheme

4.2.1 Reasonable Assumption

Wyre Power Ltd proposed to build an 850MWe combined cycle gas turbine (CCGT) and 25MWe open cycle gas turbine (OCGT) power station on land near Fleetwood, Lancashire. The proposed power station will be built on the Hillhouse International Business Park (HIBP), formerly occupied by the ICI Hillhouse Chemical works, on the western bank of the River Wyre. An application for consent under Section 36 has been submitted to the Department of Energy and Climate Change, and is currently in the last stage of determination. No objection has been made by Wyre Borough Council.

For the purposes of this reasonable assumption a 25MW plant has been identified and where possible up-rated to 50MW to provide additional information should the capacity be varied.

4.2.2 Site Description

The overall site is located approximately 1.5km north of Thornton, near Blackpool, and is approximately 4.5ha in size, although the OCGT will occupy much less than that. During construction this footprint will extend to 13ha to take account of contractor laydown areas.

4.3 Project Description

4.3.1 Key Components

The Wyre Power OCGT operates by using liquid fuel which is atomised in the combustors to fuel a gas turbine which then spins a generator to make electricity. This operation is similar to a CCGT, but is powered by natural gas and also uses the heat from the turbine exhaust to heat water in a boiler to generate steam, which then powers a steam turbine and second generator. There is no requirement to extract water for the OCGT.

The OCGT generating set (a single unit with a total capacity 25 MW) was proposed at the specific request of National Grid for the purpose of providing rapid response capability and other essential ancillary services. The OCGT is located along the eastern limit of the application site boundary, northeast of the CCGT power station.

The purpose of this element of the scheme is to quickly meet local short-term peak energy demands. The primary fuel for the Wyre Power OCGT was a low sulphur distillate liquid fuel or kerosene imported to the site by standard tanker via the road network.

Following discussions with National Grid it was envisaged that this element of the project would only be required for limited periods and is unlikely to operate for more than 200 hours per annum.

4.3.2 Building Dimensions

The table 4.1 below outlines the dimensions for the 25MW OCGT and associated equipment:

	Easting	Northing	Height m	Length m	Width m	Angle Degrees
OCGT block	334271	443384.9	3	11	26	57
Switch gear building	334298.2	443369.8	3	3	4	-29.5
Generator setup transformer building	334300	443344.5	4	11	6	-32.6
Fuel storage tank 2 for OCGT	334308.9	443385.8	5	5 (r)	-	-
Power control building	334311.9	443356.5	4	4	11	-34.9
Fuel storage tank 1 for OCGT	334323.7	443388.5	5	5 (r)	-	-

Notes: Building 17 is the OCGT stack. Grid reference refers to the southwest corner of building. Angle measured from north taken as zero.

Should a 50MW peaking plant be proposed, the building sizes would increase by approximately 20% in both length and diameter. The fuel tanks should have capacity for 24-48 hours operation, fed from a main storage tank. Given the length of time this peaking plant would operate, the assumption is to keep the storage tanks the same size as per the 25MW. It is recognised that this may result in an increase of tankers to site as it may need to fill it more frequently.

4.3.3 Orientation

There is no fixed orientation of the OCGT as it is fuelled by localised fuel storage tanks. Planting and landscaping will be allowed surrounding the plant although there will be limited opportunity for trees and shrubs close to the fuel tanker as the root systems may comprise the tank.

In addition, there is a mandatory requirement to keep a spark-free zone around the fuel tanks of approximately 6-8m. This is to minimise explosion risk, and specialist bonding material must be used around metal pipes or general metal work and certain plastics which may release a static charge. Certain types of concrete or tarmac will also have to be used to minimise the risk further. All relevant petrochemical and petroleum regulations will apply to the storage and refuelling of the tanks.

4.4 Construction Phase

4.4.1 Duration

Whilst the entire construction phase of the development (including CCGT) is 40 months, it was estimated that the OGCT component would be approximately 12 months.

4.4.2 Workforce

It is anticipated that that 650 workers will be onsite during peak construction during months 19-22. During operation, 40 permanent jobs will be created. However, this relates to the entire development. Therefore it can be assumed that a permanent workforce will be approximately 15 people during operation and that 80-100 workers will be required during construction for the OCGT, although this cannot be confirmed.

Using these assumptions for the OCGT, this equates to between 87 and 109 man years, although this cannot be confirmed.

4.4.3 Construction Value

The overall investment for the Wyre power facility was £600 million. However no information is available separately for the OCGT although other examples are available. For example, the Cowes power station (or Kingston power station) is a 140MW OCGT station powered by two 70MW units and is the Isle of Wight's only power generation source other than power from the mainland. The station was built in 1982 at a cost of £30 million and is owned and operated by RWE npower.

4.4.4 Traffic

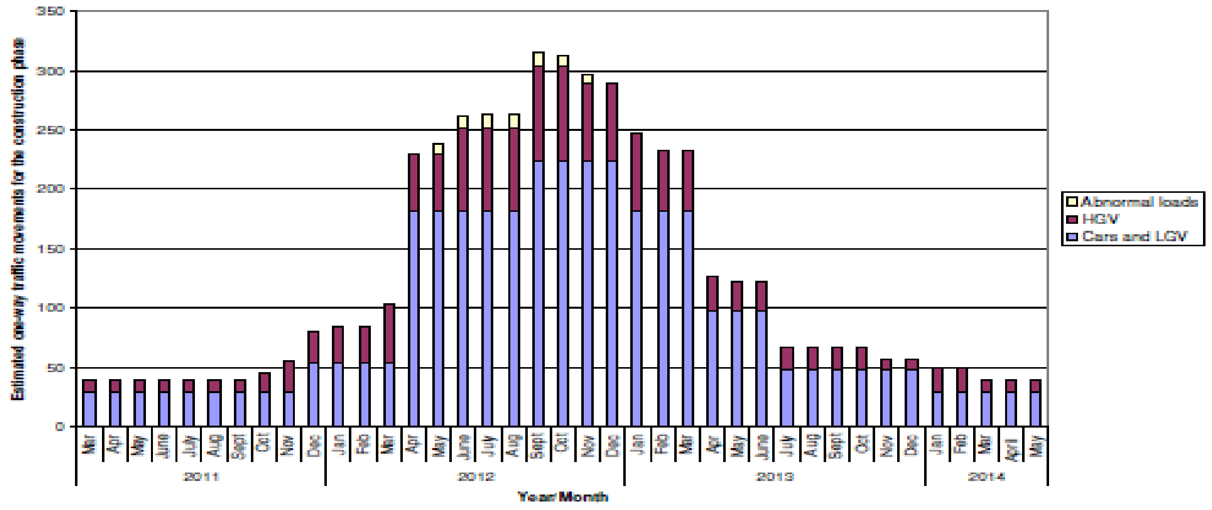
A Traffic Management Plan is to be agreed in writing prior to works commencing with HGVs using dedicated routes, especially for abnormal loads. However, during the 39 month construction period approximately 70 abnormal loads are expected, their weights ranging from 10 tonnes to 330 tonnes. It was agreed that construction traffic would come in by road as arrival by sea and rail were not feasible.

Peak HGV traffic is expected in months 19 and 20 with up to 80 one-way HGV movements (therefore 160 two-way movements) per day. Outside this period, HGV movement will be in the region of 65-70 movements one-way per day.

Peak construction traffic from workers is expected in month 20-22 to coincide with peak workers onsite. Prior to this, the number of workers was predicted to significantly increase from month 14 from 120 to 480. The number of staff is then estimated to decrease in month 26 to 240 and then to 100 in month 29.

The ES stated that a car-share or offsite construction park and ride scheme would be implemented to minimise and reduce impacts to the local residents. This would form part of the Travel Plan to be submitted as part of the planning application.

Figure 12.4: Construction traffic flow profile



4.5 Operational Phase

4.5.1 Storage of Fuel

The 25MW OCGT will be fuelled by distillate or kerosene, which will be stored in two tanks. These will have a capacity of 200,000 litres each, with the total quantity of fuel stored on site not exceeding 400,000 litres. Due to the quantity of fuel to be stored, Hazardous Substance Consent may not be required, and is subject to discussions with the HSE and Environment Agency.

As mentioned in 4.3.3, all measures must be undertaken to maintain a spark free zone, and the mandatory use of protective clothing and footwear must be adhered to.

4.5.2 General Operation

In the case of the Wyre Power OCGT, it is proposed that this plant will be operational in times of peak demand for approximately 224 hours per year. This is a typical operation of a peaking plant.

Using the Cowes/Kingston Power plant again as an example in operation, both units run on light fuel oil and operate at either peak time or when the grid requires frequency response. The station is either run locally or by remote from Fawley Power Station. The gas turbine engines have a total output of 200,000 horsepower and use 762 litres of fuel oil per minute when running at maximum output.

4.6 Decommissioning

It was anticipated that the decommissioning process would generate a similar level of activity associated with the construction phase.

4.7 Air Quality

Emissions from the OCGT operation are relevant to short-term impacts only due to limited operating hours. These emissions were not quantified within the EIA but were not anticipated to cause a significant degradation of local air quality.

4.7.1 Stack Parameters

Table 4.2 – Stack Parameters

Emission Source	25 MW OCGT	50MW (Scaled up)
Source Location (Easting, Northing)	334279.6, 443373	334279.6, 443373
Stack Height, m (from ground level)	15	15
Stack Diameter, m	2.7	3.89
Efflux Temperature, deg K	798.1	798.1
Efflux Velocity, m/s	31.3	31.3
Stack volumetric flow @ actual discharge conditions, m^3/s	185.6	371.2
Stack emission concentration @ reference conditions (273^oK, 15% oxygen content and dry exhaust conditions), mg Nm^{-3}	NO_x as NO_2: 120 SO_2: 54 CO: 5	NO_x as NO_2 : 120 SO_2: 54 CO: 5
Emission Rates, g/s	NO_x as NO_2: 9.8 SO_2: 4.4 CO: 0.4	NO_x as NO_2: 19.6 SO_2: 8.8 CO: 0.8
Operating Hours	224 hours per year	

Note: Oxygen and water content of the flue gas has not been provided in the Wyre ES, nor has the normalised flow. OCGT has been assumed to be operating 7-9am and 4-6pm during January and February every year.

4.7.2 Key Pollutants

Based on 224 hours per year, the following pollutants have been derived:

Table 4.3 – Key Pollutants

Parameter	NOx & NO_2	SO_2	CO_2
Annual emissions, tonnes per annum	7	3.2	0.3

4.7.3 Emissions from Traffic

The Wyre Power ES does not give a breakdown of traffic movements for the CCGT vs. the OCGT. As such the values provided are anticipated to be for the construction of the whole facility not just the peaking plant. However it can be assumed that given the size of the OCGT, approximately 10-20% of the construction traffic can be attributed to the OCGT.

Table 4.4 – Emissions from Traffic

	AADT
Peak Year of Construction	833
Operation Traffic	40

4.7.4 Odour

No odour issues are associated with OCGT as such no significant issues are anticipated from these plants.

4.7.5 Vapour & Plume Visibility

The Wyre OCGT will use a liquid fuel (low sulphur distillate liquid fuel or kerosene) which may have slightly higher moisture contents than natural gas, although no visible plume would be anticipated due to the high emission temperature (798 K).

4.8 Noise

4.8.1 Construction

Construction of the OCGT was considered as a single phase within the ES. Plant used to predict construction noise levels are detailed below.

Table 4.5 – Construction Noise

Plant Item	Sound Power	No.	% On Time	Data Source
Articulated Dump Truck	108	2	40	BS5228, C4. Ave 1-2
Tractor	108	2	20	BS5228, C4. Ave74-75
Tracked Mobile Crane	97	2	50	BS5228, C3, 28-30
Concrete Mixer Truck	105	2	50	BS5228, C4, Ref Av 21-22
Concrete Pump	105	2	50	BS5228, C3, 25-26
Poker Vibrator	104	1	100	BS5228, C4, 33-34
CFA Piling Rig	108	2	60	BS5228, C3, Av 21-22
Tracked Excavator CFA Operations)	99	2	40	BS5228, C3, 23-24
Gas Cutter	95	2	10	BS5228, C3, 34-35
Generator	101	1	100	BS5228, C3, Ref 32
Angle Grinder	108	2	10	BS5228, C4, 93

4.8.2 Noise from Traffic

No traffic data was presented in the noise chapter of the ES. Consequently, road traffic flows from the air quality assessment are to be used.

4.8.3 Operation

The OCGT has the potential to develop significant levels of noise, although it only operates to meet short term peaks in grid demand that occur when the main CCGT power plant is not running. This is because the OCGT does not require a significant periods of time to start up and reach base load like the CCGT (approximately 15 minutes as opposed to six hours).

During operation, the main sources of noise will come from air inlets, power block, the exhaust stacks, HRSGs, ACCs and transformers. These will be designed to have minimal noise impact locally. The plant design will adopt best available techniques (BAT) that incorporate noise reduction measures in all appropriate elements. Elevated noise levels will occur during the short-term construction period, but working hours will be limited to minimise disturbance to local residents during this period.

The OCGT station was considered as a single noise source for noise predictions in the ES using BS 4215, based on a comparison between LAr,Tr rating noise levels from the proposed development with recorded LA90T background noise levels at noise-sensitive receptors in the vicinity. This assessment assumed that the OCGT would be fitted with acoustic cladding and silencers to reduce noise emission levels.

Spectral noise data for the operation of the OCGT are presented in the table below.

Table 4.6 – Spectral Noise Data

Source	Sound Power Level, Lw	1/1 Octave Spectrum, Per Item / Unit Area										
		31.5	63	125	250	500	1K	2K	4K	8K	A	Lin
OCGT LM2X	107.8	98	98	99	94	85	81	85	79	77	91	104

4.8.4 Mitigation

The total Lw sound power level from the OCGT assumed in the prediction and assessment of noise levels was 107.8 dB(A). On the basis of the BS 4142 assessment, levels of noise from this source needed to be reduced by at least 1.8 dB to ensure that the requirements of residual BAT are achieved and that LAr,Tr rating noise levels remain at or below the numerical value of existing LAr,Tr background noise levels during the worst-case night-time period.

The application of engineering solutions to reduce the total sound power level to 106 dB(A) or less would be sufficient to control the impact from this source. It is likely that a wide range of solutions would be capable of achieving such a reduction, such as fitting an increased performance silencer to the outlet of the stack, tuned to attenuate low frequencies from the gas turbine exhaust, fitting performance acoustic insulation to the gas turbine inlet ductwork downstream of the inlet silencer, to reduce duct noise breakout in this area; and acoustically enclosing particularly noisy elements of the OCGT.

For Wyre Power OCGT the mitigation included insulation, building envelope design and potentially an acoustic barrier of sufficient size and mass. However this could be confirmed for the proposal at the Huntspill Energy Park without a specific thermal plant and noise assessment.

4.9 Lighting

4.9.1 Stack Aviation Lighting

There is no information regarding the lighting arrangements of the OGCT 15m stack, although it can be assumed for consistency with the adjacent CCGT stacks, that it would have a medium intensity red aviation light.

5. PLOT G1 – BIOMASS

5.1 Type of Energy Generation

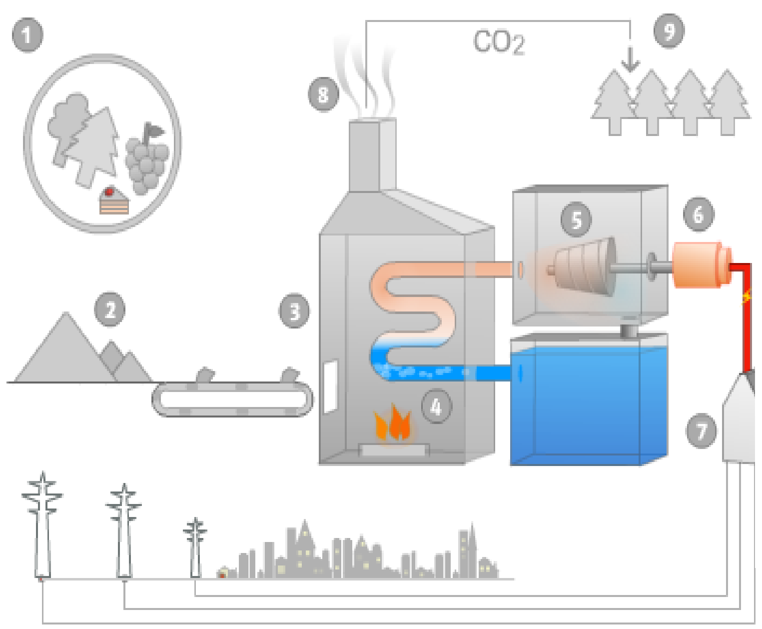
Given the size of Plot G1 and recognition of the other technologies within the Energy Park, it has been suggested that a 50MW facility such as a biomass or biomass combined heat and power (CHP) facility would be appropriate in this location. Anaerobic digestion would also be appropriate although at a lower capacity as current commercial opportunities relate to <5MW facilities. In addition, biomass provides a further opportunity to supply heat and power to the adjacent Energy Park.

Biomass (as a renewable energy source) is biological material from living, or recently living organisms. As an energy source biomass can either be used directly or converted into other energy products such as biofuel.

As a direct source of energy, biomass is plant matter used to generate electricity with steam turbines and gasifiers to produce heat, usually by direct combustion. Examples include forest residues (such as dead trees, branches and tree stumps), yard clippings, wood chips and even municipal solid waste. As a source of other energy products, biomass includes plant or animal matter that can be converted into fibres or other industrial chemicals, including biofuels.

A biomass power station with an approximate generating capacity of 49MW, would displace approximately 170,000 tonnes of carbon dioxide each year by burning wood in place of traditional fuels like fossil fuels and provide electricity for over 75,000 homes. The schematic below shows how energy is generated from biomass.

Figure 5.1 – Schematic of Biomass Operation



1. Sources of biomass e.g. sewage or municipal waste
2. Biomass is collected and taken into power station
3. Fuel is fed into furnace where it is burnt
4. Heat generated from burning the biomass boils water, generating steam
5. Steam turns turbines
6. Turbines are connected to generators. Mechanical energy is converted into electrical energy
7. Output passes through transformer and transmitted into National Grid network.

5.2 Introduction to Scheme

5.2.1 Reasonable Assumption

In order to provide reasonable assumptions, the Nevis Power Station located within the Associated British Port facility in Newport, South Wales is being used. The proposed biomass scheme has an capacity of 49MWe through the combustion of up to 370,000 tonnes per annum of biomass material comprising primarily wood chip, fruit-based biomass and energy crops. This power station was granted planning permission by Newport City Council in 2009 under reference 08/1257 and was supported by a full EIA.

5.2.2 Site Description

Approximately 4.45ha in size, the site is located at the confluence of the River Ebbw and River Usk within the industrialised port area of Newport known as South Dock. The power station was located on a brownfield site, used at the time for storage of aggregates and vehicles by Customs and Excise. However, it was surrounded by several national and European designations such as the River Usk SSSI and Lower River Usk SAC, adjacent to the Gwents Levels SSSI and in close proximity to the Severn Estuary RAMSAR, SPA and pSAC. The site was also at risk of flooding and had been impacted by invasive species.

5.3 Project Description

5.3.1 Key Components

Principal plant buildings and their dimensions are as follows:

- Wood fuel reception and storage were initially proposed to be in a timber A-frame structure 140m x 73m x 45m high, to accommodate bulk storage of fuel in a dry environment. This was later amended and approved in March 2012, where the fuel storage building was replaced with a reclaimer, therefore reducing the height and therefore visual impact. The amended building consisted of a stacker 25m high, 95m long and 55m wide).
- The boiler building would be steel framed and metal clad, approximately 30m x 42m x 45m high. This would hold all the main plant items associated with biomass combustion and steam generation. The fabric of the building would be designed to accommodate noise suppression measures.
- The turbine building would be approximately 35m x 30m x 20m high, steel framed and metallic clad, and would be annexed to the side of the boiler building. Plant in this building would be complete with acoustic enclosures to ensure low noise levels and a safe working environment for the staff. The building fabric would also be designed to accommodate noise suppression measures, and would enclose the main control room and sample analysis laboratory.
- The offices / administration building would be brick built or equivalent, approximately 20m x 16m x 8m high. This would be constructed in a concrete frame with brick fascia, and would include a reception area, individual offices, a food preparation area and toilets. A visitor facility would be provided in these offices, including wheelchair access.
- Workshops would be approximately 33m x 11m x 10m high and be constructed to house electrical plant as a maintenance facility.

- High voltage substation including switchgear and transformers approximately 4m high, contained in a compound approximately 50m x 25m. There would also be a control room of the order of 5m x 6m x 4m high containing control equipment and meters.
- Switchgear and metering transformers are approximately 4m high and would be housed in a compound surrounded by a chain link fence with authorised access only.

Figure 5.2 – Visualisation of Nevis Biomass Plant (previous scheme)

Ancillary structures would include chemical and firewater tank stores, and a site effluent treatment plant. A 4m high noise barrier along the boundary with the River Ebbw is also included in the design as a mitigation measure for acoustics and visual disturbance to the adjacent mudflats, designated for wintering and breeding birds. Although this will be subject to a detailed noise assessment at the appropriate detailed design stage for the proposed facility at the Huntspill Energy Park.

Figure 5.3 – Visualisation of Nevis Biomass Plant (amended scheme (March 2012))

5.3.2 Employment

The proposed scheme would be directly responsible for the creation of up to 30 permanent jobs (comprising 10 technical, administration and managerial staff plus 20 operational shift staff).

5.3.3 Potential Heat Loads & Design of the Power Station

In order to comply with the recommendations of the EU Cogeneration Directive, it was determined that a heat load of 50MWth (megawatt thermal) would be required in the local area. Following a review of available information as part of the EIA process, it was identified that there was no single heat load identified in excess of 5MWth within the area, and that aggregation of all heat loads produced a demand of less 20MWth. It was concluded that a CHP plant of the capacity envisaged by the applicant would not be feasible, based on current heat loads for local industry. Accordingly, the incorporation of CHP plant technology was not taken forward as part of the proposed scheme. Feasibility at the Huntspill Energy Park may be provided through the local heat and power requirements of the Energy Park itself and localised residential areas. However the for the purpose of reasonable assumptions, it is assumed that CHP is not to be integrated into the Huntspill Energy Park at this stage.

With regard to the design of the power station, available combustion methods that were investigated included fixed grates, mechanical moving grates, and fluidised bed systems. A review of these methods concluded that an inclined travelling grate was the most appropriate mechanism as this provides a degree of flexibility on the types of fuel that can be processed. Other methods were discounted as viable alternatives due to their economics, inflexibility, or inefficiency.

Potential cooling systems included water based and air cooled methods and a review of these mechanisms concluded that the use of air cooling was the most applicable method, given the unavailability of sufficient volumes of water from the nearby protected and designated River Usk and River Ebbw. Cooling towers were initially considered, although it was concluded that the proposed development site would not be able to accommodate their footprint. Furthermore, cooling towers were considered to be potentially more visually conspicuous when compared to the chosen option of ACC units. For Huntspill Energy Park it is unlikely that any extraction from the Huntspill River will be required due to the common use of ACC units.

5.3.4 Environmental Mitigation & Design Iterations

Ongoing design iteration of the proposed Nevis Power scheme was undertaken throughout the EIA process to avoid or minimise potential adverse environmental impacts, and/or to incorporate essential mitigation into the overall development. Essential mitigation was identified in respect of potentially significant landscape, ecological, flood risk and acoustic impacts. In light of the early outcomes of the EIA, the proposed scheme was modified to incorporate the following environmental mitigation measures which may be applicable once detailed assessment has been undertaken at the specific plot on Huntspill Energy Park.

5.3.4.1 Land Raising

The existing profile of the entire proposed development site is proposed to be raised to a height of 9.25m AOD to counter potential flood risk.

5.3.4.2 Acoustic Barrier

A 4m high acoustic barrier is proposed along the entire length of the south-west boundary, adjacent to the River Ebbw, and turning through 90 degrees across the southern end of the proposed development site. This was to minimise impacts specifically to wintering and wading bird populations on the River Usk and Ebbw.

An acoustic bund for ecological reasons is unlikely at Huntspill Energy Park but will be subject to a detailed noise assessment.

5.3.4.3 Landscaping

Planting measures were proposed both onsite and offsite to provide a degree of visual containment and protection for sensitive receptors, and to improve overall integration of the proposals into the receiving environment.

5.3.4.4 Ecological Habitat

An area of land located at the southern tip of the power station site was allocated for biodiversity enhancement through habitat creation for rare invertebrates

5.3.4.5 Plant Modifications

Modifications were also made to the means of fuel storage. A series of 30m high silos were originally proposed for dry storage; however these were subsequently replaced by a proposed single A-frame timber structure due to potential visual implications noted in the EIA. This was then amended in March 2012 (please see Section 5.3.1).

For the Huntspill plant, a similar design may be more viable although this is subject to detailed design at the appropriate stage.

5.3.5 Orientation

It is assumed that the biomass plant will incorporate an element of railhead, and therefore follow the same configuration as the energy from waste facility. Again there are no restrictions on landscaping.

5.4 Construction Phase

5.4.1 Duration

The construction phases of this project were scheduled to last 18 months but this may be reduced due to the redesign of the fuel storage building due to the reduction in the number of piles required. Hours of working and were limited to daylight hours of 07:00 to 19:00, Monday to Saturday. The timing of certain activity such as piling was restricted due to the migratory season of fish in the River Usk designated SAC.

5.4.2 Traffic Movements

It was anticipated that the peak workforce on-site at any one time during the construction phase would be 200 persons. Due to the proposed development site's location, it is assumed that workers would arrive by car, van or by minibus. It is assumed that 90% of the construction workers would travel by car, with an average car occupancy rate of two persons per vehicle. The peak construction worker traffic generation would be 90 cars and two minibuses (i.e. 184 two way trips per day). Vehicles would arrive between 06:30-07:00 hours and depart between 19:00-19:30 hours, outside the highway peak periods.

By way of comparison to other similar power plant facilities which do not have the potential for dock or rail facilities, the anticipated delivery/construction vehicles would equate to 15 light goods vehicles and 45 HGVs per day (over a 12 hour period) (i.e 120 two way trips per day), the total significantly reduced by the largest plant sub assemblies envisaged to arrive at the proposed development site via ship through Newport port facilities. Therefore the total potential traffic attraction during construction for a plant without the same facilities as Nevis Power would equate to 304 two-way vehicle trips per day. Therefore the use of the rail head at Huntspill is preferable but would be subject to detailed design of the plant and delivery facilities.

This would be similar at Huntspill Energy Park as it would be assumed that most of the large generating equipment would be delivered to Avonmouth Port facilities and brought to site on abnormal loader.

5.4.3 Turbine Delivery

For the Nevis Power Station, delivery of the turbine was by sea given proximity to port facilities. However for Huntspill it is assumed that this will be delivered to Avonmouth Port and delivered by road or rail head to site.

Using a Siemens SST-300 turbine as an example (see Figure 5.3), typical dimensions would be length 21m, width 11.5mand 7.5m high and will be delivered in modular arrangement of turbine casing, exhaust, gearbox, generator and base frame.

Figure 5.3 - Siemens SST-330 turbine

5.4.5 Workforce

Approximately 200 people are estimated to work on the project at peak times. This equates to 327 man years for the construction period.

5.5 Operational Phase

5.5.1 Operation

The operational electrical load of the proposed scheme is anticipated to be approximately 5MW or 5000 kW. Again, assuming a 8000-hour per annum operating profile, this is equivalent to 40,000 MW-hr and, using the same emission factor, 21500 tonnes production or emission of CO2 per annum.

5.5.2 Delivery of Biomass

For the Nevis Power Scheme, a total of 370,000 tonnes per annum of pure biomass fuel would be processed comprising of primarily wood chip, fruit-based biomass and energy crops. Biomass material would be imported and delivered in bulk container ships directly to the dockside every two weeks in shipments of between 11,500 tonnes and 17,000 tonnes, with on-site storage sufficient for 15 days. Fuel would be supplied in a dry state and would enter the proposed development via a conveyor system.

At Huntspill Energy Park it is likely that road will be the most appropriate method of delivery. An equivalent figure for road transport of biomass, assuming that the biomass is available from Avonmouth Dock would be approximately 12,333 HGV vehicles of 30 tonnes capacity annually or approximately 237 vehicle movements per week.

5.5.3 Operational Traffic Flows

Staff would work a five-shift system with six people on each shift. At worst, assuming each shift would result in approximately 4 additional vehicles (for visitors, delivery of consumable items such as distillate fuel oil or other suppliers, and maintenance purposes), a maximum total of 10 vehicles (20 two way trips) per shift could be assumed. For a five-shift system this equates to 100 trips per day, divided into 6 arrivals and 6 departures five times a day outside highway peak periods, plus deliveries and visitors across the day.

During the operational period, dry fly ash (40%) and wet bottom ash (60%) would be removed by lorry, requiring 143 lorries and 305 lorries per year respectively. This equates to 8-9 HGV movements per week (of 30 tonnes capacity), equating to a little over one HGV per day. These vehicle numbers represent a potential worst-case, which would reduce proportionately should any of the residues be removed by rail.

5.6 Decommissioning

It is anticipated that the decommissioning process would generate approximately 30% of the operations associated with the construction phase. The associated traffic is accordingly assumed to represent 30% of the construction movements, equating to 30 cars and one minibus per day outside the highway peak periods plus five light goods vehicles and 15 HGVs per day (12 hour period).

Total traffic attraction for the proposed development site during decommissioning equates to 102 vehicle trips per day.

5.7 Air Quality

The following information upon emissions from this power station has been provided using the detail provided in the ES.

5.7.1 Stack Parameters

The following information was given on the stack parameters:

Table 5.1 – Stack Parameters

Emission Source	Parameters
Source Location (Easting, Northing)	331438, 184168
Stack Height, m (from ground level)	50
Stack Diameter, m	2.49
Efflux Temperature, deg K	388
Efflux Velocity, m/s	20
Stack volumetric flow rate at actual discharge conditions, m^3/s	97.39
Emission Rates, g/s	NO_X 22.0 SO_2 15.0 PM_{10} 2.2

Unfortunately no information is provided in the ES relating to normalised flow, emission concentration, oxygen or moisture content of the stack gasses.

5.7.2 Pollutants

The proposed scheme would combust primarily wood chip, fruit-based biomass and energy crops to generate the required thermal energy for steam production to generate electricity. Data supplied by the process engineering contractor indicates that the key combustion releases from the stack would be nitrogen oxides (NOX), sulphur dioxide (SO2) and fine particulate matter (PM10). Emission rates employed in the dispersion model for each of these parameters are listed below.

Table 5.2 – Key Pollutants

Parameter	NOx	SO_2	PM10
Emission Rate (g/s)	22.0	15.0	2.2

5.7.3 Vapour & Plume Visibility

Vapour or venting of steam from the stacks commonly occurs and is normally visible during the start-up procedure, which is necessary to protect the steam turbine, but takes place for a relatively short period of time. Sometimes it can occur during emergency venting of steam, which is expected to occur infrequently.

The Nevis Power ES did not include a plume visibility assessment nor was any water vapour information provided within the planning application. It is therefore not possible to provide the water vapour content of the plume for this facility. However, the Ince Marsh 35MW biomass facility ES does provide information on the moisture content of the plume which was reported as 11% H2O. While this is smaller than the Nevis Power facility and will operate using both virgin and recycled waste wood, the volume of water emitted from the facility is anticipated to be similar, though may reduce if the facility were to only operate using wood pellets rather than chips which generally have a lower moisture content.

Assuming that the Nevis Power facility has a typical plume moisture content of 11% H2O then the mass of water emitted from the facility will be approximately 0.07 kg per kg flue gas.

5.7.4 Abatement Methods

Generally, biomass plants in the UK use Selective Non-Catalytic Reduction (SNCR) for the control of nitrogen oxides and therefore emissions are kept within EU set limits. Other emissions can be managed via careful control of combustion conditions along with the use of ammonia/urea injection (acid gas control), activated carbon injection to control the emission of metals and bag filters to reduce particulate/metal emissions. As the biomass facility will burn only virgin timber, metal and dioxin control may not be required, however the plant would still need a system to reduce particulate emissions and acid gasses.

Whilst the vast majority of water is recycling through the ACCs, water will be lost through vapour through the stack during the combustion process.

5.7.5 Assessment of Significance & Mitigation Measures Imposed

Further to dispersion modelling against the proposed biomass facility, it was determined that impacts from industrial emissions would be negligible as it would not exceed any levels affecting human health or ecosystems.

In relation to traffic, the ES refers to the NSCA guidance where the magnitude of change in PM10 was “extremely small” and therefore were classed as negligible.

Significant impact from nitrogen deposition on designated sites within the area was also considered unlikely and it was recognised that this would be monitored and controlled by the Environmental Permit.

Any impacts from dust during construction and storage of biomass in operation would be covered by the Environmental Management Plan.

5.8 Noise

5.8.1 Construction Phase

During construction the following equipment and plant were to be used:

Table 5.3 – Construction Plant

Phase	Plant
Site Levelling and Drainage	4 × Bulldozer, 4 × Grader, 2 × 30T Articulated Dump 2 × Trucks, 2 × 360 Excavator, 2 × Backhoe , 2 × Concrete Truck, 2 × Concrete Pump, 2 × Road Trucks,
Preparation laydown area	2 × 360 Excavator, 2 × Backhoe, 2 × Asphalt Paver, 2 × Concrete Truck, 2 × Concrete Pump, 2 × Road 2 × Trucks, 2 × Small Truck Mounted Auger
Construction of Foundations	2 × auger piling rigs, 2 × 40 tonne Mobile Crane, 2 × Concrete Truck, 2 × Concrete Pump, 2 × Diesel Generator
Construction of Boilers, Turbines, Fuel transport Plant and Buildings	2 × 500 tonne Cranes, 2 × Forklift, 2 × Cherry Picker, 2 × Road Trucks, 2 × Diesel Generator, 2 × Hand Tools
Commission and Performance Testing	Noise levels similar to normal Power Station Operation

The Sound Power Levels used in Construction Noise Calculations in the ES are shown in the table below. These sound power levels have been taken from BS5228. Where BS5228 does not provide a sound power level for a particular type of machine a sound power level based on previous experience has been used.

Table 5.4 – Construction Plant Noise Levels

Plant Item	% on Time	Sound Power Level
Bulldozer	50	116
Grader	50	113
360 Excavator	50	113
Concrete Truck	30	109
Concrete Pump	30	109
Road Truck	30	105
Backhoe/wheeled excavator	100	110
600 Tonne Crane	50	114
Cherry Picker	50	105
Fork lift	50	116
Road Truck	30	105
Truck Mounted Auger	50	107
CFA Piling Rig	50	116
40 ton Crane	50	109
Jackhammer	30	119
Diesel Generator	100	108

5.8.2 Operational Noise

These sound power levels used in the noise assessment were based on data provided by potential tenderers for the various installation contracts and on previously measured plant from similar installations modified for specific conditions (for example installation within a building or enclosure and use of attenuators).

Table 5.5 – Operational Noise

Plant Item	Height m	Sound Power Level dB									
		31Hz	63Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz	A
Screw Extractors Enclosed within Fuel storage building x 5	2	77	72	72	77	72	71	67	61	34	75
Acoustically Enclosed conveyors	30	99	95	88	87	84	84	81	75	71	88*
Turbine Building (designed for noise control with internal absorption)	20	82	85	94	90	90	99	78	75	73	101
Power House Silenced ventilation openings	15	106	110	101	91	77	64	68	73	68	89
Boiler House (designed for noise control with internal absorption)	45	113	113	106	91	80	76	70	65	59	93
Boiler Feedwater Pumps	8	104	98	99	87	86	86	78	77	69	90
Air Cooled Condensers with Silencers and Acoustics Screens x 6	20	100	98	90	85	88	86	83	80	73	91
Extractors Within Ash Silos x 2	2	98	93	90	98	92	91	86	82	75	95
Air compressor building	5	101	92	96	91	84	86	71	64	59	89
Workshop building	8	89	85	84	73	65	51	50	51	49	71
Waste Water treatment plant	3	91	81	85	81	84	84	87	80	73	90
Sanitary Treatment Plant	3	91	81	85	81	84	84	87	80	73	90
Water Treatment Plant	3	91	81	85	81	84	84	87	80	73	90
Flash Slip	2	88	83	80	88	82	81	76	72	65	85
Transformers House with building	4	93	97	109	107	89	84	73	79	64	100
Electrostatic Filter	30	111	111	103	95	90	83	83	82	84	94
Stack with Stanck Attenuator	35	115	107	94	88	86	83	79	76	71	90
Ship Auxiliary Power Unit	12	117	113	111	113	111	108	103	95	87	113

5.8.3 Assessment of Significance & Mitigation Measures Imposed

It was considered that the Nevis biomass plant had the potential to have significant impacts on the adjacent designated sites and the qualifying features, although it was mentioned that ecology within the area was probably habituated to the industrial nature of the port facility. Therefore it was proposed to provide a 4m high acoustic barrier, which was installed prior to construction. This would also act as a visual barrier as well to the wintering and breeding birds on the adjacent mudflats. Due to the construction of the noise barrier this would also minimise the operational noise levels and therefore disturbance to the adjacent mudflats.

The ES outlined that moderate impacts would be made at residential dwellings within the area from construction noise, but that would be temporary in nature and at controlled times of the day. Operational noise at these dwellings was predicted to be below the level for marginal significance during the night.

Noise from construction and operational traffic was also considered to have a negligible impact.

5.9 Lighting

In addition to standard regulations on aviation lighting which were applied to Nevis Power, it was agreed that there would be no uplighters used on the site and lux levels would be kept to a minimum (0-2 lux) which would reduce the level of light pollution at the site in order to minimise impact to adjacent ecology.

APPENDIX A – CRANE SPECIFICATION

MARCHWOOD POWER STATION HRSG ERECTION

HRSG MODULE INSTALLATION LIFTING OPERATIONS DRAWINGS

The Lifting Operations Drawings included in this document and the accompanying Method Statement and Risk Assessment documents have been prepared by Weldex (International) Offshore Ltd on behalf of the LOLER Appointed Person acting on behalf of Somi.

NUMBER	CLIENT	TITLE	ISSUE	DATE
2008_045	Somi	Marchwood HRSG Erection M1	P1	15.02.08
2008_046	Somi	Marchwood HRSG Erection M1	P1	15.02.08
2008_047	Somi	Marchwood HRSG Erection M2	P1	15.02.08
2008_048	Somi	Marchwood HRSG Erection M2	P1	15.02.08
2008_049	Somi	Marchwood HRSG Erection M5	P1	15.02.08
2008_050	Somi	Marchwood HRSG Erection M5	P1	15.02.08
2008_051	Somi	Marchwood HRSG HRSG Upending	P2	13.03.08
2008_052	Somi	Marchwood HRSG HRSG Upending	P2	13.03.08
2008_053	Somi	Marchwood HRSG Erection Strongback Frame Roll Down Option 2	P2	13.03.08
2008_054	Somi	Marchwood HRSG Erection Module Lift	P2	13.03.08

PREPARED BY:	EDDIE CAMPBELL	TELEPHONE:	01463 220333
POSITION:	ENGINEERING SAFETY MANAGER		
SIGN NAME:			
DATE:	13TH MARCH 2008		

CHECKED BY:	BRIAN HYDE	TELEPHONE:	01463 220333
POSITION:	TECHNICAL SERVICES MANAGER		
SIGN NAME:			
DATE:			

APPOINTED PERSON:		TELEPHONE:	
SIGN NAME:			
DATE:			

COMMENTS:

THE CONTENTS OF THIS DOCUMENT SHOULD BE CHECKED AND CONFIRMED BY THE SOMI APPOINTED PERSON RESPONSIBLE FOR LIFTING OPERATIONS PRIOR TO FIELD ISSUE.

METHOD STATEMENT	WEL / 2008 / 001	REV: 02

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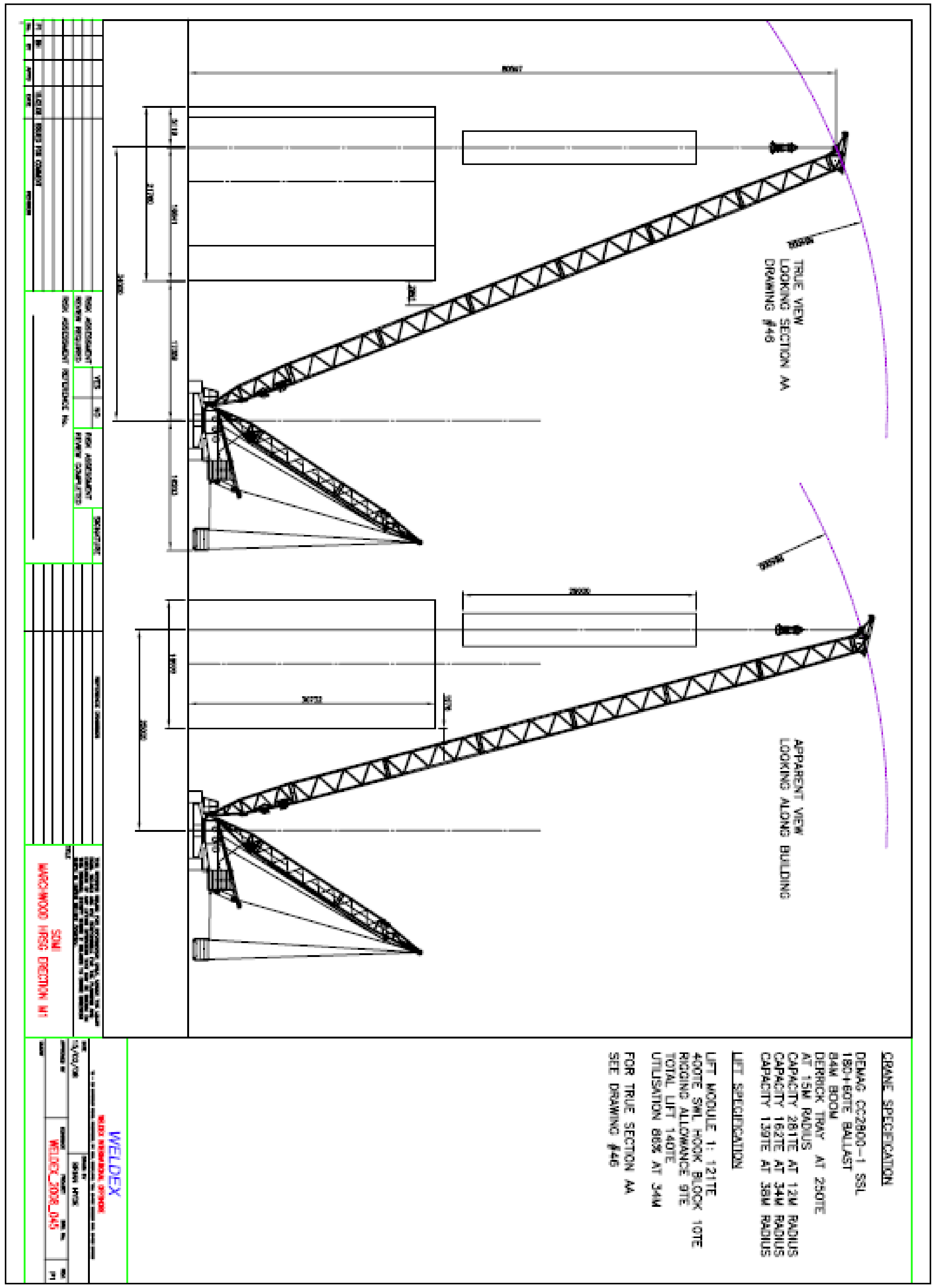

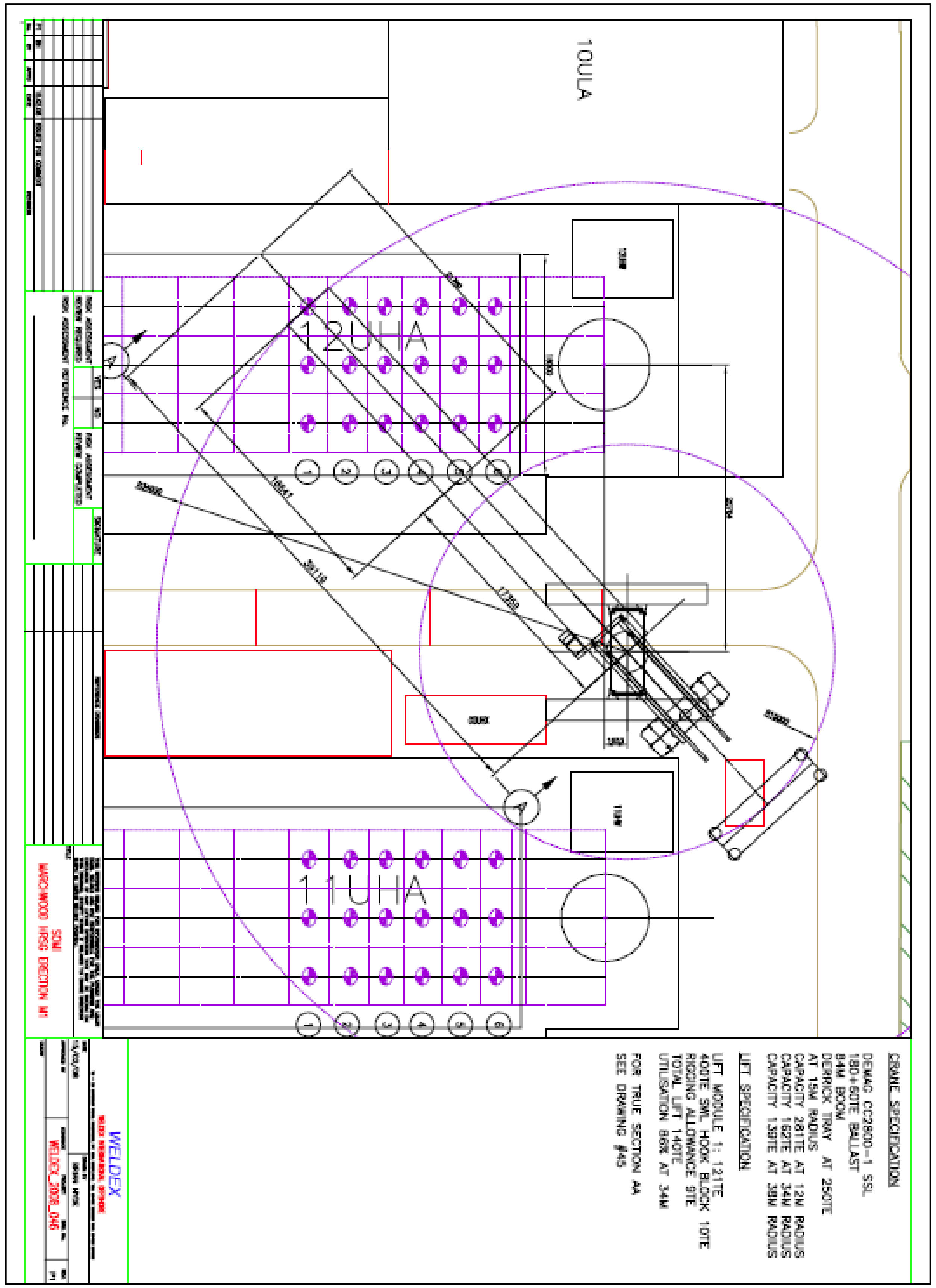
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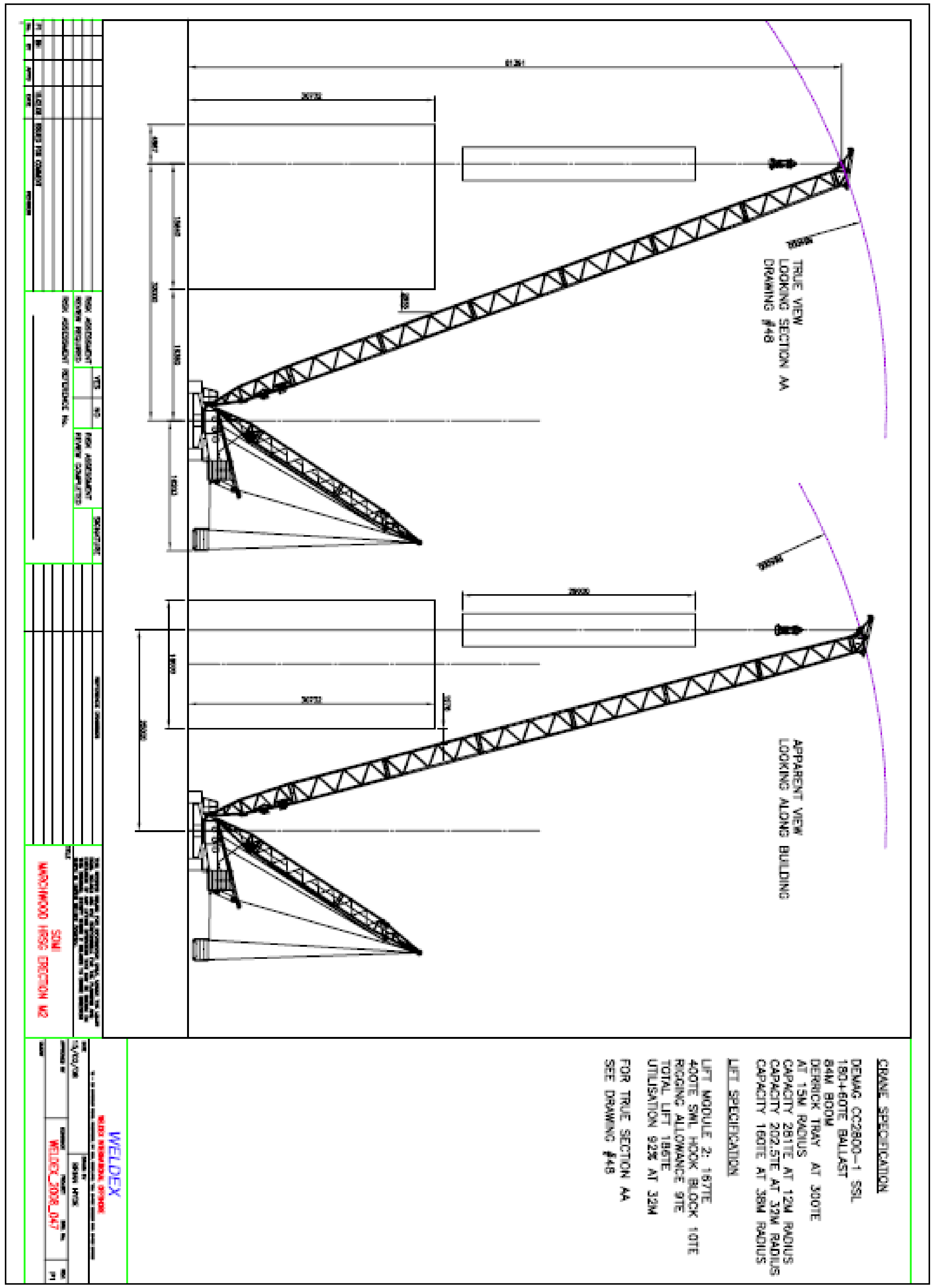
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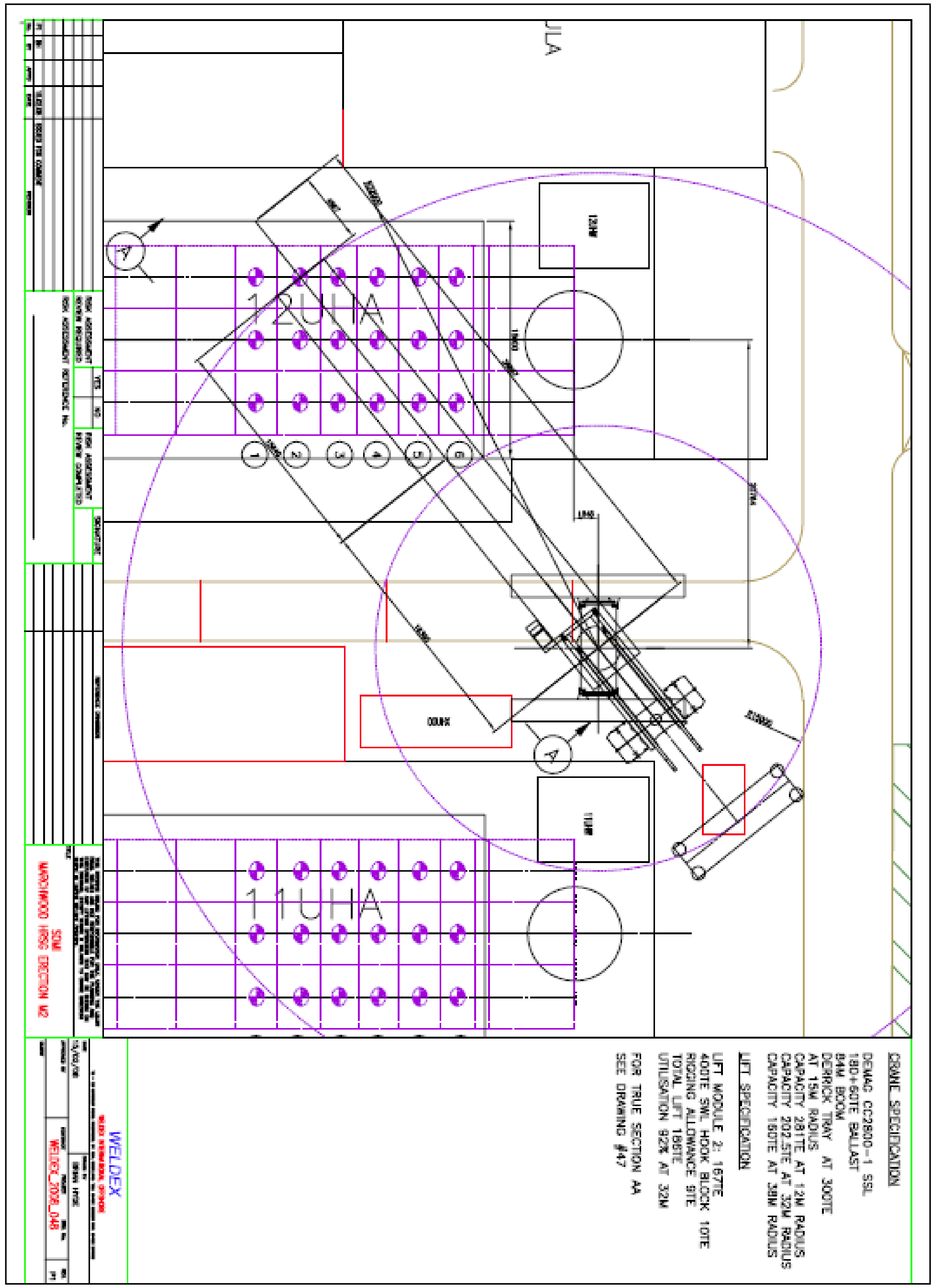
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WELDEX
WELDEX_2008_048
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84M BOOM
DERRICK TRAY AT 300TE
AT 15M RADIUS
CAPACITY 281TE AT 12M RADIUS
CAPACITY 202.5TE AT 32M RADIUS
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LIFT SPECIFICATION
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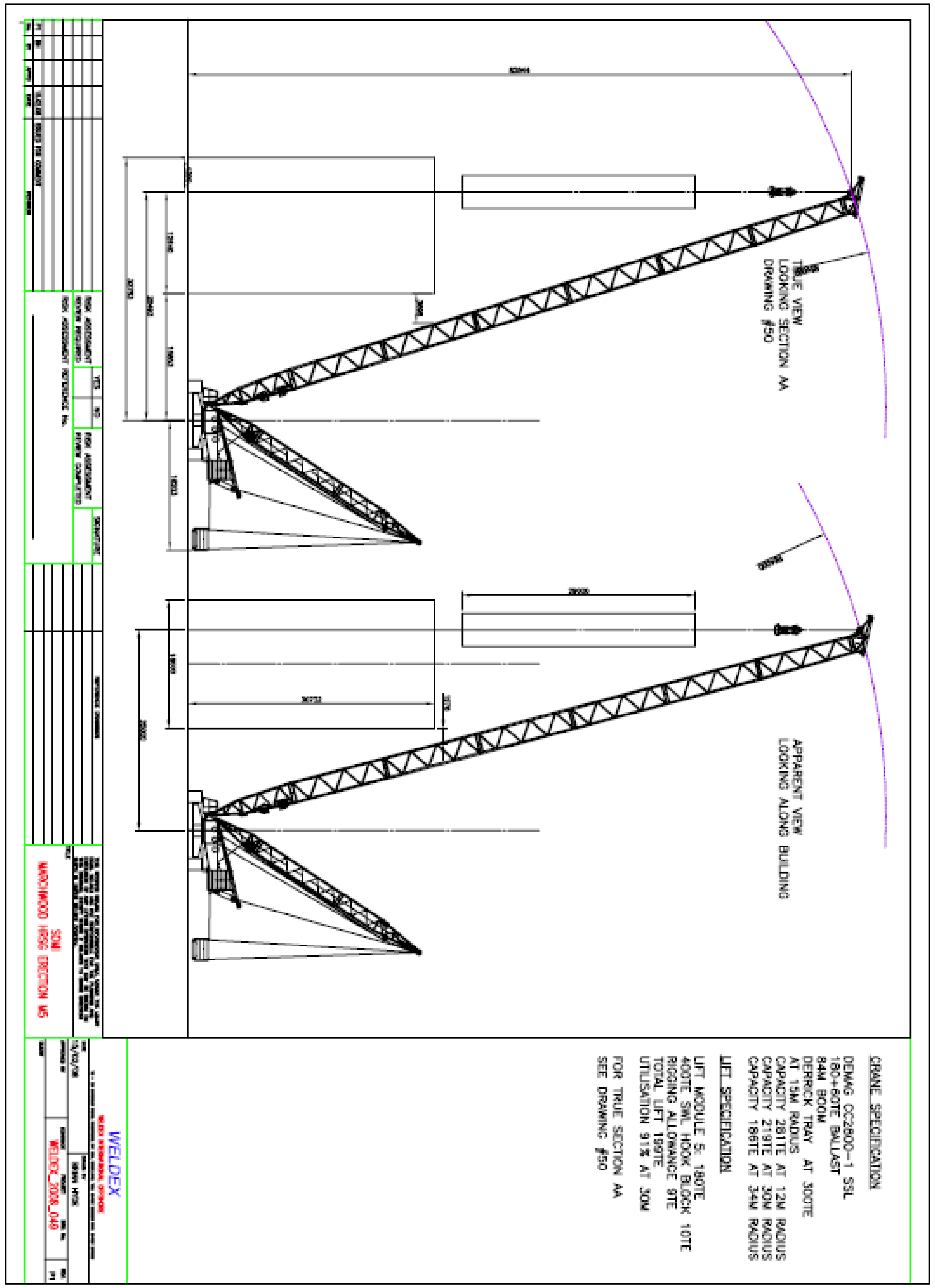
UTILISATION 92% AT 32M
FOR TRUE SECTION AA
SEE DRAWING #47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WELDEX_2008_049
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84M BOOM
DERRICK TRAY AT 300TE
AT 15M RADIUS
CAPACITY 281TE AT 12M RADIUS
CAPACITY 219TE AT 30M RADIUS
CAPACITY 186TE AT 34M RADIUS
LIFT SPECIFICATION
LIFT MODULE 5: 180TE
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UTILISATION 91% AT 30M
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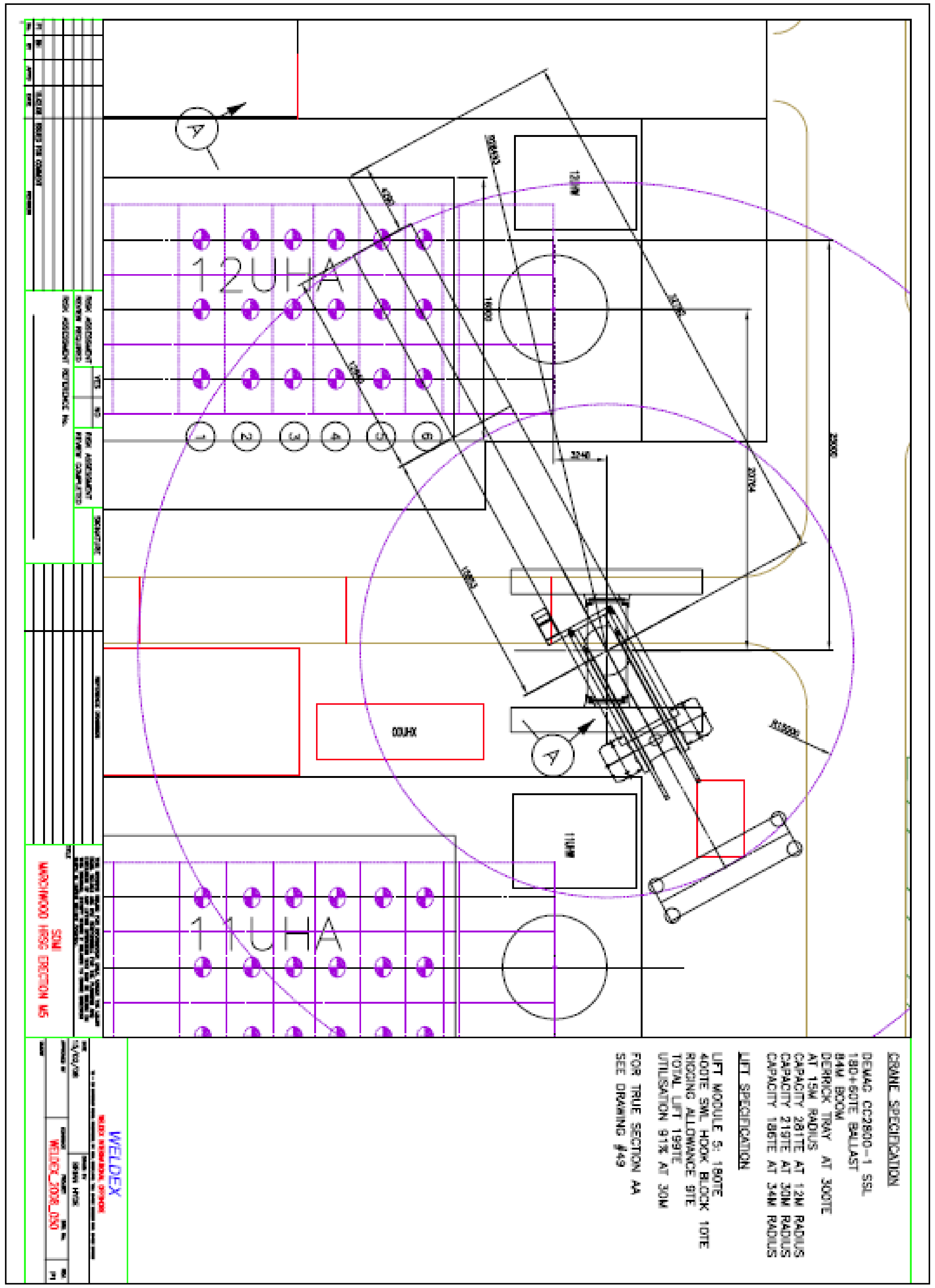
SEE DRAWING #50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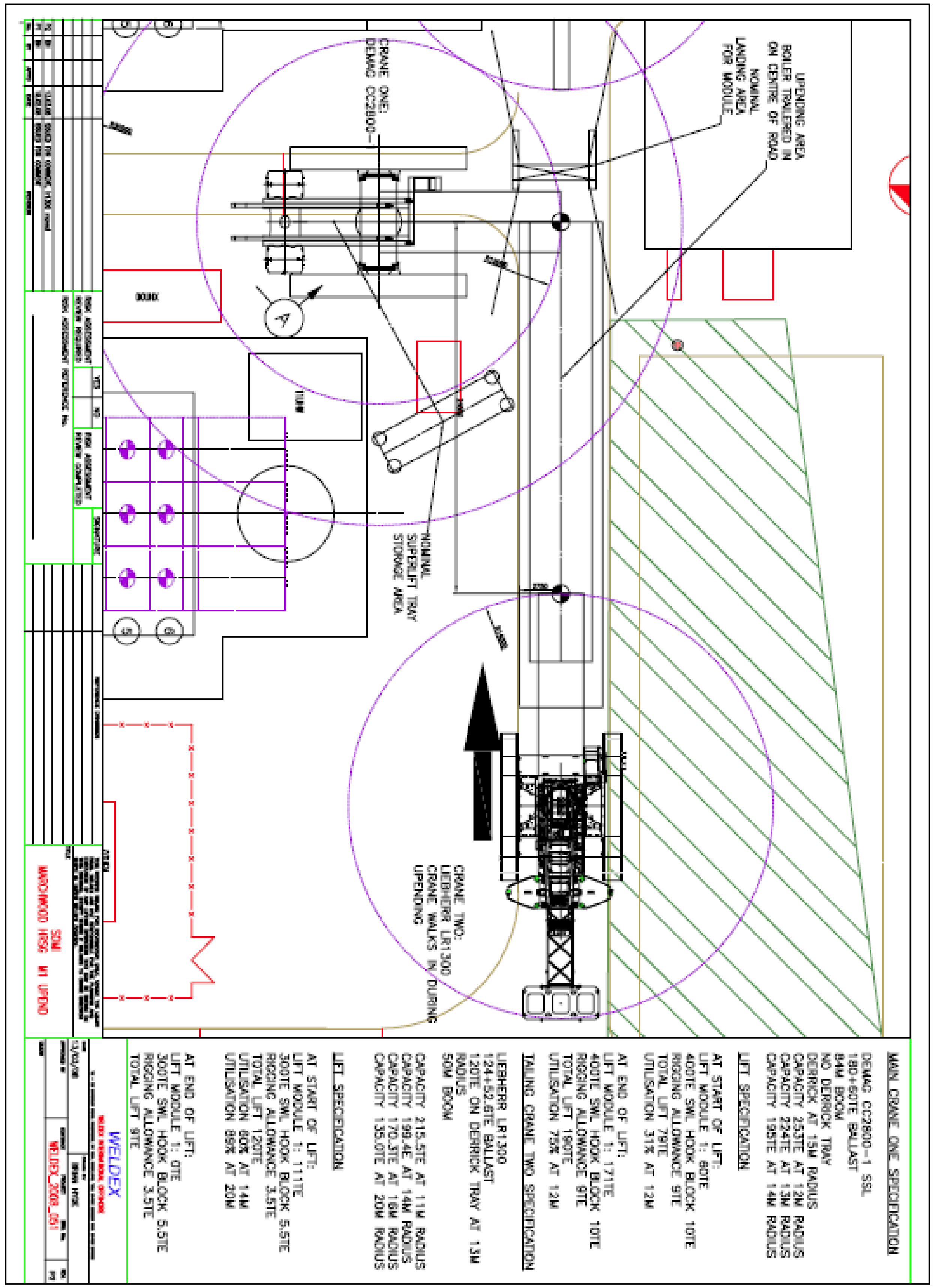
SEE DRAWING #49
WELDEX
WELDEX_2008_050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NOMINAL LANDING AREA FOR MODULE
NOMINAL SUPERLIFT TRAY STORAGE AREA
CRANE TWO: LIEBHERR LR1300 CRANE WALKS IN DURING UPENDING
MAIN CRANE ONE SPECIFICATION
DEMAG CC2800-1 SSL
180+60TE BALLAST
84M BOOM
NO DERRICK TRAY
CAPACITY AT 15M RADIUS
CAPACITY 253TE AT 12M RADIUS
CAPACITY 224TE AT 13M RADIUS
CAPACITY 195TE AT 14M RADIUS
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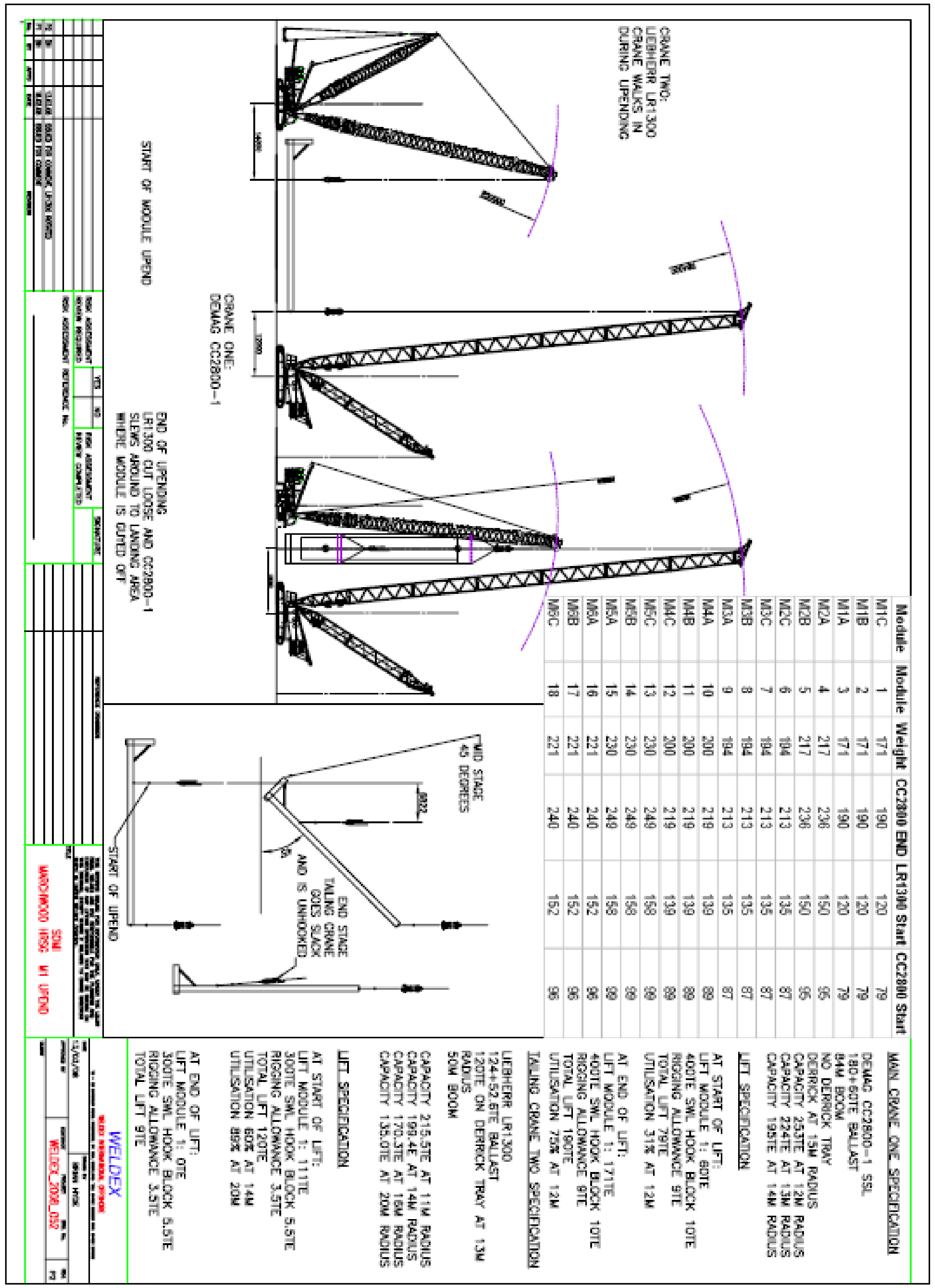
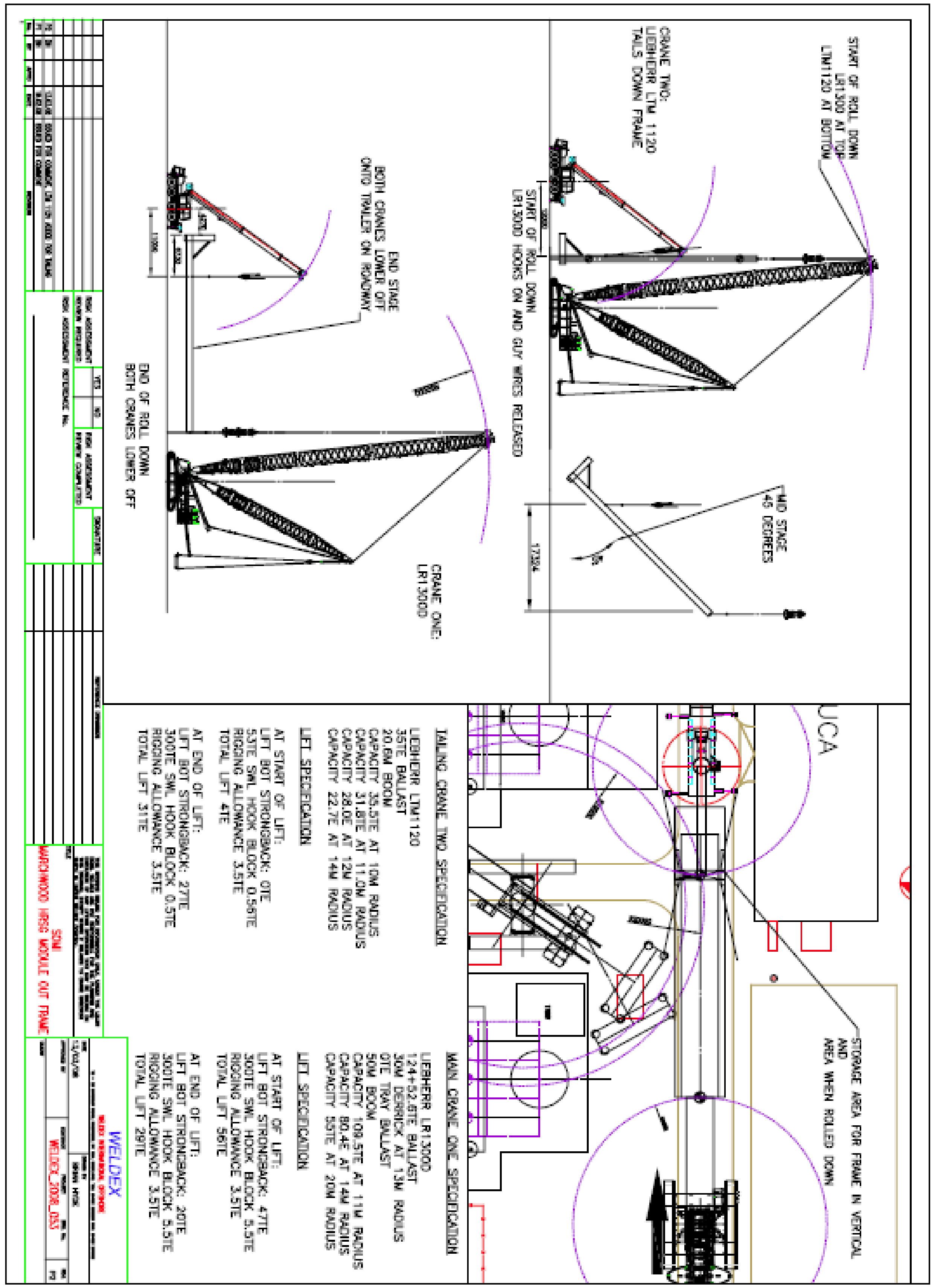
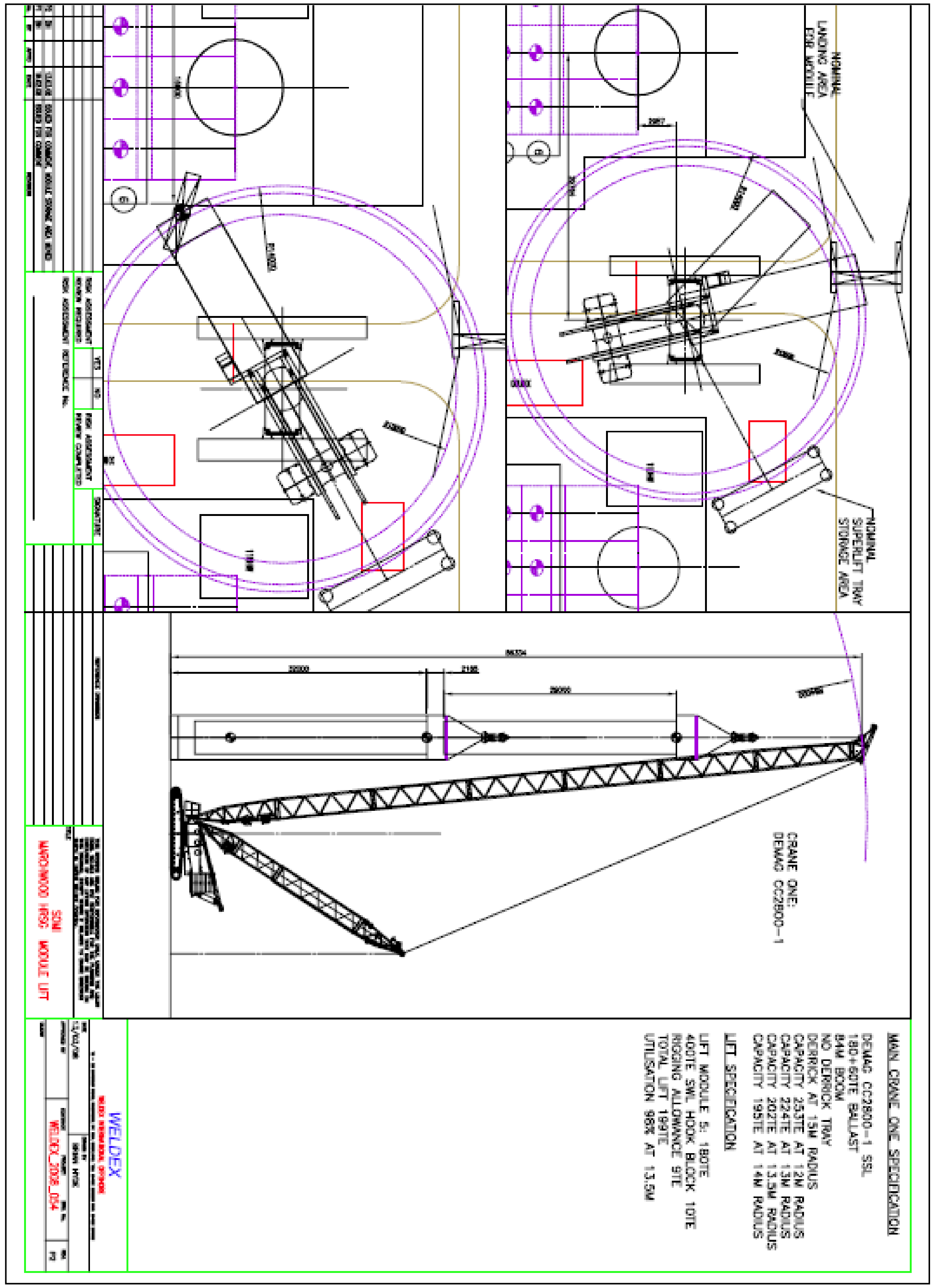
AT END OF LIFT:
LIFT MODULE 1: 171TE
400TE SWL HOOK BLOCK 10TE
RIGGING ALLOWANCE 9TE
TOTAL LIFT 190TE
UTILISATION 75% AT 12M
TAILING CRANE TWO SPECIFICATION
LIEBHERR LR1300
124+52.6TE BALLAST
120TE ON DERRICK TRAY AT 13M RADIUS
50M BOOM
CAPACITY 215.5TE AT 11M RADIUS
CAPACITY 199.4TE AT 14M RADIUS
CAPACITY 170.3TE AT 16M RADIUS
CAPACITY 135.0TE AT 20M RADIUS
LIFT SPECIFICATION
AT START OF LIFT:
LIFT MODULE 1: 111TE
300TE SWL HOOK BLOCK 5.5TE
RIGGING ALLOWANCE 3.5TE
TOTAL LIFT 120TE
UTILISATION 60% AT 14M
UTILISATION 89% AT 20M
AT END OF LIFT:
LIFT MODULE 1: 0TE
300TE SWL HOOK BLOCK 5.5TE
RIGGING ALLOWANCE 3.5TE
TOTAL LIFT 9TE
WELDEX






MAIN CRANE ONE SPECIFICATION
DEMAG CC2800-1 SSL
180+60TE BALLAST
84M BOOM
NO DERRICK TRAY
DERRICK AT 15M RADIUS
CAPACITY 253TE AT 12M RADIUS
CAPACITY 224TE AT 13M RADIUS
CAPACITY 202TE AT 13.5M RADIUS
CAPACITY 195TE AT 14M RADIUS
LIFT SPECIFICATION
LIFT MODULE 5: 180TE
400TE SWL HOOK BLOCK 10TE
RIGGING ALLOWANCE 9TE
TOTAL LIFT 199TE
UTILISATION 98% AT 13.5M
CRANE ONE:
DEMAG CC2800-1
NOMINAL LANDING AREA FOR MODULE
NOMINAL SUPERLIFT TRAY STORAGE AREA
WELDEX
SDWI
WARDINGTON HRSG MODULE LIFT

Appendix D

Example facilities for size/height comparison

Computer-generated image of Veolia proposed energy recovery facility, stack height 90 metres

Computer-generated image of a GE Combined Cycle Power Plant

Biomass Combined Heat and Power facility with 46m high stack