

MIDDLE LEVEL COMMISSIONERS

At a Meeting of the Middle Level Board held at the Middle Level Offices
March on Thursday the 28th April 2016

PRESENT

| | |
|-------------------------------|------------------|
| M E Heading Esq (Chairman) | C F Hartley Esq |
| J L Brown Esq (Vice Chairman) | J E Heading Esq |
| P WALLpress Esq | M R R Latta Esq |
| G P Bliss Esq | P G Mitchell Esq |
| G Booth Esq | S T Raby Esq |
| C D Boughton Esq | W Sutton Esq |
| R C Brown Esq | P W West Esq |
| D J Fountain Esq | H W Whittome Esq |
| S Garratt Esq | S W Whittome Esq |

The Chief Executive, the Treasurer and the Chief Engineer were in attendance.

Mr M Heading spoke of the honour of being Chairman and spoke appreciatively of the services of Mr S Whittome during his time as Chairman.

The Chairman welcomed Mr Garratt who was attending his first meeting of the Board.

Apologies for absence

Apologies for absence were received from The Lord De Ramsey and R W Groom Esq.

B.3320 Declarations of Interest

The Chief Executive reminded the Commissioners of the importance of declaring an interest in any matter included in today's agenda that involved or was likely to affect any of them.

Mr Sutton declared an interest in all planning matters as a member of Fenland District Council.

B.3321 Confirmation of Minutes

RESOLVED

That the Minutes of the Meeting of the Board held on the 5th November 2015 are recorded correctly and that they be confirmed and signed.

B.3322 Payments by the Chief Executive

The Board examined and approved payments amounting to £1,963,650.30 made during the period from 1st October 2015 to 31st March 2016.

Mr Fountain raised the issue of Anglia Farmers where some bills would go through them. The Treasurer reported that the Commissioners received the same terms with these currently paid direct, which avoided payment of charges to Anglia Farmers.

(NB) – The Chairman and Mr S Whittome declared interests in the payments made to them.

(NB) – Messrs Garratt and Sutton declared interests in the payments to Fenland District Council.

(NB) – Messrs C Hartley and Sutton declared interests in the payments to Upwell IDB.

(NB) – Mr Boughton declared an interest in the payment made to Ransonmoor Farm Ltd.

B.3323 Miscellaneous Receipts

The Board examined and approved particulars of receipts amounting to £162,607.40 during the period from 1st October 2015 to 31st March 2016.

B.3324 Determination of annual values for rating purposes

The Board considered the following recommendations for the determination of annual values for rating purposes, viz:-

Middle Level Commissioners

Determination of Annual Values for Rating purposes

April 2016

| | | | Area (Hectares) | Agricultural Land | Special Levies | | | | TOTAL |
|---|--------------------------------------|-------------------------------------|--------------------|----------------------|----------------|---------|---------|--------------|------------|
| Transfer value to Special Levy - £1,325.58 per hectare | | | | | Fenland | Hunts. | BKL&WN | P/Boro. City | |
| Opening Values (£) | | | 44031.354 | 6,737,556 | 1,894,160 | 784,964 | 775,167 | 70 | 10,191,917 |
| Opening % | | | | 66.11% | 18.58% | 7.70% | 7.61% | 0.00% | 100.00% |
| <u>March</u> | | | | | | | | | |
| <u>Ramsey</u> | | | | | | | | | |
| Ransonmoor Farms | Parsons Land Drove | Domestic dwelling | 0.136 | -45 | 179 | | | | 134 |
| <u>Upwell</u> | | | | | | | | | |
| S Angus Esq | Marmont House March Riverside Upwell | Un-rated agricultural land | 0.552 | 100 | | | | | 100 |
| K Edgson | The Cottons Outwell | Development of building plot | 0.069 | -22 | | | 90 | | 68 |
| <u>Whittlesey</u> | | | | | | | | | |
| R & K Bradley & Son | Kings Delph Drove Farcet | Private domestic dwelling | 4.864 | -539 | | 6,450 | | | 5,911 |
| <u>C.C.C.</u> | | | | | | | | | |
| A Rose | Coneywood Fen Ransonmoor | Erection of wind turbines + roadway | 2.970 | -556 | 3,937 | | | | 3,381 |
| Mr D M Harlock | Newtons Farm Warboys | Wind Turbines | 2.308 | -388 | | 3,059 | | | 2,671 |
| Total determinations | | | 44042.253 | -1,450 | 4,116 | 9,509 | 90 | 0 | 12,265 |
| Closing Values (£) | | | | 6,736,106 | 1,898,276 | 794,473 | 775,257 | 70 | 10,204,182 |
| Closing % | | | | 66.01% | 18.60% | 7.79% | 7.60% | 0.00% | 100.00% |

RESOLVED

- i) That the determinations recommended be adopted by the Commissioners.
- ii) That the Chief Executive be empowered to serve notices and to take such other action as may be necessary to comply with statutory requirements.
- iii) That the Chairman and the Chief Executive be empowered to authorise appropriate action on behalf of the Commissioners in connection with any appeals against the determinations.

(NB) – Mr Boughton declared an interest in the determination relating to Ransonmoor Farms.

B.3325 Rate arrears

Consideration was given to writing off rate arrears amounting to £159.68.

RESOLVED

That the Commissioners be recommended to write off rate arrears amounting to £159.68.

(NB) – Mr Boughton declared an interest when this item was discussed

B.3326 Contributions from Developers

With reference to minute B.1779, the Chief Executive reported that development contributions amounting to £1,647.07 had been received by the Commissioners in the period from the 1st October 2015 to the 31st March 2016 towards the cost of dealing with the increased flow or volume of surface water run-off and treated effluent volume.

B.3327 Staff

a) Salary Increases 2016/2017

Further to minute B.3273(a), the Chairman reported that at their meeting on the 22nd February 2016 the Employment Committee resolved to adhere to the current formula consisting of 50% CPI and 50% AWE for 2016/2017 and that a salary award involving an increase of 0.5% in respect of the Commissioners' employees took effect from the 1st April 2016.

The Chairman reported that, in accordance with the decision of the Employment Committee at that meeting, a formula consisting of 50% RPI and 50% AWE, each index being calculated as the average of their published monthly values from January to December in the previous year was recommended to be used to determine pay awards from 2017/2018 to 2019/2020.

Mr Sutton asked what difference this formula would have made this year. The Chairman advised it would have been 1% not 0.5%.

Mr J Heading felt it important to get the formula correct. Mr S Whittome reported the formula originally included RPI and was changed to CPI because it was felt more accurate as

the way in which the Government was thinking. Mr Bliss wondered if there was a movement to do away with RPI. The Chief Executive confirmed that the formula was a matter for the Board. Mr J Heading felt that the Employment Committee should reconsider in the light of the potential removal of RPI.

RESOLVED

That the salary/wage formula for 2017/2018 onwards be referred back to the Employment Committee.

b) Travelling expenses

Further to minute B.3273(b), the Chief Executive reported that the travelling allowances payable to Middle Level employees from the 1st April 2016 would remain unchanged for 2016/2017.

c) Applications for re-grading

The Chief Engineer referred to an application received from Mr J Carlile, which he had discussed with the Operations Engineer.

The Chief Executive referred to a letter received from Mrs T Driver and Mrs C Russell.

RESOLVED

That these applications be deferred for discussion at the next meeting of the Board.

B.3328 Local Government Pension Scheme

i) Further to minute B.3274, the Chief Executive reported that the contributions made by the Commissioners in respect of employees in the financial year 2015/2016 was £314,069 and that the contribution rate for the year was 31%. He also reported that for the financial year 2016/2017, the contribution rate would be 31.8% with contributions to be made by the Commissioners in respect of employees estimated to be in the region of £325,000. The Chief Executive further reported that the Pension Scheme is due for the triennial valuation in 2016 which will affect the contributions payable by the Commissioners from 2017/2018.

ii) Auto enrolment pension scheme (NEST)

a) Further to minute B.3275, the Chief Executive reported that the enrolment in the NEST scheme commenced in October 2015 and that the contributions made by the Commissioners in respect of employees in the period 1st October 2015 to 31st March 2016 was £1,918 and that the contribution rate was 3%. For the financial year 2016/2017, at the contribution rate of 3%, the contributions to be made by the Commissioners in respect of employees will be in the region of £6,000.

b) Members gave consideration to the contribution rate payable by the Commissioners in respect of employees in the auto enrolment pension scheme as from 1st October 2016.

RESOLVED

That the Commissioners' pension contribution remain at 3%.

B.3329 Chief Executive's Report

The Board considered the Report of the Chief Executive.

The Chief Executive asked for the Commissioners' view of the abstraction proposals and particularly the Defra proposed longer term aim of transferring greater powers to IDBs. The Chairman felt they were not particularly welcome. Mr R Brown felt that this would cause problems. Mr J Heading reported that these proposals had been raised at the recent ADA meeting, where they were rejected. Mr S Whittome felt that they could upset relationships with IDBs.

The Chairman reported that the closing date for applications for the post of Chief Executive had now passed and that the Executive Committee would be deciding how to take the matter forward. In response to Mr Allpress, the Chairman indicated that the Committee would draw up a short list and arrange interviews in the next few weeks.

The Chief Executive referred to the retirement of his Secretary at the end of June after 45½ years' service and that Mrs Katie Hunt had now been offered the post at the salary as indicated on the Supplementary Schedule.

The Chief Executive also referred to Mrs Marion Eady covering the post of one of the Finance Officers who would be taking maternity leave from July at the salary as indicated on the Supplementary Schedule. The Chief Executive reported that Mrs Eady's position would be covered by temporary agency staff.

The Chief Executive updated the Commissioners on the recent Environment Agency/IDB Strategic Meeting.

The Chief Executive referred to the proposals for Project Hereward and advised the Board that, in the course of their discussions with the Project Team, the Environment Agency had apparently raised the question of whether, if the channel is restored to navigation, Horseway Lock could effectively become the flood defence structure, with Welches Dam Lock being done away with, at least in its present form. He confirmed that he had informed the Environment Agency that the Commissioners would not consider this acceptable.

In response to Mr S Whittome, the Chief Executive confirmed that the proposal to use Horseway Lock as a flood defence had been objected to and was an Environment Agency not Project Hereward proposal.

The Chief Executive reported that details of the World Angling Championships had only just been received from the organisers and that whilst there was no objection to the lengths of watercourse (Main Drain) being used, he had more concerns over the use of the Commissioners' owned banks. He felt that the organisers should be required to liaise with the bank tenants direct, to reimburse the Commissioners for all losses or costs incurred and be required to have insurance in place to cover any damage to the Main Drain or its' banks.

The Chief Executive referred to an e-mail dated 26th April 2016 received from Mr and Mrs Klimczuk regarding installing a landing stage and bank erosion defence at Kings Dyke.

The Chief Executive raised the question of Board policy and the issue of the Commissioners being left as landowner if the structure fell into disrepair. Mr Garratt wondered about a bond for this work. Mr Latta thought the existing policy should remain.

The Chief Executive and Chief Engineer confirmed that landing stages so far permitted on the Commissioners owned banks were for public use.

RESOLVED

- i) That the Report and the actions referred to therein be approved.
- ii) That the response of the Chief Executive to the Defra Consultation on Water Resources Licensing be approved and the actions of the Chief Executive generally in the matter be approved.
- iii) That the Commissioners do not at present support proposals for IDBs to administer Water Resources Licensing.
- iv) That the Executive Committee's decision to join the Sector Led Auditor Appointment body be approved.
- v) That the Executive Committee be empowered to make the necessary arrangements for the appointment of and to appoint the new Chief Executive.
- vi) That the Commissioners' appreciation of Mrs Melton's services be recorded in the minutes and that a suitable gift be purchased.
- vii) That the appointments of Mrs Katie Hunt and Mrs Marion Eady be approved.
- viii) That Mrs Hunt be enrolled in to the NEST Pension Scheme.
- ix) That Members of the Project Hereward be invited to give a presentation at the next meeting of the Board.
- x) That the Chief Executive's recommendations regarding the World Angling Championships be approved and the organisers advised accordingly.
- xi) That permission for a private landing stage at Kings Dyke be refused.

B.3330 Executive Committee

Members considered the minutes of the meeting of the Executive Committee held on the 27th January 2016.

The Chief Executive drew attention to the Executive Committee's recommendation that the outstanding balance for the costs incurred removing the sunken boat at Kings Dyke be written off.

With regard to the Upwell Precept Subsidy, the Chief Executive reported that he had confirmed the position to the Upwell IDB Chairman who was satisfied and had confirmed that a meeting was not required.

RESOLVED

That the Executive Committee's minutes and recommendations be approved and that the Commissioners be recommended to write off the outstanding balance of £1,421.50 relating to the sunken boat at Kings Dyke.

B.3331 Chief Engineer's Report

The Board considered the report of the Chief Engineer, viz:-

Middle Level Commissioners



Engineer's Report

Report on Engineering Period
April 2015 to March 2016

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APPENDIX 1 - *Rainfall 2015/2016*

APPENDIX 2 - *Hydrology and Pumping 2015/2016*

APPENDIX 3 - *Rainfall and Pumping at St Germans and Bevills Leam*

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APPENDIX 9 - *Sheffield Hallam University Report*

ENGINEER'S REPORT APRIL 2016

April 2015 – March 2016

1. Executive Commentary

This section broadly summarises the key activities of each of the three engineering departments serving the MLC and client IDBs. It is intended to provide an overview of work carried out during the above period and that planned for the future.

A brief summary of progress on the Middle Level Strategic Improvement Scheme and progress on grant-in-aid applications is also included.

TECHNICAL SERVICES DEPARTMENT

The work carried out by the Technical Services Department during the last twelve months can be briefly summarised as follows:

On a consultancy basis:-

Land Drainage Channel Improvement Works South of the A47

Consultants acting on behalf of the Highways Agency have confirmed that they have been instructed to commence with scheme design with a view to construction works on the upsizing of a culvert under the A47 taking place in the next financial year. Accordingly the EA was asked if the time was right to complete the business case for the IDB downstream channel improvement works. The response was yes and the Hundred of Wisbech IDB was therefore asked if it wished the MLC to proceed with the required work on this basis. The IDB responded yes and work is in hand.

Stow Pumping Station

The MLC have developed a business case for a replacement pumping station for the Downham and Stow Bardolph IDB ready for a grant-in-aid application. This project is expected to cost £1.5M with grant funding identified by the EA for 2016/17 onwards.

Washways Pumping Station Refurbishment

This scheme for the Warboys, Somersham and Pidley IDB is complete.

Ransonmoor Pumping Station Refurbishment

This scheme for the Ransonmoor DDC Board is substantially complete.

The Department has been trialling revised methods of dealing with planning applications and early indications are that response rates, whilst remaining low, have shown some signs of improvement.

WORKS DEPARTMENT

Water Resources and Control of Water Levels

Spring/Summer 2015

April was a 'drier than average' month in 2015. Summer water retention levels within the Commissioners' Bevills Leam and St Germans ponds were established early in the month, while water supplies were plentiful from the EA Peterborough Nene through Stanground Lock intake. IDBs were invited to consider their early season water management plans and intake actions during this time via the text messaging system.

Demand on water resources for irrigation remained low throughout May; with above average rainfall totals being recorded. However drier weather prevailed during June, which led to intake

restrictions from the EA Nene at Stanground, resulting in both voluntary IDB slacker closures and an enforced 4 night irrigation restriction being brought into force. The 4 night irrigation restriction in place from 24th June to 6th July allowed levels to recover sufficiently, to a point where the restriction could be removed. The dry weather continued until the last week of July, when heavy localised thunderstorms reduced abstraction requirements significantly.

The remaining months, although proving problematic for growers waiting to harvest combinable crops in dry conditions, proved to be uneventful in terms of pumping and water level management.

Lower winter retention levels were gradually achieved in both Bevills Leam and St Germans ponds during the first two weeks of September, and maintained by automated pumping to pre-set parameters.

Autumn/Winter 2015/16

Rainfall throughout October, November and December was around average. Winter retention levels were maintained, again using automated pumping. January was mild and slightly wetter than the Long Term Average, resulting in the Soil Moisture Deficit level remaining at around 10mm for much of the month. February continued with average rainfall. A notable rainfall event on 9th March produced a catchment average of 27mm of rainfall. Early event reactive pumping required all 6 pumps to be operated at Bevills Leam Pumping Station for around 17 hours to cope with the flows in the western areas of the Middle Level catchment. The intensity of the rainfall led to a small volume of water backing up upstream at the Control Sluice and entering the Commissioners' flood storage area within Natural England's Nature Reserve at Wood Walton.

At the time of reporting, EA projections indicate that both ground water and EA river flows are generally around average for the time of year. It is still too early to predict conditions for water resource management later in the irrigation season, but the recent rainfall during March and current water availability indications from the EA controlled River Nene should at least be beneficial for early season irrigation

Banks and Channel Maintenance Dredging and Bank Raising

Programmed maintenance dredging works were undertaken on the Catchwater Drain from Manor Farm Bridge to Great Raveley Drain Junction. A Contractor's long reach machine was also employed to remove submerged aquatic weed from Monks Lode, Great Raveley Drain and Pigwater water channels during autumn 2015. Maintenance dredging works were undertaken during the winter period along Whittlesey Dyke, from Whittlesey Sewerage Treatment Works to a downstream extent of Lattersea Hill Farm paddocks. Submerged aquatic vegetation and filamentous algae (cott) growth was also removed from Old Pophams Eau, and the Horseway Arm of the Forty Foot River. Marginal vegetation was removed using a Contractor's hydraulic machine from New Dyke, between Connington Brook and Holme Winding Hole, and Yards End Dyke during February.

Dredging of Well Creek

Resultant spoil arising from the first phase of Well Creek dredging was left to dry over the summer months and bucket spread thinly on the adjacent arable land. Extraneous debris within the dredged material was hand-picked from the spoil and removed from site for disposal, completing the first phase of the works.

Notices of entry were sent to affected adjacent landowners/occupiers for the second phase of bankside dredging which commenced in January 2016, and extended from Thurlands Drove Junction to New Bridge. A one day free trial/assessment of a Contractor's silt pushing boat was accepted, with the timing coordinated to make use of the long reach machine already on site so that it could remove the 'pushed' material from the watercourse. The dredged material has been left on the arable field area to dry out over the summer months.

Well Creek - Bank Subsidence

A meeting with Elizabeth Truss MP, Engineers from Norfolk County Highways Department, and members of the Well Creek Trust has been attended by the Commissioners' Operations Engineer. The Highway Engineers agreed to inspect the areas of subsidence along Town Street Upwell in the near future. At the time of reporting the bank remains in an unstable condition, but does not pose a flood risk or navigational issue.

Banks and Channels Weed Control

Last year's conservation cut commenced in mid-March 2015 and was completed during the first week of April. Two subsequent Health & Safety rounds were undertaken during May and June. The grass sward during this time was particularly dense and heavy due to favourable growing conditions. The Main Cut commenced in mid-July. Progress could best be described as steady and forward speeds and subsequent work rates reduced, reflecting the dense grass sward that was evident through the system. All bank mowing work was completed in December. This year's conservation cut has been completed with the assistance of the long awaited new Spearhead machine (see cover photograph).

Herbicide Trials

An update received from Dr Jonathan Newman from CEH Wallingford indicates he anticipates no issues with the continued use of Glyphosate for emergent aquatic weed control post 2018 at the current full rate. Jonathan further comments that no evidence has been forthcoming to link applications of Glyphosate in or near water with detrimental effects on ecology.

It is disappointing to report that trials of Flumioxazin for aquatic weed control have been put on hold until a cheaper method of approval, other than the current £50K cost for a full experimental licence, can be found.

Defra had intimated in past years it was likely that it would be returning to retest previously designated watercourses within the Middle Level system during 2015. No retesting was carried out last year, and no correspondence has been received to indicate if or when they plan to return in the future.

Navigation

The 2015 navigation season passed with only one notable incident involving an unoccupied narrow boat that was subjected to suspected theft of its engine and an arson attack and subsequently sunk at Kings Dyke, Whittlesey.

Aquatic weed growth was controlled during the summer months using a combination of targeted herbicide applications to treat susceptible emergent weed growth and cutting and removal of submerged vegetation from watercourses by the Commissioners' fleet of work boats.

MECHANICAL & ELECTRICAL ENGINEERING DEPARTMENT

Along with MLC work, major overhauls and maintenance of IDB pumping plant have been completed during the period. A brief description of the works carried out over the past twelve months, together with recommendations for future works is as follows:

St Germans experienced a quiet summer and average winter. No major breakdowns have occurred but there have again been issues with the backup generator aftercoolers and one of the generator control panels is damaged through electrical shorting.

Marmont Priory Lock and the Ashline Lock Bypass weir were both dammed off for necessary repairs over the winter. Marmont Priory Lock was refurbished and the water resource control gates

on Ashline Lock have been replaced with new tilting gates which should be more reliable and easier to operate.

Major plant and motor overhauls have been completed at several IDB pumping stations and major station refurbishment schemes have been undertaken at two others as described in the Technical Services section above.

Periodic electrical retesting/remedial works at IDB installations are being carried out as and when required. The MLC offices and depot have been retested and remedial works identified are currently being carried out.

Flap valves have been refurbished at several installations. Repairs to several automatic weedscreen cleaners have also been carried out together with two major overhauls and quotations have been obtained for three new automatic weedscreen cleaners.

A third method of telemetry communication (GPRS) has been installed at Bevills Leam Station and the common controls section of the electric pumps has been replaced for improved reliability and simplification of on-load generator testing as part of the grant aided scheme.

MIDDLE LEVEL STRATEGIC IMPROVEMENT SCHEME

Meetings have been held with the EA to identify what will be required for the business case for the bank raising scheme. It is essential that this is properly defined to avoid any abortive work. It is presently anticipated that the MLC Strategy produced in 2002 will be updated but that the approach will be 'light touch' rather than a complete overhaul. This will ensure that the strategy takes account of the latest climate change predictions, works completed to date and changes in legislation and assessment, one example being the need to avoid double counting benefits.

- End of Executive Commentary -

Detailed Report

2. Water Resources & Control of Water Levels (Appendices 1, 2 & 3)

2.1 *Rainfall* – mean rainfall over the area for the reporting period was 544.9mm which is 22.01mm less than the standard average (see Appendices 1 & 2).

A notably dry month in April 2015 was welcomed by many farmers and growers for spring crop establishment. Approximately half the Long Term Average (LTA) 48% rainfall, 22mm, was recorded within the catchment during that month. May produced above average rainfall with 54mm recorded. June, by contrast, was predominantly drier than average and saw 22mm of rainfall equating to 41% of the LTA. July continued hot and dry. Daytime temperatures soared well above 30 degrees during the first week of the month. However, heavy thunderstorms during the last week of July produced localised downpours. In total 89mm of rain fell during the month (189% LTA). Near average rainfall was experienced during August, 63mm, being 117% of the LTA. Rainfall in September was around average, and produced a rainfall total of 45mm, (94% LTA). October continued as an average month in terms of LTA rainfall, with November slightly wetter than average with 67mm of rainfall recorded, totalling 120% LTA. Mild weather prevailed throughout December and into January, with very little in the way of frost or cold conditions, and with rainfall totals measuring 61mm and 69mm respectively. February although remaining unseasonably mild was dryer than average and received 32mm of rainfall equating to 87% LTA.

2.2 *Soil Moisture Deficit (SMD)* – following two drier than average months, April continued dry and ended with an SMD value of 58mm. SMD levels continued to rise slowly through May to end at 84mm. A drier than average June saw SMD values rise significantly to 139mm. This trend continued until the last week of July, when thunderstorms resulted in localised rainfall totals in excess of 50mm. SMD values peaked at 150mm prior to the heavy thunderstorms. August was closer to average in terms of rainfall. This resulted in the month end SMD value decreasing to 131mm. The SMD value during September remained virtually unchanged and returned a month end value of 128mm. SMD values fell slowly during October, ending the month at 108mm. This trend continued into November ending the month at 65mm. December and January saw falling values as would normally be expected in the wetter winter months, with month end values of 42mm and 14mm respectively. The SMD then continued to fall slowly throughout February ending the month at 10mm. Values fell again in March and ended with a month end total of 7mm.

2.3 *Water Levels (Main System)*

Summer/Winter 2015/16 – water levels were maintained relatively comfortably during the early season at maximum summer retention level. However warmer, drier weather combined with enforced intake restrictions from the EA controlled Peterborough Nene intake through Stanground Lock, for the majority of the peak abstraction season, contributed to a series of voluntary IDB slacker closures and 4 night irrigation being imposed in order to preserve statutory navigation in the Commissioners' system. The text messaging system and ability to 'micro-manage' constituent IDB's slackers and inlets again proved invaluable during this time.

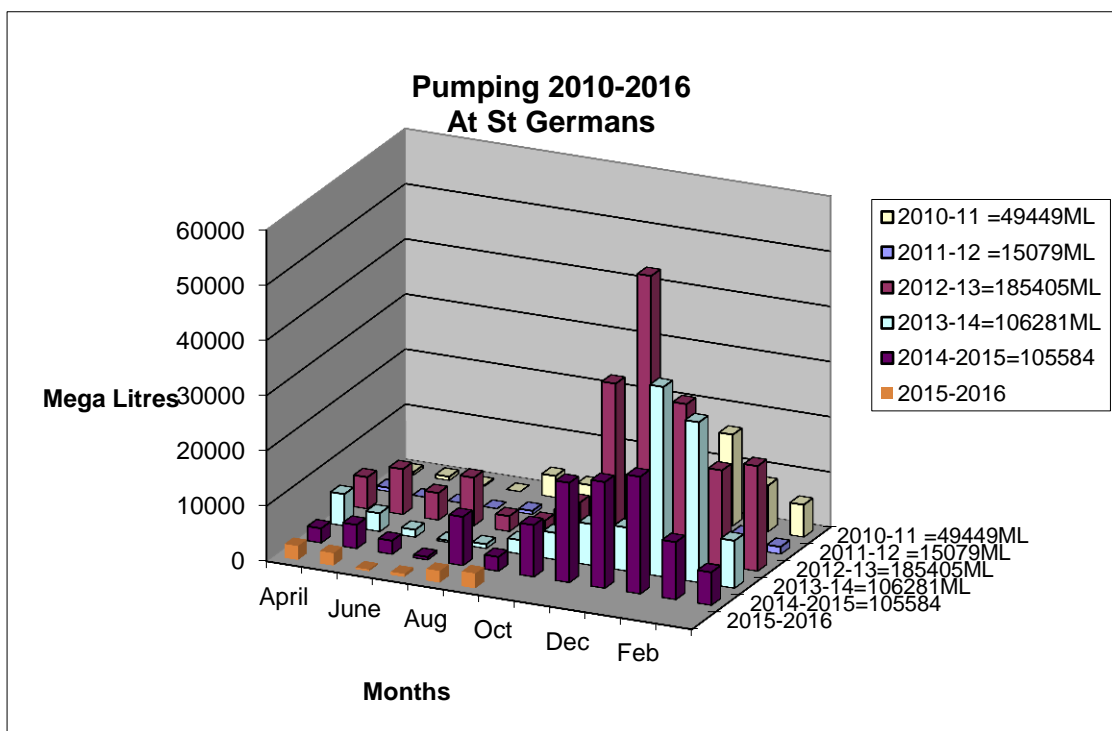
Localised thunderstorms and heavy rainfall curtailed abstraction requirements negating further irrigation restrictions during the last week of July. The remainder of the irrigation season was managed comfortably as water flows and availability within the EA Nene increased, and Stanground intake restrictions relaxed to a point where abstractors' demands could be met.

Water levels within both Bevills Leam and St Germans ponds were gradually reduced during early September, and held at winter retention level by automated pumping to pre-set pumping parameters. This remained the case throughout the winter months, with the only notable exception being a rainfall event on 9th March when approximately 27mm of rain fell,

requiring all six pumps to run for 17 hours continuously at the Bevills Leam Pumping Station to control the upstream water level in Bevills Leam pond. The pond level responded to the reactive pumping operation and fell as anticipated to normal levels with 24 hours. Some water overtopped the low bank immediately upstream of the Control Sluice on the Great Raveley Drain and entered Woodwalton Nature Reserve flood storage area. No human intervention was required at St Germans Pumping Station during or after the rainfall event other than remote monitoring of the pumping activity in its automated mode.

2.4 Water Levels (Well Creek) – water levels have been maintained in the Well Creek by pumping water into it from the Main Drain at the Aqueduct. No major issues with the electrically powered pump have been experienced this season. Water levels were lowered marginally during the recent winter navigation closure of Well Creek to allow Marmont Priory Lock refurbishment works to be undertaken. At the time of reporting, levels have been brought back to pre-set summer parameters in readiness for the 2016 navigation season.

2.5 Pumping - during the twelve month period, 61672 and 15362 megalitres of water were pumped at St Germans and Bevills Leam respectively (refer to Appendices 2 & 3).



3. Maintenance Work

3.1 St. Germans Pumping Station – it has been previously reported that the aftercoolers installed in the generator sets have been suffering corrosion problems. This appeared to be linked to rising pH levels in the coolant. Finings the original suppliers have been difficult to contact and whilst offering some assistance have recently once again been silent. It was therefore decided to investigate the root cause of the problem independently and with the aid of some European funding (free to MLC) Sheffield Hallam University carried out tests. Regrettably despite extensive tests on-site using different methods to those previously employed, the first report was inconclusive but did recommend areas for further investigation.

In parallel with the tests carried out by the University a suitable balancing agent was sourced and on the 21st August 2015 the No 3 diesel engine coolant was dosed with a chemical to lower the pH. Unfortunately during this exercise a small but significant leak was noticed and investigated (See photo).



The leak on No 3 engine is, as far as can be seen, on the aftercooler heat exchanger as was the case with No 6 engine (aftercooler exchanger replaced May 2013). The results of the dosing are very promising bringing the pH down from 11.3 to 9.76 and at the time of writing this report the coolant pH remains at this lower level. The leak on No 3 engine is manageable and so will be monitored closely but visual inspection strongly suggests a set of new cores will be required within 6-12 months.

Engines 1, 4 & 6 have also been dosed and with similar results, however the No 1 engine was found to be leaking badly and has had to be drained down. With the approval of the Board at the November meeting, Exchanger Service (who replaced No 6) was again employed to replace the leaking unit. Once fitted the generator set was filled with waterless coolant.

Following the repair of No 1 engine the old heat exchanger was sent to Sheffield Hallam University for detailed examination. The University's report (attached at Appendix 9) explains the most likely cause of the problem being linked to a stray current raising the pH level and that the corrosion was then propagated by the presence of coolant with a high pH. It is also concluded that if we use waterless coolant the reaction that takes place would not be able to occur. It is now the intention to replace the coolant in all gensets with waterless. Finnings has been advised and told that we wish to recover costs for the replacement of aftercoolers which have already failed or show signs of failure and would wish to see the remainder warrantied.

An unrelated failure also occurred on one of the gensets when a phase monitoring ring shorted. This has burnt out the control circuit which will need to be replaced. The cost may be as high as £6-£8K.

On a more positive note the Station, notwithstanding the above, has performed perfectly well over the period with no significant breakdowns or failures.

The drip trays to protect the pump MCCs were fitted and as well as providing the protection needed are hardly noticeable and therefore do not detract from the Station's aesthetic appearance.

On the 13th October trials to establish if the St Germans pumps could be confirmed as 'eel friendly' were carried out with live eels and the results were a resounding pass.

The routine deep clean was carried out during the winter months as planned. This helps to ensure that the Station is kept in a desired condition.

The pump removal table weather proofing shed, which has received planning permission, is in hand.

3.2 **Main Drain/Station Intake and Surrounds:**

Bed Level – no dredging or re-profiling has been required and none is planned for at least the next few years.

Grass Cutting – Kew Grass Care continued to undertake the Commissioners' contracted grass mowing requirements at St Germans Pumping Station last year. Light shading from the developing tree canopy should gradually discourage weed growth to a point where mowing between the trees in the planting area will no longer be necessary. This should provide a modest cost saving in regard to the grass mowing contract at St Germans in the longer term. Kew Grass Care has indicated it is available to undertake the Commissioners' grass mowing contract for the 2016 season, and has provided a competitive quotation which has been accepted.

Tree Planting Scheme – periodic inspections of the trees planted at St Germans indicate that most species are continuing to grow well. As previously reported, the Ash trees planted on site are suffering from 'Ash Dieback' and most are showing signs of the disease. The gaps created by the Ash trees' demise will provide other species with an opportunity to spread naturally to fill canopy space. The ground cover planted areas to the east and west side embankments of the Pumping Station have recently been lightly trimmed back from the sides of the building. It is not envisaged any further trimming work to this planted area will be required in the foreseeable future.

3.3 **Aqueduct Bridge** – it remains anticipated that the MLC will need to invest in maintenance works in the near future on this structure to maintain it at a standard. A sum of £25K was set aside for any works on this structure, but as mentioned in the Executive Summary it is now considered that all MLC owned bridges should be surveyed. With the Board's approval this money will now be set aside and used to help fund the surveys.

In relation to this particular structure a dive survey was carried out in 2010 by Red 7 Marine which indicated that the bridge abutments were in good condition; however signs of minor spalling at water level were noted on both sides.

3.4 **Bevills Leam Pumping Station**

Engine Overhaul Programme/Inspections – as previously reported it is currently anticipated that the three diesel engines should provide adequate service for at least another 4 years, but this remains under annual review.

Pump Overhaul Programme – the lifting and inspection of one of the pumps may take place this financial year subject to time, resources and weather.

Works to improve the common control section of the panel to improve reliability and to allow easy mains failure genset testing and on-load exercising have been completed. Additionally improvements to the auxiliary generator/controls will be carried out during the summer as the final part of the main standby generator scheme.

General – re-painting of the fuel storage tanks and the pump discharge pipework and penstock was completed within this period.

3.5 **Control Sluice** – after noting cracking near the interface of the walls, roof strapping was fitted to the building's roof to prevent it lifting during high winds.

3.6 **Navigation Structures**

Salter's Lode Lock – repairs to the horizontal top gate seal remain outstanding but are not considered urgent. They will most likely be carried out as and when any work to the hydraulic seal is required.

It was previously reported that the guillotine gate was creeping when held for a long period in the open position, however, no further issues of gate creep have been reported over the period and a monitoring stance has therefore been chosen.

Just before the Lock was reopened last year it was noted that there was evidence of a very small leakage of hydraulic fluid from one of the hydraulic cylinders. No further leakage has been observed and no further action is therefore planned at present.

Marmont Priory Lock – planned remedial work in the entrance to the Lock was successfully carried out over the winter period. Due to excessive spalling of brickwork on the eastern entrance to the Lock it was necessary to reface the wall with sheet piles and fill the resulting void with cement.



Refurbishment works on Marmont Priory Lock

Horseway Lock – it remains the case that no maintenance has been carried out on this structure for some time due to the closure of Welches Dam Lock but there continues to be progress in talks between the EA regarding the Lock and the interconnecting waterway being leased by the IWA. There is also a possibility that the IWA will assist the MLC with any works required to re-commission Horseway Lock and in an attempt to get a working relationship underway they have carried out some shrub clearance using a volunteer party being organised to remove brambles.

Ashline Lock Bypass Weir – the operating mechanism of the southern weir failed and following investigation it was found that the gate itself had seized in its guides. It was

subsequently dammed off for inspection and refurbishment or replacement. Having inspected the structure and fully considered the options, taking into account the number of times that there have been issues with the gate operation and that its design is considered poor, it was recommended to the Executive Committee that the replacement option be pursued. Following approval from the Executive Committee to proceed, quotations were obtained from three suppliers of Beamless Tilting Gates and Drop Down Weirs and subsequently an order was placed with HC Water Control for two Stainless Steel Beamless Tilting Gates, delivery and installation is planned for early April 2016.



3.7 **Weed Control on Banks & Channels**

Herbicide Trials – no further trials have been undertaken within the MLC watercourses this year. An update from Dr Jonathan Newman from CEH Wallingford, who conducted the previous trials, indicates there is likely to be a continuation of the full rate approval of Roundup Pro Biactive, (Monsanto), post-2018. This positive news follows previous concerns that the current full application rates may have been halved to meet the Environmental Quality Standard (EQS). Any further updates will be reported to the Commissioners as and when they are received.

Rigid Hornwort – late season growth of this problematic weed was experienced again in 2015. The Commissioners' weed boats were deployed in the worst affected reaches, including the Sixteen Foot and Forty Foot channels, to remove the semi buoyant weed before it could become problematic at St Germans Pumping Station weedscreen.

Azolla – sporadic growth was not evident as in past seasons. It remains unknown if colonies of the Azzolla Weevil have managed to control growth, or if growing conditions have not been conducive to its successful colonisation over the period.

Reed/Lily Spraying – was undertaken during summer 2015 when suitable weather conditions prevailed to allow lily and emergent reed and emergent aquatic weed treatments to be made in channels identified as requiring the Commissioners' attention. Watercourses treated included the Sixteen Foot, Forty Foot, Twenty Foot, Well Creek, Yards End Dyke and Catchwater Drain.

Weed-cutting (boats) – the weed cutting boats were deployed within the Commissioners' system on a priority basis during the warmer summer months, when submerged and emergent aquatic weed growth was again at its most prolific. Marginal vegetation cutting throughout the system, including the Pigwater Drain, was then completed during December.

Flail Mowing – followed the Commissioners’ pre-programmed schedule of a conservation cut of bank tops completed in early April, followed by two subsequent Health & Safety mowing rounds, undertaken in May and June 2015. The main cut commenced in mid-July, and although the progress was slowed by a heavy grass sward and some mechanical breakdown issues, mowing was completed in early December. At the time of reporting, the 2016 season conservation mowing round has commenced. The self-propelled Spearhead Energreen machine has been redelivered and is being operated in conjunction with the Commissioners’ tractor mounted top cutters and flail mowers.

Trees and Bushes clearance works have been necessary during the last twelve months along the following channels;

Old River Nene

Benwick Village - pollarding of two wind damaged Sycamore trees.

March Riverside - coppicing of Sycamore and Willow trees. Plus lower branch removal from various roadside trees to allow improved bank access for flail mowing.

March Town Centre - removal of two fallen trees from the watercourse and trimming of overhanging bushes.

Wigstones Bridge - removal of a wind-blown branch from the watercourse.

Twenty Foot River

Hobbs Lot Bridge - removal of overhanging Weeping Willow branches from the watercourse.

Well Creek

Marmont Priory Lock - removal of a Poplar tree and Ornamental Plum tree from the Lock area to facilitate remedial repairs to lock structure.

Upwell/Outwell Villages - trimming and removal of low overhanging branches from the watercourse.

3.8 Maintenance Works & Machine Cleansing, Banks and Channels

Phase I Well Creek (*Priory Corner- Marmont Priory Lock*) - the first phase of the previously reported de-silting and dredging works was completed during late summer 2015. A Contractor’s machine was hired to ‘open up’ the dredgings to allow the spoil piles to dry out thoroughly. Once dried sufficiently, the material was bucket spread over the adjacent arable field areas. Quantities of various debris removed from the channel bed during the desilting operation, were hand-picked from the levelled spoil by the Commissioners’ labour force and removed from site for subsequent disposal.

Phase II Well Creek (*Thurlands Drove Junction – New Bridge*) - the second phase of the de-silting project was programmed and undertaken in early January 2016, from Thurlands Drove Junction towards New Bridge, during a pre-planned navigation closure. This reach of Well Creek is adjacent to March Riverside public highway and required a temporary road closure to allow the Contractor’s long reach hydraulic machine access to work. Dredgings placed on adjacent arable field frontages will be left over the summer to dry sufficiently to be handled and spread and incorporated during autumn field cultivations.

An offer by a local drainage contractor (ADC East Anglia Ltd) for a free day’s trial and evaluation of its newly acquired silt pushing boat was accepted. The trial was timed to coincide with the availability of the Commissioners’ Contractor’s hydraulic long reach machine being available on site to remove the pushed silt material from the watercourse

onto an arable field at the upstream extent of the trial area. The working trial highlighted that the silt pushing technique can prove of value where the working area or bankside access for a conventional hydraulic machine is limited or not available.



Proposed Phase III Well Creek (Hall Bridge (New Bridge) – Church Bridge) – the third phase of the Well Creek dredging works is proposed to be undertaken as a continuation of the previous two years' works from Hall Bridge, (New Bridge) to Church Bridge, Upwell next winter. As this section of Well Creek is located within the residential area of the village, there is no opportunity of removing the siltation to spread onto bankside arable fields as had been achieved in the previous two phases. The location of the site will impact significantly on the overall cost of the dredging works, as it will be necessary to transport the dredgings away from the production site for disposal. A receiving site has been highlighted in the local area for material to be placed upon. Traffic management costs are also anticipated to be significantly more expensive, as access to residential houses adjacent to the dredging works will have to be maintained at all times. The estimated budget cost of undertaking the works is around £70-80K. It would be possible to reduce this estimated budget cost by undertaking a shortened length of dredging from Hall Bridge, (New Bridge) to the Methodist Chapel Footbridge. This reduced working length would bring the estimated expenditure down to around £45K.

Once dredging works extend into the lengths where bankside access is not available then consideration will be given to the long term economics of purchasing specialist equipment such as a dredging boat and silt barge or even a silt pusher. As previously reported this option is being considered for two reasons, the first being that there is extensive dredging work still required, not only in Well Creek but also through March town centre and Benwick. The second is that work can be timed to fall within quiet periods when labour is freely available, hence optimising our operations.

Catchwater Drain – last year's phased programmed machine cleansing works were undertaken from Manor Farm Bridge to Great Raveley Drain Junction using a Contractor's

long reach machine. Dredgings were removed from the channel and placed on adjacent banksides. The material was left to dry and decompose during the winter months.

Pigwater Drain – filamentous algae (cott) was removed from the channel during early July 2015, between Farcet Overspill and the Tin Dump (Great Fen Drove culvert). The prolific weed growth coincided with the warm summer weather and the peak demand for water for spray irrigation. A Contractor's hydraulic machine was deployed in early August to remove the remains of a 'Heston bale' that had been discarded further upstream and became lodged in the overspill/weedscreen at the Tin Dump (Great Fen Drove culvert).

Counter Drain (*Twenty Foot Layby – Hereford Farm*) – following the harvest of the adjacent cereal crop, windrowed dredgings, removed from the watercourse during autumn 2014, were bucket spread to allow incorporation by the owner/occupier during last autumn's field cultivations. This work completes the final phase of machine cleansing works in the Counter Drain.

Monks Lode (*New Dyke Junction – Catchwater Terminus*) – a Contractor's long reach machine was used to remove quantities of submerged aquatic vegetation from the channel. The works were undertaken during early autumn, when water temperatures were lower, thus avoiding the likelihood of deoxygenation occurring within the watercourse.

Main Drain (*Berry's Bridge – Old Pophams Eau Junction*) – bank trimming and stabilisation works were undertaken along the south west bank of the Main Drain. Approximately 80m of bank required the Commissioners' attention. Toe board and fir piles with stone revetment were installed using a Contractor's hydraulic machine.

Whittlesey Dyke (*Whittlesey Sewerage Treatment Works – Lattersey Hill Farm Paddocks*) – machine cleansing works were undertaken during December to remove siltation from the channel between Whittlesey STW and Lattersey Hill Farm Paddocks. A silt shoal immediately downstream of Manor Farm Pumping Station was removed during the works, and should improve navigational passage along the channel.

New Dyke (*Connington Brook – Holme Winding Hole*) – channel clearance works were undertaken during February using a Contractor's long reach excavator to remove silt and marginal vegetation growth from the narrow channel.

Old Pophams Eau (*Main Drain Junction – Nordelph Pumping Station*) – a Contractor's long reach excavator was used to remove accumulations of filamentous algae (cott) from the watercourse between Nordelph Pumping Station and Main Drain junction. The weed mass has been left on the bank top to dry and decompose.

Yards End Dyke (*U/S Wykes Bridge – Pigwater Junction*) – the Commissioners' Herder flail mowing machine fitted with a weed basket was used to clear aquatic vegetation from the channel.

Forty Foot River - Horseway Arm (*Horseway Bridge – Horseway Lock*) – submerged aquatic vegetation and filamentous algae (cott) were removed from the channel during the winter months. The resultant weed mass was left on the bank top to decompose.

Main Drain (*Bank Lot 17*) – works were undertaken during February to level and trim an adverse cambered bank top along the north-west side of the Commissioners' Main Drain, immediately upstream of the Aqueduct. The opportunity was taken whilst the Contractor's hydraulic machine was on site to reinstate the full width grass maintenance strip adjacent to the arable bank lot.

3.9 Clay Puddling/Bank Raising/Penetrations

Proposed Emergency Clay Puddling Store – as previously reported planning approval for the clay store was granted and the MLC were awaiting an agreement to sign from the

Wildlife Trust. An early draft document was submitted for comment, but required significant alteration as it was not considered appropriate. In response to the Clerk's comments the Wildlife Trust's solicitor submitted a revised document which was, after some further minor amendment, accepted by both parties. The Wildlife Trust has been checking with the Crown Estates, who owned the land previously, to see if there are any restrictions on the sale of the land which would preclude this agreement. Frustratingly it has been months now since the question was raised and there appears to be no answer forthcoming.

Old River Nene, Ramsey St Mary's – two separate lengths of bank seepage required the Commissioners' attention during the 2015 summer months.

The first identified, and longest length of bank seepage, was approximately 60m in length and approximately 160 tonnes of puddling clay were imported to the site along the north side bank upstream of Nightingales Corner. This was then placed into a trench in the centre of the bank. The second unconnected site, along the north-west bank between Nightingales Corner and Speed the Plough junction, was much smaller but also required a puddle trench to be dug and filled. In this instance 60 tonnes of imported clay material was used to seal the raised embankment.

Bank Raising – is proposed in four locations this year. These are relatively small in nature and represent discrete lengths of low bank which can be addressed at minimal cost; implementing them fits in with the Commissioners' previous approach of doing small works, without grant, when opportunities arise. A budget figure of £45K has been included in the estimates for these works. Locations are near to Green Vale, Exhibition Bridge, the Old Nene (downstream of Lodes End Lock) and Kings Dyke.

3.10 Bank Slips

Main Drain (Berrys Bridge to Old Pophams Eau Junction) - bank slip repair works to approximately 100m of bank along the south east side of the Commissioners' Main Drain were carried out.

Well Creek (Upwell Church Bridge to British Legion Footbridge) – the Clerk has met with Elizabeth Truss MP and advised her that unless navigation is impaired the Commissioners will take no action to repair the slip which is considered to be a landowner and highway authority matter.

3.11 Bank Penetration Surveys

As was previously reported the banks of the MLC watercourses have been inspected for pipes or other penetrations through its maintained channel banks and in excess of 300 were identified. A budget of £10K was set aside this year to start to deal with those where the MLC have direct responsibility. The first one to be dealt with was the collapsed Armco culvert entering the Catchwater drain upstream of Abbey Farm.

4. Telemetry

Provision of a third method of communication via GPRS has now been installed at Bevills Leam. This was required due to the critical function of the station that can be called to full pumping capacity in a relatively short period. Early warning of a fault is therefore essential, hence the belt and braces approach.

Communication problems were experienced with the Control Sluice outstation which required software modifications to be carried out.

Planned replacement of older telemetry outstations is being put in hand. These stations are considered beyond end of life and can no longer be repaired or relied upon over the short or medium term.

5. Property

- 5.1 **Depot** – over the period retesting of the electrics mentioned below plus some electric gate safety improvements and repairs were carried out.
- 5.2 **Offices** – nothing has been heard from Relmfield's receivers during the period and it is assumed that they will not be chasing release of retention further. Modifications were carried out to the roof/gutter interface at the rear of the building to route water discharging around the recessed solar panels into the gutter.
- 5.3 **Electrical Testing** - Portable Appliance Testing was carried out at the depot and office sites during September 2015. The Periodic Electrical Condition Report for both sites, which is required every five years, has been completed and the remedial works which were identified are complete.
- 5.4 **Salters Lode Lock House** – the heating system serving the property is a combination of oil fired and woodburner with back boiler. The wood burner requires replacement and the whole system requires modifications to meet minimum safety standards. These works are planned for the summer and will cost in the region of £6K.

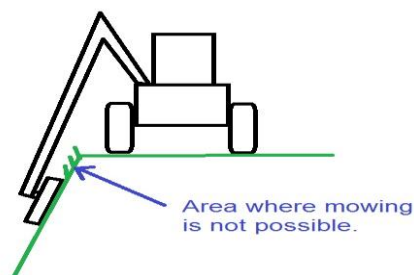
6. Plant & Vehicles

- 6.1 **General** – on the whole the plant and vehicles operated well during the period.
- 6.2 **Vehicles** – the 53 reg Nissan, which was surplus to requirements following the previous purchase of a new Toyota Hilux, was sold by auction on ebay and fetched £1,875 plus VAT. A fibreglass cab top was also sold for £51.

An order has been placed through Anglia Farmers for a New Ford Transit 350 L2-H2 to replace the 2005 registered Transit van, used by the workshop fitters; delivery is expected during April 2016. The expenditure for this will fall into the 2016/17 financial year.

- 6.3 **Mowers** – during September 2015 the Herder Grenadier MBK 513LS flail mower lost hydraulic power due to a faulty valve and at the same time the 2002 Herder flail mower cutting head drive assembly broke apart. The necessary parts for repair had to be sourced from Holland resulting in the machines being out of service for approximately two weeks until repairs were affected.

The new Spearhead bespoke flail was delivered in August but was found to be deficient in several aspects. The first seems to be an oversight in that the unit had received a larger engine to run both top mower and flail together but had only one hydraulic pump installed resulting in an either/or option only being available. The other perhaps more significant issue was that the long reach arm (17m) could not be retracted far enough such that it



in August was found to be deficient in several aspects. The unit has recently been redelivered and is currently being employed to carry out part of the Health and Safety cut. A couple of small faults have been found and at present the invoice for the machine has not been settled, although it is likely that it will be soon. Early indications on the improvements made appear positive though.

- 6.4 **Weed Boats** – the new Hemos combination mowing boat was delivered in May 2015 and operated well, after some initial teething problems. The 04 combi boat it replaced was sold by auction on ebay achieving a price of £10K plus VAT.

All boats have generally operated satisfactorily with only the usual maintenance requirements and repairs to the cutting heads being necessary.

Draft guidance, produced by The Association of Inland Navigation Authorities (AINA), for a Standard for Inland Waterway Non Passenger Vessels has recently been received which appears to be excessive when related to the weed boats we use. Hemos (the manufacturer) of our boats has been consulted and agrees with our opinion. Hemos intends to make an official CE-declaration which will also refer to the guidance produced by The Association of Inland Navigation Authorities.

- 6.5 Miscellaneous Items** – also planned for this year are purchase of a sweeper bucket for the teleporter at an estimated cost of £4K, a replacement chipper at an estimated cost of £15K, a replacement flail head for the Herder at an estimated cost of £7.5K and two trucks at £20K each.

7. Asset Records

As previously reported the EA has been working on a new asset management system (AIMS) as part of its Creating Asset Management Capacity (CAMC) project. The aim was to create a system to replace the National Flood and Coastal Defence Database (NFCDD), bringing together a register of all fluvial and coastal flood risk management assets in England and Wales into one common system. It was agreed that the information held within the ADA Asset Data Integration System (ADIS) could be exported to help populate the new system.

The IDBs were initially informed that they would be able to start transferring data to AIMS from October 2012. It remains the case that no update has been given on when access might be provided and the advice seems to be that limited web space linked with the EA's move to the Government's website is the route of the problem. Also although it was suggested that the MLC might be involved in a pilot study, which could have represented the first step towards access being offered, nothing further has been heard in respect to this.

8. Improvements and Surveys

- 8.1 *St Germans New Pumping Station*** – the only outstanding matter on the replacement Pumping Station scheme continues to be Mr Loades' land compensation. This matter remains in the hands of his agent who has made no attempt to contact the MLC for quite some time now.

- 8.2 *River Works*** – the extent of bank raising works is described elsewhere in this report.

Great Fen New Flood Storage – it remains the case that due to a long term tenancy agreement discussions will be needed with the tenants before any outline design is progressed. To date no contact has been made with the tenants but this may be triggered by works linked to the bank raising project mentioned elsewhere in this report.

Woodwalton Fen Alternative Storage - Natural England considered the use of Woodwalton Fen for flood storage damaging its ecology and hence was keen to explore options of provision of an alternative flood storage scheme. However before exploring this further it was felt necessary to complete a Water Level Management Plan review described later in this report. This review has been completed and was fully funded through grant-in-aid.

Woodwalton Fen Bank Raising – the Water Level Management Plan review referred to above has recommended, amongst other things, the raising of the fen bank at the southern end of the reserve such that it is once again returned to its design height. This would reduce the frequency of unplanned flooding of the reserve. To consider this further a survey

is to be carried out. The survey and possibly, if works are not extensive, the bank raising itself may be covered under the existing grant allocation. The release of further grant will however be subject to local EA area sign off.

8.3 *Bevills Leam Pumping Station* – the priorities for this Station remain:

1. Consider the replacement of the main pump control components that are generally now obsolete, this has been partially achieved as part of the backup generator installation and further improvements are planned by way of replacement of the Station's auxiliary generator/controls this summer.
2. Consider what to do about the Dorman engines and gearboxes for pumps 4, 5 & 6.
3. Address the lack of smoke/heat detection and fire alarm equipment.
4. Stop the rain ingress through the Station roof.

General housekeeping works continue and re-painting of the pipework and diesel tanks was carried out.

8.4 *Embankment Raising Works* – following the Board's instruction to proceed with the development of an outline scheme business case for its consideration and then, if approved, for submission to the EA for a grant-in-aid sanction approval, a number of meetings have been held with EA staff. The most recent concluded that a light touch refresh of the Middle Level Strategy might be helpful in that it would underpin the business case by addressing the catchment wide nature of the scheme. It was also noted at this meeting that the EA is changing its grant approval process such that there will be an extra step in the process. This extra step will be final financial approval (post full scheme design) prior to release of grant. This step is an attempt to avoid the issue of grant approval for a scheme being given when only early cost estimates are known. Work on preparing a specification for the strategy review has commenced.

8.5 *Benwick Scheme* – as previously reported one land owner continues to express his unhappiness with the works and put a claim in for compensation. This was passed to the District Valuer who advised that the manner in which it was presented and the lack of any supporting information meant that he could not assess it. The land owner has, as per the Executive Committee's instructions, been advised that his claim has been rejected and will not be considered unless properly submitted. No further formal communications have since been received from the land owner.

8.6 *Sixteen Foot Survey* – it is proposed that a full bed level survey be undertaken of the Sixteen Foot Drain. There is some concern that bed levels in this channel are above their design figures and the survey is needed to assess how much by and what the impact of this might be in a major event. It is proposed that this be completed in-house and the cost for this is estimated at £6.5K.

9. Environment Agency (EA) Studies/Works/Plans

9.1 *Cranbrook Drain/Counter Drain (Welches Dam Pumping Station) Strategy Study* – there is nothing further to report on this at this time.

9.2 *Whittlesey Washes* – work to reinforce the south barrier bank to meet the design standard required by the Reservoirs Act Panel Engineer are now substantially complete.

9.3 *Stakeholder representation and/or Consultation* - is maintained in respect of the following:

- i. Cambridgeshire and Peterborough Local Flood Warning Planning Group – Chief Engineer
- ii. Great Fen Steering Committee – Chief Engineer
- iii. Wet Dredgings – Operations Engineer
- iv. British Standards Institute CB501 – Chief Engineer representing ADA
- v. EA National Asset Management Technical Advisory Group (AMTAG) – Chief Engineer representing ADA
- vi. CIWEM (Chartered Institute for Water and Environmental Management):– Rivers and Coastal Group committee Junior Vice Chair – Chief Engineer
- vii. iMap - FCERM - Chief Engineer
- viii. Updating Freeboard Allowance Steering Group – Chief Engineer
- ix. AINA Wet Dredgings Group – Operations Engineer
- x. Huntingdonshire Local Plan & Water Cycle Strategy (WCS) – Planning Engineer
- xi. Fenland Local Plan – Planning Engineer
- xii. Peterborough Flood & Water Management Partnership – Planning Engineer
- xiii. KL&WN Local Development Framework (LDF) – Planning Engineer
- xiv. East Cambs Local Plan – Planning Engineer
- xv. Peterborough Planning Policy Framework – Planning Engineer
- xvi. South Cambs. Local Plan – Planning Engineer
- xvii. Fenland Developer's Forum – Planning Engineer
- xviii. March Surface Water Management Plan (SWMP) – Planning Engineer
- xix. Cambs County Flood & Water SPD Steering Group – Planning Engineer
- xx. Adaptation Of Existing Reservoirs For Flood Storage Steering Group – Chief Engineer
- xxi. EA Small Scheme Streamlining Grant Working Group – Chief Engineer
- xxii. EA/IDB Eel Liaison Group – Chief Engineer as Co-Chair

10. **Health & Safety**

10.1 ***Croner Consulting*** – continue to provide the MLC and associated IDBs with help and advice of Health and Safety issues.

10.2 ***Training was provided as follows:***

- Autodesk 2016 – 1 member of staff
- CDM 2015 : Principal Designer & Designer – 1 member of staff
- Introduction to the Flood Estimation Handbook – 1 member of staff
- PA1 & PA6 – 3 members of workforce
- Social Media – 1 member of staff
- SuDS Workshop – 1 member of staff
- SuDS & Surface Water Workshop – 1 member of staff

11. **Engineering Staff**

11.1 ***Vacancies/Appointments/Departures*** – there is nothing further to report on at this time.

11.2 ***Sickness*** – of a total staff of 13 with an approximate expected maximum of 2912 man days six members shared thirty one days sick leave between them. The relevant absences were thirteen days, seven days, five days, three days, two days and one day. The remaining 7 members of staff did not take any time off for sickness.

12. **Engineering Workforce**

12.1 ***Vacancies/Appointments/Departures*** – a review of the operative team was carried out over the period. Following consultations this review concluded that two people's positions were redundant. Both effected people were offered alternative employment. One accepted and the other elected to take redundancy and early retirement. This has left a vacancy and it is expected that this post will not be filled until the autumn or early spring.

12.2 *Sickness* – during the twelve month period the workforce of 11/10 men, with an approximate expected maximum of 2442 man days, five members shared eighty eight days sick leave . Unfortunately the extended absence of the last period has continued with a further thirty nine days being taken by the operative with a knee injury totalling sixty nine days over the twelve month period, the remainder of the absences were for eight days, seven days, three days and one day respectively. The remaining 6 members of the workforce did not take any time off for sickness.

13. Planning

13.1 *Planning Applications* – the manner in which planning applications are dealt with was amended as a further pilot. It is intended to improve this service by putting more onus on the applicants to be proactive and through the introduction of fixed charging for pre-application enquires for the most common types of development. The early signs are positive, although it is considered that it will always be a challenge to fully engage with applicants and their agents when there is often a lack of desire to treat flood risk as seriously as it is considered that it should be.

13.2 *Riverside Enhancements*

Ramsey Basin – the County Council has installed a new footbridge over High Lode and works were undertaken by the MLC to translocate water voles by improving one area of habitat and removing food sources in another (cost recovered for the County Council in full). The final step in this chain of planned works is the installation of a 180m length of piling along the southern end of High Lode on the eastern bank to create new moorings. The date for installation of this and whether or not this will be done by the MLC on a cost recovery basis remains undetermined, although at one point it was suggested that Cambridgeshire Highways would install the first third of the moorings using the money they had available. This was to be completed by the end of March 2016. No works have been carried out and the required consent document has not yet been applied for.

14. Recreation

14.1 *Navigation*

The 2015 navigation season passed with only one notable incident involving an unoccupied narrow boat that was subjected to a suspected theft and arson attack and subsequently sunk at Crease Bank, Kings Dyke, Whittlesey. When the owner had indicated he was not in a position to salvage the vessel himself, the Commissioners had no option but to undertake a recovery operation, using a specialist contractor to attend to the sunken vessel and reopen this busy Link Route for navigation. After providing the owner with a number of opportunities to offer the Commissioners a reasonable figure to go some way to recovering their costs a decision was taken to sell the vessel and it was subsequently sold on ebay.

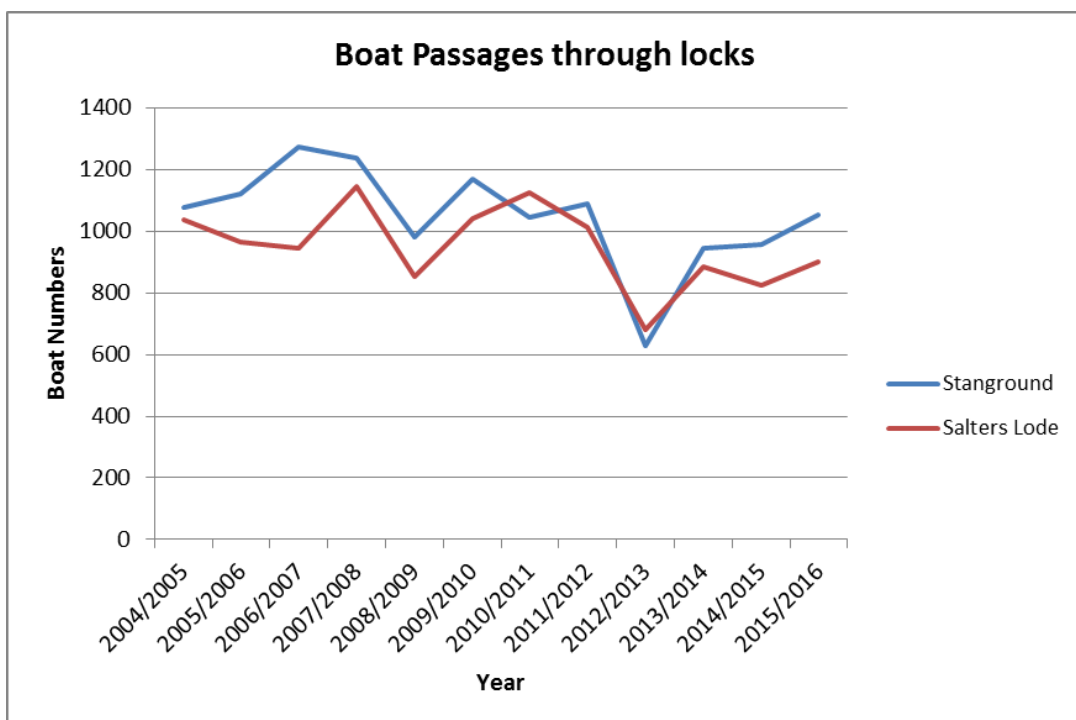


14.2 Inland Waterways Association (IWA) Volunteering

An initial approach was made to the Commissioners by the Peterborough branch of the IWA regarding volunteering works that their membership wished to undertake within the Commissioners' system. A meeting was held and identified the criteria of voluntary work and the practicalities of different aspects of work that could be achieved on such a basis. Following a site meeting, it was agreed IWA volunteers would work along the northern bank of the Forty Foot river (Horseway Arm) clearing overhanging branches and bushes from the bank under the supervision and direction of their own trained Health and Safety advisor. Following consultation with the Commissioners' Environmental Officer, the trimming works commenced in early January, and have been reasonably successful to date. It is planned works will continue along this reach next winter following the bird nesting season.

Boat Passages - boats movements through Stanground and Salter's Lode Locks were as shown below (figures for the previous year are shown in brackets):

| Boat Passages – 2015/2016 | | | | |
|---------------------------|--------------------|------------------|------------------|------------------|
| Month | Salter's Lode Lock | | Stanground Lock | |
| | In | Out | In | Out |
| April | 34 (29) | 38 (35) | 34 (47) | 43 (54) |
| May | 46 (49) | 54 (47) | 81 (48) | 79 (68) |
| June | 76 (51) | 69 (58) | 72 (58) | 89 (64) |
| July | 78 (84) | 91 (114) | 94 (88) | 89 (87) |
| August | 103 (92) | 91 (88) | 116 (104) | 109 (107) |
| September | 60 (71) | 61 (51) | 78 (73) | 61 (61) |
| October | 27 (12) | 28 (21) | 31 (30) | 27 (20) |
| November | 6 (2) | 5 (2) | 13 (12) | 6 (6) |
| December | 1 (1) | 1 (2) | 2 (3) | 3 (1) |
| January | 0 (0) | 0 (0) | 0 (3) | 0 (0) |
| February | 2 (0) | 1 (0) | 0 (0) | 1 (3) |
| March | 27 (12) | 13 (3) | 9 (10) | 18 (10) |
| TOTAL | 464 (403) | 439 (421) | 530 (476) | 525 (481) |



14.2 **Angling**

National Fishing Matches – the 2015 British Pike Championships hosted by Whittlesey Angling Association were held on Saturday 7th November 2015, along the Twenty Foot River and Bevills Leam. The event was contested by 220 anglers, landing 105 pike between them, with a combined match total weight of 548lb. The largest single specimen caught on the day weighed in at 23lb 4oz.

Club Reports – catches have continued to be reasonable throughout the year. Notable catches of shoaling silver fish including roach, rudd, dace and bream have been reported. Good catches of small fish from the Old River Nene through March Town Centre, the Benwick village to Half Penny Toll Bridge reach, and the Horseway Arm of the Forty Foot River have been reported during the winter period.

World Angling Championships – no further updates have been received regarding the likelihood of the event being held on the Commissioners' Main Drain. As time moves on, it would appear increasingly unlikely that the Main Drain will be the preferred venue on which the event is to be held. The Commissioners' position continues to be that **their support is reliant on the event being cost neutral to themselves**. Any further correspondence will be reported to the Commissioners when received.

14.3 **Middle Level Waterways Users Committee** - the Committee met on the 17th April and 16th October 2015 and are due to meet again on 15th April 2016.

15. **Conservation** – this is covered in detail in the Environmental Officer's Report.

15.1 **The Operations Manual** – this is reviewed annually. The Operations Manual summary document, to be prepared by the Environmental Officer for publication on our website, is still to be completed.

15.2 **The Commissioners' and local Drainage Boards' Biodiversity Action Plans** – are largely implemented and development of the next wave of plans is under consideration. These are likely to have a heavy emphasis on data gathering and monitoring.

15.3 **Conservation Committee** - the Committee met on the 19th March 2015, 17th September 2015 and 16 March 2016.

15.4 **Woodwalton Fen Alternative Storage** – as was previously reported Natural England considered that the use of Woodwalton Fen for flood storage has been damaging to its ecology and hence a question was raised on whether it might be possible to store the required 2M m³ of flood water on land to the south and west of the SSSI. To underpin any further consideration of this option a Water Level Management Plan review was undertaken (funded in full by grant-in-aid). This review has been completed and issued following Pier Review. It is interesting to note that there are some works that can be undertaken by Natural England and the MLC to improve the situation, which stop short of the major works originally proposed by Natural England. These include the raising of the bank at the southern end of the fen and changes in site management practices. It remains the case however that Natural England wish to see alternative storage options pursued and a meeting between them, the MLC and the EA is being arranged to discuss and agree an action plan and timetable.

15.5 **Great Fen General** – following receipt of planning permission the "Kester's Docking" project has been implemented. This extends the area of restoration carried out previously in the north eastern corner of the Great Fen area (Rymes Reedbed).

If members wish to see aerial views of some of the works going on as part of the project then these are available on www.youtube.com by searching for 'Great Fen Drone'.

In 1940 a Spitfire, piloted by Harold Penketh (age 20), crashed into the fen on a routine training exercise. In early October this year a team headed by Oxford Archaeology recovered the debris from the crash site, which had sat buried for the previous 75 years.

- 15.6 *Eel Studies*** – the EA advised that all reports on IDB pumping stations for the Bedfordshire and Cambridgeshire Area were on hold pending further advice from national on what the next action steps should be and at the time of reporting this remains the case. Advice has been issued in the interim by defra/EA stating no further grant money should be spent on facilitating eel passage at FRM assets unless maintenance or replacement works were planned on those assets. In addition it has been suggested that a proportionality and affordability test needs to be carried out to ensure any investment in provision of infrastructure for eel passage is not unreasonably large when compared to the cost of asset replacement or refurbishment. Whilst there is no national guidance on what might be considered proportional it is interesting to note that the Thames RFCC defined that this amount should not exceed an additional 5% over and above what was being spent on the asset.

The Chief Engineer is Co-Chairing an EA/IDB liaison group on behalf of ADA which is looking into the matter of eels and IDB pumping stations which have been identified as priority sites. An initial meeting was held last summer and a further meeting is planned for 19th April 2016. The Chief Engineer will report on any position changes, should there be any, at the Board meeting.

Within the St Germans pond and at the Station itself, eel movement monitoring and physical eel passage through pump trials have been carried out. As part of this exercise 21 eels were placed in the upstream intake of the pumping station and the pumps turned on. The visual results suggest that the eels were unharmed by the pumps, but specimens were taken away to be examined in a laboratory to find out exactly how they have fared during their brief journey through the station. Of surprise was the fact that 21 tagged eels were placed in the intake sump and over 40 caught in the Fyke net downstream. As previously reported the station has now been confirmed as eel friendly.

16. Publicity

- 16.1 *Navigation Notes*** - are available on the Commissioners' website.

- 16.2 *Visits*** - the following visitors were received at St Germans Pumping Station:

| | | |
|---------------------------------|---|---|
| 3 rd July 2015 | - | Worshipful Company of Farmers (Wye Reunion) |
| 20 th July 2015 | - | NFU |
| 25 th September 2015 | - | Mr R Hartle (Member of public) |
| 1 st October 2015 | - | Wisbech Valuer's Association and Kings Lynn Round Table |
| 30 th October 2015 | - | Mr C Knight (Member of public) |

To date only two visits have been arranged for this year, South Holland Growers Group on Friday 22nd April and Marshland St James WI on Monday 15th August.

- 16.3 *Media*** – the Chief Engineer was interviewed by BBC Radio Cambridgeshire for a piece on long term flood risk in the Fens and presented at the Institution of Civil Engineers Flood Summit on the 21st October. Articles appeared in the local press and a national waterways publication in relation to the recovery of the sunken vessel.

The Chief Engineer has been asked to present at the ICE Flood Expo at the Excel Exhibition Centre in October and will chair a session at the CIWEM Rivers and Coastal spring meeting in Birmingham. He has also been asked to give a presentation to the Peterborough Engineering Society in February 2017.

The Commissioners' 'Twitter' presence now has 155 followers, up from 95 last April.

17. **ICT Report**

17.1 **Hardware** – quotes were obtained from three companies for the planned main server replacement and TSG were chosen based on price and closest fit with our requirements. At the November Board Meeting a budget figure of £10-12K was approved and an order was subsequently placed with TSG (and Elite Document Solutions for the document management application transfer). All work has been completed within this budget figure. Work carried out included; supply and installation of a replacement server which hosts three virtual servers, transfer of all files to one server and the accountancy software and document management applications to another. The third virtual server is used for management purposes only. Both the accountancy and document management software versions were upgraded to the latest versions as part of the transfer process. The biggest change to arrangements perhaps was the move of our email storage and management from on-site to the cloud under a subscription service with Microsoft.

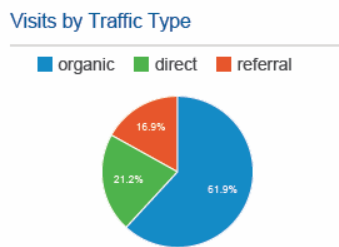
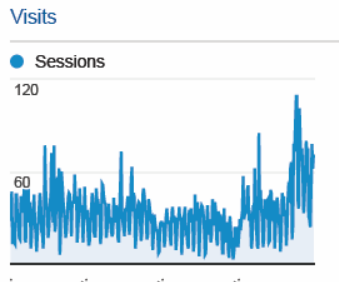
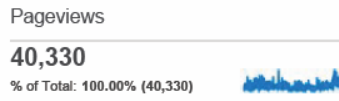
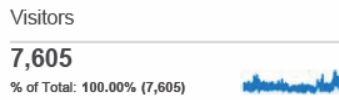
This year's plan is to replace the plotter at an estimated cost of £3K. Also, as previously advised, consideration is this year being given to when workstations should be replaced (current cost estimate £15K).

17.2 **Software** – the rating software upgrade to the South Holland developed DRS system continues to be implemented although it has taken longer than originally anticipated to get the records fully transferred and up to date. Also during the period the consultancy invoicing software TimesheetXpress was upgraded at a cost of £550 to the latest version (previous version was 2012). This addressed a problem with the number of jobs which could be generated on the scheme (this is unusually large due to us allocating a job number for each planning application we comment or offer advice on). A cloud based storage subscription service has been arranged for use by the Environmental Officer to house his extensive collection of photographs.

17.3 **Mobile Phones and Land Lines** – land line provision remains with TML at the moment but the staff and workforce mobile phone lines have been transferred to EE who offered a better deal including a larger data allowance and unlimited texts and calls. The Broadband service has been upgraded to super-fast fibre. Telemetry mobile lines remain with Vodafone as the cheapest supplier.

17.4 **Web site** – www.middlelevel.gov.uk - with 7,605 visitors this year the website use continues to increase year on year (previous year visitor numbers 6,360).

Consideration has been given to the addition of a 'member's only area' which can be accessed through the website but requires a password to gain access. Estimates for options have been obtained from the company that manage our website 'Switch'. This can be viewed in Appendix 8.

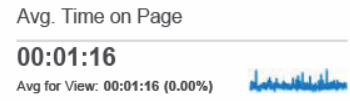
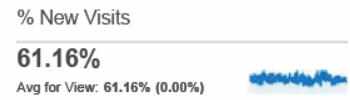


Pageviews and Unique Pageviews by Page

| Page | Pageviews | Unique Pageviews |
|----------------------------------|-----------|------------------|
| / | 6,703 | 5,216 |
| /navigation.aspx | 2,783 | 1,998 |
| /about-us.aspx | 2,584 | 1,925 |
| /map.aspx | 1,843 | 1,309 |
| /vacancies.aspx | 1,703 | 1,247 |
| /home.aspx | 1,591 | 1,093 |
| /planning.aspx | 1,495 | 1,115 |
| /contact-us.aspx | 1,418 | 1,226 |
| /internal-drainage-boards.aspx | 1,116 | 679 |
| /planning-consent-documents.aspx | 887 | 726 |

Visits and Pages / Visit by Source/Medium

| Source / Medium | Sessions | Pages / Session |
|--|----------|-----------------|
| google / organic | 6,480 | 3.44 |
| (direct) / (none) | 2,530 | 3.63 |
| bing / organic | 643 | 3.77 |
| ada.org.uk / referral | 369 | 4.60 |
| visitcambridgeshirefens.org / referral | 192 | 2.69 |
| yahoo / organic | 190 | 3.48 |



Visits by Keyword

| Keyword | Sessions |
|----------------------------------|----------|
| (not provided) | 6,461 |
| middle level commissioners | 189 |
| middle level | 49 |
| over & willingham idb | 43 |
| middle level byelaws | 33 |
| middle level commissioners march | 18 |
| middle level commissioners | 16 |
| middle level navigation | 14 |
| middle level navigations | 13 |
| www.middlelevel.gov.uk | 11 |

18. Internal Drainage Board Works

18.1 Weed Control & Channel Maintenance

Inspections/advice/assistance – recommendations on weed control were made to 14 Internal Districts. Middle Level operatives undertook herbicide applications on 12 Internal Districts, as weather conditions allowed, on a contract basis during 2015.

Maintenance Dredging and Associated Channel Works – work was organised and coordinated in 15 Board's areas.

18.2 Pumping Station Maintenance

Service Visits – the Commissioners' engineers made 290 visits to IDB pumping installations to carry out routine inspections/maintenance and/or rectify breakdowns.

Other Maintenance Works – carried out, or in progress, at pumping stations:

- Various IDB's - Automatic weedscreen cleaner repairs.
- Various IDB's - Administered IDB Insurance revaluations-complete.
- Polver Pumping Station (East Of Ouse Polver & Nar IDB) - Weedscreen cleaner overhaul-complete.

| | | |
|---|---|--|
| Mow Fen Pumping Station (East Of Ouse Polver & Nar IDB) | - | Installation of new control equipment- complete. |
| Fortreys Hall Pumping Station (Sutton and Mepal IDB) | | No 3 pump removed for repair under warranty by Zylem, now reinstalled and station fully operational. WSC major overhaul - complete. Outfall flap valves removed and overhauled –complete. |
| Bettys Nose Pumping Station (Benwick) | - | Pump to be lifted for investigation in seal leakage - complete |
| Bensons & Curf Pumping Station (Curf & Wimblington Combined IDB) | - | Automatic weedscreen cleaning equipment reaching completion, installation planned for October. |
| Skeggins Fen (Skeggins Fen DD) | - | New rising main pipework installation – complete |
| Purls Bridge Pumping Station (Manea & Welney IDB) | - | Pump overhaul - complete |
| Staffurths Bridge Pumping Station (March & Whittlesey IDB) | - | Pump overhaul - complete |

Periodic Electrical Testing – re-testing of fixed equipment and remedial works at IDB pumping stations continue as and when required.

18.3 *Improvement Works*

Projects - progress is as follows:

| | | |
|--|---|---|
| Curf Pumping Station (Curf and Wimblington IDB) | - | Weedscreen cleaner installation. Tenders obtained, order placed machine installed and operational. |
| Bensons Pumping Station (Curf and Wimblington IDB) | - | Weedscreen cleaner Installation. Tenders obtained, order placed machine complete, awaiting suitable conditions for erection, planned for late March although due to adverse weather conditions UK Power Networks postponed the works and the revised date is currently unknown. |
| Inlet Structures – modifications to inlet structures and access platforms. (Hundred Foot Washes IDB) | - | Current phase of works complete. Further phases expected. |
| Washways Pumping Station (Warboys, Somersham & Pidley IDB) | | Major improvement project complete. Tenders obtained for weedscreen cleaner installation, order placed and machine under construction. Tenders obtained for replacement control equipment, order placed, units fabricated and awaiting suitable conditions for installation, planned for April/May 2016 |

- | | | |
|---|---|---|
| Ransonmoor Pumping Station (Ransonmoor DDC) | - | Major improvement project now substantially completed final commissioning is imminent. Works included delivery pipework modifications, weedscreen cleaner and pump overhaul and replacement engine and control equipment. |
| Catchment Improvement Drainage Works at A47 (Hundred of Wisbech IDB) | - | The Highways Authority has advised that they will be progressing a scheme design and then installation of an upsized A47 culvert. EA has allocated money for 2016/17 for an IDB scheme. |
| Stow Bardolph Pumping Station (Downham & Stow Bardolph IDB) | - | Business case development for a replacement pumping station completed and submitted to the EA for consideration in terms of release of allocated grant in aid. |
| West Winch and North Runcton Parish Councils | - | |

Work organised by the Works Department and carried out by Middle Level Labour - assistance has been given with the following:

- | | | |
|---------------------------------|---|---|
| Benwick IDB | - | Herbicide application to Board's Drains. Assist contractor with new culvert and barrier installation in Board's Drain |
| Curf & Wimblington Combined IDB | - | Herbicide application to Board's Drains. Assist contractor with 35m bank piling works to Board's Drains. |
| Holmewood & District IDB | - | Flail mowing of Board's Drains |
| March East IDB | - | Herbicide application to Board's Drains. Install new stile at Binnimoor Pumping Station. Removal of fly tipped debris from District Drain. |
| March East IDB continued | - | Assist contractor with installation of drainage pipe at Bedlam Pumping Station |
| March Fifth DDC | - | Herbicide application to Commissioners' Drains. Repair damage to brick culvert headwall and Kee clamp railing at Boards drain at Foxglove Avenue. |
| March Sixth DDC | - | Herbicide application to Commissioners' Drains. Clearance of blockage at gravity outfall. Remedial repairs to flap valve. |
| March Third DDC | - | Herbicide application to Commissioners' Drains. Assist contractor with approximately 20m of bank piling works to Commissioners' Drains. Construction of bagged concrete filled bagged headwall. |
| March & Whittlesey IDB | - | Herbicide application to Board's Drains. Assist Contractor with approximately 500m of bank piling works to Boards Drains |
| Needham & Laddus IDB | - | Assist Contractor with piling works. |
| Nightlayers IDB | - | Herbicide application to Board's Drains. Assisting Contractor with approximately 60m of bank piling works. |

| | |
|---------------------------|---|
| Ramsey First (Hollow) IDB | Herbicide application to Board's Drains. Removal of self-sown saplings from Board's Drain. Assisting Contractor with culvert improvement works. Assisting Contractor with emergency cott clearance works |
| Ransommoor DDC | - Herbicide application to Commissioners' Drains. |
| Sawtry IDB | Flail mowing Board's Drains. Assisting Contractor with installation of temporary coffer dam at inlet |
| Swavesey IDB | Herbicide application to Board's Drains. |
| Waldersey IDB | - Bush cutting works. |
| White Fen DDC | - Herbicide application to Commissioners' Drains. |

19. **Engineering Fees**

19.1 **Fees** – the fee outlook for this financial year again remains steady, with the largest income generators being the two Pumping Station refurbishments and the development of the Stow Fen Pumping Station scheme.

20. **ADA**

20.1 **Meetings** - the Chief Engineer and Environmental Officer continue to attend the ADA Technical and Environmental Committee meetings. The Chief Engineer also continues to represent ADA on the BSi panel and EA/defra – national AMTAG (Asset Management Theme Advisory Group) and most recently the EA/IDB Eel Liaison Group. The Chief Engineer is also working on strengthening the links between ADA and CIWEM, given the significant crossover in areas of interest.

20.2 **The Annual ADA Conference** – will this year be held on 17th November at One Great Georges Street, Westminster.

21. **EA Sanctioned Project List**

21.1 **A list of the EA 'Sanctioned Project List'** follows, covering all MLC and MLC consultancy projects for 2015/16:

Great Fen - Water Level Management Restoration Scheme - £50K last financial year but spanning into this one, £1.2M in 2017/18 and £1.25M in 2018/19. This is for dealing with the issues relating to Woodwalton Fen mentioned earlier in this report.

Eel Escapement Assessments – various sites including £8K for St Germans and £5K for Bevills Leam Pumping Stations.

22. **Renewable Power**

At present the savings and FITs payments linked with the office PV cells installation remain ahead of predictions.

David Thomas
Chief Engineer

11 April 2016

APPENDIX 1
Rainfall
2015/2016

RAINFALL - April 2015 to March 2016

| Month | Abbots Ripton | Chatteris | March | Stanground Lock | Tebbit's Bridges/Bivitts Leam | Monthly Average | Cumulative Monthly Average | | Standard Average | Cumulative Standard Average | | Excess of rain/fall over standard average | Cumulative difference |
|-----------|---------------|-----------|-------|-----------------|-------------------------------|-----------------|----------------------------|-----------|------------------|-----------------------------|-----------|---|-----------------------|
| | | | | | | | Apr - Sept | Oct - Mar | | Apr - Sept | Oct - Mar | | |
| 2014/2015 | | | | | | | | | | | | | |
| April | 13.7 | 16.4 | 13.5 | 13.2 | 12.5 | 13.56 | 13.9 | 45.95 | 46.0 | -32.1 | -32.1 | | |
| May | 51.6 | 50.6 | 45.0 | 40.7 | 36.0 | 44.78 | 58.6 | 45.76 | 94.7 | -4.0 | -36.1 | | |
| June | 14.6 | 31.0 | 24.5 | 15.5 | 11.5 | 19.42 | 78.1 | 45.97 | 143.7 | -39.6 | -65.6 | | |
| July | 30.4 | 75.1 | 83.5 | 59.7 | 53.5 | 70.44 | 148.5 | 49.74 | 193.4 | 30.7 | -44.9 | | |
| August | 47.8 | 47.2 | 63.5 | 49.7 | 44.0 | 50.44 | 198.9 | 53.39 | 246.8 | -3.0 | -47.9 | | |
| September | 34.2 | 29.8 | 41.0 | 36.4 | 32.5 | 34.78 | 233.7 | 51.00 | 297.8 | -16.2 | -64.1 | | |
| October | 49.5 | 65.7 | 52.5 | 60.4 | 38.5 | 53.32 | | 57.83 | | 356.6 | -4.5 | -68.6 | |
| November | 58.0 | 62.0 | 60.0 | 61.3 | 59.5 | 60.16 | | 52.78 | | 431.4 | 7.4 | -61.2 | |
| December | 53.4 | 54.4 | 55.5 | 37.4 | 47.5 | 49.64 | | 43.99 | | 452.4 | 6.7 | -65.6 | |
| January | 58.0 | 55.3 | 65.0 | 77.1 | 48.0 | 60.88 | | 46.10 | | 493.5 | 14.8 | -63.8 | |
| February | 31.2 | 27.0 | 20.0 | 27.3 | 15.1 | 24.12 | | 32.94 | | 537.5 | -8.8 | -68.6 | |
| March | 58.1 | 53.8 | 59.5 | 66.9 | 75.9 | 63.04 | | 35.44 | | 569.9 | 27.6 | -32.0 | |
| TOTAL | 591.5 | 599.3 | 593.5 | 545.6 | 475.5 | 544.83 | 231.7 | 566.89 | 297.8 | 569.9 | -22.0 | -64.1 | |

The standard average is for the current standard reference period 1981-2010.

Average rainfall in recent years

| | |
|-------------------------|---------|
| April 2015 - March 2016 | 544.9mm |
| April 2014 - March 2015 | 609.7mm |
| April 2013 - March 2014 | 573.4mm |
| April 2012 - March 2013 | 754.0mm |
| April 2011 - March 2012 | 365.3mm |
| April 2010 - March 2011 | 469.8mm |
| April 2009 - March 2010 | 603.9mm |
| April 2008 - March 2009 | 690.3mm |
| April 2007 - March 2008 | 666.5mm |
| April 2006 - March 2007 | 605.5mm |
| April 2005 - March 2006 | 467.5mm |
| April 2004 - March 2005 | 602.8mm |
| April 2003 - March 2004 | 614.4mm |
| April 2002 - March 2003 | 660.0mm |
| April 2001 - March 2002 | 621.5mm |
| April 2000 - March 2001 | 759.3mm |

HYDROLOGY AND PUMPING - April 2015 to March 2016

| Month | Rainfall | | | Estimated Potential Evapotranspiration mm | Soil Moisture Deficit (month end) mm | Rain Days | | Pumping | | | | Maximum Water Levels m.A.D. | | |
|--------------|--------------------|---------------------|--------------|---|--------------------------------------|------------|--------------|--------------------|------------|--------------------|-----------------------------------|---------------------------------|---------------|----------------------|
| | Monthly Average mm | Standard Average mm | Deficit mm | | | Surplus mm | Area Average | Standard Average * | Days | Mega Litres pumped | St. Germans Equivalent Run-off mm | Bevills Leam Mega Litres pumped | Bodley Bridge | Great Ravelsby Drain |
| April | 13.86 | 45.95 | 32.09 | | 47.25 | 58 | 7 | 14 | 13 | 25.14 | 3.61 | 907 | 99.66 | 99.60 |
| May | 44.75 | 48.76 | 3.98 | | 77.54 | 84 | 22 | 13 | 16 | 2230 | 3.24 | 557 | 99.69 | 99.60 |
| June | 19.42 | 48.97 | 29.55 | | 63.96 | 139 | 13 | 13 | 3 | 317 | 0.46 | 726 | 99.67 | 99.62 |
| July | 70.44 | 49.74 | | 20.70 | 48.64 | 118 | 16 | 12 | 3 | 536 | 0.80 | 637 | 99.68 | 99.63 |
| August | 50.44 | 53.39 | 2.95 | | 40.41 | 124 | 16 | 12 | 15 | 2130 | 3.03 | 715 | 99.70 | 99.62 |
| September | 34.75 | 51.00 | 16.22 | | 38.40 | 128 | 14 | 12 | 15 | 2630 | 3.85 | 269 | 99.61 | 99.55 |
| October | 53.32 | 57.83 | 4.51 | | 35.14 | 114 | 14 | 14 | 13 | 2332 | 3.38 | 469 | 99.60 | 99.56 |
| November | 60.16 | 52.78 | | 7.38 | 8.37 | 67 | 20 | 16 | 19 | 3336 | 4.79 | 312 | 99.56 | 99.52 |
| December | 49.04 | 43.99 | | 5.65 | 16.51 | 42 | 19 | 15 | 23 | 5692 | 8.13 | 3207 | 99.60 | 99.50 |
| January | 60.88 | 46.10 | | 14.78 | 7.82 | 14 | 21 | 16 | 30 | 1743 | 25.06 | 3156 | 99.73 | 99.54 |
| February | 24.12 | 32.94 | 8.82 | | 9.13 | 10 | 12 | 14 | 25 | 5736 | 8.27 | 2177 | 99.58 | 99.52 |
| March | 63.04 | 35.44 | | 27.60 | 36.07 | 7 | 16 | 13 | 31 | 16682 | 23.97 | 4230 | 100.03 | 100.00 |
| TOTAL | 544.83 | 566.89 | 22.01 | | | | 190 | 164 | 206 | 61672 | 88.59 | 15362 | | |

* Standard average (1981 - 2010) rain days taken from available information

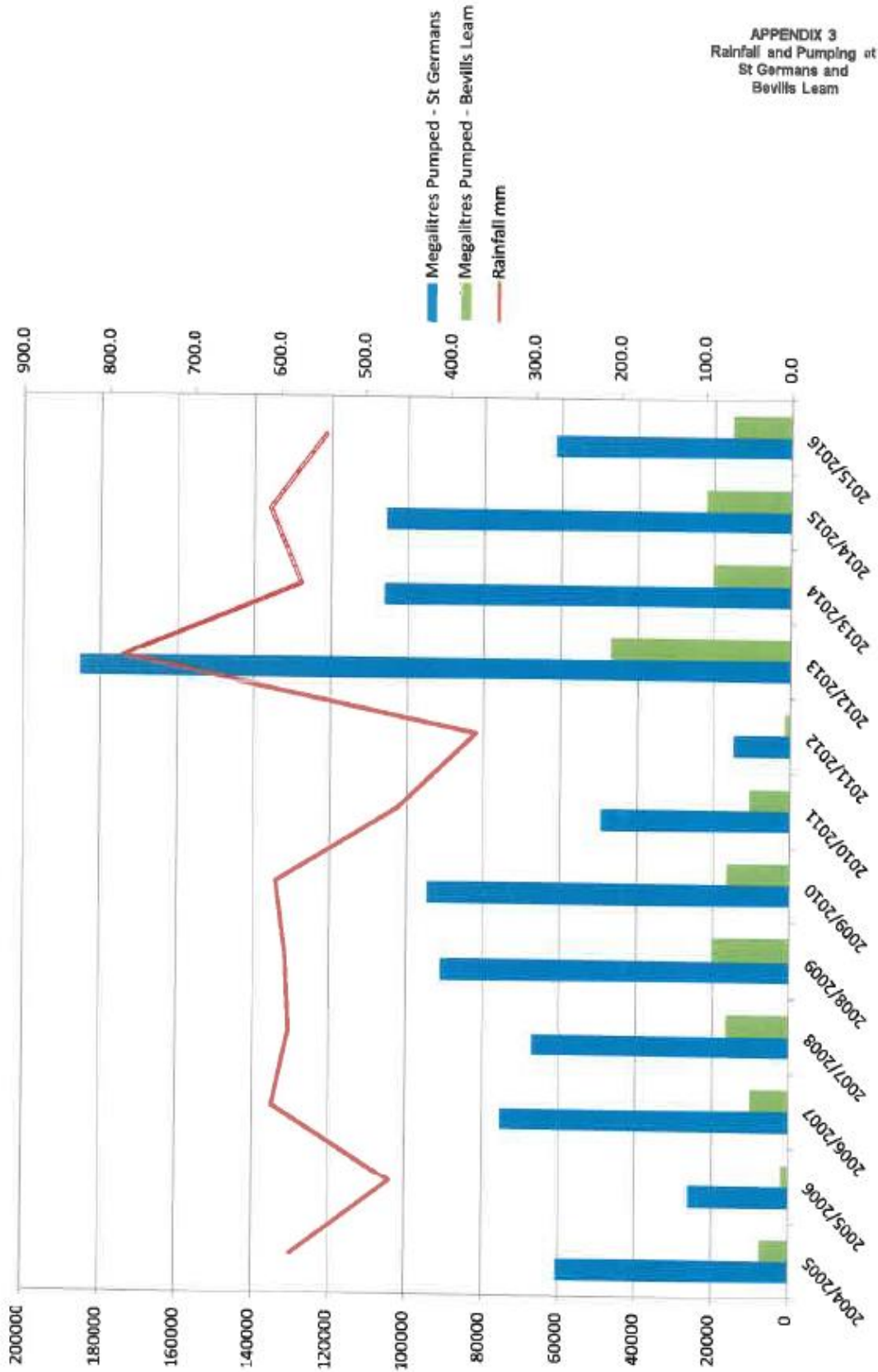
Mega Litres Pumped at St Germans

| | |
|-------------------------|--------|
| April 2015 - March 2016 | 61672 |
| April 2014 - March 2015 | 106538 |
| April 2013 - March 2014 | 100280 |
| April 2012 - March 2013 | 186408 |
| April 2011 - March 2012 | 14960 |
| April 2010 - March 2011 | 46563 |

Mega Litres Pumped at Bevills Leam

| | |
|-------------------------|-------|
| April 2015 - March 2016 | 15362 |
| April 2014 - March 2015 | 22047 |
| April 2013 - March 2014 | 20422 |
| April 2012 - March 2013 | 46951 |
| April 2011 - March 2012 | 1560 |
| April 2010 - March 2011 | 10773 |

APPENDIX 3
 Rainfall and Pumping at
 St Germans and
 Bevilis Leam



Plant and Vehicles - March 2016

| | | Date of Purchase | Approx. Hours/ Miles | Estimated Insured Value (£) | Present Condition |
|--------------------------------|----------|-------------------------|---------------------------------|------------------------------------|--------------------------|
| New Holland T5060 Tractor | AE08 LMU | Aug'08 | | 15000 | Very Good |
| Votex Mower 2 | | | 3001 | 2500 | Very Good |
| Votex Mower | | Nov'10 | 2362 | 2500 | Very Good |
| Herder Grenadier Flail Mower | | Oct.'02 | 10475 | 5000 | Fair |
| New Holland 4WD Tractor | AE04 DVP | May '04 | | 15000 | Fair |
| John Deere Tractor | FX07 BFU | Mar '07 | | 16000 | Very Good |
| Massey Ferguson Tractor | AE60 FVF | Oct'10 | | 30000 | Very Good |
| Herder Flail | | Oct'10 | 5280 | 10000 | Very Good |
| Hemos Weed Lifting Boat | | Aug.'03 | 8441 | 8000 | Good |
| Hemos Weed Lifting Boat | | Aug.'04 | 8276 | 8000 | Good |
| Hemos Combi Boat | | Nov.'05 | 6360 | 14000 | Good |
| Hemos Combi Boat | | Apr.'08 | 6816 | 16000 | Good |
| Hemos Combi Boat | | May'15 | 750 | 50000 | Very Good |
| Ford Transit | AJ55 KJN | Nov.'05 | 70445 | 1500 | Poor |
| Hilux pick-up | AK57 UFH | Sep.'07 | 85426 | 5500 | Good |
| Ford Pickup | AE58 AWH | Sep.'08 | 112730 | 3500 | Fair |
| Iveco Tipper | BL12 LCZ | Aug'12 | 14843 | 22500 | Very Good |
| Mitsubishi L200 | AE13 MDV | Apr'13 | 29019 | 12500 | Very Good |
| Ford Connect | AE63 DHU | Sep'13 | 27547 | 9000 | Very Good |
| Mitsubishi L200 | AE64 NSN | Sep'14 | 15741 | 12500 | Very Good |
| Toyota Hilux | AO64 ZNV | Feb'15 | 9049 | 14500 | Very Good |
| Ford Pickup | AM58 MWG | Dec.'08 | 105717 | 3000 | Poor |
| Nissan Navara pick-up | AO60 VOB | Jan'11 | 123750 | 8000 | Fair |
| Hilux pick-up | AU62 YAD | Sep'12 | 82313 | 13500 | Very Good |
| Ford Ranger | AE63 DJY | Nov'13 | 49300 | 18000 | Very Good |
| Ford Iveco Lorry & Atlas Crane | S411 YEW | Jan.'99 | 150921 | 13500 | Fair |
| Caterpillar Fork Lift Truck | | June '09 | | 1000 | Fair |
| JCB Teleporter | KX56 MHV | March '07 | | 27000 | Very Good |

Engineering Consultancy Fees - 2015/2016

| | |
|---|-------------------|
| Benwick IDB..... | 3,223.54 |
| Bluntisham IDB..... | 95.00 |
| Churchfield & Plawfield IDB..... | 1,086.00 |
| Conington & Holme IDB..... | 285.22 |
| Curf & Wimblington Combined IDB..... | 5,383.08 |
| Downham & Stow Bardolph IDB | 6,261.86 |
| East of Ouse Polver & Nar IDB..... | 3,847.66 |
| Ely Group of IDBs..... | 19.50 |
| Euximoor IDB..... | 169.62 |
| Farmcare | 40.00 |
| Feldale IDB..... | 368.50 |
| Haddenham Level DC..... | 246.50 |
| Holmewood & District DDC..... | 145.50 |
| Hundred Foot Washes IDB..... | 236.12 |
| Hundred of Wisbech IDB..... | 8,674.92 |
| Manea & Welney DDC..... | 976.67 |
| March East IDB..... | 4,197.33 |
| March Fifth DDC..... | 2,584.45 |
| March Sixth DDC..... | 1,364.26 |
| March Third DDC..... | 4,206.35 |
| March & Whittlesey IDB..... | 6,374.11 |
| Needham & Laddus IDB | 2,318.50 |
| Nightlayers IDB | 4,629.44 |
| Nordelph IDB..... | 90.00 |
| Over & Willingham IDB..... | 195.00 |
| Ramsey IDB..... | 150.75 |
| Ramsey First (Hollow) IDB..... | 1,731.86 |
| Ramsey Fourth (Middlemoor) IDB..... | 472.68 |
| Ramsey Upwood & Great Raveley IDB..... | 1,349.86 |
| Ransonmoor DDC..... | 5,683.26 |
| Sawtry IDB..... | 911.29 |
| Skeggins Fen (Private) DD | 78.25 |
| Sutton & Mepal IDB..... | 5,896.13 |
| Swavesey IDB..... | 3,316.38 |
| Upwell IDB..... | 1,581.17 |
| Waldesey IDB..... | 1,932.28 |
| Warboys Somersham & Pidley IDB..... | 8,825.45 |
| White Fen DDC..... | 981.40 |
| Whittlesey IDB..... | 803.25 |
| | Sub total |
| | 90,733.14 |
| Above figures do not include: | |
| Mechanical & Electrical (pumping station maintenance) | 42,102.46 |
| Third party & Pre-application advice | 17,202.72 |
| Soakaway Certificates..... | 600.00 |
| Surface water/effluent discharge certificates..... | 1,800.00 |
| | Total |
| | 152,438.32 |

Solar Panel Returns - Actual vs Predicted

assumes savings of £4K per year.

| Year | Reading | | Unit Cost (p) | Total Cost | Saving | Solar Energy Generated (KWh) | Maint. Cost | FITS (p) | FITS earned | Total Saved | Investment Minus Savings | |
|------|-----------|-------------|---------------|------------|-----------|------------------------------|-------------|----------|-------------|-------------|--------------------------|-------------|
| | Day (KWh) | Night (KWh) | | | | | | | | | Actual | Target |
| -1 | 111,500 | 29,870 | 9.77 | N/A | N/A | N/A | | | £0.00 | N/A | £28,215.00 | £28,215.00 |
| 0 | 170,507 | 49,932 | 9.77 | £6,970.71 | NA | N/A | | | £0.00 | | £22,400.73 | £24,215.00 |
| 1 | 209,556 | 66,738 | 9.77 | £4,825.13 | £2,145.58 | 24,755 | | 12.57 | £3,668.69 | £5,814.27 | £16,641.08 | £20,215.00 |
| 2 | 246,485 | 83,621 | 9.77 | £4,622.63 | £2,348.08 | 47,775 | | 12.57 | £3,411.56 | £5,759.64 | | |
| 2.5 | 273,497 | 93,604 | 9.77 | £3,239.05 | | 53,892 | | 12.57 | £906.54 | | | |
| 3 | | | | £0.00 | £0.00 | | | | -£1,212.57 | -£1,212.57 | £17,853.65 | £16,215.00 |
| 4 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | £12,215.00 |
| 5 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | £8,215.00 |
| 6 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | £4,215.00 |
| 7 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | £215.00 |
| 8 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£3,785.00 |
| 9 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£7,785.00 |
| 10 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£11,785.00 |
| 11 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£15,785.00 |
| 12 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£19,785.00 |
| 13 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£23,785.00 |
| 14 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£27,785.00 |
| 15 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£31,785.00 |
| 16 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£35,785.00 |
| 17 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£39,785.00 |
| 18 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£43,785.00 |
| 19 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£47,785.00 |
| 20 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£51,785.00 |
| 21 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£55,785.00 |
| 22 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£59,785.00 |
| 23 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£63,785.00 |
| 24 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£67,785.00 |
| 25 | | | | £0.00 | £0.00 | | | | £0.00 | £0.00 | £17,853.65 | -£71,785.00 |

53892 kWh

Total Units Generated as of 7th April 2016

£43,931.35

Predicted income at year 25 (allowing for say £10K maintenance)

* readings taken when HTS applied for

** half year readings so savings cannot be estimated

MEMBERS AREA RESPONSE

From: Jon Hurley [mailto:jon.hurley@weareswitch.com]
Sent: 30 March 2016 15:37
To: David Thomas
Cc: Kate Pollard
Subject: RE: WEBSITE

David,

Put simply yes, but the solution will depend on how individually segregated you want the board pages to be, as the standard CMS doesn't manage individual page access out of the box and instead provides with a secure area that anyone with a login can access.

Before we did any development work we'd need to bring your site into the latest version of the CMS and update its server location, which will add approximately 4 hours overhead to the job in hand. For ease of understanding I have included this within the high level time estimate for each option listed below if appropriate.

I have assumed that you would want to create and provide login details rather than offering and moderating a generic registration process on the website that any visitor could use.

OPTION A – Standard Secure Area

We assist you to create 'secure pages' with your members' content per board and these are linked to from the board pages. Clicking the link offers a username/password box before access is granted.

As there is no individual page level security, if someone did this, became "logged in" and then navigated to another board page, they would be granted access to the members page by clicking the link there without further challenge.

Estimate: 8 hours - £760 plus VAT

Option B – Individual Page Access – Simpler through Config

As Option A, expect that members once logged in would be restricted to accessing specific pages. We would achieve this through additional config on the server (IIS web.config) and therefore you would not be able to change/amend/update access through the CMS. We'd need to be involved if you created new pages, or renamed an existing page.

Estimate: 12 hours - £1,140 plus VAT

Option C – Individual Page Access – Complex through CMS

As option B, but with the configuration built in to the CMS, so that a CMS user can choose which member groups has access to a secure page. This option is the costliest but has the most flexibility moving forward.

Estimate: 22 hours - £2,090 plus VAT

Option D – Replatform

We take the opportunity to rebuild your website using Wordpress rather than our Engage CMS and take advantage of available premium third party plugins to achieve the individual member access to specific pages, and moving the content across from old to new, as required.

This would also provide the opportunity to reflect a little on the current site and make structural/design changes as required.

High level estimate: £5-6,000 plus VAT.

Feel free to let me know if you want me to chat these through with you.

Regards
Jon

MOBILE FRIENDLY WEBSITE RESPONSE

From: Jon Hurley [mailto:jon.hurley@weareswitch.com]
Sent: 30 March 2016 18:02
To: David Thomas
Subject: RE: WEBSITE

David.

If you want a responsive site (one that works seamlessly across devices) then I'd recommend the Wordpress rebuild I'd quoted, a responsive rebuild on Engage is doable but will probably end up around the same cost without taking into account any structural or design changes.

Jon

**Report of an Investigation Into
the Corrosion Failure of the After Cooler Heat Exchanger
of Engine One at St. Germans Pumping Station**

**Prepared for
The Middle Level Commissioners**

**By I.M.Fielden FRMS PhD BEng MInstP
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www.shu.ac.uk/meri



1 Introduction

The client, The Middle Level Commissioners, delivered a heat exchanger core unit, which constituted one quarter of the after cooler heat exchanger from "Engine 1", a 2,000 HP diesel generator set at their St. Germans pumping station. The heat exchanger had corroded and leaked at its soldered joints, apparently corroding from the inside.

The St. Germans pumping station is a relatively new installation, commissioned in April 2010 and consisting of six large, electrically driven pumps. These pumps are normally driven by power from the national grid, but at times of high demand or grid power failure, one or more pumps are driven by power generated by one or more of six 2,000 HP Caterpillar Diesel generator sets, housed in engine rooms on a mezzanine level above and "behind" the main pump house floor. Each pump has a dedicated diesel generator set. The six diesel engines each have two heat-exchangers ("radiators") on two separate cooling circuits, one cooling the main engine jacket, forming a cooling circuit holding 250 litres of coolant, and one "after cooler" (AC), holding 150 litres of coolant. The after cooler circuit runs at a lower temperature, reported to be a maximum of 40°C.

As the station pumps only on-demand, and usually using grid power, the engines are largely standing idle, being run for maintenance/testing purposes roughly once every six weeks, totalling roughly 20 hours of running per year. To date, only engine four has been used for "real" pumping work, and has completed a non-stop run of 80 hours, due to pumping demand higher than could be fully met by the grid power supply. This engine therefore has significantly more hours run than the others, though in terms of total hours run, it remains "nearly new". The engines are situated in clean, dry engine rooms, which are unheated, but reported to have remained comfortably above freezing, even during an outside temperature of -15°C. The engines are equipped with their own electric heating.

The engine/generator sets and coolant fluids are understood to have been supplied by Caterpillar, but the heat exchangers are understood to have been supplied by a UK company.

As-commissioned, the engines were filled with Caterpillar's "DEAC" (Diesel Engine Antifreeze-Coolant), a "traditional" water-glycol anti-freeze/coolant, containing inorganic corrosion inhibitors.

In 2013, approximately three years after commissioning, the after cooler heat exchanger of engine number 6 was found to be leaking coolant. This failure, and an investigation of the associated coolant chemistry, are the subject of an earlier report prepared for The Middle Level Commissioners and PCMS engineering.

The failed heat exchanger was replaced and the cooling circuits of engine 6 were filled with Caterpillar's "ELC" (Extended Life Coolant) an "OAT" water-glycol coolant, utilising organic acid corrosion inhibitors (as opposed to the "traditional" inorganic inhibitors). At the same time, the cooling systems of engines 1-5, and the jacket cooler of 6 were also drained of their "DEAC" coolant, refilled with water, run (in order to pump the water fill around the system), drained, filled with "Novoc" (an alkaline cleaning/flushing agent), run, drained, filled with water, run, drained, and finally re-filled with ELC.

The evidence available when the previous report was written failed to show a clear cause for the corrosion, and did not prove whether corrosion was restricted to engine 6 aftercooler, or whether it was proceeding in the other engines and/or engine 6 jacket cooling circuit (at a lower rate), or whether corrosion was or was not proceeding in the new engine 6 after cooler heat exchanger (AC 6). However, in late 2013/early 2014 use of a borescope is reported to have allowed inspection of a very limited proportion of each heat exchanger, which is reported to have shown no visible corrosion on any of the heat exchangers.

Problems were reported with ineffective earth bonding on some engines and their surrounding supporting equipment (heat exchangers etc.), as installed. In particular engine six, which suffered erratic/unwanted behaviour of the control electronics as a result. Thus engine six is not in the condition it was in at the time of the failure, as it now has effective earth bonding to all parts, including the heat exchangers.

Engine rooms 2, 4 and 6 are identical in layout, while 1, 3 and 5 are "other handed" - i.e. if the even numbers are "left handed" then the odd numbers are "right handed". Each engine room has an 11kV-to-690V 3-phase transformer located behind a concrete wall in the rear left/rear right corner. When the associated pump is running from grid power, these transformers will be carrying a load in the order of a megawatt. To the left and right of the engine rooms are the other engine rooms, except 1 (a stairwell and the control room) and 6 (a stairwell and the outside wall). Above the engine rooms is the station roof (with air intakes for the engines). Below 1-5 is a machinery space containing storage tanks and the hydraulic machinery to operate the penstocks, while below 6 is the 11kV switchroom. "Behind" the engine rooms is the outside wall, with the exhaust outlet and cooling air exhaust vent. "In front of" the engine rooms is a mezzanine walkway above the pump house floor and largely empty space, which allows crane access to the pumps on the main floor below. The electric motors powering the pumps are situated on the top of each pump, i.e. are below, and a significant distance in front of, their associated engine room. The power electronics controlling the pumps are situated below the mezzanine walkway, on the main pump house floor. In short, other than the generator powered by each engine, there appears to be no major source of AC magnetic fields (motors, transformers etc.) close enough to the engine to cause induced AC currents.

2 Visual Examination

The heat exchanger core is made up of many oval section, thin walled brass tubes, soldered into heavier gauge brass endplates. Between the tubes is welded a complex-shaped "tape" of thin metal (copper?), which forms a "zig-zag" between the tubes.

The heat exchanger appears to have leaked from multiple positions where the tubes are joined into the end plates, at both the top and bottom of the heat exchanger. This is indicated by the runs and pools of pale-brown corrosion product/deposit at these positions, and showing the paths taken by liquid escaping from these positions, figure 1.

The endplates, viewed from the side normally submerged in coolant (figure 2), are covered in copious deposits of largely pale brown corrosion product. When the corrosion product is gently scraped away, little or no solder can be seen at the join between the tubes and the plate. The corrosion product is fragile and easy to remove.

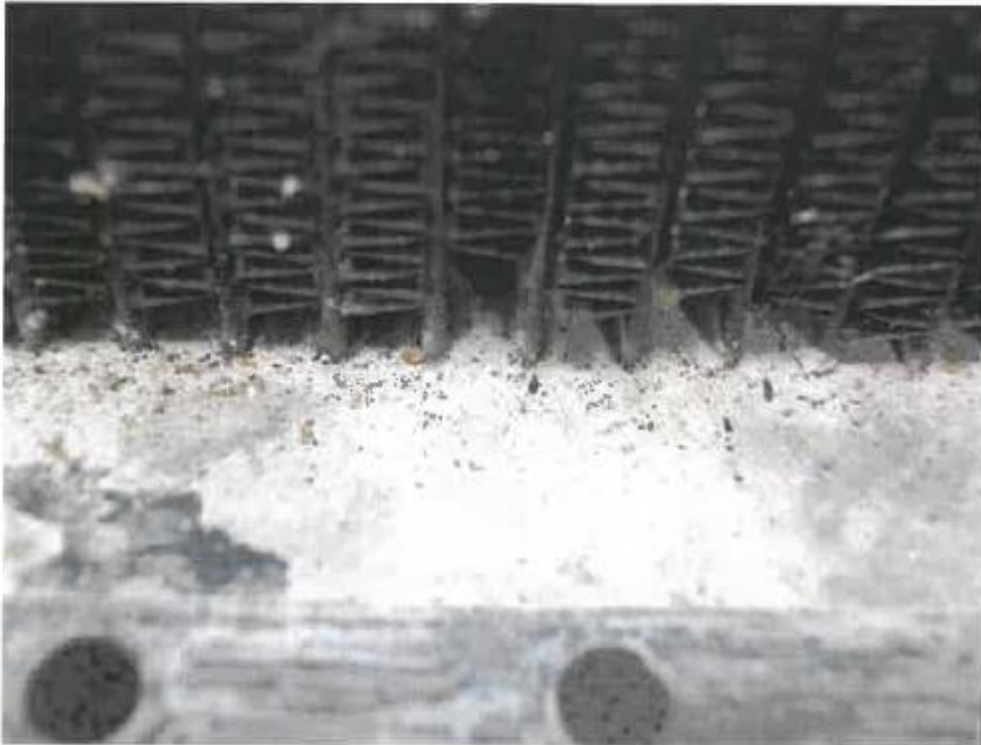


Figure 1. Bottom endplate, showing vertical tubes, "zig-zag tape" between tubes and pale brown/cream deposit on endplate. This is the surface normally exposed to air, not the "coolant" side of the heat exchanger.



Figure 2. View of heat exchanger endplate "coolant side", showing copious deposits of corrosion product.

3 Optical Microscopy

A metallographic section was taken through the joints of several tubes with the end plate, and through the endplate covering an area exposed to the coolant and an area under a sealing gasket, where coolant would not be expected to contact the metal. These were embedded in conductive thermosetting resin, then ground and polished to a 1µm diamond finish before examination on the optical and scanning electron microscopes.

The optical appearance of the tubes and plates confirmed that they were made of brass. In places where the coolant had not been in contact with the metal (on the "air" side of joints and under the sealing gasket), a thin coating of silver coloured metal was observed, (figures 3 and 4). EDX analysis (below) confirmed that this was tin.

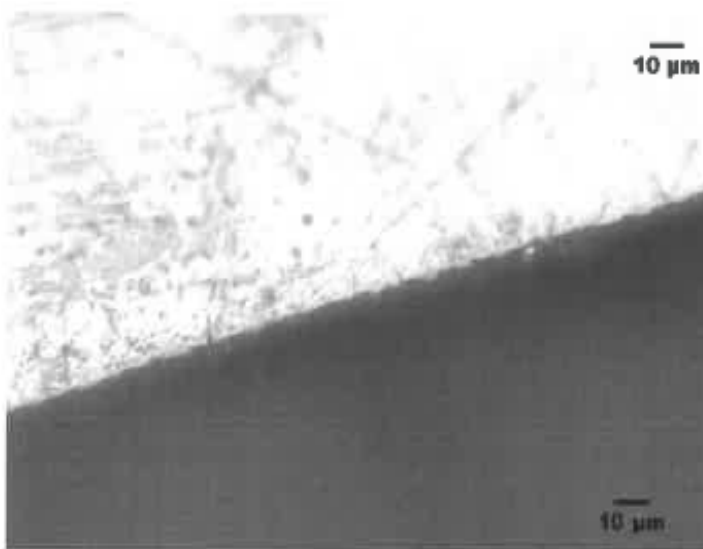


Figure 3.

Outer surface of brass heat exchanger tube, on the "coolant side" of the plate.

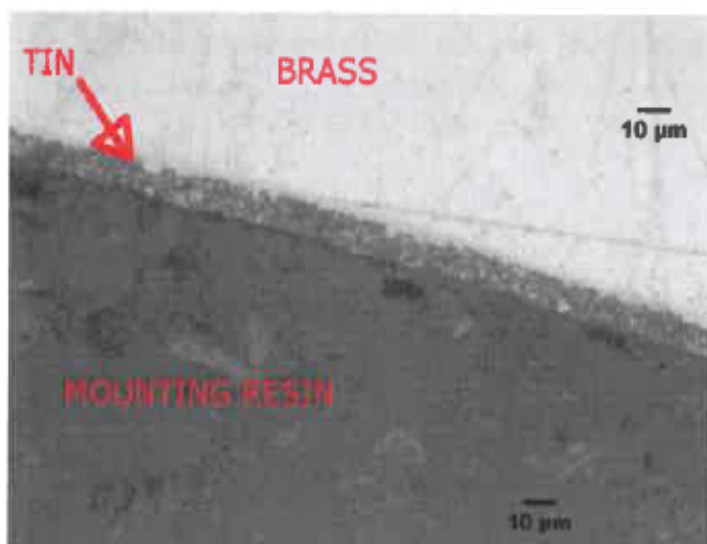


Figure 4.

Outer surface of the tube shown in figure 2, on the "air side" of plate. Note the tin coating, approximately 10µm thick. Note that the brass/tin interface is fundamentally flat, smooth and, very similar in appearance to the exposed brass surface in figure 3, suggesting little or no attack on the brass.

At the joints, no solder was observed on the "coolant" side of the plate, only a little pale, apparently non-metallic deposit (figure 5). However, the distribution of the various substances is made considerably clearer in the electron microscopy and X-ray mapping imagery, in the next section.

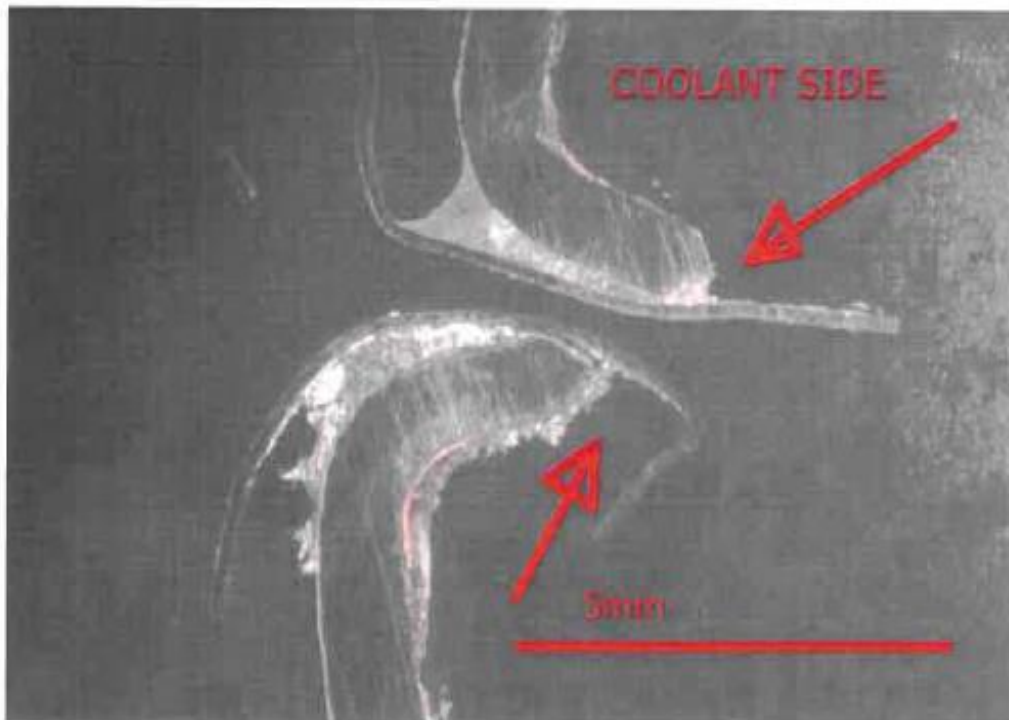


Figure 5. Optical image of a section through a tube/plate joint. Arrows indicate where solder is missing. The tube was flared open to admit the mounting resin, despite this, the pressure used has caused some distortion and narrowing of the central part of the tube sample.

In the positions where the plates had been pierced to accommodate the tubes, the plates had been bent "upwards" (or downwards, in the case of the bottom end plate), such that a lap joint was formed between the tube and the plate, rather than a simple hole through which the tube was passed. This lap joint would have been filled with solder in order to join the tubes to the plates and to make a seal. A sketch of an "ideal" joint is given as figure 6.

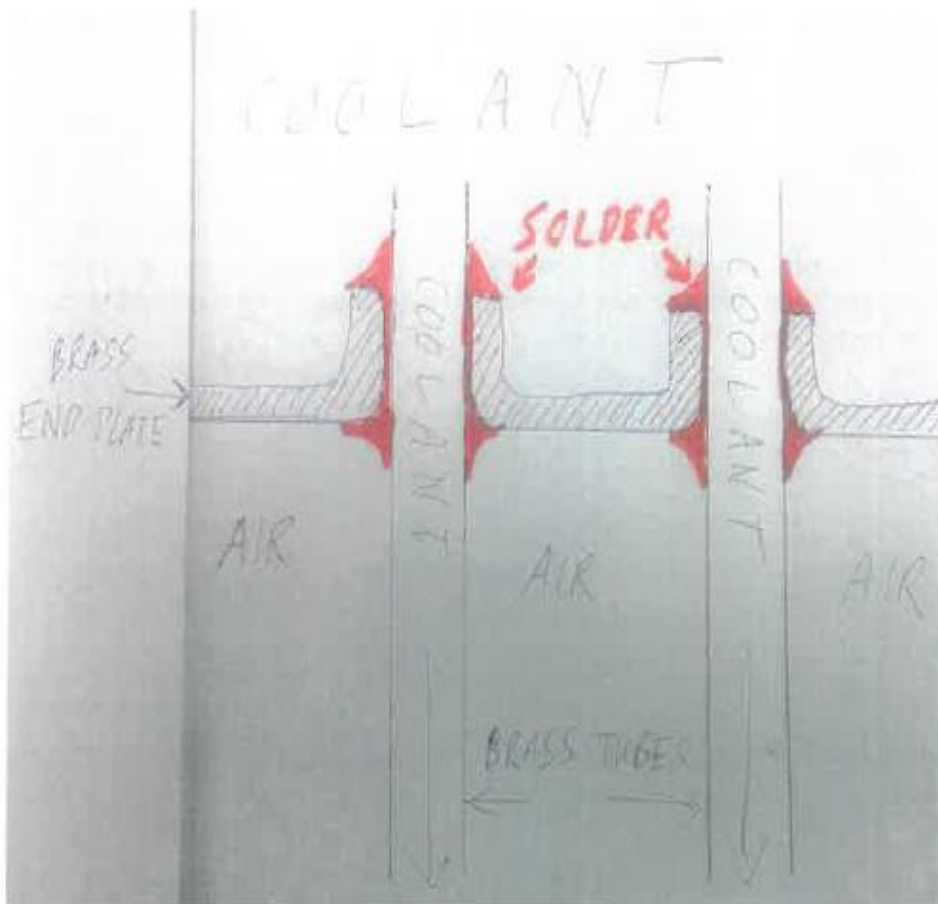


Figure 6. Sketch showing how the tube/plate joints would be configured, ideally.

4 Scanning Electron Microscopy, EDX Analysis and EDX Element Mapping

The Scanning Electron Microscope allows high-resolution, high magnification imaging, with a good "depth of field". That is to say, if the surface of the sample is rough, it is possible to get both the "peaks" and the "valleys" in focus in the same image. This is difficult if not impossible to achieve with light microscopy at medium to high magnification.

The electron microscope fires a beam of electrons at the sample and scans the beam across the sample. In addition to producing the image, when the electrons hit, the atoms in the sample produce X-rays. The energy of the X-rays produced is specific to each kind of atom, somewhat like a fingerprint. If the electron beam is stopped at one place on the sample, all the X-rays will come from the small area that is being hit by the beam. This area is normally less than 5 microns across and 5 microns deep. If the X-rays are captured by a detector that can also measure the X-ray's energy (an energy-dispersive detector) then a spectrum of the X-ray energies can be produced. From this, the operator (assisted by a computer) can tell what kinds of atoms, i.e.

what chemical elements, are present in this small surface volume and approximately how much of each element. This technique is called Energy Dispersive X-ray microanalysis, or EDX.

Further, once it is known what elements are present, the computer can be configured to scan an area and "pay attention" only to X-rays of certain energies, corresponding to the elements of interest. These are assigned arbitrary colours and the scanned area is coloured with a greater density of colour (more dots) in areas where more of that X-ray originate, and less colour or no colour where little or no X-rays of interest originate. These build up "element maps" showing the distribution or relative distribution of the elements of interest. Elemental mapping is heavily used in this report.

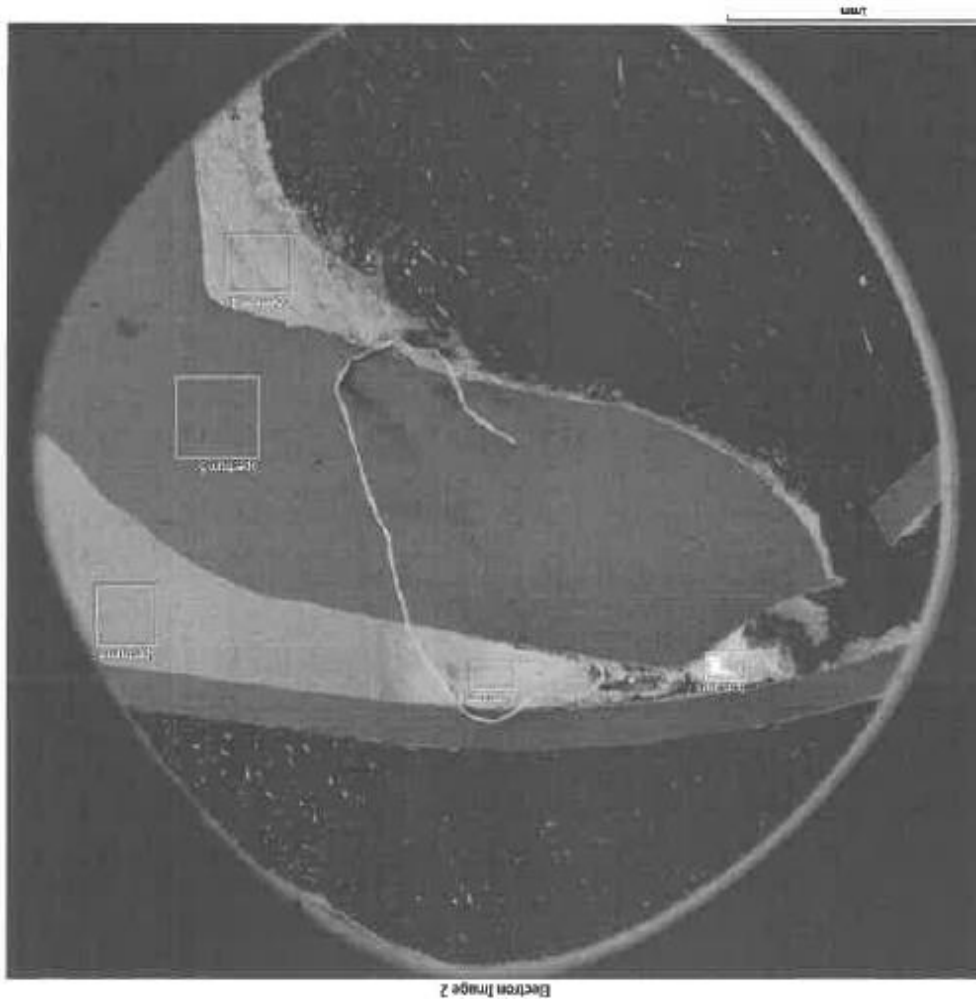


Figure 7. Electron microscope image of a section through a tube/plate soldered joint, showing areas from which EDX analyses have been taken (Spectrums 4, 5, 6, 7 & 8, shown below as figures 8-12).

Note that the image has been rotated by 180° in order to place the "coolant side" at the right hand side of the page, as it is in the other microscope images in this report.

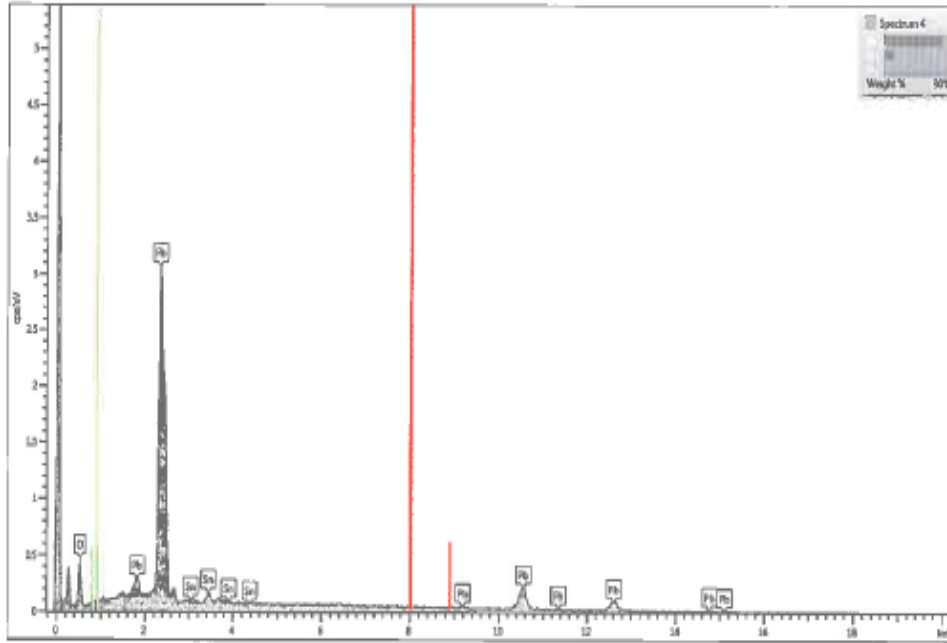


Figure 8. Spectrum 4 from Figure 7 above. The elements detected are lead (Pb) and oxygen (O), with a trace of tin (Sn). Indicating that this is corrosion product largely composed of lead oxide/hydroxide/plumbate (hydrogen is likely to be present but is not detectable by EDX).

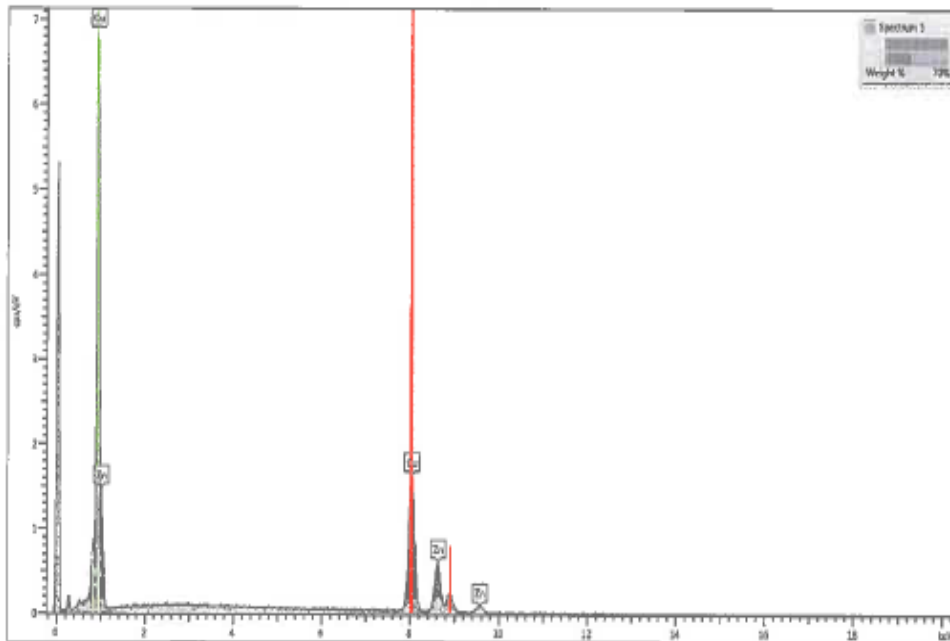


Figure 9. Spectrum 5 from Figure 7 above. The tube plate. The elements detected are copper (Cu) and zinc (Zn), in a ratio of approximately 70/30 indicating that this is 70/30 brass.

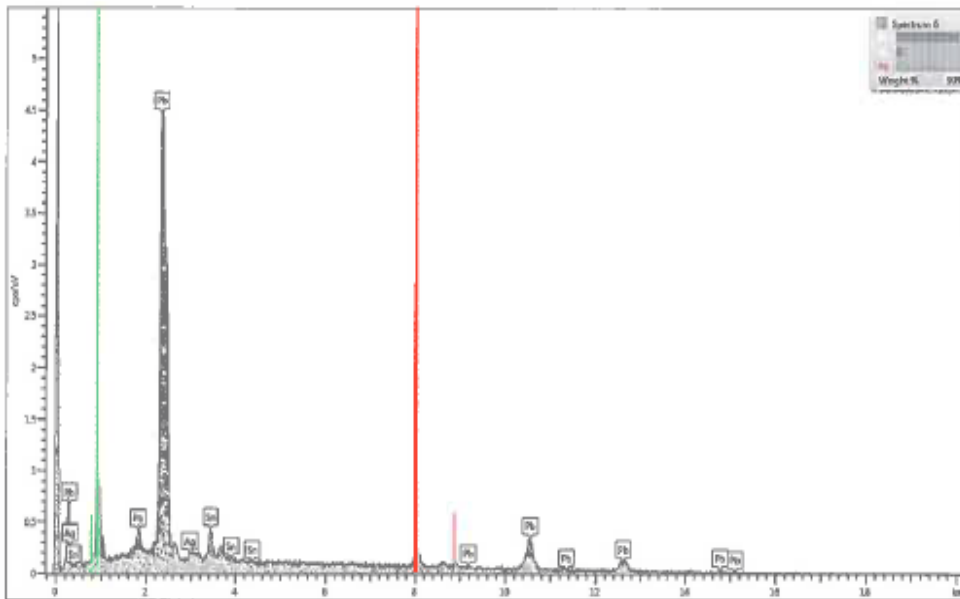


Figure 10. Spectrum 6 from figure 7, above. An area of solder, unaffected by the corrosion. The detected elements are lead (Pb), the majority constituent, tin (Sn), and a detectable trace of silver (Ag), which is frequently found in trace quantities in lead. Also present (unlabelled peaks at about 0.9 and 8 keV) is copper (Cu), which has presumably transferred from the brass during sample polishing. Copper is not found at other positions in the solder. The analysis computer estimates the lead:tin ratio as about 90% lead, 10% tin (by mass). Thus it seems that the solder used was a solder of 95-85% lead, 5-15% tin, most likely 90/10.

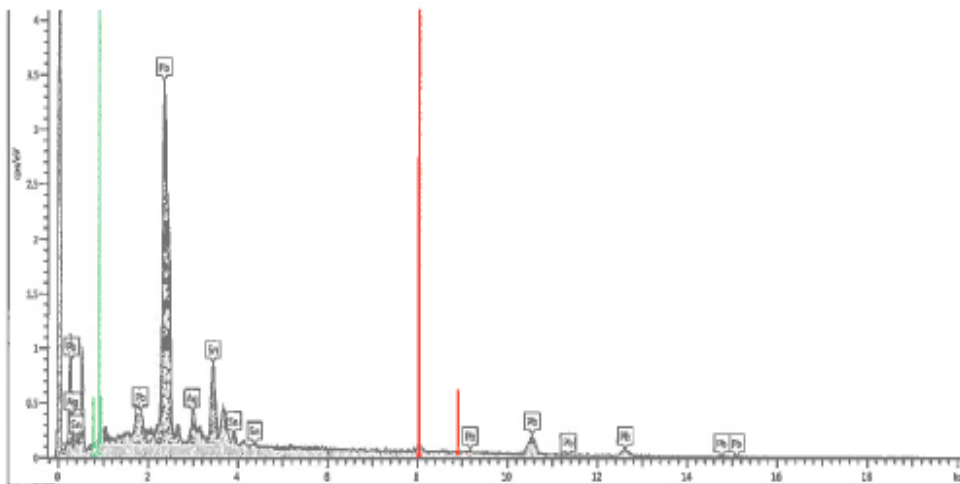


Figure 11. Spectrum 7 from figure 7, above. Corrosion product. The detected elements are lead (Pb), tin (Sn), oxygen (unmarked peak of height 1 at 0.5 keV) and silver (Ag). This analysis suggests that the corrosion product is enriched in tin and silver and depleted in lead, relative to the original solder. This is contradicted by spectrum 4 above, and by other results shown below, indicating that the composition of the corrosion product is not uniform.

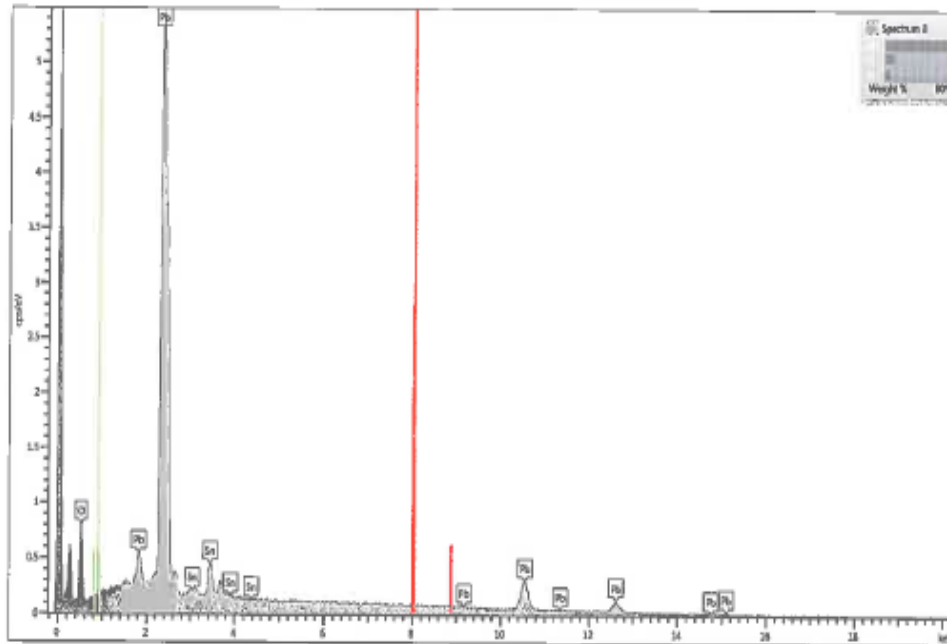


Figure 12. Spectrum 8 from figure 7, above. Corrosion affected solder/early stage corrosion product. Elements detected are lead (Pb), oxygen (O), and tin (Sn). It is unclear from this analysis and spectrums 4, 6 & 7 above, whether the first stage of corrosion preferentially attacks the tin, the lead, or both equally. This question is resolved by element mapping results, shown below.

Figure 13 A-F below, like figure 7 above, shows a section through a tube/plate joint, including the remaining solder and the corrosion products that partly occupy the space where the solder once was.

Figure 13 B and 13 C show that copper and zinc are confined to sharply defined areas (the brass parts) and are not found in any quantity elsewhere (though there is a little background noise). This lack of any significant copper or zinc in the corrosion product further suggests that the brass has not been attacked.

Figure 13 D shows that the quantity of lead in the solder (towards the left and top, where higher levels of tin are found), and the quantity of lead found in the corrosion product (where lead is high but tin low, towards the right and bottom (coolant side)), are similar. This suggests that the majority of the lead is not dissolving, but rather is converting in place to a solid corrosion product, which is then removed in many places, because it is mechanically weak and fragile.

Figure 13 E, and figure 14 (below) show the quantity of tin in the corrosion product/partly corroded solder trapped within the lap joint, and show that this depletes from the undamaged solder (left) towards the coolant side (right). This corrosion product is mechanically protected/trapped by the brass of the plate and the tube alongside it, so mechanical removal is not possible. Thus the tin depletion must be because it is dissolving into the liquid coolant and being carried away. This also suggests that attacking and dissolving the tin is the first stage of the corrosive action.

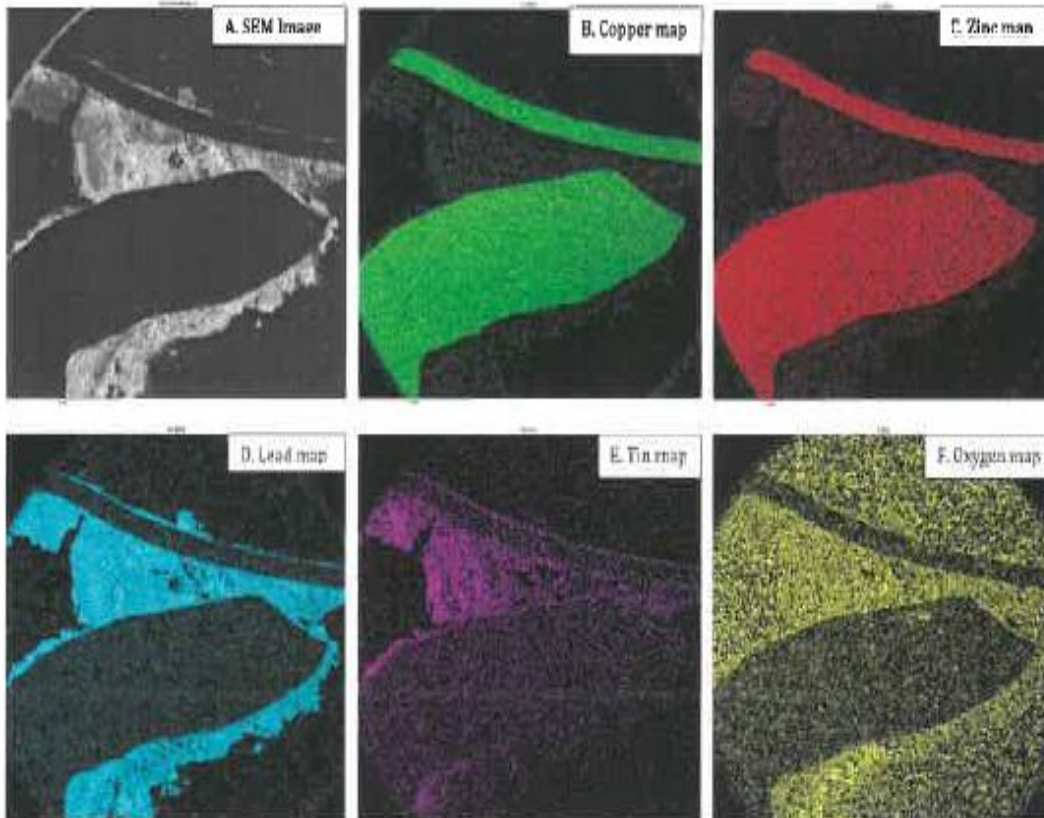


Figure 13. Electron microscope image and elemental maps of a section through a tube/plate joint. Note the gradient of tin concentration in fig. 13 E, and the near-absence of tin from the coolant side of the plate (right).

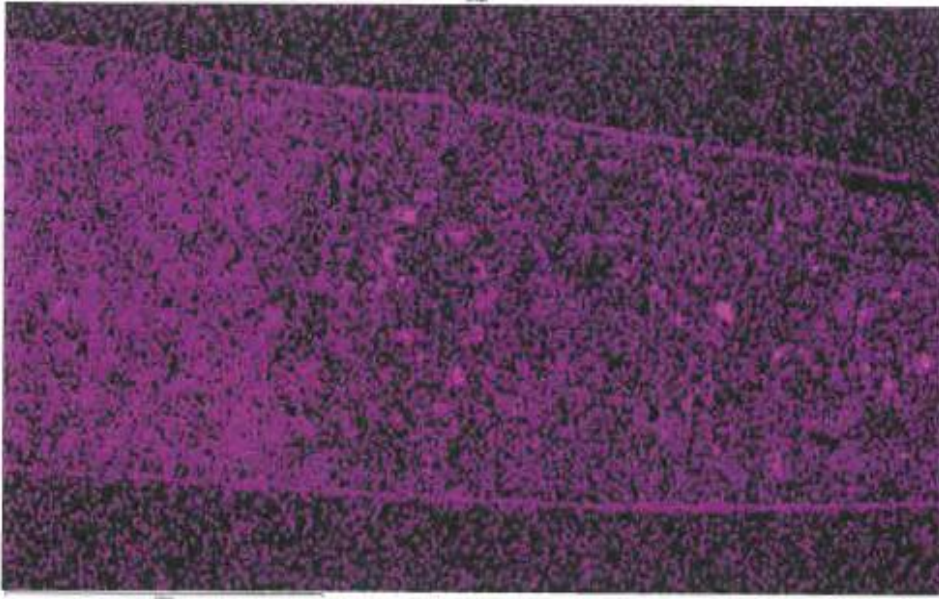


Figure 14. Tin map. Higher magnification detail of solder/early stage corrosion product (centre) trapped in the lap joint between the tube wall (below) and the plate (above). Bright lines along the surfaces of the tube and the plate are the tin coatings of the tube and the plate. Note how the quantity of tin in the solder depletes from the left (undamaged solder) to right (corroded solder, towards the coolant), with some suggestion of tin-rich particles/clumps forming.

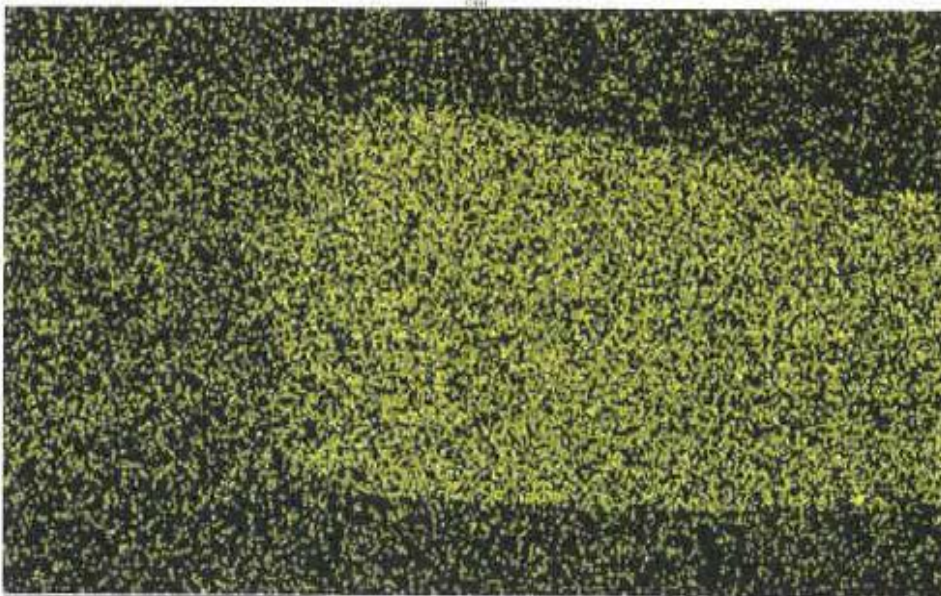


Figure 15. Oxygen map of the area shown in figure 14. Note how the quantity of oxygen increases as tin decreases, indicating a clear link between the tin depletion and the corrosion process.

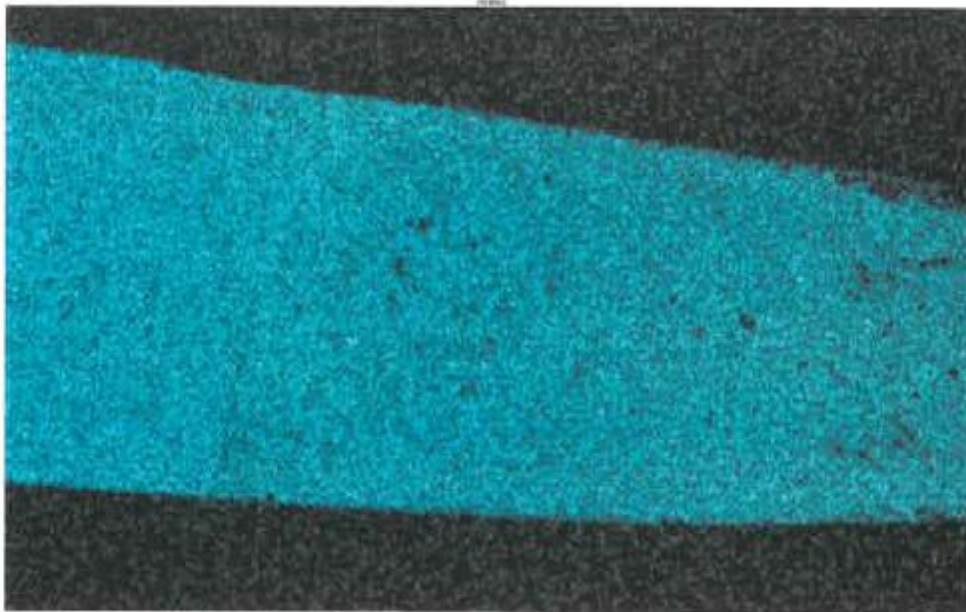


Figure 16. Lead map of the area shown in figures 14 and 15, above. Showing that the quantity of lead present is not greatly changed by the processes of dissolution of the tin or oxidation of the lead.

In summary, the tin/lead has been attacked and removed/dissolved (in the case of the tin), and converted to oxide/hydroxide and similar (in the case of the lead). The brass has not been detectably attacked.

It is notable that the corrosion/tin depletion has proceeded deep inside the overlapping parts of the lap joints of the tubes with the plates, i.e. inside deep crevices. It seems unlikely that purely electric-field driven attack (stray current corrosion) would have progressed inside such deep crevices, for the same reasons that it is difficult/impossible to electroplate inside deep crevices. Deep crevices would however be no obstacle to a simple non-electrical chemical attack.

5 Discussion

The tin coating of the brass tubes and plates of the heat exchanger, and the lead/tin solder joining the brass tubes to the brass plates, have suffered gross, uniform attack, such that they are absent, except for inside deep crevices in the overlapping brass tube/brass plate joint. However, the brass substrate appears to have suffered no attack, even when it is examined at high magnification.

The alkalinity (high pH) of the "used" coolants analysed in the earlier work would be expected to cause chemical attack on both tin^{1,2} and lead³, but would not have significantly attacked brass or copper, as is observed. Stray current corrosion in which the heat exchanger was acting as the

¹ Personal communication, Dr N. Farmilo

² T.P. Murphy, Uhlig's Corrosion Handbook, third edition, Ed R.W.Revie, Wiley & Sons 2011. P854

³ F.E. Goodwin, Uhlig's Corrosion Handbook, third edition, Ed R.W.Revie, Wiley & Sons 2011. P793

anode, would be expected to cause dissolution of tin, lead and the brass of the heat exchanger (copper & zinc). This is not observed.

It is possible for tin (and probably lead) to undergo "cathodic corrosion", in which some other metal, or a stray current source, is the anode and the cathode is the tin, at which OH⁻ ions are generated, which then attack the metal. In a sealed environment, such as a cooling circuit, it is plausible that the cathode need not be the lead or tin, as OH⁻ ions generated anywhere in the cooling circuit will persist and gradually increase the pH of the system (rather than reacting with atmospheric carbon dioxide). The pH could potentially be increased over time to the point at which the high pH causes the passive oxides coating and protecting the lead and/or tin to break down, allowing the lead/tin to be dissolved as hydroxides, stannates and/or plumbates.

The brass parts of the heat exchanger (tubes and plates) were tin coated when installed. Once this tin coating was removed, there was the potential for galvanic corrosion of the brass-lead and brass-tin couples, in which the brass would be the cathode, and thus unharmed, while the lead/tin would be dissolved/oxidised. Again, this is as observed. This potential for the corrosion process to be self-sustaining, once started, could be considered "auto catalytic". However, as installed, the brass was covered with tin, and so was not in contact with the coolant, giving no potential for galvanic corrosion. Therefore an early or first step in this corrosion process must have been either the formation of OH⁻ ions by oxygen reduction, thus enabling an alkaline attack on the lead/tin, or the removal/dissolution of a substantial proportion of the tin coating on the brass by some other means, thus enabling a galvanic attack on the lead/tin.

As filled, the coolant had a pH below 10 (measurements showed pH roughly 8.5-9.5), thus there should have been little or no alkalinity-driven attack on lead or tin. As installed, the brass of the heat exchanger was not in contact with the coolant (being coated with tin), thus there should have been no galvanically driven attack on the lead/tin.

A common cathode reaction during corrosion is $O_2 + 2H_2O + 4e^- \rightarrow 4OH^-$ (oxygen reduction in a neutral or basic solution)⁴. The DEAC and ELC coolants are both basic solutions, hence this reaction is likely and would result in an increasing concentration of OH⁻ ions (increasing alkalinity, increasing pH), which is as observed in service. This indicates that a corrosion/stray current corrosion/electrolysis process was probably occurring somewhere in the coolant circuit, and that its cathode reaction was (at least in part) oxygen reduction. A further implication is that the corrosion of the tin/lead/solder is not a gradual process. Rather the tin and solder suffers no corrosion, until the pH of the coolant has risen to some critical value (between 10 and 11), at which point the corrosion process "switches on" because the metal's passivation breaks down, and corrosion then progresses relatively rapidly.

This suggests that the heat exchanger may not have been directly involved in stray current corrosion, but rather suffered chemical dissolution of its tin and lead, by a solution that had simply become too alkaline for their passivation to resist. This may have been either as a result of electro-chemical action in which the heat exchanger was the cathode (the anode or current source being outside the heat exchanger), or electro-chemical action somewhere else in the cooling circuit, i.e. entirely outside the heat exchanger, not involving the heat exchanger.

⁴ S.R. Freeman, *Analysis and Prevention of Corrosion-Related Failures, Failure Analysis and Prevention*, Vol 11, ASM Handbook, ASM International, 2002, p 749-760, Eq 11

It seems unlikely that the corrosion is due to a simple chemical incompatibility between the coolant and the heat exchangers. If this were so, it would be expected that all the heat exchangers would corrode, and would do so at similar rates, which does not appear to be the case. However, it should be noted that some of Caterpillar's documentation implies that neither DEAC nor ELC are compatible with "high lead" solders⁵, and X-ray micro-analysis of the undamaged solder shows it to be roughly 90% lead 10% tin (by weight), which seems likely to meet most definitions of "high lead". Caterpillar should be asked to give a clear indication of whether their DEAC and ELC coolants are or are not chemically compatible with tin, lead, 90-10 lead-tin solder, and tin-coated brass, and under what circumstances they are/are not compatible. Any documents supplied with the coolants or engine detailing the materials they are and are not compatible with, precautions for use, guidance on selection of a suitable heat exchanger etc., should be scrutinised for any mention of the above materials.

It is notable that both failures to date have occurred in after-cooler cooling circuits, not the hotter-running jacket cooler circuits. These should have a maximum temperature of 40°C, and thus should not be subject to lead attack by thermal degradation products of glycol, as there should be no thermal degradation products of glycol at such modest temperatures. Further, analysis of coolant by PCMS engineering, and the alkaline pH of the coolant, indicated no "glycolate" decomposition products (which would be acidic). If, as suspected, the root cause of the increasing alkalinity is a stray current, this implies that an electrically powered/connected heater, accessory, instrument etc., that is outside the heat exchanger and (possibly unintentionally) in electrical contact with the coolant in the after cooler circuit, is the source of the stray current.

Potential and resistance measurements conducted on engine six showed that the AC electrically powered fan mounted on the heat exchanger assembly was unlikely to be the source of any stray current, but that it provided a good path to earth via the protective earth connection of its wiring. If the heat exchanger was acting as the cathode in a stray current cell, this implies that the other electrode was at a +ve DC potential, rather than being a source of AC current.

The reports of engine control electronics being initially unreliable and "cured" by improved earthing of the engine, strongly suggests the presence of stray currents/voltages within the engine and insufficient paths to earth/return for them. If this was so, then the well-earthed heat exchanger will have provided a viable path to earth via ionic conduction through the coolant. Stray current from a +ve source within the engine, if it took that route to earth, would be expected to have the effects in terms of rising pH and tin/lead corrosion that are observed. However, any other stray current route to earth via the coolant, but not via the heat exchanger, could easily also have the same effect.

Measurements of pH, reported from engine six after filling with ELC and test running, showed the coolant to have a pH of about 9.5. Other than stray current or an active galvanic corrosion cell within the coolant circuit, there appears to be no mechanism that would account for the rising coolant pH that is observed. If the cause were a galvanic corrosion cell, then the metal of

⁵ Caterpillar Leaflet PEHP7057-01, at <https://www.wyomingcat.com/BusinessSolutions/FluidAnalysisLab/Documents/SOSCoolantAnalysis.pdf>, last accessed 10/1/16. (Table, page 4, third line "Lab result: High lead. Cause: Overheated coolant and/or high lead solder used. Effect: Solder attack."). Page 4 of this is reproduced as appendix 1 to this report.

the anode should be found dissolved in the coolant, but no metals likely to be used in the construction of an engine and its accessories (other than lead and tin) are found dissolved in, or in an increasing quantity, in the coolant. This implies that the cause is a stray current, or a galvanic cell in which the anode is lead/tin.

6 Conclusions

The tin coating of the brass components, and the lead/tin solder that joined them together, have been attacked and removed from all of the heat exchanger surfaces that were in contact with the coolant, except at some places within deep crevices at tube/plate joints.

The attack on the tin and the lead/tin solder is consistent with chemical attack by a solution having a pH above that required to break down the passivity of lead and tin.

The rising pH (increasing alkalinity/basicity) observed in the coolant over time is consistent with an oxygen reduction reaction at the cathode of either a stray current path or a galvanic corrosion cell.

The increasing alkalinity of the coolant, and hence the corrosion failure, was caused by either stray current or a galvanic cell. Either of these must have had an anode (+ve) and a cathode (-ve). The anode (+ve) was external to the heat exchanger, i.e. somewhere in the engine or the pipework between the engine and the heat exchanger (neither of which have been examined for this report). The location/identity of the cathode (-ve) is unclear.

Other than lead and tin, there are no dissolved engineering metals in the used coolant that were not present in the unused coolant taken from the stores. Therefore, the cause of the initial alkalinity/initial attack is more likely to be stray current than galvanic corrosion. Some contribution from galvanic action cannot be ruled out, particularly after the tin coating had been removed from the brass of the heat exchanger.

Signed Dr. I.M.Fielden FRMS BEng. MInstP

Date Author

Countersigned Dr. N. Farmilo. MSc.

Date Peer-reviewer

7 Recommendations

It is reported that it is proposed to use "waterless coolant"⁶ in these engines.

⁶ http://www.evanscoolants.co.uk/PDS/4pp_PDS_heavy_duty.pdf last accessed 22/01/2016

It is to be expected that this, being very much less conductive than a water/glycol based coolant, will effectively prevent any stray current from passing through the coolant. It would also prevent galvanic corrosion, if that was the cause of the current flow through the coolant. This would then prevent the build-up of alkaline species that has attacked the tin/lead in the past.

It should however be borne in mind that some metals, such as stainless steels, rely upon a passive oxide layer for their corrosion protection. In an oxygen-free environment, this passive layer cannot be regenerated when it becomes damaged, and corrosion (or more usually stress-corrosion cracking, corrosion fatigue or erosion-corrosion) can then occur, even though, on the face of it, the oxygen-free, water-free environment would be expected to be benign.

This is a particular concern with highly stressed parts such as springs, in which micro-damage to the passive layer is a certainty and corrosion-fatigue or stress-corrosion cracking is a possibility. It is also a concern where high velocity fluid is in contact with metal surfaces, as this too will damage the passive layer. Rapid erosion-corrosion will then follow, if the passive layer is unable to self-repair.

In our opinion it is therefore worthwhile checking whether any stainless steel springs or similar high-stressed parts (clips, fasteners etc.) are permanently submerged in the coolant, and what metals (if any) might be in contact with high-velocity fluid flows. Springs and high velocity flows are often encountered in pumps, so the design and materials of the coolant pump in particular should be considered.

8 Appendix 1



MAINTENANCE SERVICES

Every sample tells a story

Here's some of the valuable information S-O-S coolant analysis can determine from your sample.

| LAB RESULT | CAUSE | EFFECT |
|-------------------------------------|--|---|
| Glycolate and Formate | Overheated coolant (overheated glycol) | Corrosion |
| High Glycol Level | Too much concentrate added | Poor heat transfer and solder attack |
| High Lead | Overheated coolant and/or high lead solder used | Solder attack |
| Low pH with High Iron | Plastic bleedby or overheated coolant | Severe pitting |
| High Copper | Negative stray current or hard water (adding stray chlorine) | Ammonia attack of copper radiator coolant zones |
| All Metals High with Low Glycolate | Positive stray current | Severe metal attack |
| Precipitate | High glycol level and/or unacceptable source water | Radiator/cooler tube block or water pump seal leakage |
| Unacceptable Hardness (ppm) | Unacceptable source water | Precipitation of additives |
| Oil in Coolant | Crack in through holes or heat exchanger leak | Engine staining |
| High Calcium | Contamination by steam boiler or atmosphere | Iron corrosion |
| Low Calcium | Standard coolant or water added to EUC* | Iron and solder attack |
| High Silicate and/or High Phosphate | Too much Supplemental Coolant Additive (SCA)† | Water pump seal leakage |
| Low Glycol Level | Too much water added | Cavitation, corrosion, reduced freeze point |
| Low Nitrite and/or High Iron | Too much SCA added† | Cavitation and corrosion |
| High Aluminum | Overheated coolant or too SCA† | Aluminum attack |

* Applies only to Cat Extended Life Coolant (ELC)

† Refer to Standard Diesel Engine Antifreeze/Coolant (SDAC)

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Printed in USA.

The Chief Engineer reported that investigations by Sheffield Hallam University had concluded that if waterless coolant was used in the aftercoolers at St Germans Pumping Station, this would cure the problem of rising pH levels causing corrosion.

The Chief Engineer raised the question as discussed by the Executive Committee, of whether sums should be put aside to deal with problems at St Germans Pumping Station and reported that a problem had arisen with the control panel capacitors, that the cost of replacement panels was £72,000 and that this was not within the current estimates. He reported that the Executive Committee had not favoured putting money aside to which the Vice Chairman advised that the Executive Committee were of course not aware of the scale of these costs. Mr Bliss wondered if the old capacitors could be re-used. The Chief Engineer reported that the panels were built in 2007, had operated from 2010, and that the price would include fitting. Mr H Whittome queried the effect of the capacitors and whether this meant that the station could no longer pump. The Chief Engineer confirmed that capacitors were not kept in stock and that if a capacitor blew there could be significant damage. Mr Mitchell felt it was unlikely to blow but confirmed it could wear out on the shelf. He felt that a service contract was unnecessary. Mr Latta wondered if the old capacitors could be kept in stock. The Chief Engineer agreed to check but felt that it would depend on the condition of the capacitors.

Mr Raby wondered if the problems with Finnings had arisen because of the lack of a service contract. The Chief Engineer advised that a contract was not taken out due to it not covering parts. The Chairman and Mr Sutton wondered if the cost could be phased. The Chief Engineer advised that the pumping station possessed a large amount of equipment and from time to time investment would be required. Mr Mitchell felt it was folly to lay up components as it was important to look at how the function was actually being performed rather than necessarily a like for like replacement.

The Chief Engineer sought the Board's comments on the question of ring fencing sums generally.

Mr Raby wondered at the figure to be ring fenced. The Treasurer advised that this could be the surplus from previous years and any ongoing surplus from the present budget. The Vice Chairman felt when talking of significant numbers there was more need to budget. Mr Garratt felt that the decision was really when money would be taken. He supported the principle but was concerned at members either the Board or the Executive Committee being made aware of when sums would be taken from the "ring fenced pot".

The Chief Engineer suggested that any underspend on St Germans Pumping Station could be ring fenced and in response to Mr Sutton felt that this pot should also include Bevills Leam. The Treasurer drew attention to the bills that would arise in the future. Mr Mitchell any ring fencing should be restricted to amounts of £20-30,000 per annum. The Chief Engineer felt in practice that this would probably be the figure required. Mr Mitchell felt any fund should not be allowed to build up too high.

The Chief Engineer reported that the free trial of the silt pushing boat on Well Creek had taken place early in the year. In response to Mr Raby, the Chief Engineer confirmed that, although this boat was better than barges, there were still operational issues and it was not proposed for use in this stretch of waterway.

The Chief Engineer reported that the modifications to the new Spearhead Twiga SPV3 flail mowing machine had been carried out and the early indications on the improvements made appeared to be positive.

In response to the Chairman, the Chief Engineer reported that there had been teething problems with the new motor and there was an oil leak but might be only the oil filter. He advised

that it had had 3-4 weeks work effectively. In response to Mr Raby, the Chief Engineer advised that he would be reporting on the future mowing arrangements at the next meeting of the Board.

As regards eels, the Chief Engineer reported that the position remained that the Environment Agency wished to work with IDBs regarding facilitating eel passage at pumping stations. He advised that although it was a legal requirement to remove barriers on high priority sites, individual exemptions were being issued. He confirmed that Defra's position was that expenditure had to be proportionate and authorities were not required to spend money until works were carried out on a pumping station. Questions still arose as to when maintenance would trigger this need.

Consideration was given to estimates received for the inclusion of a 'member's only area' on the Commissioners' website.

RESOLVED

- i) That the Report and the actions referred to therein be approved.
- ii) St Germans Pumping Station
 - a) That the problem with the control panel capacitors be referred to the Executive Committee who be authorised to take action as they felt fit.
 - b) That expenditure at St Germans be dealt with out of general reserves and no ring fencing of surplus funds take place.
- iii) Middle Level website

To proceed with Option D at a cost of £1,1400 + VAT for the 'member's only area' and ensure the site has mobile access.

B.3332 Treasurer's Report

The Treasurer reported on the likely out-turn figures for 2015/2016.

RESOLVED

That the report of the Treasurer be approved.

B.3333 Expenditure estimate and special levy and drainage rate requirements 2016/2017

The Board considered estimates of expenditure and proposals for special levy and drainage rates in respect of the financial year 2016/2017 and were informed by the Chief Executive that under the Land Drainage Act 1991 the proportions of their net expenditure to be met by drainage rates on agricultural hereditaments and by special levy on local billing authorities would be respectively 66.01% and 33.99%.

Consideration was given to the existing arrangements whereby the Executive Committee receives quarterly reports on expenditure together with a projection for out-turn for the year.

Mr F Hartley considered the £80,000 figure for Well Creek was appropriate. The Chairman proposed approval of the expenditure element of the proposed budget.

In response to Mr Boughton, the Chief Engineer reported that the Well Creek costs included the Commissioners own labour but not supervision costs.

In response to Mr J Heading, the Chief Executive and Chief Engineer confirmed that the figures in the agenda for pension costs and contributions did include all costs; labour costs and NI/pension in the estimates were allocated to the jobs.

RESOLVED

- i) That the existing arrangements for budget monitoring be continued.
- ii) That the following recommendations be submitted to the Commissioners, viz:-
 - a) That the estimates be approved.
 - b) That a total sum of £2,653,069 be raised by drainage rates and special levy.
 - c) That a rate of 26.00p in the £ be laid and assessed on Agricultural hereditaments in the District.
 - d) That Special levies totalling £901,682 be made and issued as follows for the purpose of meeting such expenditure, viz:-

£493,552 to Fenland District Council

£206,563 to Huntingdonshire District Council

£201,567 to the Borough Council of Kings Lynn and West Norfolk

B.3334 Inspection of Works

Further to minute B.3319(b), the Chief Executive informed Members that the Inspection would now be held on Thursday 23rd June 2016 and that the Chairman and Chief Engineer would decide the route.

B.3335 Applications for byelaw consent

The Chief Executive reported that the following applications for consent to undertake works in and around watercourses had been approved and granted since the last meeting of the Board, viz:-

| | | |
|--------------------------|---|-------------------------------|
| Benwick IDB | The filling & piping of approximately 12m of a Watercourse at Lily Holt, Doddington Road, Benwick | 15 th October 2015 |
| J & B Chappell | The construction of 2 no 5m long moorings & the construction of steps to the moorings on the frontage of the Old River Nene | 16 th October 2015 |
| Fenland District Council | The refurbishment/replacement of an existing pedestrian footbridge link from Town Bridge to West End Park, March – Old River Nene | 29 th October 2015 |

| | | |
|-------------------------------|---|--------------------------------|
| M Roberts | The construction of a timber landing stage not exceeding 4m in length together with steps & a handrail, all on the frontage of the Well Creek at The Hollies, 42 St Peters Road, Upwell | 4 th November 2015 |
| Amalgamated Construction Ltd | The replacement of old timber decking with GRP Panels at the Network Rail Bridge over the Twenty Foot River at Turf Drove, Whittlesey | 26 th November 2015 |
| Mr & Mrs M Jones | <p>1. The replacement of the existing revetment to the bank of the Old River Nene. The revetment to comprise round fir posts/piles at 1 metre intervals with steel/plastic piles placed behind and geo-textile and in fill gravel inserted as necessary.</p> <p>2. The construction of 10 no. steps with handrails to existing fishing platforms – Old River Nene</p> | 4 th December 2015 |
| Mr & Mrs H Farmer | <p>1. The construction of a prefabricated concrete garage to the dimensions approximately 6.2m long x 3.8m wide x 2.5m high and</p> <p>2. The installation of a wooden palisade type fence with gates, not exceeding 1 metre high, to enclose garden – Old River Nene</p> | 20 th January 2016 |
| Mr & Mrs Blaney | The construction of a single storey extension at the rear of 22 Nene Parade, March – River Nene Old Course | 26 th January 2016 |
| P Hayers | The construction of a timber landing stage not exceeding 6m in length together with steps & a handrail, all on the frontage of the Well Creek at 79 School Road, Upwell | 2 nd February 2016 |
| Cambridgeshire County Council | The installation of 6 signposts using signscrew foundations to mount chequeboard signs & 5 replacement signposts for mounting of highway directional signs in the verge of the Watercourse & adjoining the B1098 highway opposite the junctions with Upwell Road & Padgett's Road – Sixteen Foot River | 8 th February 2016 |
| Mr & Mrs G Spencer | The installation of 2 outfalls & an associated drainage system including a private package treatment plant associated with the replacement of an existing bungalow – River Nene Old Course, Ramsey St Marys | 16 th February 2016 |
| Cambridgeshire County Council | The resurfacing of the unadopted road off Puddock Road, Warboys, running adjacent to the Forty Foot River & in front of Puddock Pumping Station and over the Outfall | 11 th March 2016 |

| | | |
|------------|---|-----------------------------|
| R Ayres | The piping & filling of 8m of Watercourse close to Poplar Farm off Heights Drove Road, Ramsey Heights | 23 rd March 2016 |
| J D Oswald | The construction of a timber/steel landing stage incorporating 100mm x 100mm galvanised box section steel posts & sealed base plates & not exceeding 8m in length together with steps & a handrail, all on the frontage of the Old River Nene at 8 Whittlesey Road, Benwick | 24 th March 2016 |

RESOLVED

That the action taken be approved.

B.3336 Water Resources Committee

Further to minute B.3312, Mr H Whittome reported that, together with the Operations Engineer, he had met with Anglian Water Services and the Environment Agency to discuss early season issues. He advised that groundwater levels and river forecasts were high and the Environment Agency predicted few problems in 2016. Mr H Whittome added that Anglian Water said that their reservoir filling was "on curve" for the time of year and that the Commissioners' weekly use was equivalent to Anglian Water's daily take.

Discussions took place as to whether Anglian Water Services would modify their intake to help the Commissioners. The Environment Agency had been very helpful in seeking to facilitate this. Mr Boughton wondered if IDBs were co-operative in operating slackers.

Mr H Whittome advised that there was a better level of understanding and co-operation.

B.3337 Conservation Committee

Members considered and approved the minutes of the meeting of the Conservation Committee held on the 17th March 2016.

Members noted the photographs of the rainfall event in March.

B.3338 Lack of Maintenance of SUDS Features

The Chief Executive reported that this matter had been raised by the Conservation Committee at their recent meeting.

The Chief Executive reminded the Board of the provisions of the Flood and Water Management Act 2010 which had not been brought into force by government with the matter left to be decided as part of planning, which had led to unfortunate results. Mr Raby referred to development in the south west of the area and referred to balancing areas in Sawtry, particularly the A1 reservoirs. The Chief Executive outlined problems with balancing and areas where IDB consent was not required. The A1(M) pipes were still maintained by Highways England's contractor. He noted the contributions paid to the Board in consequence of the perceived lack of maintenance. The Chief Engineer confirmed that there had been no problems at Bevills Leam in March 2016. Mr Raby referred to the development at Alconbury. The Chief Engineer advised

that this would be an "eco friendly self sustaining site". The Chief Engineer had tried to engage with planners and developers but no engagement had yet taken place. Mr Raby perceived problems. Mr J Heading referred to Highways England and balancing ponds and felt that real issues regarding maintenance arose.

B.3339 Environmental Officer's Press Releases and Report

The Chief Executive referred to the Environmental Officer's Press Releases dated December 2015 and April 2016 which had previously been circulated to members.

Members considered and approved the Report of the Environmental Officer.

RESOLVED

That Cliff Carson be commended on his report.

B.3340 Banking Arrangements Changes to the National Savings Accounts signatories

The Chief Executive reported that it was necessary to update the signatories on the National Savings Accounts.

RESOLVED

That the Chairman and the Clerk be the authorised signatories on the National Savings Accounts.

B.3341 Association of Drainage Authorities

The Chief Executive reported:-

a) Annual Conference

That the Annual Conference of the Association of Drainage Authorities would be held in London on Thursday the 17th November 2016.

RESOLVED

That the Chief Executive be authorised to obtain a ticket for the Annual Conference of the Association if a Member wishes to attend.

b) Annual Conference of the River Great Ouse Branch

On the Annual Conference of the River Great Ouse branch of the Association held in Prickwillow, Ely on Tuesday the 8th March 2016.

c) Floodex 2016

That Floodex 2016 will be held at The Peterborough Arena on the 18th and 19th May 2016.

B.3342 Review of Internal Controls

- i) Members considered and expressed satisfaction with the current system of Internal Controls.
- ii) The Board considered the completion of the Annual Governance Statement for the year ended on the 31st March 2016 as required in the Audit Regulations.

RESOLVED

That the Accounts and the Annual Governance Statement for the year ended on the 31st March 2016 be considered at the Inspection.

B.3343 Date of next Meetings

The Chief Executive reminded Members that the next meetings of the Commissioners and the Middle Level Board would be held on Thursday the 5th November 2015.

B.3344 Planning

Mr S Whittome referred to planning policies and the low take up of the Middle Level Commissioners' planning procedures. The Chief Executive outlined the reference in his report and expressed surprise at the low numbers. Mr J Heading referred to small developers relying only on planning consents.

Mr Sutton thought the title of "Developers' Forum" was false as it was mainly agents who were present. He too was disappointed at the response. The Chief Executive agreed to put as an agenda item on developers' Forum and to send an electronic copy of the Planning procedures to Mr Mitchell.