Monk Lake No 2

RESERVOIRS ACT 1975

CERTIFICATE OF EFFICIENT EXECUTION OF WORKS UNDER SECTION 7(6)

I, Andrew Sheerman-Chase of Hydroplan Ltd, Riverside Park, Station Road, Windborne, Dorset, BH21 1QU being a member of the All Reservoirs Panel of Engineers appointed by Taytime Limited to be responsible for construction of a large raised reservoir known as Monk Lake No 2 situated at Staplehurst Road, Marden, Kent, TN12 9BU (National Grid Reference TQ768476) which was completed on 26th June 2018 certify that as far as I am able to ascertain (see note 1) those works have been efficiently executed in accordance with the drawings and descriptions attached to this certificate.

Signature of Engineer

Date of Certificate 3rd September 2024

Note 1 In preparing this certificate I have been reliant on information from previous construction engineers as detailed in the following document.

Previous Construction Engineers under Act

Engineer	Appointed	
	from	to
Stewart Cale	April 2008	Unknown
Nick Reilly	Unknown	2017
Geoff Wilson	2017	January 2024
Andrew Sheerman-Chase	January 2024	Current

Details of Lake

The original scheme for the three lakes was developed by Montano Land Surveyors and a more recent survey layout has been provided by Next Phase Ltd in 2019.

Details of the reservoir given in the table below.

Storage Volume	47,000 m^3
Surface Area	30,768 m^2
Embankment Height	4.50 m
Lake Floor Level	20.00 mOD
Embankment Crest Level	22.00 mOD
Category	Non-impounding

Table 1 Details of Lake

The reservoirs are filled by water pumped from the River Beult. The lakes are situated within the River Terrace gravels but are lined with Weald clay

Planning permission for the lakes was obtained in 2003 for the previous owner Mr Hughes. It is understood that works commenced in 2005. In March 2008 it was reported the ownership was transferred to Guy Harrison of Taytime Ltd

Works were halted prior to completion on the 30th April 2008 but recommenced early 2013. A Preliminary Certificate was issued on 26th June 2018 to allow filling to a level of 21.60 mOD

As part of the conditions on issuing the preliminary certificate it was required the survey was carried out. The survey found that there was insufficient freeboard and it was recommended by the then construction engineer Geoff Wilson, that the overflow was lowered by 150 mm. This was carried out in August 2024.

ANNEXURES TO CERTIFICATE

	Date	Description	Prepared by
Annex 1	5th Dec 2007	Inspection Report	Stewart Cale
Annex 2	10th June 2009	Proof of Evidence	Stewart Cale
Annex 3	26th June 2018	Preliminary Certificate	Geoff Wilson
Annex 4	27th Sept 2019	Proposed Site Layout	Next Phase Ltd
Annex 5	11th June 2022	Limited Topographical Survey	J C White Geometrics Ltd
Annex 6	28th Sept 2022	Letter re Project Status	Geoff Wilson
Annex 7	3rd Sept 2024	Report by Construction Engineer	Andrew Sheerman-Chase

Annex 1 Inspection Report Stewart Cale 5th of December 2007

Monk Lakes Limited

Report on the Inspection of Monk Lakes (Lake 2) Reservoir Under the Reservoirs Act 1975

Scott Wilson
Kanthack House
Station Road
Ashford, Kent
TN23 1PP. United Kingdom
Telephone: +44 1233 658200
Fax: +44 1233 658299
Email: stewart.cale@scottwilson.com

November 2007
D118024\R17858\SAC

Reservoirs Act 1975

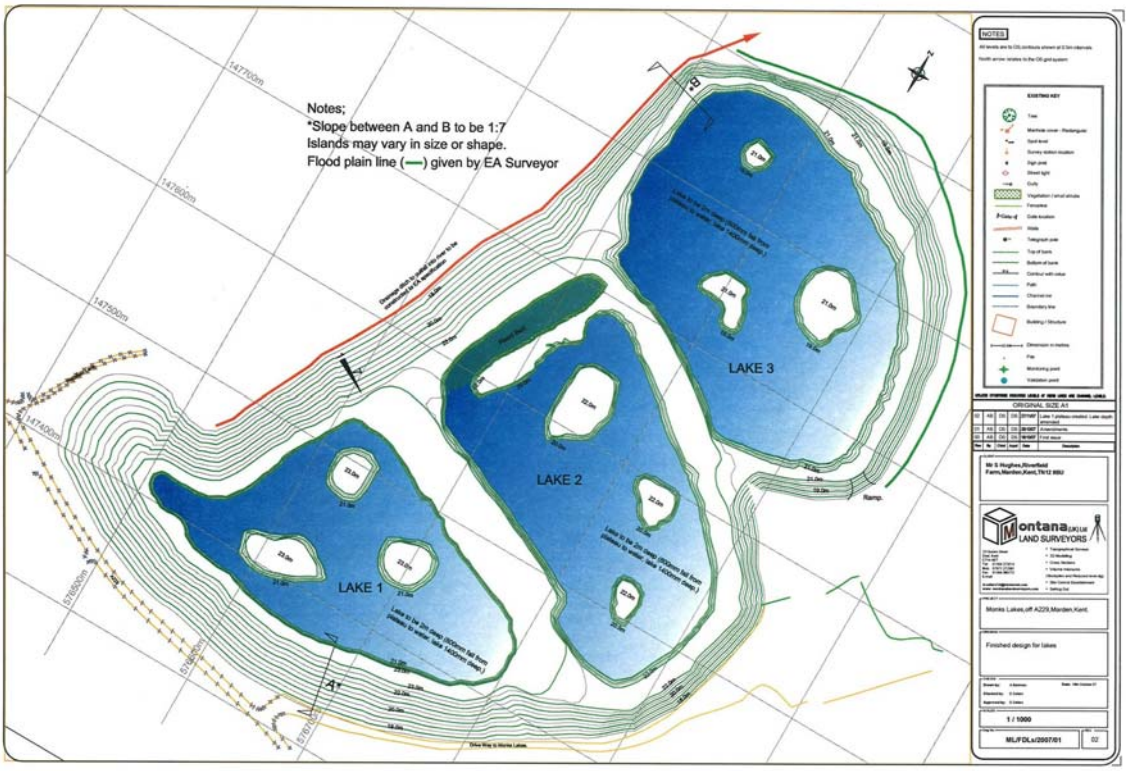
Record of Construction Engineer's Visit Under Section 6(5)

1.	Name and situation of reservoir	Monk Lake 2 Riverfield Farm Marden Kent. TN12 9BU OS Grid Reference: TQ768476 The reservoir is to the east of the A229 road about 4 km north-north-east of Staplehurst.
2.	Construction Engineer	Stewart A. Cale c/o Scott Wilson Ltd Kanthack House Station Road Ashford Kent TN23 1PP Tel: 01233 658200 Fax: 01233 658299 Mobile: 07759 399100 Email: stewart.cale@scottwilson.com
3.	Panel of which Supervising Engineer is a Member	All Reservoirs Panel
4.	Expiry Date of Panel Membership	10th October 2010
5.	Name and Address of Undertaker	Mr Simon Hughes Monk Lakes Limited Riverfield Farm Marden Kent. TN12 9BU Tel: 01622 833332 or: 01580 891474 Fax: 01580 891201 Mobile: 07926 380148 Email: hughess@btconnect.com
6.	Name and Address of Enforcement Authority	Environment Agency Reservoir Safety - Surveillance Manley House, Kestrel Way Exeter, Devon EX2 7LQ
7.	Date of Inspection	Wednesday 7 November 2007, late morning.
8.	Current Inspection Report Dated	None.
9.	Dam Category (ICE method)	Category B (assumed, non-impounding).

10. Site Description

Monk Lakes are situated at Hertsfield Farm, to the east of the A229, about 4 km NNE of Staplehurst, as shown below.

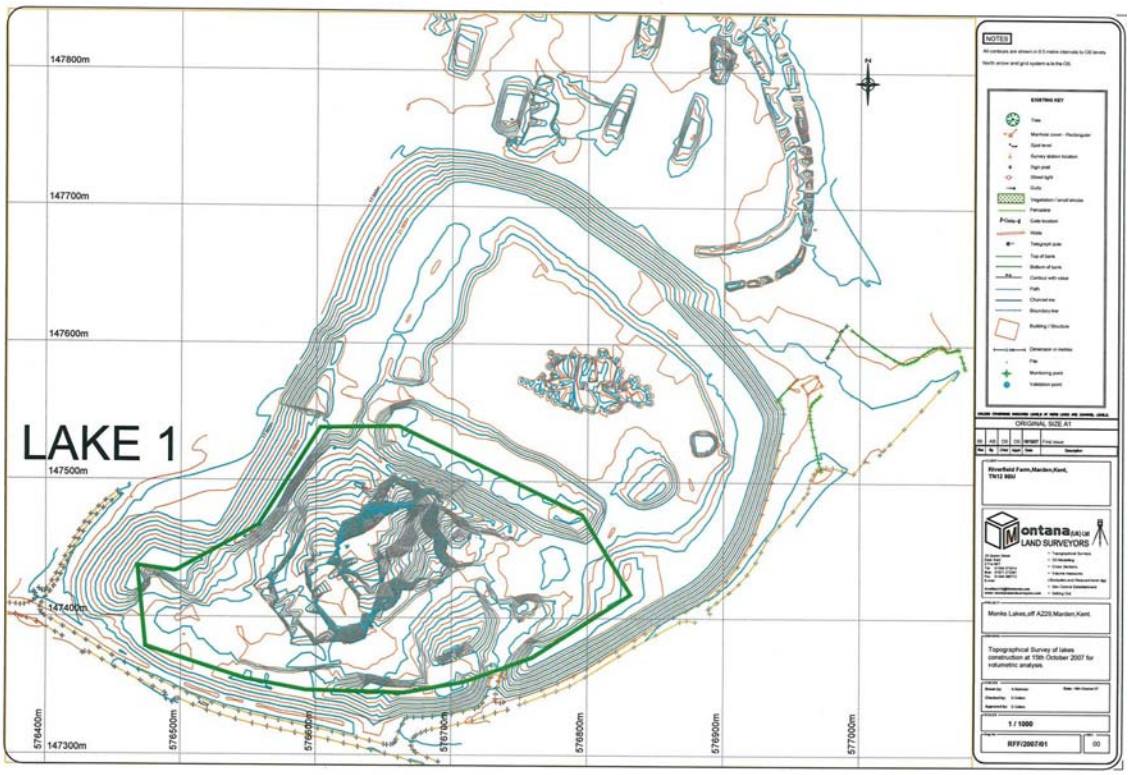
The proposed reservoir is non-impounding and will be used as a fishing lake. It is situated entirely within the farm boundaries. The reservoir currently being constructed is Lake 2 of three lakes eventually proposed on the site, as shown in the figure below.



The inspection was carried out in late morning. The weather was overcast and cool, with a little light wind. There had been very little rain in the period prior to the inspection. The inspection was the first by the Construction Engineer.

Construction of the embankment for Lake 2 is understood to have commenced in 2005.

The figure below is a recent detailed survey of the proposed reservoir and the surrounding area.



The route taken for the inspection was to commence at the eastern corner of Lake 2 near the shop and then walk anti-clockwise along the north and west embankment alignments. From the western edge the route taken was along the south, to the north of the excavations being undertaken to extract clay, where Lake 1 will be sited. The centre of the reservoir was also inspected.

The existing embankments for Lake 2 were formed from earthfill excavated from the fishing lakes known as Monk Lakes which are situated to the east of the new lakes. The existing lakes are generally excavated into natural ground and do not, therefore, come within the ambit of the Reservoirs Act.

The embankment which will eventually form Lake 2 is approximately rectangular in shape with the main axis orientated north-west/south-east. The embankment is virtually complete, except on the south-west side where there are two vehicle access points through what will be the embankment. The crest also will be raised by about 0.5 m.

The embankments have been constructed to a current crest elevation of +21.50 m AOD and a crest width of between 15 m and 20 m between the south and north corners (anticlockwise). It is proposed to raise the embankment crest to +22 m AOD in due course. This work will reduce the eventual crest width to about 13 m-18 m.

The crest is currently 20 m wide in the north-west but a subsidiary embankment has been created within the basin, creating a wetland area shown on Figure 1, so that anglers will not be visible from the residences to the north-west. The crest will provide access for anglers' and, in addition, platforms will be created using earthfill, typically 10-20 m wide, into the reservoir for use by anglers.

The external slopes of the embankment vary from 1V:3.5H in the east, to 1V:4.2H in the north and 1V:7.4H in the west. The external slope near the houses will eventually be 1V:8H. The south-west and south have yet to be completed but will be about 1V:3.5H, as in the east. All these slopes are appropriate for the earthfill material used and proposed to be used in construction.

The geology of the site is characterised by Weald Clay, which is shown on Sheet 288 of the Geological Survey Map to be over 100 m thick at this location. There are some River Terrace gravels shown in the northern part of the site which are associated with the River Beult, which is approximately 500 m to the north/north-east, and flows westwards. The gravels will be of variable thickness but generally of shallow depth. Water for the reservoir will be pumped from the River Beult. The reservoir basin will be lined with the best clay available from the nearby excavations.

Along the north-west toe of the current and final embankments a drainage ditch will be constructed which will take any rainfall runoff from the embankment slopes and discharge it to the north, where it will flow to the River Beult. The ditch will prevent water from the site being discharged onto the nearby properties off Hertsfield Lane. The ditch presents no danger to the embankment or properties.

11. Observations

As noted above, the inspection was commenced at the eastern corner. The embankment at this point was constructed some time ago and has consolidated and been vegetated, as shown in the two photos below.

Eastern corner at the parking area looking south-westwards

Eastern corner from the parking area looking north-westwards

All the embankments were tested with a hand-driven spike and found to be competent. The crest was very well compacted and the slopes less so, as would be expected. The material encountered during the probing was generally clayey, but some sand and gravel was evident in places. All the external slopes were noted to be stable.

The crest is in good condition and is generally level, as seen in the two photographs below.

Crest near eastern corner looking south-westwards

Crest near eastern corner looking north-westwards

There is an access ramp to the crest approximately 100 m from the eastern corner, as shown below. It is assumed that this ramp will be retained when the three lakes are completed.

Access ramp

The reservoir basin has been largely completed as shown in the panorama below. Note the islands and the generally flat base of the reservoir.

Reservoir basin

In the above photo it should be noted that the clay on the floor of the basin is a little desiccated, due to a period of dry weather, and there is an outlet pipe visible in the centre of the photo. Nearby houses are also visible.

Close-up of outlet pipe

It is proposed that the water level is controlled by an outlet pipe shown above. Care will be needed to prevent blockage of the pipe, especially as reeds will be encouraged within parts of the reservoir. It is unclear why the pipe is at an angle, or where it exits. It is recommended that when the embankment is raised a short section, about 5 m wide, should be left200 mm below the crest elevation to permit water to flow from Lake 1 → Lake 2 → Lake 3 in the event of overpumping and blockage of the outlet. Water would eventually be discharged from Lake 3 safely towards the River Beult.

The external slope near the northern corner was noted to be in good condition, as shown below. It will eventually form the embankment between Lakes 2 and 3.

External slope at northern corner from embankment crest

External slope at northern corner from embankment toe

The area near the north-west wide has been constructed with a subsidiary embankment, as mentioned above and shown on the plan, Figure 1.

There was a small amount of water in this proposed wetland area, in a low spot, at the time of the inspection, as seen in the photo below.

Internal floor of reservoir basin in the wetland area

The above photo also shows earthfill material within the basin which will be reprofiled to form an island.

The external slope on the north-western side is close to existing housing and has been placed at a shallow slope, 1V:8H, to improve visual impact. Both the slope and crest have yet to be completed or vegetated, see photos below.

North-western slope and crest. Note houses close by

Clay material is currently being excavated from an area to the south-west of the proposed Lake 2, as noted below.

Clay quarry

Once excavation is complete it is planned that a further reservoir will be constructed in this area, Lake 1.

The south-eastern embankment is in good condition and has been planted to soften its visual appearance from the A229 and access track. The tree planting is approved due to the size of the embankment at this point.

South-east embankment alongside access track

The access track to the parking area runs between the proposed new reservoir and a small existing reservoir to the south-east. This small reservoir has been built with a steeper slope than the proposed reservoir.

Slope failure has clearly occurred and has been exacerbated by a blocked/broken outlet pipe. This illustrates the dangers of oversteepened side-slopes when Weald Clay is used as a construction material, see photo below:

Slope failure on nearby reservoir embankment

Although not part of this report it is recommended that the pipe is repaired and the slope is repaired and flattened, possibly by a buttress.

12. Comments

The work carried out to date has been undertaken well and there are no signs of problems, except as noted directly above on previous work. It will be necessary to complete the embankment at the two vehicle access points in the south-west which provide an entry point to the basin for vehicles. Care will need to be taken to ensure that the sections of earthfill are joined properly. There is some work still to be done within the reservoir and final profiling of some external faces.

The floor of Lake 2 has been constructed to +20 m AOD approx. and it is proposed that the embankment will be +22 m AOD.

For a reservoir of this nature a wave freeboard of 0.4 m would be appropriate in view of the extensive bank protection proposed, so a TWL of 21.6 m AOD is suggested. This should be the elevation of the outlet pipe when its construction is finalised. This will mean a water depth of 1.6 m. If this water depth is adopted the reservoir will have a capacity of about 47,000 m^3, all of which will be included within the Reservoirs Act capacity calculations. The spill section between Lakes 2 and 3 should be set at +21.8 m AOD.

It is suggested that vegetation is established as soon as possible on completed sections of the embankment which will be left exposed.

Special care should be taken to install a suitable screen around the outlet pipe to prevent blockage. The screen should not be easily accessible and be robust in order to hinder vandals.

The works at the site are ongoing and the next Construction Engineer's visit should coincide with virtual completion of the reservoir, which is understood to be about mid-2008. The Undertaker should contact the Construction Engineer when construction recommences and should report construction progress to ensure inspection dates are agreed. At that time it should be possible to issue a Preliminary Certificate to permit filling.

Stewart Cale

Construction Engineer Date: 5th December 2007

Annex 2 Proof of Evidence Stewart Cale 10th June 2009

Proof of Evidence

Monk Lakes, Marden

On instructions of:	Mrs E Harrison
Document prepared by:	Stewart Cale BSc(Eng), CEng, FICE
Date:	10 June 2009
Version:	Rev. 1

Scott Wilson Ltd
International House
Dover Place
Ashford
Kent TN23 1HU
Tel: 01233 658200

Proof of Evidence

1. Introduction

This document provides the proof of evidence of me, Mr. Stewart Alexander Cale, of Scott Wilson Ltd., 10th Floor, International House, Dover Place, Ashford, Kent TN23 1HU. My proof is for the Public Inquiry on 7 July 2009 relating to the appeal against the Enforcement Notice issued by Maidstone Borough Council in respect of Monk Lakes fishery.

I have been requested to consider a number of aspects in relation to this matter, which I have set out below

2. Qualifications and Experience

I am a Chartered Civil Engineer and I have practised internationally as a Consulting Civil Engineer, particularly in the fields of geotechnics, dams, reservoirs and water management, for over 40 years. I am a member of the British Dam Society. In relation to the issue before me I confirm that I have been appointed by the Secretary of State to the All Reservoirs Panel under the Reservoirs Act 1975 and that I am experienced, *inter alia*, in the construction of reservoirs under the Act as Construction Engineer. My CV is included as Appendix 1.

3. My History of Involvement with Monk Lakes/Riverfield Fish Farm

I was requested by Mr Simon Hughes, the previous owner of Monk Lakes, to act in the capacity of Construction Engineer, as defined in the Reservoirs Act 1975, for Lake 2 reservoir at Monk Lakes. I was appointed in October 2007 to oversee the technical and certification issues as set out in the Reservoirs Act. It was necessary to appointment a Construction Engineer as the proposed capacity of the lake(s) meant that the lake(s) came within the ambit of the Reservoirs Act, i.e. a storage capacity greater than 25,000 m^3. I undertook an initial inspection of the site on 7 November 2007 and compiled a report on that inspection which I have attached to this Proof of Evidence as Appendix 2.

Following the preparation of my report, and subsequent approval by Mr Hughes, I submitted my report to the Environment Agency, Reservoirs' Safety Unit, Exeter, as required, in December 2007.

In January 2008 I was in telephone discussion with Mr Jason Dawkins, of Riverfield Farm and Mr Hughes, subsequent to which I wrote a letter, submitted in Appendix 3, to Mr Dawkins.

In March 2008 I was made aware that ownership of Monk Lakes had changed from Mr Hughes to Mr Guy Harrison. I was in communication with the Environment Agency regarding this change of ownership and in late April 2008 Mrs Emily Harrison informed the Environment Agency that my services would be retained as Construction Engineer.

I visited the site briefly again on 30 May 2008 at which time I was advised of difficulties which were occurring with the planning process. I had a series of technical discussions and consultations with Mr and Mrs Harrison in relation to the Reservoirs Act and I sent an explanatory email, dated 10 August 2008, to Mr Harrison. The email is attached as Appendix 4.

I have subsequently had a number of telephone discussions with Mrs Harrison regarding the reservoirs.

4. Correspondence

I have listed the principal correspondence of relevance above and included copies in the Appendices, to which reference should be made.

5. Slope Sketch/Calculations

I have been provided with a sketch showing that a proposed slope of 1V:8H will be used for the embankment slope in the vicinity of the dwellings along Hertsfield Lane. This aspect is discussed in my letter of 28 January 2008, annexed as Appendix 3. The slope angle is approximately 7 degrees to the horizontal and, based on my examination of the construction materials used on site, I would expect a slope constructed with the material that I have observed on site to be stable.

From the sketches provided to me the precise juxtaposition of the embankment adjacent to the cottages along Hertsfield Lane is requires additional clarification.

6. Ditch Work

The original 2003 drawing provided to me shows a ditch parallel to Hertsfield Lane, but the location of the ditch as shown was impractical. This aspect was identified by others and it was subsequently proposed that a drain and bund should be provided at the toe of the embankment. I dealt with this matter in a letter to Mr Dawkins, see Appendix 3. It is normal reservoir engineering practice to provide a drain or ditch along the toe of the embankment to collect and discharge rainfall run-off from the embankment slope. The detailed design of the embankment can be easily adjusted to incorporate this minor feature.

7. Stability of the Banks

The external slopes of the embankments have been constructed, or shown to be constructed in the 2003 drawing, at relatively conservative slopes of either 1V:8H to the west and south, as discussed above, or 1V:4H for the remaining slopes to the south and east. The material used for construction appears to be suitable to ensure long term stability at either of these slopes. I observed no signs of distress, settlement or movement when I examined the embankments in November 2007. However, at that time the reservoirs had not been brought into service.

8. Review of the Original 2003 Planning Permission

The original drawing, submitted as part of the planning application in 2003, showed the proposed arrangement of the lakes. The drawing has been made available to me and I have referred in particular to the above-ground (raised) lakes. The currently constructed outline of the lakes is very similar to the originally proposed layout. A revised internal arrangement has been proposed within the reservoirs, as shown on the Montana Surveys' drawings referenced below. As far as the Reservoirs Act is concerned the internal arrangement of the lakes is inconsequential as the external embankment is the primary concern. I understand that the above-ground lakes are largely outside the 2003 floodplain and have been raised to prevent the loss of specimen fish in the event of a flood. The construction arrangement of the lakes is typical of that employed for non-impounding reservoirs. The lakes have been constructed using a clay lining, which again is a typical construction technique which, if Weald Clay is used, requires fairly shallow slopes, which appear to have been provided in this case.

It is my understanding that the proposed water depth within the reservoirs should be fairly constant and in the region of 1.4 – 1.5 metres. The specification was for the top of the banks

to be 2.0 metres above the reservoir base. This provides sufficient freeboard for wave run-up and rainfall storage. This arrangement complies with the Reservoirs Act.

Fill for the embankments would often be obtained from within the reservoir footprint, but in this instance the water depth would be too great and additional fill would probably be required to be imported to infill to the required levels.

9. Practical Flexibility Due to the Engineering Complexity

The design of the reservoir(s) has tended to be developed as the project proceeds, whilst complying broadly with the original scheme concept. Whilst not ideal, this style of project implementation is not unusual, but requires a degree of constant attention to detail and interaction between the parties.

10. Floodplain

I have provided comments on the floodplain issue in Appendix 4, to which reference should be made

11. Soil Quantities

I have received no details or calculations relating to the quantities of material available on site. In order to comment on this matter I or another party would have to carry out some engineering calculations.

12. Quality of the work thus far

The quality of earthworks carried out on site that I observed, particularly during my 2007 visit, were noted to be of a good standard. See my November 2007 report for additional details.

13. References

I have been provided with the following document to assist me in the preparation of this Proof of Evidence:-

8 No. Survey drawings dated August 2008.

Report by Mr Dawes

Finished Design for Lakes – Montana Surveys (UK) – 10 October 2007 Rev 2

Finished Design for Lakes – Montana Surveys – 30 May 2008 Rev 4

Final copy to be signed

…….

Stewart Cale BSc(Eng), CEng, FICE
Consulting Civil Engineer
All Reservoirs Engineer
10 June 2009

- Appendix 1 – Stewart Cale – CV
- Appendix 2 – Construction Engineer’s Inspection Report
- Appendix 3 – Letter to Mr Dawkins
- Appendix 4 – Email to Mr Harrison

Appendix 1 – Stewart Cale - CV

CURRICULUM VITAE

Stewart Cale

Reservoirs Engineer

POSITION
Director

DATE of BIRTH
20 November 1943

NATIONALITY
British

LANGUAGES
English (mother tongue)
French (fair)
German (basic)

QUALIFICATIONS
B.Sc.(Eng) University of London
Chartered Engineer
Fellow Institution of Civil Engineers
Member All Reservoirs Panel under the UK Reservoirs Act (1975)
Member of ICOLD Sub-Committee on Tailings Dams
Member, British Dam Society
Member, British Geotechnical Society

KEY SKILLS
Dam and Geotechnical Engineering
Water Resources Planning
Tailings and Mining Waste Disposal Schemes
Project Management
Economic Analyses
Asset Valuation

Synopsis

Stewart Cale has 40 years broad international experience in the management of a wide range of engineering projects involving multi-disciplinary teams. In particular he has been responsible for water resources development involving earthfill, rockfill and concrete dam construction for irrigation, water supply, flood control and hydro-electric power projects.

He has also been responsible for the design and implementation of many hydraulic fill tailings dams and waste disposal schemes for the mining industry worldwide. Concurrent with this work he has been engaged in the development of Ground Solutions Group, a Scott Wilson associated company, which offers ground investigation, geotechnical testing and survey services in the UK.

Reservoir Inspections, construction and advisory services carried out under the UK Reservoirs Act 1975

- Ringwood & Wingerworth, Derbyshire
- Brook Farm & Culnells, Kent
- Pitt Dene & Abbots Ripton, Cambs.
- North & South Lakes, Norfolk
- Ashburnham Lakes, Sussex
- Knight's Farm & Methwold, Suffolk
- Powers Hall & Dammerwick, Essex
- Galston, East Ayrshire
- Surrenden Lakes & Weirton, Kent
- Courtauld & Cherry Orchard, Essex
- Cornwood, Devon
- Cornbury Park, Oxfordshire
- Bayham Lake, Kent/East Sussex
- Wang River & River Hen, Suffolk
- Sheffield Park & Bodiam Castle, East Sussex
- Sheerland Farm & Morghew, Kent
- Headcorn Flowers Reservoir, Kent
- Old Alresford & Southwick Park, Hampshire
- Carter's Bridge Reservoir, Cambs.
- Boughton Church & Pembury, Kent
- Spring Farm & Feeringbury, Essex
- Knight's Farm Dam, Suffolk
- Toyota Wet & Dry Reservoirs, Derbyshire
- Dartridge & Church Reservoirs, Essex

Reservoir Inspections (continued)

Worldwide Reservoir/dam Expertise

Involved worldwide in various aspects of the conception, planning, design, construction, specialist services and operation of the following projects:

- Akosombo & Barikese Dams, Ghana
- Musi & Muntimpa Valley Dams, Zambia
- Mindola West Basin, Zambia
- Tagaloan, Philippines
- Rosia Montana, Romania
- Wheal Jane, UK
- Kalengile, Zaire (DRC)
- Kansanshi & Lubengele Dams, Zambia
- Cabacal Dam, Brazil
- Varvarinskoye, Kazakhstan
- Morupule Ash Dams, Botswana
- Paracatu Tailings Dam, Brazil
- ERGO & Mvumase, South Africa
- EdP, Portugal (40+ dams)
- Kariba Dam, Zambia/Zimbabwe
- El Valle & Aguablanca, Spain
- Hwange & Freda Rebecca, Zimbabwe
- Mkombane & Fairview, Swaziland
- Salsigne, France
- Tara, Ireland
- Baadheere, Somalia
- Pirdop, Bulgaria
- Corpus Christi, Argentina/Paraguay
- Liwonde, Tedzani, Nkula & Kapichira, Malawi
- Batoka, Zambia/Zimbabwe
- Tanesco, Tanzania (7 dams)
- Hayl as Safil, Oman
- Mudi & Hynde Dams, Malawi
- Letseng la Terra, Lesotho
- Pakrut, Tajikistan

Specialist Geotechnical Services

Provision of expert advice in respect of geotechnical issues re:

- Mining Subsidence
- Slope Failure
- Dam Failure
- Open Pit Stability
- Landfill
- Ground and Materials Investigations
- Geotechnical Testing
- Seepage

Appendix 2 – Construction Engineer's Inspection Report

November 2007

Monk Lakes Limited

Report on the Inspection of Monk Lakes (Lake 2) Reservoir Under the Reservoirs Act 1975

Scott Wilson
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Telephone: +44 1233 658200
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Email: stewart.cale@scottwilson.com

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Reservoirs Act 1975

Record of Construction Engineer's Visit Under Section 6(5)

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3.	Panel of which Supervising Engineer is a Member	All Reservoirs Panel
4.	Expiry Date of Panel Membership	10th October 2010
5.	Name and Address of Undertaker	Mr Simon Hughes Monk Lakes Limited Riverfield Farm Marden Kent. TN12 9BU Tel: 01622 833332 or: 01580 891474 Fax: 01580 891201 Mobile: 07926 380148 Email: hughess@btconnect.com
6.	Name and Address of Enforcement Authority	Environment Agency Reservoir Safety - Surveillance Manley House, Kestrel Way Exeter, Devon EX2 7LQ
7.	Date of Inspection	Wednesday 7 November 2007, late morning.
8.	Current Inspection Report Dated	None.
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10. Site Description

Monk Lakes are situated at Hertsfield Farm, to the east of the A229, about 4 km NNE of Staplehurst, as shown below.

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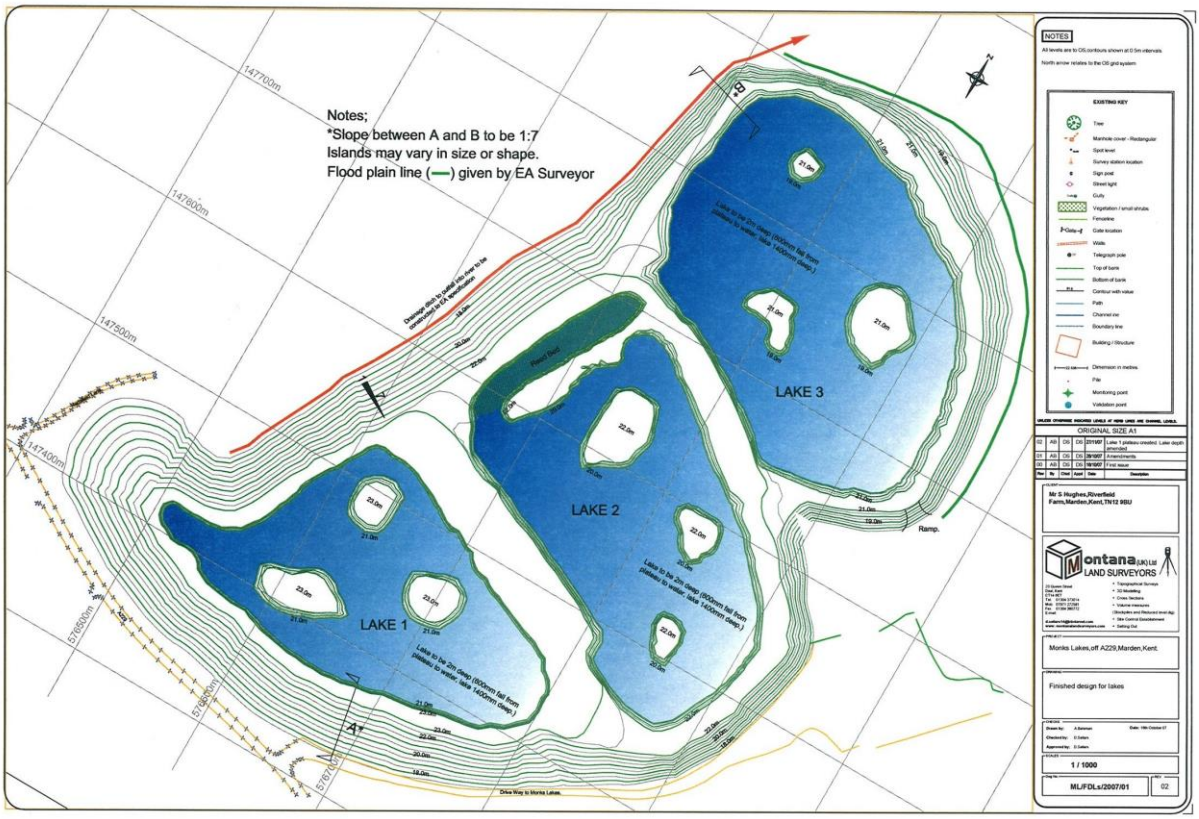

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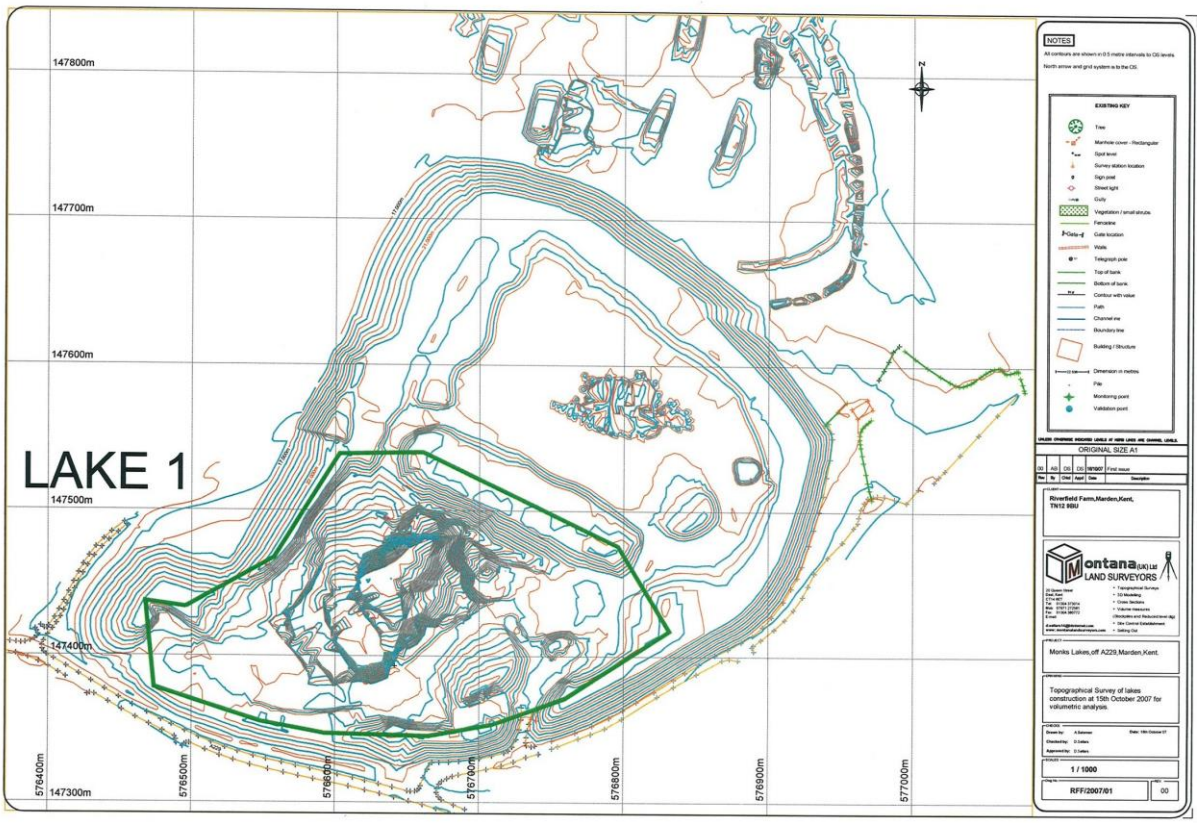

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The embankments have been constructed to a current crest elevation of +21.50 m AOD and a crest width of between 15 m and 20 m between the south and north corners (anticlockwise). It is proposed to raise the embankment crest to +22 m AOD in due course. This work will reduce the eventual crest width to about 13 m-18 m.

The crest is currently 20 m wide in the north-west but a subsidiary embankment has been created within the basin, creating a wetland area shown on Figure 1, so that anglers will not be visible from the residences to the north-west. The crest will provide access for anglers and, in addition, platforms will be created using earthfill, typically 10-20 m wide, into the reservoir for use by anglers.

The external slopes of the embankment vary from 1V:3.5H in the east, to 1V:4.2H in the north and 1V:7.4H in the west. The external slope near the houses will eventually be 1V:8H. The south-west and south have yet to be completed but will be about 1V:3.5H, as in the east. All these slopes are appropriate for the earthfill material used and proposed to be used in construction.

The geology of the site is characterised by Weald Clay, which is shown on Sheet 288 of the Geological Survey Map to be over 100 m thick at this location. There are some River Terrace gravels shown in the northern part of the site which are associated with the River Beult, which is approximately 500 m to the north/north-east, and flows westwards. The gravels will be of variable thickness but generally of shallow depth. Water for the reservoir will be pumped from the River Beult. The reservoir basin will be lined with the best clay available from the nearby excavations.

Along the north-west toe of the current and final embankments a drainage ditch will be constructed which will take any rainfall runoff from the embankment slopes and discharge it to the north, where it will flow to the River Beult. The ditch will prevent water from the site being discharged onto the nearby properties off Hertsfield Lane. The ditch presents no danger to the embankment or properties.

11. Observations

As noted above, the inspection was commenced at the eastern corner. The embankment at this point was constructed some time ago and has consolidated and been vegetated, as shown in the two photos below.

Eastern corner at the parking area looking south-westwards

Eastern corner from the parking area looking north-westwards

All the embankments were tested with a hand-driven spike and found to be competent. The crest was very well compacted and the slopes less so, as would be expected. The material encountered during the probing was generally clayey, but some sand and gravel was evident in places. All the external slopes were noted to be stable.

The crest is in good condition and is generally level, as seen in the two photographs below.

Crest near eastern corner looking south-westwards

Crest near eastern corner looking north-westwards

There is an access ramp to the crest approximately 100 m from the eastern corner, as shown below. It is assumed that this ramp will be retained when the three lakes are completed.

Access ramp

The reservoir basin has been largely completed as shown in the panorama below. Note the islands and the generally flat base of the reservoir.

Reservoir basin

In the above photo it should be noted that the clay on the floor of the basin is a little desiccated, due to a period of dry weather, and there is an outlet pipe visible in the centre of the photo. Nearby houses are also visible.

Close-up of outlet pipe

It is proposed that the water level is controlled by an outlet pipe shown above. Care will be needed to prevent blockage of the pipe, especially as reeds will be encouraged within parts of the reservoir. It is unclear why the pipe is at an angle, or where it exits. It is recommended that when the embankment is raised a short section, about 5 m wide, should be left 200 mm below the crest elevation to permit water to flow from Lake 1 → Lake 2 → Lake 3 in the event of overpumping and blockage of the outlet. Water would eventually be discharged from Lake 3 safely towards the River Beult.

The external slope near the northern corner was noted to be in good condition, as shown below. It will eventually form the embankment between Lakes 2 and 3.

External slope at northern corner from embankment crest

External slope at northern corner from embankment toe

The area near the north-west wide has been constructed with a subsidiary embankment, as mentioned above and shown on the plan, Figure 1.

There was a small amount of water in this proposed wetland area, in a low spot, at the time of the inspection, as seen in the photo below.

Internal floor of reservoir basin in the wetland area

The above photo also shows earthfill material within the basin which will be reprofiled to form an island.

The external slope on the north-western side is close to existing housing and has been placed at a shallow slope, 1V:8H, to improve visual impact. Both the slope and crest have yet to be completed or vegetated, see photos below.

North-western slope and crest. Note houses close by

Clay material is currently being excavated from an area to the south-west of the proposed Lake 2, as noted below.

Clay quarry

Once excavation is complete it is planned that a further reservoir will be constructed in this area, Lake 1.

The south-eastern embankment is in good condition and has been planted to soften its visual appearance from the A229 and access track. The tree planting is approved due to the size of the embankment at this point.

South-east embankment alongside access track

The access track to the parking area runs between the proposed new reservoir and a small existing reservoir to the south-east. This small reservoir has been built with a steeper slope than the proposed reservoir.

Slope failure has clearly occurred and has been exacerbated by a blocked/broken outlet pipe. This illustrates the dangers of oversteepened side-slopes when Weald Clay is used as a construction material, see photo below:

Slope failure on nearby reservoir embankment

Although not part of this report it is recommended that the pipe is repaired and the slope is repaired and flattened, possibly by a buttress.

12. Comments

The work carried out to date has been undertaken well and there are no signs of problems, except as noted directly above on previous work. It will be necessary to complete the embankment at the two vehicle access points in the south-west which provide an entry point to the basin for vehicles. Care will need to be taken to ensure that the sections of earthfill are joined properly. There is some work still to be done within the reservoir and final profiling of some external faces.

The floor of Lake 2 has been constructed to +20 m AOD approx. and it is proposed that the embankment will be +22 m AOD.

For a reservoir of this nature a wave freeboard of 0.4 m would be appropriate in view of the extensive bank protection proposed, so a TWL of 21.6 m AOD is suggested. This should be the elevation of the outlet pipe when its construction is finalised. This will mean a water depth of 1.6 m. If this water depth is adopted the reservoir will have a capacity of about 47,000 m^3, all of which will be included within the Reservoirs Act capacity calculations. The spill section between Lakes 2 and 3 should be set at +21.8 m AOD.

It is suggested that vegetation is established as soon as possible on completed sections of the embankment which will be left exposed.

Special care should be taken to install a suitable screen around the outlet pipe to prevent blockage. The screen should not be easily accessible and be robust in order to hinder vandals.

The works at the site are ongoing and the next Construction Engineer's visit should coincide with virtual completion of the reservoir, which is understood to be about mid-2008. The Undertaker should contact the Construction Engineer when construction recommences and should report construction progress to ensure inspection dates are agreed. At that time it should be possible to issue a Preliminary Certificate to permit filling.

Stewart Cale

Construction Engineer Date: 5th December 2007

Appendix 3 – Letter to Mr Dawkins

Copy of letter to Mr Dawkins 28 January 2008

Dear Mr. Dawkins,

Monk Lakes

Further to our earlier telephone conversation and the conversation I had with Simon Hughes on Friday last week, I have now had an opportunity to examine the two sketches that you kindly provided.

Sketch No. 1 shows the existing cross section of the embankment on the north-west side of Lake No. 2 where it abuts the land at the rear of the nearby cottages. Sketch No. 2 shows a revised cross section of the embankment which will entail excavation of an approximately 12 m horizontal wedge along the face of the embankment. It is understood that the resulting material will be placed on the inside of the embankment, thereby ensuring a minimum crest width of 8 m is maintained.

At the toe of the revised embankment a drain will be excavated approximately 1 m deep by 1 m wide to collect and discharge rainfall runoff from the embankment slope. The drain will slope to the north. A small bund will be placed on the outside of the drain to prevent any possibility of runoff entering the rear gardens of the previously mentioned properties.

I am content that the changes to the embankment will not affect its stability as the slope will be maintained at 1V:8H and that a sufficient crest width will be maintained. The toe drain presents no stability concerns.

In view of the above changes, once construction has commenced, it would be appropriate for me to visit the site and ensure that the works are being undertaken in the correct manner. If you would kindly telephone me when you have reached an appropriate stage I will arrange to inspect the works.

Yours sincerely
for **Scott Wilson Ltd**

Stewart Cale
Construction Engineer, Reservoirs Act

Direct Line: 01233 658248
email: stewart.cale@scottwilson.com

Appendix 4 – Email to Mr Harrison

Copy of email to Mr Harrison 10 August 2008

Dear Mr Harrison

Monk Lakes

Thank you for your telephone call regarding the construction of Lake 3 at Monk Lakes in which you asked for clarification of certain issues in relation to the Reservoirs Act 1975. As I understand it there have been queries regarding the construction of the lake in view of the location of the flood plain, as recently redefined, and ground conditions.

My comments on the issues are as follows.

Flood Plain

I was originally provided with certain site information regarding the construction of Lakes 1 and 2, which I included in my report of November 2007 to the previous site owner. The report concluded that the construction work to date was in compliance with the Reservoirs Act and that in due course I would be content to provide the necessary certificates to enable the lakes to be brought into service.

The subsequent drawing that you provided a short while ago summarises the flood plain situation insofar that the original design of Lakes 1 and 2 avoided intrusion into the 2003 Flood Plain of the River Beult and the lakes were sited on Weald Clay. The revised 2007 Flood Plain enabled a reconsideration of the design by the owner and enabled Lake 3 to be incorporated into the system of lakes without encroaching on the flood plain.

However, the 2008 variation of the flood plain showed a significant change that has affected your long term planning. The embankment footprint appears now to intrude into the flood plain. I attach a copy of the relevant drawing for reference.

My immediate reaction would be to query, formally, the derivation of the latest outline of the 1:100 year flood plain, which I believe was obtained from the Environment Agency. The 2007 and 2008 lines are very similar on the right bank but are markedly different on the left bank, for no apparent reason. There are some aspects of the alignment that I find difficult to reconcile.

Ground conditions

The geology of the area is dominated by Weald Clay to the south, but significant areas of variable alluvium and River Terrace gravels are associated with the valley of the River Beult, within which the site lies. No specific ground investigation data has been made available to me, but it is understood that the region of Lake 3 was excavated in part by the previous site owner who encountered poor ground conditions for the construction of fishing lakes. As a result a design for Lake 3 using a similar elevated arrangement was selected using clayey fill that would raise the lake above the surrounding ground whilst remaining outside the 2007 flood plain. This is a secure method of construction that is appropriate for the area and ground conditions and avoids extensive ground investigation and foundation work.

A secondary benefit with the proposed design is that Lake 3 is designated as a specimen lake and as such is better constructed as a raised lake to prevent the loss of specimen fish during flood conditions.

Planning Policy Statement 25 (PPS25) : Development and Flood Risk (December 2006) sets out the Government's national policies and should be taken into account by developers and planning authorities. Of relevance in your case is the categorisation of the precise zoning of the land that may be affected and the possibility that a Flood Risk Assessment (FRA) may be appropriate route to take coupled with the incorporation of SUDS (Sustainable Urban Drainage Systems), of which the existing and future lakes could form part given appropriate attention to water levels and storm storage volumes.

I hope the above summary of the situation is useful to you.

Yours sincerely

Stewart Cale
Construction Engineer for Monk Lakes under the Reservoirs Act 1975

Annex 3 Preliminary Certificate Geoff Wilson 26th June 2018

RESERVOIRS ACT 1975

MONK LAKE 2

Preliminary Certificate

I, Geoffrey Charles George Wilson of 3, The Osier Field, Ball Lane, Kennington, Ashford, Kent, TN25 4PL, being a member of the Non-impounding Reservoirs Panel, appointed by Taytime Limited to be responsible for the construction of a new large raised reservoir known as Monk Lake 2 situated at Staplehurst Road, Marden, Kent, TN12 9BU (National Grid Reference TQ768476), consider that the reservoir can properly be filled wholly with water up to a level of 21.60 m A.O.D., subject to the following conditions:

The conditions are set out in the attached Annex.

Signature of Engineer: 

Date of Certificate: 26 June 2018

Annex 4 Proposed Site Layout Next Phase Ltd 27th September 2019

0 20 40 60 80 100m
(1:1000 Scale)

NOTES:

THIS DRAWING IS COPYRIGHT AND MUST NOT BE REPRODUCED IN PART OR IN WHOLE WITHOUT PRIOR WRITTEN CONSENT.

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THIS DRAWING IS FOR PLANNING PURPOSES ONLY.

DO NOT SCALE OFF OF THIS DRAWING; ALL DIMENSIONS MUST BE VERIFIED ON SITE BEFORE COMMENCING WORK OR ORDERING ANY MATERIALS.

KEY:

- APPLICATION BOUNDARY
- 1 IN 100 YEAR FLOOD PLAIN LINE
- EXISTING BUILDINGS TO BE DEMOLISHED
- PROPOSED DRAINAGE DITCH TO PBA SPEC (SEE 29431/001/SK03, DITCH LEVELS TBC VIA CONDITION).
- NO ANGLING BETWEEN THE HOURS OF 22:00 AND 08:00 WITHIN HATCHED AREA

REV:	DESCRIPTION:	BY:	DATE:
F	PROPOSED DRAINAGE DITCH ANNOTATION AMENDED	RL	12/11/19
E	PROPOSED DRAINAGE DITCH AND ANNOTATION AMENDED	RL	12/11/19
D	ANNOTATION AMENDED	RL	05/11/19
C	ADDITIONAL EXISTING DATA SHOWN	RL	04/11/19
B	CARPARK LEVELS AMENDED	RL	04/10/19

NEXTPHASE
THE TOWN PLANNING EXPERTS

HEAD OFFICE
8 Bore Street, Lichfield,
Staffordshire, WS13 6LL
tel: 01543 571718

LONDON OFFICE
16 Upper Woburn Place,
London, WC1H 0BS
tel: 020 3741 8225

www.nextphasedevelopment.co.uk

Chartered Planning & Development Surveyors

PROJECT: Monk Lakes

CLIENT: Taytime Ltd.

TITLE: Proposed Site Layout

SCALE AT A0:	DATE:	DRAWN BY:	CHECKED BY:
1:1000	27/09/19	RL	CW

PROJECT NUMBER:	DRAWING NUMBER:	REVISION:
0183-04	0183-04/02	F

Annex 5 Limited Topographical Survey JC White Geometrics Ltd 11th June 2022

LEGEND

SERVICES

AV	AIR VENT
CAJB	CABLE JUNCTION BOX
CATV	CABLE TELEVISION COVER
CD	CABLE DUCT
CIP	CABLE INSPECTION POINT
EIC	ELECTRIC INSPECTION COVER
EJB	ELECTRIC JUNCTION BOX
EP	ELECTRICITY POLE
ER	EARTHING ROD
FH	FIRE HYDRANT
GIC	GAS INSPECTION COVER
GJB	GAS JUNCTION BOX
GV	GAS VENT
JB	JUNCTION BOX
MK(E)	SERVICE MARKER (ELECTRIC)
MK(G)	SERVICE MARKER (GAS)
MK(W)	SERVICE MARKER (WATER)
OHW	OVERHEAD WIRES
SC(G)	STOP COCK (GAS)
SC(W)	STOP COCK (W)
STP	SUPPORT FOR TELEPHONE POLE
SV	STOP VALVE
TIC	TELEPHONE INSPECTION COVER
TJB	TELEPHONE JUNCTION BOX
TP	TELEPHONE POLE
WIC	WATER INSPECTION COVER
WM	WATER METER

LEVELS

DPC	DAMP PROOF COURSE
THL	THRESHOLD LEVEL
T.O.P	TOP OF PIPE
T.O.W	TOP OF WALL
WL	WATER LEVEL

INTERNAL

CLG	CEILING LEVEL
DHL	DOOR HEAD LEVEL
FL	FLOOR LEVEL
SCLG	SUSPENDED CEILING LEVEL
US	UNDERSIDE
USB	UNDERSIDE OF BEAM
WCL	WINDOW CILL LEVEL
WHL	WINDOW HEAD LEVEL

DRAINAGE

BD	BACK DROP
BL	BASE/BED LEVEL
CL	COVER LEVEL
CP	CATCH PIT
DC	DRAINAGE CHANNEL
DP	DOWN PIPE
G	GULLY
IC	INSPECTION COVER
IL	INVERT LEVEL
MH(C)	MANHOLE (COMBINED)
MH(F)	MANHOLE (FOUL)
MH(S)	MANHOLE (SURFACE WATER)
RE	RODDING EYE
RWP	RAIN WATER PIPE
SEG	SIDE ENTRY GULLY
SVP	SOIL VENT PIPE
UM	UNKNOWN MANHOLE TO LIFT
VP	VENT PIPE
WO	WASH OUT

FEATURES

B	BOLLARD
BH	BORE HOLE
BP	BRICK PILLAR
BS	BUS STOP
CPS	CONCRETE PAVING SLABS
FB	FLOWER BED
LB	LITTER BIN
LC	LIGHTING COLUMN
P	POST
PB	POST BOX
RNP	ROAD NAME PLATE
RS	ROAD SIGN
SW	SOLID WALL
SP	SIGN POST
SU	STEP(S) UP
TCB	TELEPHONE CALL BOX
TH	TRIAL HOLE
TS	TREE STUMP

CONTROL

OSBM	ORDNANCE SURVEY BENCH MARK
STN	SURVEY STATION
TBM	TEMPORARY BENCH MARK

TREE (girth/spread/height/species/no. of boles)

DIRECTION OF LEAN

PHOTOGRAPH NUMBER, LOCATION & DIRECTION

GATE — GATES

FENCE

BUILDING

OVER HEAD BUILDING LINE

FACE OF WALL

BACK OF RETAINING WALL

LINE

CHANGE OF SURFACE

EDGE OF UNDERGROWTH

BANKING

TOP OF BANK

BOTTOM OF BANK

KERB

DROP KERB

VERGE

CONTOUR WITH VALUE

OVER HEAD WIRE

HEDGE/TREE LINE

FOR FUTURE SURVEY WORK OR SETTING OUT, J C WHITE GEOMATICS LIMITED QUOTED SURVEY CONTROL COORDINATES & LEVELS MUST BE USED. UNDER NO CIRCUMSTANCES SHOULD ANY OTHER SURVEYED POINTS ON THE DRAWING BE USED OTHER THAN AS A GROSS ERROR CHECK.

TREE GIRTHS AND SPREADS ARE QUOTED AS A MEAN SIZE, AND SHOWN TO SCALE.

WHILST EVERY EFFORT IS MADE TO IDENTIFY TREE SPECIES AND GAUGE HEIGHTS, NO RESPONSIBILITY BE TAKEN FOR THE ACCURACY OF THIS INFORMATION.

WHILST EVERY EFFORT IS MADE TO ENSURE THAT PIPE DIAMETERS, INVERT LEVELS AND DRAINAGE TYPES ARE CORRECT, THE ACCURACY OF THIS INFORMATION CANNOT BE GUARANTEED, AND IT IS STRONGLY RECOMMENDED THAT EXISTING DRAINAGE INFORMATION IS VERIFIED PRIOR TO THE COMMENCEMENT OF ANY DETAILED DESIGN AND CONSTRUCTION WORK.

NO RESPONSIBILITY CAN BE TAKEN FOR DRAINAGE INFORMATION OBTAINED FROM SOUTHERN WATER RECORDS.

LEVELS AT KERB LINES ARE CHANNEL LEVELS.

ALL COORDINATES AND LEVELS ARE BASED ON A LOCAL GRID CENTRED ON AN OS ACTIVE RINDX DERIVED COORDINATE FOR STN 1. ALL COORDINATES HAVE BEEN COMPUTED USING A SCALE FACTOR OF 1.000000.

SURVEY IN GREY IS SUPPLIED BY CLIENT.

J. C. WHITE
Geomatics Limited
Shrine Barn, Shrine Farm, Sandling Road, Postling, Hythe, Kent, CT21 4HE
Tel : 01303 261212 Fax : 01303 264040
Email : survey@jcwhite.co.uk Web site : www.jcwhite.co.uk

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CLIENT

Monk Lakes Fishery Ltd.

JOB TITLE

Monk Lakes,
Staplehurst Road, Marden,
Kent. TN12 9BS.

DRAWING TITLE

Limited Topographical Survey

JOB No. *21/08/029*	DATE *May 2021*
SURVEYED BY *JT*	DRAWN BY *JS*
SCALE *1:500*	DWG. No. *1* REV. No.
CAD PLOT DATE *11.06.2021*	ORIGINAL SHEET SIZE *A0*
CADFILE NAME *210629 - Monk Lake Levels.dwg*	

Annex 6 Letter regarding Project Status Geoff Wilson 28th September 2022

Engineering and Properties Ltd
Geoff Wilson, Non-impounding Reservoirs Engineer

Emily Harrison
Taytime Ltd
C/o Monk Lakes
Staplehurst Road
Marden
Kent
TN12 9BS

3 The Osier Field
Ball Lane
Kennington
Ashford
Kent
TN25 4PL
W: 01233 641536
M: 07534 137118
Email: geoffcg@hotmail.com

26 September 2022

Dear Emily

Monk Lake 2 – The Reservoirs Act and Project Status

Please find below a project status summary for Monk Lake 2 concerning my work as Construction Engineer (CE). I was appointed in 2017 as a replacement for the previous CE whom I understand had retired.

I have visited the reservoir at least once per year since 2017 and am pleased to advise that I have had no concerns over the condition of the reservoir. A Preliminary Certificate was issued in June 2018 and we are now working towards the issue of the certificate of Efficient Execution of the Works and the Final Certificate. Topographic surveys have been undertaken that have provided useful data for ongoing monitoring and to inform some minor works. There remain a couple of outstanding actions to be completed before the certificates can be issued. I anticipate that the necessary work will be completed in the coming months and the Final Certificate issued in early to mid-2023.

Further to the requirements of the Ministerial Directive to produce Emergency Plans for all Registered Reservoirs, I provided the necessary Section 12AA (3) and 12AA (4) Certificates for Monk Lake 2.

I can confirm that Monk Lake 2 is fully compliant with all requirements of the Reservoirs Act.

Yours sincerely

G C G Wilson

Geoff Wilson, NIR Panel Engineer
Engineering and Properties Ltd

Annex 7 Report by Construction Engineer Andrew Sheerman-Chase August 2024

Construction Engineer's Report under the Reservoirs Act 1975

Monk Lake No 2

Staplehurst

For

Taytime Ltd

August 2024

`

Hydroplan
Unit 12 Riverside Park
Station Road
Wimborne
Dorset BH21 1QU

Hydroplan
Engineering & Consulting
Part of Hydroplan Group

DOCUMENT RECORD SHEET

Revision No	Issue Date	Description	Prepared	Checked
P1	27-8-24	Issued for review	ASC	NOR
0	3-9-24	First issue	ASC	NOR

Table of Contents

1 NAME AND SITUATION OF RESERVOIR

1.1 Reservoir name

Monk Lake No 2

1.2 Situation

Staplehurst Road, Marden, Tonbridge, Kent, TN12 9BS
OS Grid Reference: TQ768476
The reservoir is to the east of the A229 road about
4 km north-north-east of Staplehurst.

2 NAME AND ADDRESS OF ENGINEER

Andrew Sheerman-Chase
Hydroplan Ltd
Unit 12 Riverside Park
Station Road
Wimborne
Dorset
Tel 07799 133412
Email andrew.sheerman-chase@virgin.net

All Reservoirs Panel of Engineers
Appointed until 9th August 2029

3 NAME AND ADDRESS OF UNDERTAKER

Taytime Ltd
Monk Lakes, Staplehurst Road,
Marden, Tonbridge, Kent,
TN12 9BS.

4 DATE OF INSPECTION

13th August 2024

5 INFORMATION AVAILABLE

A list of information made available to me is given in the table below. The original drawings referred to in Mr Cale's report of 5 December 2007 have been lost but there was a small scale reproduction in his report.

Date	Description	Prepared by
5th Dec 2007	Inspection Report	Stewart Cale
10th June 2009	Proof of Evidence	Stewart Cale
July 2015	Groundwater Monitoring Report	Peter Brett Consultants
26th June 2018	Preliminary Certificate	G Wilson

February 2019	Response to Maidstone Borough Council Regarding Water Issues	Hafrenwater
27th Sept 2019	Proposed Site Layout	Next Phase Ltd
May 2021	Limited Topographical survey	J C White Ltd
11th June 2021	Limited Topographical survey	J C White Ltd
26th Sept 2022	Letter re Project Status	G Wilson

Table 1 Information Available

6 DESCRIPTION OF THE RESERVOIR

6.1 General

The location of the lake is shown in Figure 1. The original scheme for the three lakes was developed by Montana Land Surveyors and shown in Figure 2. A more recent survey layout from 2019 is given in Figure 3.

Details of the reservoir given in the table below.

Storage Volume	47,000 m^3
Surface Area	30,768 m^2
Embankment Height	4.50 m
Lake Floor Level	20.00 mOD
Design Crest Level	22.00 mOD
Category	Non-impounding

Table 2 Details of Lake

The reservoirs are filled by water pumped from the River Beult. The lake is situated partly within the River Terrace Gravels but is reportedly lined with Weald Clay.

6.2 Background

There have been four Construction Engineers, under the Reservoirs Act, involved with this lake as follows

Engineer	Appointed	
	from	to
Stewart Cale	April 2008	Unknown
Nick Reilly	Unknown	2017
Geoff Wilson	2017	January 2024
Andrew Sheerman-Chase	January 2024	Current

Table 3 Construction Engineers under Act

Planning permission for the lakes was obtained in 2003 for the previous owner Mr Hughes. It is understood that works were commenced in 2005. In March 2008 it was reported that the ownership had been transferred to Mr Guy Harrison of Taytime Ltd.

Works were halted prior to completion on the 30th April 2008 but recommenced early in 2013. At the time of the Stewart Cale report in 2007 the works had been completed but not operational. A Preliminary Certificate was issued by Mr Geoff Wilson on 26th June 2018 to allow filling to a level of 21.60 mOD.

As part of the conditions on issuing the Preliminary Certificate it was required that a survey was carried out. This was undertaken by JC White Geomatics and from the survey it was found that there was insufficient freeboard. It was recommended that the overflow was lowered by 150 mm. This was completed in August 2024.

6.2.1 Stewart Cale's Report 2007

Stewart Cale, an All Reservoirs Panel Engineer, carried out an inspection as Construction Engineer on 7th November 2007. It is not thought that he was involved in the early stages of construction but was subsequently brought in when the reservoir was almost complete.

In his report he stated that the construction commenced in 2005. The fill for Lake 2 was being excavated from the adjacent fishing lakes. These lakes (Lake No 1 and No 3) do not come under the Reservoirs Act as the water stored was largely below ground.

At the time of his visit the embankment for Lake No 2 was virtually complete except on the south-west side where there were vehicle access points. The embankment at that time had been constructed to an elevation of 21.5 m OD with a crest width of between 15 and 20 m but it was proposed to reduce this to about 13 to 18 m and raise the embankment to 22.00 m OD.

The external slopes varied between 1 to 3 ½ to 1 to 4.2. The external slopes near Hertsfield Farm and adjacent houses was to be at 1 in 8. The embankments to the south-west and south were yet to be completed but were to be constructed to a slope of 1 in 3.5.

Mr Cale stated that the geology under the site was Weald Clay with River Terraces in the northern part of the site. The geological map of the area is reproduced in Figure 5. The reservoir was to be clay lined with material taken from the adjacent borrow areas.

During his inspection the embankments were checked with a hand driven spike and found to be well compacted and the external slopes stable. Photographs taken during his inspection show 100mm overflow pipe being installed.

In the report it is stated that the floor was to be constructed to 20.00 m OD and the embankment crest was to be at 22 m OD. With a water level of 21.6 metres OD is suggested that this would give a freeboard of 400 mm which he considered adequate.

6.2.2 Stewart Cale, Proof of Evidence 10th June 2009

The Proof of Evidence produced by Mr Stewart Cale was related to an appeal against the Enforcement Notice issued by Maidstone Borough Council.

In this document he confirmed that he had been appointed as Construction Engineer under Reservoirs Act in April 2008. He said that there had been planning difficulties and that the proposed slope adjacent to the dwellings on Hertsfield Lane was to be at 1 in 8 - that is an angle

of 7°. He expected the slope at this angle would be stable. In the south-east areas the slope would be at 1 in 4. He said that he had observed no sign of distress or settlement or movement when inspecting the embankments in November 2007 although at that time the reservoir had not been brought into service.

Mr Cale said that the original drawing showing the planning application in 2003 gave the proposed arrangement of the lakes (Figure 2). The actual construction was very similar to that proposed. The main concern was the external embankments and he understood that the aboveground lakes would largely be outside the 2003 floodplain. The lakes, he believed, had been constructed using a clay lining of Weald Clay. He understood that the water depth would be fairly constant in the region of 1.4 to 1.5 metres. The top of the banks was to be 2.0 m above the reservoir base.

Mr Cale said that although he had received no details of calculations but he noted, during his 2007 visit, that the works were to a good standard.

6.2.3 Letter Geoff Wilson 26th September 2022

Mr Wilson noted that he was appointed in 2017 to replace the retired Construction Engineer. A Preliminary Certificate was issued in June 2018. He stated that he was now working to issue the Construction Certificate and the Final Certificate once a couple of issues have been resolved[1]. He confirmed that Monk Lake No 2 was fully compliant with the requirements of the Reservoirs Act.

6.2.4 Geoff Wilson's email 24th May 2024

Mr Wilson commented on a topographical survey in which he advised insufficient freeboard in 2022. He suggested that the embankment should be raised by 200 mm.

6.2.5 Geoff Wilson's Email 22nd July 2024

In this email he recommended that the overflow pipe be reduced by 150 mm.

6.3 Overflow

There are no drawing showing details of the overflow. From my site inspection there appears to be 100 mm plastic pipe within a concrete support. The overflow discharges probably into Lake No 3.

6.4 Instrumentation

There is no instrumentation installed in this lake.

Recommendation: a gauge board should be installed to indicate the top water level of 21.6 m OD.

6.5 Access

Access is off of the Staplehurst Road A229. There is a tarmac road in the 1st section and then onto a gravel surfaced road and car park by the site office.

[1] The main issue was the level of the overflow and lack of freeboard found following a survey by JC White Surveyors.

6.6 Downstream conditions

The lake is situated adjacent to the floodplain of the River Beult. To the north and south are the Monk Lake No 1 and No 3. To the west are a large number of fishponds which form part of the Riverfield Fish Farm.

7 CONDITION OF RESERVOIR

7.1 General

The inspection was carried out on 13th August 2024. During the inspection I was accompanied by Morgan Kinsey-Jones.

The weather during the inspection was hot and sunny with a temperature of 24°C. The water level was estimated to be 300 to 400 mm below the overflow.

7.2 Reservoir Embankments

7.2.1 East Embankment.

In this section the embankment was about 4 m high. The outer slope was at about 1 in 3.5 and covered with close mown grass. There were a few small to medium sized trees on the slope. The crest width was at least 15 metres and covered with close cut grass and the surface was a little undulating.

On the inner slope was a dense covering of small willow saplings. On a short section the vegetation had been cut back to provide access for the fishermen. The slope was at about 1 in 4. There was no evidence of wave erosion. The water level at the time was about 800 mm below the crest.

7.2.2 South Embankment.

The outer slope was about 3 metres high and had a slope of about 1 in 3.5 and covered with rough grass and various weeds and occasional shrubs. The crest in this area varied between about 12 and 18 metre wide. The inner slope was at 1 in 3 and covered with short grass but along the water line was sedge and some small willows. There was no evidence of wave erosion.

7.2.3 West Embankment.

On the west embankment the outer slope was very shallow at about 1 in 6 or flatter. The upper part was covered with short mown grass and in the lower part rather tufted grass with thistles. Below the slope is Hertfield Farm and adjacent properties. The overall height of the slope here was estimated to be about 4 metres.

7.2.4 North Embankment.

The outer slope of the embankment was about 3 to 4 metres high and a slope of 1 in 3.5 and covered with short cut grass and occasional weeds. The crest was very wide here being in excess of 20 metres. The inner slope was at about 1 in 4 to 1 in 5 and covered with tree saplings to about 3 or 4 metres high. There were occasional breaks in the tree cover. There was no evidence of wave erosion.

7.2.5 Settlement and movement

There was no evidence of movement in the slopes. Some desiccation cracking was apparent. The surface was undulating so it was not possible to assess if there had been localised settlements**Error! Reference source not found.**.

7.2.6 Seepage performance

There was a no evidence of seepages or damp areas at the toe of the embankments.

7.3 Inlet structures

There is no inlet structures associated with this reservoir.

7.4 Outlet works

The condition of the overflow was assessed by viewing from the closest embankment and from close up photographs taken the previous week during lowering of the overflow pipe.

7.5 Drawdown Arrangement and means of controlling inflow

There is no low level outlet. Inflows are controlled by stopping pumping.

7.6 Access and security provisions

There is good access to this reservoir. Access to the site is controlled by a gated barrier**.**

8 ENGINEER'S FINDINGS

8.1 Reservoir risk analysis

A risk assessment was carried out with reference to the document Guide to Risk Assessment for Reservoir Safety Management published in 2013. A Tier 1 qualitative risk assessment was undertaken.

Hazard	Likelihood	Consequence	Comments and mitigating measures
Overtopping	Low	Low	The embankment can tolerate overtopping due to the large width and good quality grass cover.
Blockage of Overflow	Moderate	Low	The lake is rarely up to the level of the overflow.
Internal (Piping) Erosion	Low	Low	The considerable width of the embankment and nature of the clay soils results in a low probability of piping erosion
Slip in Inner Slope	Low	Low	The inner slope is relatively flat and slips are unlikely. If they occur carry out remedial works
Slip in Outer Slope	Low	Low	The outer slopes are at 1 in 3.5 to 1 in 8 - slips are very unlikely.

Table 4 Risk Assessment

8.2 Seismic risk

It was determined that the reservoir is in Zone B (Figure 5 of An Engineering Guide to Seismic Risk to Dams in the United Kingdom). In Zone B there is a moderate chance of local earthquakes but larger events are rare

A seismic evaluation was carried out in accordance with the guide and the results shown in the table below.

Capacity	0
Height	0
Evacuation	4
Downstream Damage	4
Classification Factor	8
Category	II
Earthquake Zone	B
PGA (Table 4)	0.125g
Level of Safety Evaluation (Table 5)	Eb

Table 5 Seismic Evaluation

This has a low classification factor falling into a safety evaluation (table 5 of the guide) of E_a where no seismic safety evaluation is required. There are no aspects of this lake which are vulnerable to earthquake shaking.

8.3 Internal Erosion

The depth of water in the lake is only 2 m or less. With the wide crest and flat slopes the seepage path is long and piping erosion is unlikely.

8.4 Adequacy under Flooding Conditions

This is a non-impounding reservoir. It has virtually no catchment as the embankment crest is graded off to the outer slope.

They are issues concerning surface water flooding related to the Hertsfield Farm and adjacent buildings. This has been dealt with in the February 2019 report by Hafrenwater and is outside the scope of this report.

8.5 Reservoir Category and Freeboard

In the report by Mr Cale he suggested this was a Category B reservoir because the risk to properties downstream. In the original design the crest level proposed was 22.0 m OD giving a freeboard a 400 mm.

Information from JC White Survey

Crest Low point	21.91	mOD		
Original overflow level	21.92	mOD	-0.01	m
Overflow pipe reduced	0.15	m		
New Top of Overflow	21.77	mOD	0.14	m
Preliminary Certificate	21.60	mOD	0.31	m

Table 6 Levels and Freeboard

The latest survey information (JC White Surveys) indicates a minimum crest level on the east embankment of 21.91 m. The design crest level was supposed to be 22.0 m OD. A Preliminary Certificate has been given with a top water level of 21.6 m OD. The freeboard is less than proposed in the design and is 310 mm. Another issue is that the overflow pipe, although it has

been reduced by 150 mm, it has an estimated elevation of 21.77 m OD which gives a freeboard of only 140 mm.

My conclusion is that 300 mm freeboard is acceptable given the following factors.

a) This is a non-impounding reservoir and is filled by pumping.
b) The embankments are robust in construction having a crest width of 12 m or more with modest side slopes of 1 in 3.5 or flatter.
c) The embankments are constructed of Weald Clay which is good for embankment construction.
d) The east embankment is protected by 3 islands and the fetch is between 14 and 94 metres.
e) The upstream slope has a dense covering of willow and other small saplings reducing the effect of waves.

8.6 Adequacy of low-level outlets and means of controlling inflow

This is a non-impounding reservoir so there is no inflow apart from direct rainfall and pumping. There is no means of lowering the water in the reservoir apart from pumping. This issue should be dealt with in the on-site emergency plan.

8.7 Adequacy of access provisions from maintenance and emergencies

There is adequate access for maintenance and emergencies.

9 SUPERVISION PROVIDED BY THE UNDERTAKER

There is good surveillance of the reservoir. The fisheries manager is on site most days

9.1 Correctness of the PFR

At the present time there is no reservoir record book (PFR).

Recommendation The undertaker should prepare a reservoir record book in the recommended format for a High-Risk reservoir.

9.2 Compliance with water level monitoring

There is no recording of water levels. However, the site staff do keep close eye on the water levels.

Recommendation: Water levels should be recorded at monthly intervals once the reservoir record book has been prepared.

9.3 Instrumentation

There is no instrumentation installed in this lake.

9.4 Reservoir surveillance

The surveillance of this reservoir is good. The site office is situated at the toe of embankment and a close watch is kept on the water levels.

Recommendation. It is recommended that a visual examination of the structure is carried out at monthly intervals.

9.5 Emergency planning

There is an on-site emergency plan but it is incomplete.

Recommendation: Enter all the necessary information into the on-site emergency plan

10 RECOMMENDATIONS

1) A water level gauge should be installed to clearly indicate the top water level of 21.6 m OD.
2) A reservoir record book (PFR) should be commenced. The previous Construction Engineer Mr Wilson may be able to help on this aspect.
3) The On-site Emergency Plan should be completed.
4) Any notable occurrence such as subsidence or cracking in the embankments (apart from desiccation cracking) should be reported to the Reservoir Safety Engineer.

11 SIGNATURE OF THE ENGINEER

12 DATE OF THE REPORT

27th August 2024

Appendix 1 Figures

Figure 1 Location of Lake

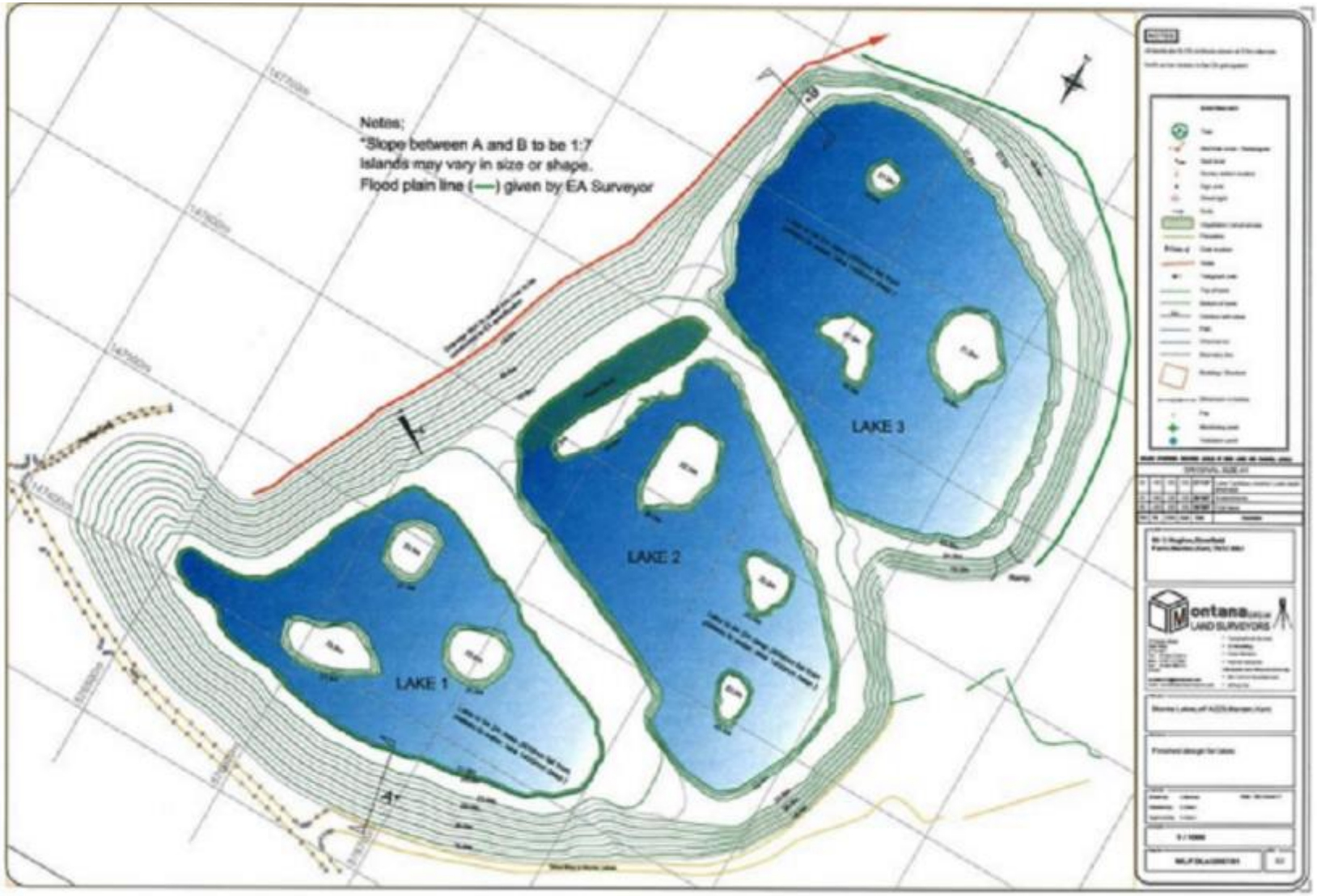

Figure 2 Original Layout Plan – Montana Surveys c2005

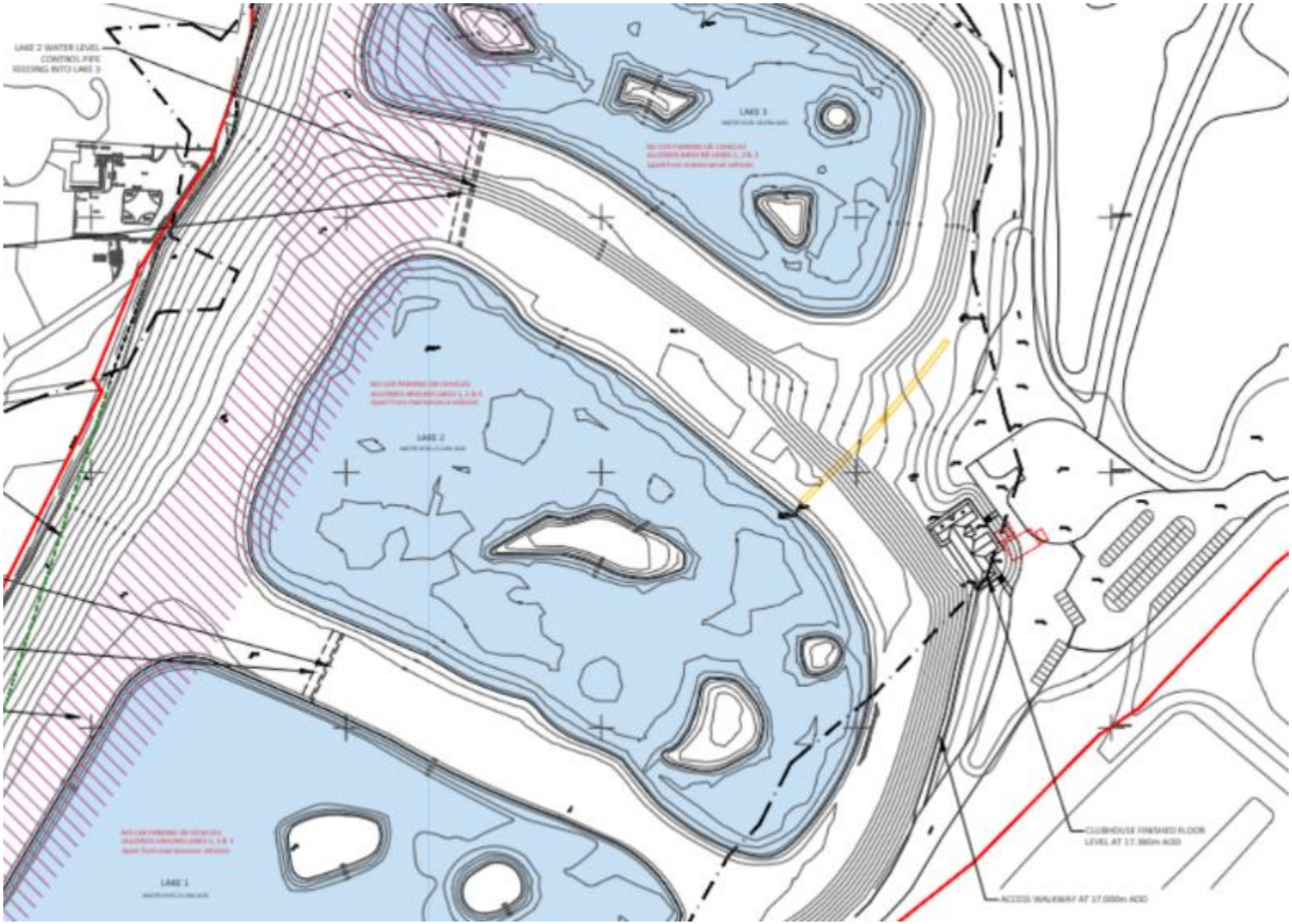

Figure 3 Survey Plan 2019 - NextPhase

Figure 4 Satellite Image of Lake No 2

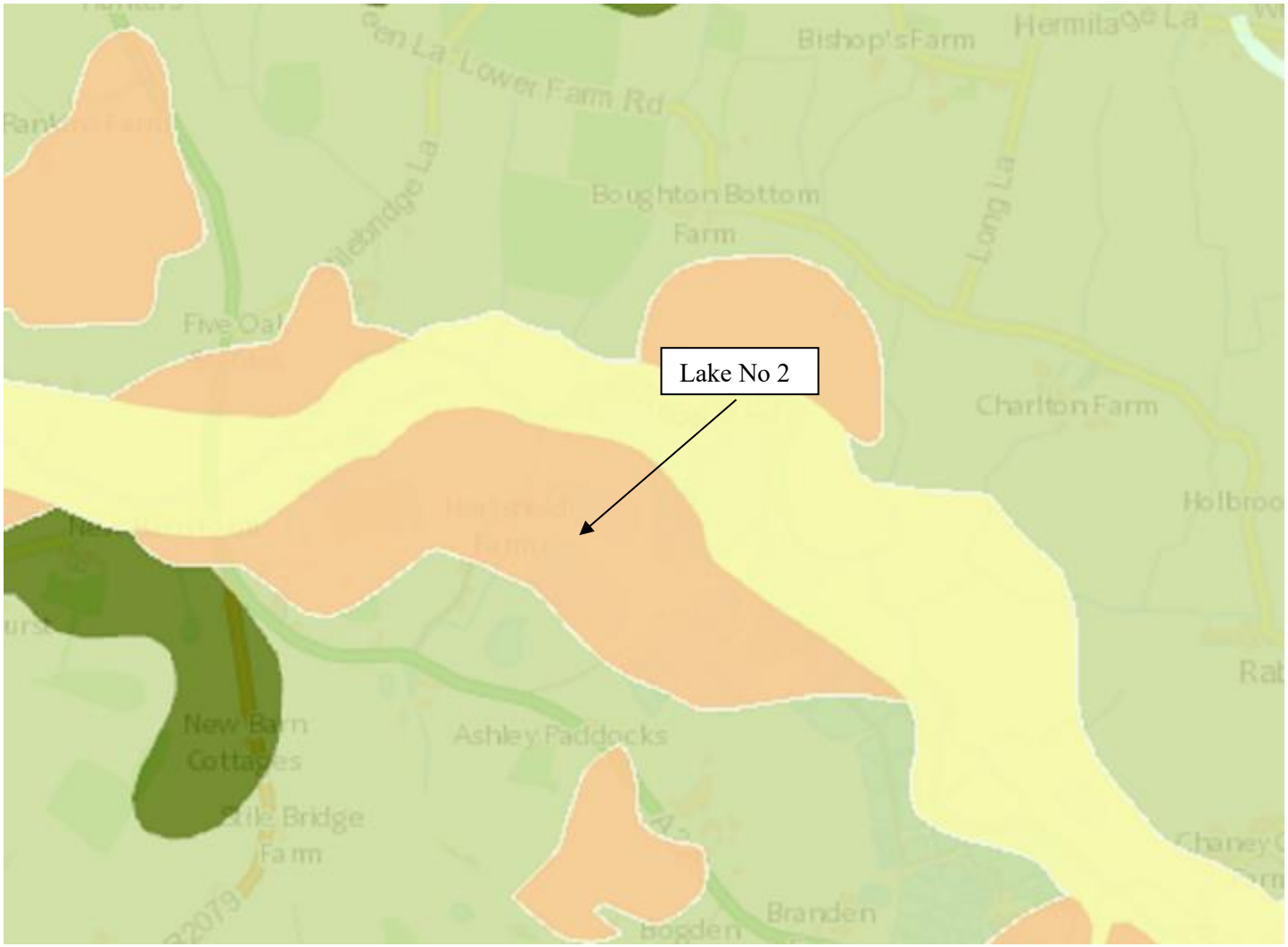

Figure 5 Geology of Area

Appendix 2 Photographs

Photograph 1 East embankment outer slope

Photograph 2 East embankment crest

Photograph 3 East embankment inner slope

Photograph 4 South embankment outer slope

Photograph 5 South embankment crest and inner slope

Photograph 6 West embankment crest and inner slope

Photograph 7 West embankment outer slope

Photograph 8 Desiccation cracking in clay

Photograph 9 North embankment outer slope

Photograph 10 North embankment crest

Photograph 11 Overflow viewed from embankment

Photograph 12 Measuring overflow pipe before cutting 150 mm

Photograph 13 Overflow pipe after cutting