CIRIA 736 Assessment: 2023 update

Ark Data Centres, Corsham

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Comments

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1. Introduction

1.1 Background

This report has been prepared as an addendum to the previous C736 assessment report (WIE16316-130-R-1-1-1-PS). The 2021 report was prepared to discharge Improvement Condition 2 (IC2) of Ark Data Centres Ltd.'s (Ark's) environmental permit (PP3003PW, last varied 23 March 2022). This updated report builds on the findings of the 2021 report and reflects planned developments at the Spring Park Data Centre (henceforth referred to as 'the Site').

This addendum report presents a review of existing and planned secondary and tertiary containment systems at the Site, as of March 2023. Generator sets, containment systems and drainage infrastructure installed remain unchanged from the 2021 assessment, but the following planned changes required the assessment to be reviewed and updated:

- The addition of 10 generators to the HV Generator Farm (HV Gen) facility (also referred to as P7). Generators for installation will be the same model as the existing 14 units. (All 24 generators are already subject to the environmental permit); and
- Development of the SQ19 area, which is within the westernmost section of Ark's landholding. It is planned SQ19 will ultimately include 16 generators of a common specification.

As in 2021, secondary and tertiary containment requirements were determined through a risk assessment and classification exercise, reflecting capacity and specification requirements under C736.

1.2 Tertiary containment

Terminology used throughout this assessment reflects that in C736. Significantly, C736 defines tertiary containment as follows, and this definition is used here:

"Minimises the consequences of a failure in the primary and secondary containment systems. This is done by providing an additional level of protection preventing the uncontrolled spread of the inventory such as site drainage and sumps, diversion tanks and lagoons, containment kerbing to roadways and parking areas and impervious liners and/or flexible booms. ***Tertiary containment will be used when there is an event that causes the escape of liquids from the secondary containment through failure or overflow*** *(e.g., bund joint failure, or firewater overflowing from a bund or escaping from building/warehouse during a prolonged fire)."*

1.3 Status of 2021 report

The 2021 assessment was prepared to discharge Improvement Conditions 2 and 3 of the site's environmental permit (PP3003PW, as issued 7 July 2020). Two compliance assessment reports accepted the assessment as discharging these conditions:

- **Compliance assessment report PP3003PW/0393670, dated 25 May 2021:** This report confirmed the discharge of Improvement Conditions 1 and 2, acknowledging the receipt of the 2021 C736 assessment report. This report required Ark to confirm when **recommendations raised by the 2021 report had been addressed.**
- **Compliance assessment report PP3003PW/0398175, dated 19 July 2021:** This report accepted the 2021 C736 assessment report as discharging Improvement Condition 3. The Environment Agency requested a summary of actions taken to address the recommendations raised by the 2021 C736 assessment by 25 February 2022, which it is understood were subsequently provided.

Environmental permit PP3003PW/V002 discharged Improvement Conditions 2 and 3.

2. Overview of Generator Plant

2.1 Generator plant installed at the time of the 2021 report

General Design

At the time of the 2021 report, the installation included 42 standby generators of a common design, which are listed in Table 1 below. Each generator was installed in a container and sits atop an integrated belly tank. The belly tank serving each generator is integrally bunded, with the outer skin providing at least 120% of the volume of the inner vessel. Fuel storage serving the generator sets was designed to comply with the Control of Pollution (Oil Storage) (England) Regulations.

The 2019 proposed generator masterplan (provided as Appendix A) presents the location and arrangement of generators installed at the time of the 2021 report. Generators installed are shaded in a darker buff.

Table 1: Generator inventory at time of 2021 report

Facility	Number Installed	Energy Centre	Generator Model [1]	Thermal Input (MWth)	Usable Oil Capacity per Generator Unit (m^3)	
					Diesel	Engine Oil
P1	8	P1 EC1 – P2 EC6 [2]	SDMO X1250C	2.717	15.5	0.12
P2	12	P2 EC1 – P2 EC6 [2]	SDMO X1850C	3.656	20.5	0.12
HV Generator Farm (HV Gen, also known as P7)	14	HV Gen [2]	MTU DS2500	5.650	34	0.12
SQ17	8	SQ17 EC1 [3]	SDMO X2000C	3.956	3.66	0.12
		SQ17 EC2&3	SDMO T1900	3.301	17	0.12
		SQ17 EC4&5	SDMO T2200	4.381	17	0.12
SQ19 [4]	0	-	-	-	-	-

[1] Generator specifications given reflect existing, installed inventory at the time of the 2021 report.

[2] Energy Centres at P1 are each composed of a single model of generator. This is also the case at P2 and HV Gen.

[3] A remote diesel tank with a capacity of 18.18 m^3 also serves the SQ17 EC1 energy centre. Associated interconnectors and pipework have an estimated volume of 1.32 m^3.

[4] SQ19 was not present at the time of the 2021 report and was therefore not assessed.

Belly tanks serving all generators at the P1, P2 and HV Gen facilities and the SQ17 EC2&3 and SQ17 EC4&5 energy centres are integrally bunded and were manufactured to BS 799:2010 Part 5 Type J (2010).

The generator belly tanks are interconnected within banks of generator sets at SQ17, P1 and P2. Tanks at the HV Gen facility are not interconnected. Except for generators G1 and G2 in the SQ17 area, as discussed under the separate heading below, interconnectors fitted include a pipe-in-pipe secondary containment system.

Valves at either end of all interconnector systems continue to be kept closed at all times, except in the event transfers are required due to generator failure while on load.

Data centre SQ17: Energy Centre 1 (SQ17 EC1)

The design of Energy Centre 1 differs from the remainder of the installation. Two standby generators (GS1 and GS2) are installed side by side in a generator hall with interconnected belly tanks. A remote, aboveground integrally bunded tank serve the belly tanks for generators 1 and 2. This tank has a capacity of 18,175 litres and the bund provides 110% of the capacity of the primary vessel.

Fuel is supplied from the remote tanks via 63mm petrofuse twin wall pipework. This pipework runs belowground in 150mm diameter sealed concrete ducts. A fuel work pit is fitted with leak detection. The ducts are fitted with ingress seals with the pits, to prevent losses to soil.

GS1 and GS2 are interconnected via 63mm petrofuse pipework.

The filling point for the remote aboveground tank supplies the vessel via 63mm petrofuse pipework, which runs underground via sealed ducts constructed as described above. The filling points are fitted with level gauges for the tank and an overfill alarm.

2.2 Planned revisions to generator plant

General Design

Due to demand for data centre capacity, Ark is proposing to expand the site. The proposed expansion will deliver additional backup generator capacity:

- HV Gen: addition of 10 generators to this facility, of the same model as the existing 14 units (note that all 24 are already authorised by the permit); and
- SQ19: development of the westernmost section of Ark's landholding, including 16 generators.

Initially, the expansion of the site will concern six generator sets (Gen 01 through Gen 06) at SQ19, which are due to be commissioned in the fourth quarter of 2023. A timescale has yet to be set for the delivery of the other units at SQ19 and the 10 units at HV Gen.

Table 2 presents the proposed expanded inventory of generators at the site. Appendix B provides an updated proposed masterplan for the site, including the planned arrangement of the new generator units.

Table 2: Proposed expanded generator inventory

Facility	Proposed Number	Change in Generator Number	Energy Centre	Generator Model	Thermal Input (MWth)	Oil Storage per Generator Unit (m^3)	
						Diesel	Engine Oil
P1	8	0	P1 EC1 – P2 EC6	SDMO X1250C	2.717	15.5	0.12
P2	12	0	P2 EC1 – P2 EC6	SDMO X1850C	3.656	20.5	0.12
HV Generator Farm (HV Gen)	24	+10	HV Gen [1]	MTU DS2500	5.650	34	0.12
SQ17	8	0	SQ17 EC1	SDMO X2000C	3.956	3.66	0.12
			SQ17 EC2&3	SDMO T1900	3.301	17	0.12
			SQ17 EC4&5	SDMO T2200	4.381	17	0.12
SQ19	16	+16	SQ19	MTU DS2500	5.660	37.908	0.12

[1] Additional generators at the HV Gen facility are planned to have the same specification as the existing fourteen.

HV Gen

The expansion of the HV Gen facility will ultimately introduce 10 new containerised generators (HV1 through HV10) with the same model (MTU DS2500) as the existing 14 units at this location. This reflects the 24 already authorised by the permit. These generators will be located north of the existing bank of generators including HV11 through HV18. Each of the new generator sets will include a double skinned belly tank, manufactured to BS 799:2010 Part 5 Type J (2010).

All the tanks will have a usable capacity of 34,000 litres, identical to the capacity of the belly tanks serving the existing 14 generator sets at this location.

SQ19

The SQ19 area, which lies to the southwest of SQ17, will be developed as an 11kV generation farm. As noted above, the first phase is due in the fourth quarter of 2023 and will include the installation of six generator sets (Gen 01 through Gen 06). SQ19 has been planned to allow a further 10 generator sets to be installed on a future date, which has yet to be confirmed. Generators are planned to constitute the same model (MTU DS2500).

Each of the new generator sets will include a double skinned belly tank, manufactured to BS 799:2010 Part 5 Type J (2010). All the tanks will have a usable capacity of 37,908 litres. The outer tank will have a volume of 52,400 litres, providing secondary containment of 138% of the primary vessel volume.

Tanks serving the SQ19 generator sets will not be fitted with interconnecting pipework; tanks in each generator set will be independent.

3. Surface Water Drainage Systems

3.1 Surface water drainage systems at the time of the 2021 report

All the generator sets are installed in areas featuring impermeable hardstanding. Surface water run-off from each generator area is managed through a variety of strategies, as described below.

P1 Area

The generator sets are installed externally to the south of P1. A channel drain receives surface water run-off from this area, which is discharged to the infiltration pond to the east of P1. All external hardstanding for P1 (covering an area of 3,849m^2) is received by the infiltration pond. No form of abatement (e.g., interceptor) is installed.

The infiltration pond has an estimated volume of 1,000m^3 (at 1.2m depth) and 1,245m^3 (at 1.4m depth) and was designed to satisfy a 1 in 100 year rainfall event, with an allowance for climate change impacts. The pond is largely unlined.

A measured infiltration rate was not available for the infiltration pond. The rate is understood to be very high as it has never retained any stormwater, including during testing.

A mine lies around 30m below the site. In the event of water-soluble polluting material entering the infiltration pond it is understood the mine would receive contaminants, which lie around 5m above the identified water table level.

P2 Area

All the generator sets in this area are installed externally to the west of P2. A channel drain receives surface water run-off from this area, which is received by a Conder Clereflo CNB4.5s/21 Class 1 bypass interceptor before discharge to a soakaway. This interceptor has an oil capacity of 67.5 litres. Overflows for the soakaway are received by the combined public sewer on Westwells Road.

Impermeable hardstanding for the area including the generators has a total area of 2,942m^2.

HV Generator Farm (HV Gen) Area

All the generator sets in this area are installed externally to the east of P4.

Surface water run-off in this area is received by channel drains. The channel drains feed into a Klargester NSFA065 full retention Separator to the north before discharging to a soakaway to the northeast. This interceptor has an oil capacity of 650 litres. Overflows for the soakaway are received by the combined public sewer on Westwells Road.

Impermeable hardstanding for the HV Gen area has a total area of 2,334m^2. Channel drains and the interceptor in this area serve a total drained area of 3,160m^2.

SQ17 Area

Generators G1 and G2 and G3, G4 and G5 are installed inside buildings to the south of SQ17.

Fugitive releases beyond these buildings are considered very unlikely. The buildings are free of internal drainage features.

The integrally bunded tank serving G1 and G2 and the associated filling point is installed externally to the west of SQ17. Surface water drainage systems in this area were not defined.

Generators G6, G7 and G8 are installed externally to the north of SQ17. Surface water run-off from

hardstanding in this area is received by channel drains and runs to a drain running along the northern access road to the site. No form of abatement (e.g., interceptor) treats this discharge. A lined attenuation pond temporarily holds surface water drains at the external area to the north of SQ17 to reduce flows. The drain running along the northern access road is received by the combined public sewer on Westwells Road.

3.2 Planned changes to surface water drainage systems serving the HV Gen and SQ19 areas

HV Generator Farm (HV Gen) Area

It is understood drainage systems in this area have not changed and will not change because of the plan to install 10 further generator sets. The drainage system was designed to reflect the full intended inventory of 24 generators, so no modifications have been deemed necessary.

SQ19 Area

The generator sets will be installed in a hard surfaced area, occupying an area of approximately 2,040m². The generator sets will be installed in two banks running from west to east, either side of a proposed channel drain: Gen 01 through Gen 08 will lie to the south of this drain, while the planned locations for Gen 09 through Gen 16 will lie to the north. The channel drain will discharge to a soakaway to the south of generators Gen 01 through Gen 08 via a petrol interceptor.

The planned petrol interceptor has been specified as a Klargester NSP8003 Class 1 bypass oil separator or equivalent approved unit. The interceptor will have a 45 litre and 300 litre storage capacity for oil and silt respectively. The interceptor will be fitted with an oil alarm.

3.3 Extended spill response equipment following the 2021 report

As part of the programme of actions taken to discharge Improvement Conditions 2 and 3 of the environmental permit, Ark procured further spill response equipment and updated its response procedures.

Inflatable pillows are now held in the P1 area for insertion into the manhole. This provides emergency tertiary containment before discharges can occur to the infiltration pond.

The inflatable pillows were also selected for potential use on the lined attenuation pond that receives surface water drainage from SQ17. Once deployed, this would enable the use of the attenuation pond as a tertiary containment tank.

4. Risk Assessment and Classification

4.1 Source, pathway and receptor hazard classification

The source, pathway and receptor hazard classification developed in 2021 was revisited, reflecting the planned changes at the HV Gen and SQ19 areas.

An updated assessment of the hazard substances within the planned revised installation present to the environment was assessed with respect to the potential sources (Table 3), pathways (Table 4) and receptors (Table 5) in accordance with section 2 of C736. The substances were grouped according to location within these assessments and hazards determined using the three tier criteria set under C736.

The highlighted rows in Table 4 concern the pathways associated with the HV Gen and SQ19 areas, which are affected by the planned revisions considered in this report. Planned changes to the HV Gen and SQ19 areas do not affect the sources or receptors present within the installation.

Table 3: Source hazard rating

Source	Hazard rating	Rationale
Diesel storage within generator belly tanks or remote storage and supply to generators	**Moderate (M)**	• Limited flammability • Hazard statement classifications • Phase separation with water • Vessel volumes • Stated LD50 for diesel • Fusible links in each generator set (72ºC set point), automatically closing fire valve on fuel feed to prevent fires • One-hour fire rating of generator sets • Firefighting foam application via pourers within enclosed generator containers
Diesel within tank interconnectors	**Low (L)**	• Limited flammability • Hazard statement classifications • Phase separation with water • Low volumes within interconnectors • The equipment at SQ19 and the HV Gen area (G11 through G24) does not feature interconnectors. • Stated LD50 for diesel
Engine oil storage within generator containers	**L**	• Non-flammable • Hazard statement classifications • Phase separation with water • Limited vessel volumes • Stated LD50 for engine oils

Table 4: Pathway hazard rating

Pathway	Hazard rating	Rationale
Surface water drainage (HV Gen)	**L**	• Integral bunding of generators, which constitute independent units • No interconnectors between the generators • Full retention interceptor with alarm • Level monitoring, alarms, filling procedures and spill response procedures • Proximity of drains to applicable sources • Drain received by combined sewer
Surface water drainage (SQ19)	**M**	• Integral bunding of generator units, which constitute independent units • No interconnectors between the generators

Pathway	Hazard rating	Rationale
		• Bypass interceptor with alarm • Level monitoring, alarms, filling procedures and spill response procedures • Drain received by soakaway
Surface water drainage (P1)	**M**	• Integral bunding of generator units, which constitute independent units • Interconnectors integrally bunded and valves closed at all times unless transfers are underway • Proximity of drains to sources identified • Level monitoring, alarms, filling procedures and spill response procedures • Absence of interceptor • Infiltration rate at infiltration pond • Infiltration pond depth to groundwater (~35m) • Phase separation of oils in water
Surface water drainage (P2)	**L**	• Integral bunding of generators, which constitute independent units • Interconnectors integrally bunded and valves closed at all times unless transfers are underway • Drains received by interceptor with alarm • Level monitoring, alarms, filling procedures and spill response procedures • Proximity of drains to sources identified • Drain received by soakaway or combined sewer (latter on soakaway overflow only)
Surface water drainage (SQ17)	**L**	• Integral bunding of generators and tank serving G1 and G2, which constitute independent units • Sealed ducts and trenches for connections between filling point, remote tank and generators G1 and G2. • Interconnectors integrally bunded and valves closed at all times unless transfers are required • Generators G1 through G5 indoors inside buildings • Absence of interceptor • Level monitoring, alarms, filling procedures and spill response procedures • Proximity of drains to sources identified • Discharge to combined sewer
Hardstanding / bund floor defects	**L**	• Steel, pre-fabricated and pressure tested primary and secondary containment for generators • Interconnectors integrally bunded • Bund and hardstanding design standards • Inspection and maintenance programmes
Groundwater flow	**L**	• Drainage systems receive surface water run-off in each area; risk primarily associated with infiltration pond serving P1 and soakaways • Test data shows groundwater ~35m below ground level at P1 infiltration pond. Similar characteristics anticipated in SQ19 soakaway area. • Hardstanding and secondary containment systems • Level monitoring, alarms, filling procedures and spill response procedures
Absorption by soil	**L**	• Drainage systems receive surface water run-off in each area • Hardstanding and secondary containment systems • Level monitoring, alarms, filling procedures and spill response procedures

Table 5: General receptor hazard rating

Receptor	Hazard rating	Rationale
Foul sewer (off-site wastewater treatment works)	**M**	• Combined sewer receives drains from P2, HV Gen and SQ17 areas • Volumes of oils held • Integral bunding of generators and interconnectors (where fitted) • Dilution in sewer system • Receipt of effluent by wastewater treatment plant
Groundwater and Soils (via infiltration pond or soakaways)	**M**	• Impermeable hardstanding throughout generator areas • Integral bunding of generators and interconnectors (where fitted) • Ground protected against polluting run-off by distance from generators, site topography and interceptors • Volume of oils held • Site within Zone II groundwater protection zone
Groundwater and Soils (via unmade ground)	**L**	• Integral bunding of generators and interconnectors (where fitted) • Unmade ground protected against polluting run-off by surface water drainage systems (e.g., channel drains), distance from generators and site topography • Volume of oils held • Site within Zone II groundwater protection zone
Surface water	**Negligible (N)**	• Site 500m from closest surface water body (Bydemill Brook) but only 10m above the level of it • Distance from drains discharging into surface water bodies • Site drains discharge to combined sewer, soakaways or infiltration ponds • Integral bunding of generators and interconnectors (where fitted)
Biota	**L**	• Impermeable hardstanding throughout generator areas • Surface run-off received by drains to combined sewers for all locations, bar P1 and SQ19 areas • Unmade ground protected against polluting run-off by surface water drainage systems (e.g., channel drains) and interceptors, distance from generators and site topography • Integral bunding of generators and interconnectors (where fitted) • Volume of oils held • Site approximately 300m from nearest protected site at the closest point • Areas of the site set aside for ecological purposes
Human health	**M**	• Surface run-off received by drains to combined sewers for all locations, bar P1 and SQ19 areas • Limited flammability and volatility of oils held • Site within a primarily industrial area • Integral bunding of generators and interconnectors (where fitted) • Generator plant approximately 250m from the nearest residence • Documented operating and emergency procedures, supported by risk assessments and method statements • Personal protective equipment available • Spill response equipment

4.2 Source-pathway-receptor assessment

Overall hazard ratings were determined for each location given the source, pathway and receptor classification. Table 6 presents the findings of this assessment. As in section 4.1, highlighted rows in Table 6 concern the pathways associated with the HV Gen and SQ19 areas, which are affected by the planned revisions considered in this report.

Given the contrasting fates of surface run-off (the P1 and SQ19 areas versus the P2, HV Gen and SQ17 areas), different source-pathway-receptor relationships exist, and this is reflected in the updated assessment for the installation.

Table 6: Source-pathway-receptor assessment

Source		Pathway		Receptor		Source-pathway-receptor hazard rating	Combined source-pathway hazard rating for specific receptor(s)	Combined source-pathway-receptor hazard rating (all receptors)
SQ19 Area Only								
Diesel storage within generator belly tanks or remotely and supply to generators	**M**	Surface Water Drainage (SQ19)	**M**	Groundwater and Soils (via soakaway)	**M**	MMM - Moderate	MMMM - Moderate	**MMMM - Moderate**
				Groundwater and Soils (via unmade ground)	**L**	MML – Moderate		
				Biota	**L**	MML – Moderate		
				Human health	**M**	MMM – Moderate		
		Hardstanding / bund floor defects	**L**	Groundwater and Soils (via soakaway)	**M**	MLM – Moderate	MLLM – Moderate	
				Groundwater and Soils (via unmade ground)	**L**	MLL – Low		
				Biota	**L**	MLL – Low		
				Human health	**M**	MLM – Moderate		
		Groundwater flow	**L**	Groundwater and Soils (via soakaway)	**M**	MLM – Moderate	MLLM - Moderate	
				Groundwater and Soils (via unmade ground)	**L**	MLL – Low		
				Biota	**L**	MLL – Low		

Source		Pathway		Receptor		Source-pathway-receptor hazard rating	Combined source-pathway hazard rating for specific receptor(s)	Combined source-pathway-receptor hazard rating (all receptors)
				Human health	**M**	MLM – Moderate		
		Absorption by soil	**L**	Groundwater and Soils (via soakaway)	**M**	MLM – Moderate	MLLM - Moderate	
				Groundwater and Soils (via unmade ground)	**L**	MLL – Low		
				Biota	**L**	MLL – Low		
				Human health	**M**	MLM – Moderate		
Engine oil storage within generator containers	**L**	Surface Water Drainage (SQ19)	**M**	Groundwater and Soils (via soakaway)	**M**	LMM – Moderate	MLLM – Moderate	**MLLL - Low**
				Groundwater and Soils (via unmade ground)	**L**	LML – Low		
				Biota	**L**	LML – Low		
				Human health	**M**	LMM – Moderate		
		Hardstanding / bund floor defects	**L**	Groundwater and Soils (via soakaway)	**M**	LLM – Low	LLLL – Low	
				Groundwater and Soils (via unmade ground)	**L**	LLL – Low		
				Biota	**L**	LLL – Low		
				Human health	**M**	LLM – Low		
		Groundwater flow	**L**	Groundwater and Soils (via soakaway)	**M**	LLM – Low	LLLL - Low	
				Groundwater and Soils (via unmade ground)	**L**	LLL – Low		
				Biota	**L**	LLL – Low		
				Human health	**M**	LLM – Low		
		Absorption by soil	**L**	Groundwater and Soils (via soakaway)	**M**	LLM – Low	LLLL - Low	

Source		Pathway		Receptor		Source-pathway-receptor hazard rating	Combined source-pathway hazard rating for specific receptor(s)	Combined source-pathway-receptor hazard rating (all receptors)
				Groundwater and Soils (via unmade ground)	**L**	LLL – Low		
				Biota	**L**	LLL – Low		
				Human health	**M**	LLM – Low		
P2, HV Gen and SQ17 areas								
Diesel storage within generator belly tanks or remotely and supply to generators [1]	**M**	Surface Water Drainage (P2 / HV Gen & SQ17 areas)	**L**	Foul sewer (off-site wastewater treatment works)	**M**	MLM – Moderate	MMLLM – Moderate	**MMLL - Moderate**
				Groundwater and Soils (via soakaways)	**M**	MLM – Moderate		
				Groundwater and Soils (via unmade ground)	**L**	MLL – Low		
				Biota	**L**	MLL – Low		
				Human health	**M**	MLM – Moderate		
		Hardstanding / bund floor defects	**L**	Foul sewer (off-site wastewater treatment works)	**M**	MLM – Moderate	MLLM – Moderate	
				Groundwater and Soils (via unmade ground)	**L**	MLL – Low		
				Biota	**L**	MLL – Low		
				Human health	**M**	MLM – Moderate		
		Groundwater flow	**L**	Groundwater and Soils (via unmade ground)	**L**	MLL – Low	LLM – Low	
				Biota	**L**	MLL – Low		
				Human health	**M**	MLM – Moderate		
		Absorption by soil	**L**	Groundwater and Soils (via unmade ground)	**L**	MLL – Low	LLM - Low	

[1] Interconnectors are not and will not be installed on existing and planned generator sets at the HV Gen area.

Source		Pathway		Receptor		Source-pathway-receptor hazard rating	Combined source-pathway hazard rating for specific receptor(s)	Combined source-pathway-receptor hazard rating (all receptors)
				Biota	**L**	MLL – Low		
				Human health	**M**	MLM – Moderate		
Diesel within tank interconnectors	**L**	Surface Water Drainage (P2 & SQ17 areas)	**L**	Foul sewer (off-site wastewater treatment works)	**M**	LLM – Low	LLLL – Low	**LLLL - Low**
				Groundwater and Soils (via soakaways)	**M**	LLM - Low		
				Groundwater and Soils (via unmade ground)	**L**	LLL – Low		
				Biota	**L**	LLL – Low		
				Human health	**M**	LLM – Low		
		Hardstanding / bund floor defects	**L**	Foul sewer (off-site wastewater treatment works)	**M**	LLM – Low	LLLL – Low	
				Groundwater and Soils (via soakaways)	**M**	LLM - Low		
				Groundwater and Soils (via unmade ground)	**L**	LLL – Low		
				Biota	**L**	LLL – Low		
				Human health	**M**	LLM – Low		
		Groundwater flow	**L**	Groundwater and Soils (via unmade ground)	**L**	LLL – Low	LLL – Low	
				Biota	**L**	LLL – Low		
				Human health	**M**	LLM – Low		
		Absorption by soil	**L**	Groundwater and Soils (via unmade ground)	**L**	LLL – Low	LLL – Low	
				Biota	**L**	LLL – Low		
				Human health	**M**	LLM – Low		

Source		Pathway		Receptor		Source-pathway-receptor hazard rating	Combined source-pathway hazard rating for specific receptor(s)	Combined source-pathway-receptor hazard rating (all receptors)
Engine oil storage within generator containers	**L**	Surface Water Drainage (P2 / HV Gen & SQ17 areas)	**L**	Foul sewer (off-site wastewater treatment works)	**M**	LLM – Low	LLLLL – Low	**LLLL - Low**
				Groundwater and Soils (via soakaways)	**M**	LLM – Low		
				Groundwater and Soils (via unmade ground)	**L**	LLL – Low		
				Biota	**L**	LLL – Low		
				Human health	**M**	LLM – Low		
		Hardstanding / bund floor defects	**L**	Foul sewer (off-site wastewater treatment works)	**M**	LLM – Low	LLLLL - Low	
				Groundwater and Soils (via soakaways)	**M**	LLM – Low		
				Groundwater and Soils (via unmade ground)	**L**	LLL – Low		
				Biota	**L**	LLL – Low		
				Human health	**M**	LLM – Low		
		Groundwater flow	**L**	Groundwater and Soils (via unmade ground)	**L**	LLL – Low	LLL – Low	
				Biota	**L**	LLL – Low		
				Human health	**M**	LLM – Low		
		Absorption by soil	**L**	Groundwater and Soils (via unmade ground)	**L**	LLL – Low	LLL – Low	
				Biota	**L**	LLL – Low		
				Human health	**M**	LLM – Low		
P1 Area Only								
Diesel storage within generator belly tanks or remotely and supply to generators	**M**	Surface Water Drainage (P1)	**M**	Groundwater and Soils (via infiltration pond)	**M**	MMM - Moderate	MMMM - Moderate	**MMMM - Moderate**
				Groundwater and Soils (via infiltration pond or soakaways)	**L**	MML – Moderate		

Source		Pathway		Receptor		Source-pathway-receptor hazard rating	Combined source-pathway hazard rating for specific receptor(s)	Combined source-pathway-receptor hazard rating (all receptors)
				Biota	**L**	MML – Moderate		
				Human health	**M**	MMM – Moderate		
		Hardstanding / bund floor defects	**L**	Groundwater and Soils (via infiltration pond or soakaways)	**M**	MLM – Moderate	MLLM – Moderate	
				Groundwater and Soils (via unmade ground)	**L**	MLL – Low		
				Biota	**L**	MLL – Low		
				Human health	**M**	MLM – Moderate		
		Groundwater flow	**L**	Groundwater and Soils (via infiltration pond or soakaways)	**M**	MLM – Moderate	MLLM - Moderate	
				Groundwater and Soils (via unmade ground)	**L**	MLL – Low		
				Biota	**L**	MLL – Low		
				Human health	**M**	MLM – Moderate		
		Absorption by soil	**L**	Groundwater and Soils (via infiltration pond or soakaways)	**M**	MLM – Moderate	MLLM - Moderate	
				Groundwater and Soils (via unmade ground)	**L**	MLL – Low		
				Biota	**L**	MLL – Low		
				Human health	**M**	MLM – Moderate		
Diesel within tank interconnectors	**L**	Surface Water Drainage (P1)	**M**	Groundwater and Soils (via infiltration pond or soakaways)	**M**	LMM – Moderate	MLLM - Moderate	**MLLL - Low**
				Groundwater and Soils (via unmade ground)	**L**	LML – Low		
				Biota	**L**	LML – Low		
				Human health	**M**	LMM – Moderate		

Source		Pathway		Receptor		Source-pathway-receptor hazard rating	Combined source-pathway hazard rating for specific receptor(s)	Combined source-pathway-receptor hazard rating (all receptors)
		Hardstanding / bund floor defects	**L**	Groundwater and Soils (via infiltration pond or soakaways)	**M**	LLM – Low	LLLL – Low	
				Groundwater and Soils (via unmade ground)	**L**	LLL - Low		
				Biota	**L**	LLL – Low		
				Human health	**M**	LLM - Low		
		Groundwater flow	**L**	Groundwater and Soils (via infiltration pond or soakaways)	**M**	LLM – Low	LLLLL – Low	
				Groundwater and Soils (via unmade ground)	**L**	LLL – Low		
				Biota	**L**	LLL – Low		
				Human health	**M**	LLM – Low		
		Absorption by soil	**L**	Groundwater and Soils (via infiltration pond or soakaways)	**M**	LLM – Low	LLLL – Low	
				Groundwater and Soils (via unmade ground)	**L**	LLL – Low		
				Biota	**L**	LLL – Low		
				Human health	**M**	LLM – Low		
Engine oil storage within generator containers	**L**	Surface Water Drainage (P1)	**M**	Groundwater and Soils (via infiltration pond or soakaways)	**M**	LMM – Moderate	MLLM – Moderate	**MLLL - Low**
				Groundwater and Soils (via unmade ground)	**L**	LML – Low		
				Biota	**L**	LML – Low		
				Human health	**M**	LMM – Moderate		
		Hardstanding / bund floor defects	**L**	Groundwater and Soils (via infiltration pond or soakaways)	**M**	LLM – Low	LLLL – Low	
				Groundwater and Soils (via unmade ground)	**L**	LLL – Low		

Source	Pathway		Receptor		Source-pathway-receptor hazard rating	Combined source-pathway hazard rating for specific receptor(s)	Combined source-pathway-receptor hazard rating (all receptors)
			Biota	**L**	LLL – Low		
			Human health	**M**	LLM – Low		
	Groundwater flow	**L**	Groundwater and Soils (via infiltration pond or soakaways)	**M**	LLM – Low	LLLL - Low	
			Groundwater and Soils (via unmade ground)	**L**	LLL – Low		
			Biota	**L**	LLL – Low		
			Human health	**M**	LLM – Low		
	Absorption by soil	**L**	Groundwater and Soils (via infiltration pond)	**M**	LLM – Low	LLLL - Low	
			Groundwater and Soils (via unmade ground)	**L**	LLL – Low		
			Biota	**L**	LLL – Low		
			Human health	**M**	LLM – Low		

The updated assessment supports the conclusion of the 2021 report: the installation continues to be deemed to incorporate three discrete zones with varied levels of hazard. These are listed below:

- Diesel storage within the generator sets and associated equipment;
- Diesel within tank interconnectors; and
- Engine oil within generator sets.

Despite the greater sensitivity of discharges from SQ19 to the soakaway and the P1 area to the infiltration pond, the assessment determined that hazards posed did not fall into a separate hazard class. Specifics of the routes for potential contamination remain distinct.

4.3 Updated Risk Assessment

As in 2021, risk ratings were derived from the hazard ratings through an assessment with the likelihood of the loss of containment. The annual probability of loss of containment was defined in accordance with table 2.3 of C736: High (greater than 1% (1 in 100)), Medium (between 1% (1 in 100) and 0.001% (1 in 1 million)) and Low (less than 0.001% (1 in 1 million)).

Table 7 presents the findings of the risk assessment and containment classification exercise.

Table 7: Source-pathway-receptor assessment

Zone	Hazard rating	Annual probability of loss of containment	Risk rating *	Rationale
Diesel storage within or supporting the generator sets, associated filling equipment and filling process	M	M	MM – Moderate	• Limited flammability, hazard classification • Integrated secondary containment with alarms • Distance from drainage infrastructure • Level monitoring, alarms, filling procedures and spill response procedures • Interceptors (where installed)
Diesel within tank interconnectors (where installed)	L	L	LL – Low	• Limited flammability, hazard classification • Integrated secondary containment with alarms • Very low volumes held in interconnectors, valves kept closed under normal conditions
Engine oil within generator sets, including during changes	L	L	LL – Low	• Limited flammability, hazard classification • Integrated secondary containment with alarms • Low volumes (approx. 120 litres) per set • Spill response procedures

** risk rating determined in line with box 2.2 of C736*

4.3.1 Containment classification

Based on the risk levels determined, containment classifications determined previously determined in the 2021 remain valid, despite the addition of SQ19 and further generators in the HV Gen area. The classifications applied reflect section 2.6 of C736:

- Diesel storage within the generator sets, the associated filling equipment and filling process: **Containment class 2;**
- Diesel within tank interconnectors[2]**: Containment class 1**; and
- Engine oil within generator sets, including during changes: **Containment class 1**.

As in 2021, despite the separate classes applicable, the generator sets provide local containment across all of the three zones via a common approach.

[2] Please note that interconnectors are not and will not be installed for generator sets in the SQ19 or HV Gen areas.

5. Assessment of Containment Measures for the Revised Areas

5.1 Details of secondary containment systems

Common containment systems for generator sets in the HV Gen and SQ19 areas

The planned generator sets include local secondary containment. This will provide a secondary containment capacity at least 148% of the volume of the primary vessel for units at the HV Gen facility and 138% of the primary vessel for units at SQ19. As with the existing generator sets, secondary containment systems will be integral to each generator set container. The secondary (outer) skin of the tank extends beyond the end of the container and serves the fill point cabinet. As the integral outer tank is weatherproof, rainwater accumulation is avoided.

The fill point cabinet serving the generator sets will be fitted with an O.L.E. electronic level gauge and an alarm. On activation of an alarm sensor, the alarm would sound locally and at the respective operating centre control for the data centre via the facility Energy Monitoring System. the following sensors are connected to the alarm:

- An overfill/high-high sensor;
- Leak sensors within the outer tank and interconnectors;
- Low level sensors; and
- A low-low level sensor, which would activate at 10% of the inner tank nominal capacity, triggering the shutdown of the generator set.

5.2 Loss scenarios

The 2021 report considered two central scenarios for the assessment of containment capacity for diesel storage, which remain reflective the site's risk profile despite the planned expansion:

- Total loss: A significant leak affecting the primary tank, leading to a total loss; and
- Fire: A fire leading to the deployment of firefighting foam into the container but where this did not prevent catastrophic damage to the primary tank and bund, leading to total loss of contents.

As in 2021, the first scenario remains plausible given the following factors:

- Due to the belly tank design, losses outside of the generator set due to a leak (e.g., seal or primary tank failure) are exceedingly unlikely.
- Vehicles may not enter the generator areas without authorisation, reducing the likelihood of collisions.

The second scenario was selected as 'doomsday' scenario, but is considered less likely due to the following factors:

- Fusible links fitted are set to operate at 72ºC, automatically shutting down the generator to prevent a fire arising.
- Trip devices protect electrical systems.
- The generators have a one-hour fire rating and foam pourers are fitted in every enclosure, supporting effective fire response.
- Should foam be applied, this would be expected to only contain limited oil volumes due to the separation of the generator space from the belly tank by the 5mm steel walls of the tank.

5.3 Assessment of secondary containment systems

Section 4 of C736 provides recommendations on containment capacity for hazardous substance storage.

The required containment capacity was calculated in accordance with C736 and is shown in Table 8 against an assessment of actual containment capacity.

The tanks are not ‘hydraulically linked’ as defined by Section 4.2.1 and 4.2.3 of C736. As the generator sets are independent, integrally bunded units with a one-hour fire rating, the required containment capacity was assessed for each set separately.

Table 8: Required containment capacity

Zone(s)	Vessel [1]	Maximum inventory volume (m^3)	Accumulated rainfall allowance (m^3) [2]	Firewater volume (m^3) [3]	Firefighting foam allowance (m^3) [4]	Dynamic effects allowance (m^3) [5]	Total containment requirements (m^3) [6]	Actual secondary containment capacity (m^3)
Diesel storage within the generator sets, the associated equipment; Engine oil within generator sets, including during changes	HV Gen generator sets	Diesel: 34 Engine oil: 0.12	N/A	37.85	N/A	N/A	Total loss: 34.12 Fire: 71.77	50.76
	SQ19 generator sets	Diesel: 37.908 Engine oil: 0.12	N/A	53.53	N/A	N/A	Total loss: 38.028 Fire: 91.56	52.4
	P1 generator sets, Energy Centres 1 & 2	Diesel: 15.5 Engine oil: 0.12	N/A	28.67	N/A	N/A	Total loss: 15.62 Fire: 44.29	25.2
	P1 generator sets, Energy Centre 3	Diesel: 15.5 Engine oil: 0.12	N/A	*28.67*	N/A	N/A	Total loss: 15.62 Fire: 44.29	22.8
	P2 generator sets, Energy Centres 1-3	Diesel: 20.5 Engine oil: 0.12	N/A	49.20	N/A	N/A	Total loss: 20.62 Fire: 69.82	31.8
	P2 generator sets, Energy Centres 4-6	Diesel: 20.5 Engine oil: 0.12	N/A	37.65	N/A	N/A	Total loss: 20.62 Fire: 58.27	31.8
	SQ17 generator sets, Energy Centre 1	Diesel: 3.66 Engine oil: 0.12	N/A	82.13	N/A	N/A	Total loss: 3.78 Fire: 85.91	4.39
	SQ17 generator sets, Energy Centre 2	Diesel: 17 Engine oil: 0.12	N/A	18.52	N/A	N/A	Total loss: 17.12 Fire: 35.64	26.64

Zone(s)	Vessel [1]	Maximum inventory volume (m^3)	Accumulated rainfall allowance (m^3) [2]	Firewater volume (m^3) [3]	Firefighting foam allowance (m^3) [4]	Dynamic effects allowance (m^3) [5]	Total containment requirements (m^3) [6]	Actual secondary containment capacity (m^3)
	SQ17 generator sets, Energy Centre 3	Diesel: 17 Engine oil: 0.12	N/A	48.17	N/A	N/A	Total loss: 17.12 Fire: 65.29	26.64
	Remote tank, serving G1 and G2 at SQ17	Diesel: 18.18	N/A	54.54 [7]	N/A	N/A	Total loss: 18.18 Fire: 72.72	20.0
Generator set interconnectors (where fitted)	Interconnector (maximum length 4.5m)	Diesel: 0.023 [8]	N/A	N/A	N/A	N/A	0.023 [8]	0.921
Interconnectors and pipework for G1 and G2 at SQ17	Interconnector (estimated length of 21m)	Diesel: 1.32 [9]	N/A	N/A	N/A	N/A	1.32	2.2

1 Fuel storage within each generator set is functionally independent of all other generators. Interconnector valves (where present) are closed under all conditions, except in the unlikely event of a generator failure when on load. The generator containers feature internal firefighting equipment plumbed into a dry riser and each set has a one-hour fire rating, reducing the likelihood of fires spreading between the units and the risk of primary and/or secondary containment failures across multiple sets.

2 Not applicable: secondary containment systems are not open to rainwater.

3 Foam pourers installed within generator set. Figures reflect that generator container space would be filled with foam, comprising 40% of the volume of each container (60% occupied by generator itself).

4 Not applicable: included within calculation of firewater volumes, due to stated design of fire response (see 3 above).

5 Not applicable: all containment is provided via integral bunds. Generator sets are enclosed within containers with the tank and bund at the base in belly tank design.

6 Assessed separately with respect to plausible scenarios. As noted in section 5.2.

7 Calculated on basis of the Sandoz Parameter ($3m^3$ per m^3 material stored), as per Box 4.1 of C736.

8 Maximum interconnector volume applied. Volumes reflect filled DN80 pipework. Valves closed at all times, except in the unlikely event of generator failure when on load.

9 Internal diameter of 63mm petrofuse pipe could not be confirmed. Conservative internal diameter of 60mm applied for estimation.

5.3.1 Bund design

Section 6 and 7 of C736 make recommendations on the design of secondary containment systems, setting performance criteria.

Tables 9 presents an assessment of the secondary containment design for existing generator sets and the additional planned HV Gen and SQ19 units against the recommendations of C736. Table 10 replicates the assessment findings from the 2021 report, providing a specific assessment of the remote diesel tank serving G1 and G2 at the SQ17 area.

The planned changes have not affected the conclusions reached in 2021: bund design recommendations under Sections 6 and 7 of C736 were or will be met in most cases. Non-conformances found were primarily due to the integrally bunded design of the tanks, which will not affect the performance of the system with respect to spills or leaks.

Table 9: Bund design assessment: Diesel storage within generator sets and associated equipment (Containment Class 2) (including within the planned SQ19 and HV Gen units)

Recommendation	Conformity
Recommended: Provide not less than 750 mm clearance between primary tank and bund walls for maintenance access.	**Not met:** belly tanks within the generator sets are integrally bunded.
Desirable: System to detect leakage from primary tank in situations where not practicable to provide clearance between base of tank and bund.	**Met:** the bund of every generator set includes/will include a leak detection sensor. These sensors are connected to an alarm system, raising the alarm locally and at the respective operating control centre for the data centre via the Energy Management System.
Desirable: No structure within bund to be closer than its own height to the bund wall.	**Not applicable:** As part they form part of each belly tank, the bunds are integral to the structure of the container.
Recommended: Pumps, valves, couplings, delivery nozzles and other items associated with the operation of a primary container to be located inside the bund or within a separately bunded area.	**Met:** All pumps, valves, filling pipework, fuel polishing equipment and the oil make-up tank are/will be within the bunded area.
Recommended: Penetrations of the bund wall to be avoided.	**Met:** Penetrations below the highest level liquid of the belly tank or bund have been avoided, except for interconnectors (where fitted). Interconnectors are not installed on the existing HV Gen units and will not be installed on units in the SQ19 area. Where installed, interconnectors are/will be integrally bunded as part of a pipe-in-pipe system with separate gate valves at the point of connection to either tank.
Recommended: No provision for rainwater draw-off via a valved outlet in bund wall.	**Met:** The generator sets are of a weatherproof design and do not accumulate stormwater.
Recommended: Take account of possible jetting failure.	**Met:** As the tanks are within a sealed, integral bund jetting is not a risk.

Recommendation	Conformity
Desirable: Take account of surge effects.	**Met:** Surges are not an issue due to the containment system design. The tank and integral outer tank have been pressure tested. The integral outer tank is constructed in 5mm steel with a 6mm base plate. This design will be applied for the planned SQ19 and additional HV Gen units.

Table 10: Bund design assessment: Diesel storage within the remote tank serving G1 and G2 at SQ17 (Containment Class 2)

Recommendation	Conformity
Recommended: Provide not less than 750 mm clearance between primary tank and bund walls for maintenance access.	**Not met:** The tank is integrally bunded
Desirable: System to detect leakage from primary tank in situations where not practicable to provide clearance between base of tank and bund.	**Met:** Level monitoring equipment and accessible secondary containment trays allow identification of leaks.
Desirable: No structure within bund to be closer than its own height to the bund wall.	**Not applicable:** The tank is integrally bunded, surrounding the primary vessel on all sides.
Recommended: Pumps, valves, couplings, delivery nozzles and other items associated with the operation of a primary container to be located inside the bund or within a separately bunded area.	**Met:** All pumps, valves and pipework are within the bund.
Recommended: Penetrations of the bund wall to be avoided.	**Met:** The tank is free of penetrations through the bund wall.
Recommended: No provision for rainwater draw-off via a valved outlet in bund wall.	**Met:** The tank is of a weatherproof design and does not accumulate stormwater.
Recommended: Take account of possible jetting failure.	**Met:** As the tank has a sealed, integral bund so jetting is not a risk.
Desirable: Take account of surge effects.	**Met:** Surges are not an issue due to the containment system design.

5.4 Tertiary containment

5.4.1 'Total loss' scenario

Given the integral bunding of the site's existing and planned primary containment systems, releases from the generator sets would be contained within the respective bunds. This was supported by the findings of the containment capacity assessment, as shown in Table 8.

As concluded in the 2021 report, tertiary containment systems **are not considered justified** to address risks posed by the catastrophic failure of inner diesel storage tanks.

Smaller fugitive leaks are considered unlikely. Leak detection equipment serves the external skin of each belly tank, interconnector and sump within each generator set container. Should any failures arise, these would be rapidly identified through local alarms and remote alarms at the operating control centre for the respective data centre. Losses would also be identified by routine site inspections. Spill response equipment is available at each data centre to respond to releases.

A dedicated fuel transfer procedure is in place. The procedure includes the verification of adequate ullage is available, the availability of spill response equipment and monitoring of the connection, offload and disconnection process.

It is understood that additional spill response equipment will be provided for SQ19 and the extended HV Gen area, reflecting the increased inventory of generator sets and diesel fuel.

5.4.2 Fire scenario

As identified in Table 8, the assessment concluded that secondary containment systems would not be adequate to retain firewater volumes and any lost oils in the event primary and secondary vessels were breached. This conclusion includes the additional planned SQ19 and HV Gen generator sets.

The site's surface water drainage systems, as described in Section, do not satisfy the requirements of C736 to constitute designated 'tertiary containment'. Although existing and planned drainage systems have been designed to handle foreseen stormwater flows, the infrastructure, features and ground conditions are inadequate to provide tertiary containment in the 'fire' scenario:

- Abatement systems such as interceptors (where installed) are inadequately sized to provide adequate tertiary containment capacity;
- Soakaways are employed in the P1, P2 and planned SQ19 areas;
- High rates of infiltration have been identified at the stie previously; and
- The site is within a zone II groundwater protection zone.

The site's major spill and fire water pollution control plan (14025-D-SP, dated 30 November 2021) has been updated to reflect changes since 2018.

As in 2021, **permanent** tertiary containment measures continue to be considered unjustified, due to the same factors as previously:

- The low risk of major fires arising, due to:
  - the very low frequency that generators are operated. Periodic testing is undertaken for short period only and electricity supply disruptions are rare;
  - flashpoint and autoignition temperatures of diesel;
  - 24-hour staffing of the site, with monitoring by competent personnel;
  - fire prevention, detection, alarm and response measures;
  - protective measures on electrical systems;
  - inspection, servicing, maintenance and housekeeping procedures for the generator sets and associated equipment; and
  - limited inventories of flammable materials within the generator container, which is separated from the belly tank except via pipework.
- Fire response measures applied, including:
  - fire response procedures;
  - fusible link protection;
  - one-hour fire rating of the generator sets;
  - application of foam to the generator space, which is separated from fuel storage in the belly tank;
  - the enclosure of the generator within a container is expected to provide an effective method to apply finished foam by retaining the foam applied, suppressing oxygen supplies and enhancing the cooling effect; and

- application of the foam to a container is expected to limit the rate of losses via drainage into the wider area.

- Site restrictions:
  - space constraints;
  - significant, cost-prohibitive modifications that would be required to site infrastructure and drainage across the large installation;
  - lagoons, soakaways, ponds and other structures need to remain effective for stormwater management purposes; and
  - ongoing monitoring and maintenance requirements for any new systems introduced (e.g., stormwater management).

5.4.3 Emergency/Temporary tertiary containment measures

The generator sets and the remote tank serving G1 and G2 at SQ17 are all installed over impermeable hardstanding. Hardstanding would initially receive any lost material, allowing the deployment of spill containment or absorbent measures. It is understood that similar hardstanding will be installed for the extended HV Gen and planned SQ19 areas.

Spill kits have been provided for at least every two generator sets at each location. The kits include clay mats, seal putty, absorbent socks, pillows and mats. Emergency Operating Procedures and a Pollution Control Plan concern the deployment of spill kits by personnel and embedded contractors, reflecting anticipated spill and firewater behaviour on release. Spill kits are checked monthly and replenished if required.

In the event of a generator set fire where it is safe to deploy contingency measures, the one-hour fire rating of the generator sets may enable the deployment of measures to contain or abate the impact of firewater.

SQ19 area: Projected spill behaviours

The design and capacity of the drainage system in the SQ19 area reflects the findings of a flood risk assessment, reflecting peak rainfall intensity for the area.

As noted in Section 5.4.2, the drainage system has not been designed to act as a permanent tertiary containment system. A drainage channel running north west to south east will be present between the north and south banks of generator sets, in turn received by 150mm drainage pipework leading to the Klargester NSP8003 Class 1 bypass oil separator and ultimately the soakaway to the south of both banks of generator sets.

Under the ‘fire’ scenario used in Table 8, a secondary containment shortfall of 39.16 m^3 was identified. Should this scenario arise, the excess volume is anticipated to be lost to hardstanding and flow to the surface water drains. Without intervention, e.g. closure or blocking of the separator outfall, it is anticipated that lost liquids would be received by the soakaway and require remediation.

6. Conclusion

6.1 Assessment Findings

The characterisation the site's inventory of diesel and oils, storage equipment and site conditions led to the identification of two central loss scenarios, which were examined against containment capacity requirements under C736. These scenarios were 'total loss' and 'fire':

- Total loss: A significant leak affecting the primary tank, leading to a total loss of its content; and
- Fire: A fire leading to the deployment of firefighting foam into the container but where this did not prevent catastrophic damage to the primary tank and bund, leading to total loss of contents.

Bunds in place and planned for installation as part of the SQ19 and extended HV Gen areas were considered adequate to eliminate the risk of secondary containment failures or overflow under the 'total loss' scenario. Tertiary containment measures were not considered justified for this scenario.

For the fire scenario, the updated assessment concludes that secondary containment systems serving all existing and planned generator sets do not have an adequate capacity to retain foreseen firewater volumes and any lost oils, should primary containment be breached. However, as in 2021 and as stated in Section 5.4.2, **permanent tertiary containment systems are not considered justified**: fire incidents continue to be considered low risk and the site maintains a range of fire response measures and site restrictions.

6.2 Recommendations

Table 11 presents an of recommendations to address the findings of the updated, 2023 assessment. This table has also been updated to record the status of the actions raised in the 2021 assessment.

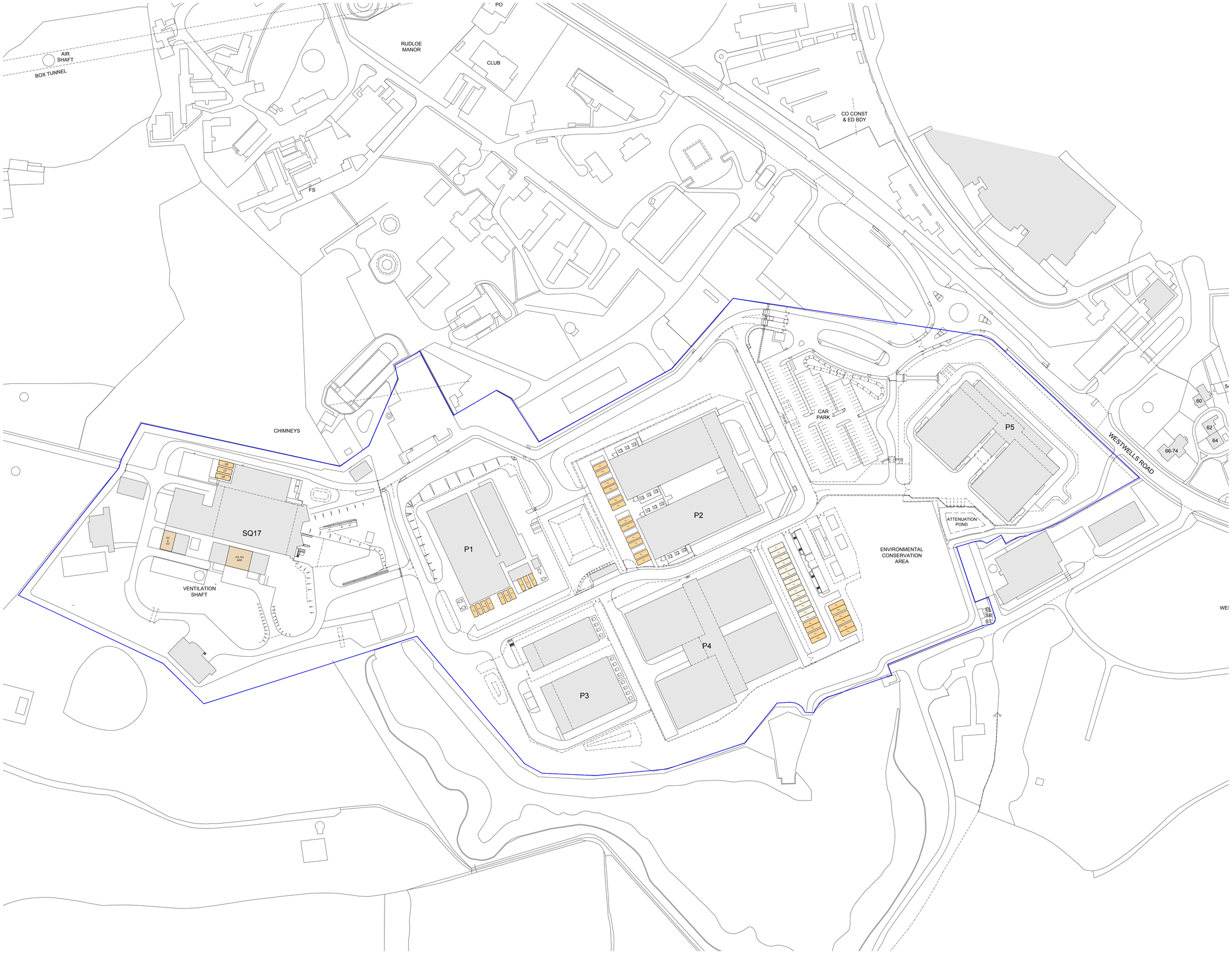
Table 11: Recommendations for tertiary containment improvements

Item	Recommendation	Proposed Timescale / Completion Date
Actions from the 2023 assessment		
1	Review likely spill behaviours in the SQ19 area, expanding on the information in Section 5.4.3 and reflecting projected volumes that may be lost under the 'fire' scenario in Table 8. This review should consider factors including: • The topography of the area; • The location of drains under the final design; and • Any barriers to flow, such as kerbs or inclines. Spill behaviour may be formally modelled as part of this assessment.	30 June 2023
2	Based on the outcome of item 1, determine the merits of installing an outfall closure valve on the planned interceptor at SQ19. If a closure valve would not result in an overall reduction of pollution potential, this measure may be discounted.	31 July 2023

Item	Recommendation	Proposed Timescale / Completion Date
3	Update the site's Emergency Operating Procedures, Pollution Control Plans and associated plan drawings to reflect the extended generator inventory. Communicate these changes to the workforce and arrange further information, instruction, and training as necessary to ensure response measures can be deployed correctly.	Prior to fuelling the generators for commissioning
4	Acquire and deploy additional spill kits and containment equipment to reflect the extended generator inventory and addition of the SQ19 area.	Prior to fuelling the generators before the start of generator commissioning
5	Update inspection and check routines to capture the planned generator sets, additional equipment and spill and emergency response measures.	Prior to fuelling the generators before the start of generator commissioning
Status of actions from the 2021 assessment		
2021-1	Further investigate likely spill behaviours in each area. This should consider factors including: • topography of each location; • drain locations; and • existing barriers to flow (e.g., kerbing). Consider formally modelling spill behaviours.	Completed 14 July 2021 via follow-up to Environment Agency site inspection
2021-2	Confirm firefighting foam specifications and volumes with the Fire and Rescue service.	
2021-3	Prepare contingency plans for the management of firewater based on the above two points. This should identify: • when it is and is not safe to install emergency containment; • necessary equipment to contain or abate firewater losses should a generator fire arise; • a process to collect and dispose of contained firewater; and • responsibilities for delivery of the procedure and supporting competencies.	
2021-4	Acquire any additional containment and spill response equipment necessary to deliver the plan developed under step 3.	
2021-5	Review competency with respect to the developed contingency plan(s). Arrange further information, instruction or training as necessary to deploy the plan effectively.	
2021-6	Review alternative fire suppression systems to foam (e.g., gas-based), as this may allow the removal of firewater risks in the long-term	N/A – dismissed by client at time of 2021 report

APPENDICES

A. 2019 Generator Masterplan



DISCLAIMER:

NOTES:

BACKGROUND SURVEY INFORMATION SHOWN IS COMBINATION OF VARIOUS PAST TOPOGRAPHICAL SURVEYS.

OWNERSHIP BOUNDARY LINE

Rev:	Notes:	Date:	Dwn:	Iss:
00	Planning Issue	25.10.19	SK	MM

SCALE
0 25M 50M

N

Client:

ARK DATA CENTRES

hale
ARCHITECTURE
22c Leathermarket Street, London, SE1 3HP

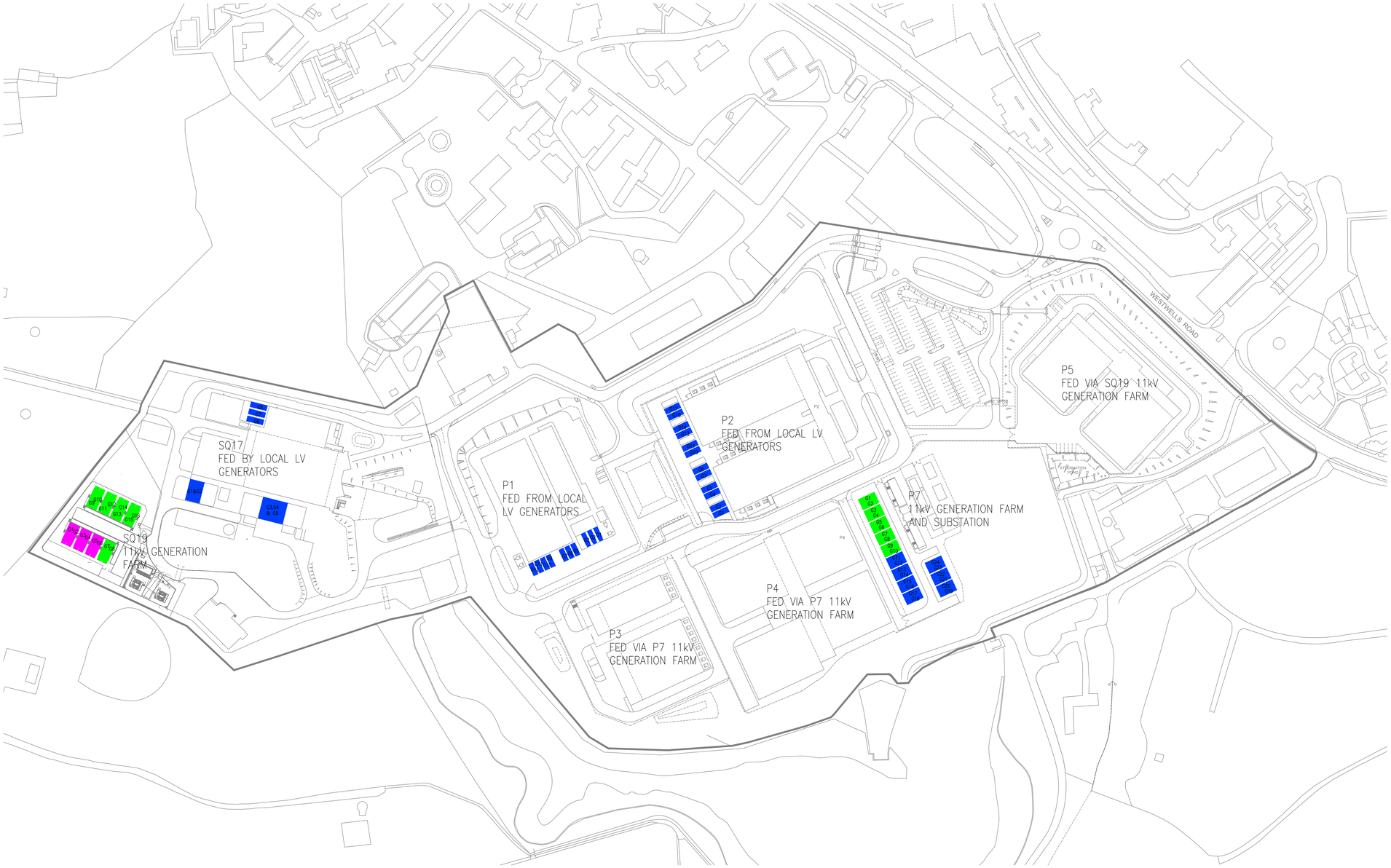
Project:
P5 Spring Park
Corsham

Drawing Title:
Proposed
Masterplan

Project No:	Scale @ A1 / A3
19072	1:1250 / 1:2500

Drawing No:	Revision:
PL-1002	00

B. 2023 Generator Masterplan



LEGEND:
- EXISTING GENERATORS
- SQ19 DAY 1 GENERATORS TO BE COMPLETED Q4 2023
- FUTURE PROVISION FOR GENERATORS

N

P01 FOR INFORMATION

Rev	Drawn By	Date	Chkd By	Date	Apprvd By	Date
	LC	23/02/23	PJL	23/02/23	PJL	23/02/23

Revisions

Approval Status
- A - Approved
- B - Approved with Comments
- C - Do Not Use

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Engineering Projects | Service & Maintenance
Interior Fit Out | Design & Consultancy

Client
ARK DATA CENTRES

Project
SPRING PARK
CORSHAM

Drawing Title
SITE PLAN
GENERATOR LOCATION
MASTERPLAN

Status S1 Purpose FOR INFORMATION

Scale 1:1000 @A0 Proj.No. OPP08375

Drawing No. Revision
OPP08375-JCA-PM-ZZ-DR-E-61001 P01

FILE NAME: X:\OPP08375 - ARK SQ19 STAGE 4\Drawings\A3\08375-JCA-PM-ZZ-DR-E-61001- GENERATOR MASTERPLAN.dwg

Our vision

"Engineering a better environment for people and the planet"

Our mission

"To solve complex problems for the benefit of clients, communities and the climate"

Our values

People orientated

Individually and collectively, people are our business.
We strive to create environments for everyone to flourish and thrive.

Flexible

Pragmatic by nature and dedicated to getting the job done to the highest possible standard.

Professional

Operating at pace with integrity to deliver technical and robust solutions.

Environmentally aware

We understand our responsibility to the environment, it shapes our decision making and informs our practice.

Innovative

Our forensic questioning provides the ability to deliver appropriate innovations at every stage on every project.

Relationship focused

We value individuality and the benefits of working collaboratively to achieve positive outcomes for all.