

Thornhill St Michael and All Angels
(Anglican Diocese of Leeds)

Grade I listed

Condition Report
on windows sIV and sV
with recommendations and
outline method statement

Jonathan and Ruth Cooke
June 2020



Acknowledgements

The authors would like to thank Brian Sprakes for kind permission to use his draft text for the forthcoming CVMA summary catalogue relating to Thornhill's sIV and sV, and Chris Parkinson for kind permission to use images of the windows. Thanks also to Dr Joseph Spooner and Dr Penny Hebgin Barnes for their interest and support. This generosity is much appreciated.

Executive summary

1.1

The windows sIV and sV are part of an internationally significant collection of ancient glass at St Michael's church.

They are structurally in reasonable condition, with exception of tracery lights. The glasses are however known to be vulnerable due to their composition, and the painted detail is at risk.

1.2

the summary recommendation as at July 2019 by the present writers was for an internally ventilated protective glazing system, with or without additional guards for protection against external impact.¹

The stained glass requires conservation in the workshop, including addressing the distortion of the tracery lights and reversed pieces in sV.

1.3

External glazing can be manufactured from new kiln distorted sheet glass such as 4mm "Collins Curve" and in the case of sV, installed in sections, each with perimeter leads to accommodate slight movement. In sIV, the four areas of stained glass contained within the main lights can be individually framed.

1.4

These windows, in common with others containing ancient glass (with exception of west window) have stainless steel 304 grade powder coated Weldmesh guards, 3" x ½" slot, of recent date and in good condition, fabricated from templates to individual lights, and installed stainless steel fastenings, and these could be reused.

¹ The installation of a protective glazing system is a crucial part of the preventive conservation of architectural stained glass, which is vulnerable to both mechanical and environmental damage. The principal aims of a protective glazing system are to relieve the stained glass of its function as a weather shield, to protect it against mechanical and atmospheric damage, and to prevent condensation on the surface of the stained glass. Every window installation is unique, and therefore the design of its protective glazing must take into account the particular preservation needs of the stained glass and its architectural setting, as well as the physical and aesthetic impact on the building. Protective systems vary according to these needs, and may range from an externally installed and ventilated layer to the internally ventilated isothermal glazing system, which is the most effective method currently available. Knowledge about the functioning and effects of protective glazing is necessary to make the right decisions. A protective glazing system can minimize the extent or even eliminate the necessity of interventive conservation treatment and will facilitate removal of the stained glass panels. Wire guards can provide additional protection against mechanical damage, although their potential visual impact must be considered."

<http://www.cvma.ac.uk/CVConservationGuidelines2004.pdf> 3:2:1 accessed 21st May 2020

Preliminaries

2.1

Background to the commissioning of present report

In July 2019, at the request of Mr Brian Pearson on behalf of the PCC of Thornhill, Jonathan Cooke ACR prepared a condition report on 30 windows at St Michael's, comprising all the leaded glazing and stained glass, with exception of Savile Chapel and chancel east windows. The inspection and report was made possible by a generous grant from Churchcare.

Both sIV and sV contain c15 fragments, York school, as Savile Chapel glazing, most if not all of which have been displaced from other windows in the church, and were reset into these two window apertures by Burlison and Grylls at the time of the 1877 reordering by G. E. Street.

One of the principal summary recommendations from the July 2019 report was for the conservation of windows sIV and sV, reported as follows:

"sIV....

Given the age and condition of the glass: viability due to its composition, its historic significance as part of the important collection of c15 glazing at Thornhill, and the need in the medium term for intervention to address the distorted tracery panels, we would recommend an internally ventilated system of environmental protection to prevent further deterioration of painted surface and substrate. If this were to be carried out before further significant deterioration occurs to the lead matrix, substantial releading should not be necessary. This is a significant consideration both on grounds of cost and risk to the historic glass.

sV.....

"..as sIV; the reversed pieces provide supplementary reason for protection."

Jonathan and Ruth Cooke have now been asked by Mr Pearson to provide a detailed report specific to these two windows, including method statement, for the purposes of obtaining Faculty and seeking grants towards the cost of their conservation, and are pleased to prepare this without charge. For this reason, and in the interests of the glass, this report should not be used for competitive tenders or otherwise circulated other than for these purposes without prior permission.

2.2 Jonathan and Ruth Cooke Ltd

The workshop has been in continuous practice since 1987, and incorporated in 2005. Led by Jonathan Cooke ACR, all aspects of every project are undertaken by Jonathan personally or under his direct personal supervision. Jonathan and Ruth Cooke Ltd rigorously adheres to the ethics and principles for the conservation of historic glass required of members of the UK's Institute for Conservation (ICON). As an accredited conservator, Jonathan undertakes regular continuing professional development reviews. Comments by both readers of his most recent CPD review (October 2019) are reproduced here, in full.

A thoughtful and reflective review. It is clear that you have challenged yourself in many areas of your working life particularly helping others by teaching, publication and work with peers. To your credit is that you have not shied away from learning that is a necessity rather than a natural inclination. Your love of the field shines through your conduct and writing.

A very reflective and thorough CPD Review. Your commitment to CPD through support of increasing awareness for craft skills and conservation processes together in an advocacy role is impressive.

The present writers are very familiar with the medieval glass at Thornhill. They prepared a condition report on the chancel east window in 1998, and undertook conservation treatments to that window for Barley Studio in 2000. Their conservation records have been made available to the editors of the forthcoming CVMA catalogue.

The present writers also undertook condition reports and environmental monitoring of the severely degraded glass in the Savile Chapel from 2008 -2011 working with members of Sheffield University's Glass Technology department and English Heritage. The conservation of windows nIII, nIV and nV was subsequently carried out by Jonathan and Ruth Cooke. The records for this work have been made available to the editors of the forthcoming CVMA catalogue. A replica of nII was created by Jonathan Cooke as the glazing was not considered to be viable *in situ*, and the original panels are now stored in the Savile Chapel. This window was the subject of the MA thesis by Thomas Cooke, their son, who acts as their researcher, principally on medieval projects.

They are also tasked with creating and installing a panel of painted and unpainted fragments of 15c glass from Thornhill thought to have been discovered at the time of the removal of the Savile monument for the *Gothic: Art for England* exhibition at the Victoria and Albert Museum in 2003. The details of the proposal are the subject of a separate document.

2.3 Access

Inspection of sIV and sV was carried out in July 2019 as detailed in the 2019 report, *q.v.* *"Following much discussion beforehand with Mr Pearson it was agreed that we would inspect all glazing as far as safe and practicable, from ladders, with binoculars and external close access to the clerestory lights from the aisle and chancel roofs."*

Close physical access to both sIV and sV was to full height of main lights. Visual inspection only of tracery lights was due to restriction on height; external inspection was further restricted by guards.

2.4 Location of windows and ground plan

The internationally recognised CVMA numbering system is used throughout: the ground plan created for the earlier reports reproduced again here. sIV and sV are located on the south wall of the south aisle, first and second from east.

2.5 Significance of the Thornhill glass

The late c19 stained glass windows and leaded glazing were, remarkably, all made by the firm of Burlison and Grylls from the time of the reordering by G E Street onwards.

Moreover, with the exception of a panel of heraldic glass by Henry Gyles displayed in the north choir screen, and the donated glass from York Minster installed in 1953 into a newly glazed west window, Burlison and Grylls also restored all the ancient windows in the church during the Street campaign. These comprise the chancel east window - the subject of a condition report by the present writers in 1998, four windows in the Savile Chapel², also the subject of condition reports in

² east window now in store in the chapel, the present window a modern replica

2008-2011 and other publications by the present writers relating to their condition³. Burlison and Grylls were also responsible for the arrangements of displaced c15 material into sIV and sV. The CVMA volume on West Yorkshire has not yet been published and J&RC's brief working summary catalogue for sIV and sV was used for the 2019 report. However, the draft text of the forthcoming CVMA catalogue entry for Thornhill has kindly been made available by Mr Brian Sprakes for present purposes.

The extant fragments of a lost window depicting the Nine Orders of Angels in sIV appear to have additional significance in the context of both the medieval dedication of Thornhill to St Michael and All Angels, and taking into consideration the rare, possibly unique, suite of south aisle windows designed and executed by Burlison and Grylls depicting angelic subjects, around the time that they were undertaking work to the medieval glass, including resetting of fragments from this lost window.

2.6 The building environment

The building is generally very well maintained, with an ambient heating regime avoiding spikes of temperatures; humidity levels remain high. The church is kept closed, and, although there are large volumes, no form of controllable ventilation is evident. We have recorded data on previous occasions; even in July 2019, during a period of dry weather with higher than average temperatures, notepaper became damp to the touch within less than an hour.

There is rising ground on the north elevation, and it has been noted in previous reports on the vulnerable c15 glass of the Savile Chapel that the north east corner of the building has been historically damp. Researches and anecdotal evidence gathered from 2008 onwards indicated that the problems had obtained for significant periods of time. although several issues relating to the roof and lack of drainage in the vicinity have been resolved, the building is still damp. So, the fragments reset into sIV and sV from nII and other north elevation locations post-1877 suggest that the south wall has provided a more benign environment for unstable glasses than the damper north in the intervening years, as the condition of these fragments appears to be relatively sound. That being said, some internal fractures are visible in the white glasses of sIV and sV, though the processes of deterioration are less advanced than in the original nII and other glazing that remains on the north wall. Close inspection on the bench is necessary to determine more fully their condition.

2.7 Quinquennial inspection

Last carried out by Graham Saxton BSc(Hons)MRICS BCAS on 18th July 2017. We have had sight of the report, and no major concerns relating directly to either of these windows are raised: both windows are reported as in good condition. It is noted that [sV] "which contains medieval glass, would benefit from expert cleaning, but this would be a very costly exercise" (p.19)

³Conservation Basics: English Heritage Practical Building Conservation series 2013
ISBN 9780754645511

English Heritage Research Dept. Report series no 31-2011 ISSN 1749 8775

St Michael's and All Angels church, Thornhill Dewsbury West Yorkshire; Scientific examination of stained window glass Technology report: David Dungworth, Jonathan Cooke, Ruth Cooke, Richard Jacques and David Martlew

Condition report

3.1

sIV south aisle south wall second from east



Sizes etc.

twin light window, five principal, four further small tracery lights, perpendicular fenestration c.1490. Masonry, ashlar, mainly c19, though some of the hood moulding and parts of external cill could be medieval. Stainless steel guards, set within sight size apertures; apparently non-ferrous fixings.

Each main light 18" x 84" in two panels, with division at 48" from cill.

Traceries not accessed due to restriction on height: A and B registers estimated at 7" x 20" max.

The leads to the c19 quarry glazing are 3/8" flat, internal leads of stained glass panels 3/16" and 1/4" flat profile, and date to the 1877 reordering. No earlier leads were noted.

In common with all windows at the church dating to the Street restoration, the panels of the main lights are tied with copper ties to external mild steel *ferramenta*, here comprising a single stanchion and six horizontals in each light.

Lead cills

Catalogue of ancient glass (CVMA draft)

"This window formerly containing fragments of the **Nine Orders of Angels**, of which Whitaker saw three imperfect figures and the inscriptions 'Archangeli' and 'Virtute[s]'.⁴ Fragments of the figures are now in window sV.

The present window contains much plain-quarry glazing, but does house some medieval glass.

Light a.

In the centre, an **angel musician**, a nimbed demi-figure with elevated wings, playing a psaltery. White robe; hair and collar in pale yellow; wings and instrument in a darker yellow stain. Repairs to the left wing, otherwise in good condition. 15th-c.

Figure h 0.26m, w 0.43m

Above, **St Sebastian**. Only the nimbed head and naked shoulders remain, an arrow piercing the upper breast. Above the head appears the tree to which he was bound; yellow branches with three clusters of blue leaves.

Slight paint loss to the facial features and pale-yellow hair, otherwise in good condition. 15th-c.

Figure h 0.30m, w 0.23m

⁴ Ibid., p. 318 [note J and R Cooke Whitaker, op.cit]

Light b.

In the centre, a **dragon**, almost complete, only part of a foreleg and a small section of the hindquarters missing. Painted in yellow stain and shown walking to sinister with head raised. A white ornamental leash extends over its back; this may refer to the legend of St George, in which the dragon, wounded by the saint, was lead into the town by the princess using her girdle.⁵ Repair leads, otherwise good condition. Almost certainly originally from sII, dated 1491.

Figure h 0.27m, w 0.38m

Above, fragment of **St George** facing half to dexter; only his nimbed and helmeted head and gauntleted left hand holding the shaft of his spear remain. The visor of the helmet is raised revealing the face with eyes looking upwards and a short forked beard. White armour with yellow stain on the edges and in the nimbus. Lead repairs. Almost certainly originally from sII, dated 1491. Also the head and part of the left wing of **an angel**, the head tilted slightly to the left, with yellow curly hair and wing feathers. Single lead repair. Possibly part of the Nine Orders. Late 15th-c.

Figure h 0.37m, w 0.23m

A1-4. Tracery openings containing **fragments** of ermine, yellow-stained patterned robes, canopy-work, flashed ruby, and blue pot-metal. Late 15th-c.

h 0.51m, w 0.18m

B1. **Fragments**, including yellow-stained rays from a nimbus or glory, white robes, and (in the upper lobe) small bare legs and feet. Late 15th-c.

h 0.51m, w 0.18m

C1-2, D1-2. Eyelets with miscellaneous **fragments**.ed and painted fragments, including material from nII in C1 and C2, possibly also B1⁶"

All set on a clear cathedral quarry ground c.1877

Techniques

grisailles, dark brown in reflected light, and silver stain on white glasses: tracery fragments additionally include ruby flash and blue pot metal glasses. Trace lines, shading and stippled washes - no backpainting was detected, though inspection was restricted by guards

Condition

Lead matrix all C19; no later interventions were noted other than *in situ* repairs in cathedral glass to unpainted quarries. Leaded breaks to angel wing date to Burlison and Grylls restoration. Structurally in reasonable condition, given age of leads and supports, with some movement on slight pressure. Leaded light cement reasonably sound, with no significant leaching. The tracery lights are distorted and bowing, probably due to lack of support and daily and seasonal significant variations in temperature at the glass surface in a sheltered "hot spot" on the south wall; all pieces appear secure within the lead comes at present.

The c15 white glass, some of which is original to the north elevation, is generally in better condition than that of nII and other Savile Chapel glazing. There is an unleaded fracture across the psaltery due to pressure, and it is possible that there are further fractures in the tracery lights which were not accessed closely. Small internal fractures such as characterise the glass of the Savile Chapel, are visible to

⁵ *Golden Legend*, II, p. 239; and Jöckle 1997, p. 181.

⁶ the present writers have brought this to the attention of the editors of the forthcoming CVMA volume

the naked eye, as noted above, though the process of deterioration is less advanced. There are some small areas of visible corrosion in the form of micro pitting to the internal surface, resulting in paint loss in these areas. No impact damage was noted.

Internal surface deposits appear to comprise loose dust and more adherent grime and soot. External surface not closely accessed; there appears to be a patina of dirt overall from the action of water on bars, mortar and general air-borne pollutants.

The c15 painted surface decoration varies in stability; in some pieces only trace lines remain; there is also some loss of trace line in places where the paint has been applied more thickly. As with north side windows, there is no detectable pattern to the paint loss within pieces. Elsewhere, the paintwork appears intact though it should be assumed unstable throughout.

Bars and support system; there is some superficial corrosion to the *ferramenta*, no damage to masonry or visible staining to the glass was noted. Most of the copper ties which are adequate in number appear to be still secure. There are no supports in the tracery lights.

3.2

sV south aisle south wall third from east



Sizes etc.

Twin light window, five principal, seven smaller tracery lights, perpendicular fenestration c. 1490. Masonry, ashlar, reveals and hood moulds probably c15, elsewhere, c19.

Each main light 19" x 86" in two panels, with division at 36" from cill.

Traceries not accessed due to restriction on height: A and B registers estimated at 7" x 20" max.

Tied to external *ferramenta*, comprising single stanchion and six horizontals in each light.

Stainless steel guards, set within sight size apertures; apparently non-ferrous fixings.

Leads principally 1/4" flat throughout

Catalogue of ancient glass (CVMA draft)

"sV.

Whitaker noted 'three faces without rays or bodies' in light b.⁷ The window, of two lights with tracery, is now filled with a medley of stained glass collected from various windows, including the choir clerestory and the now plain-glazed sII.

Each light h 2.11m, w 0.43m

1a.

In the centre, a **shield of arms (Amyas impaling Lacy)** without tinctures, (*Argent*), on a bend three roses impaling (*Argent*), seven pellets *sable*. To the left, faded canopy and garment fragments and a yellow-stained wing. To the right, the wounded legs of the crucified Christ turned to dexter, together with what may be part of an orb in yellow stain, possibly from a depiction of the **Holy Trinity** formerly in the upper parts of sII. Late 15th-c.

In the lower parts are two unrelated **heads**: a man's head looking to dexter, with yellow hair, white cowl, and blue robe, and a smaller head looking downwards and wearing a white cap. To the left: two fragments of oak-leaf quarries, an angel's wing, and a white robe with a yellow-stained pattern. To the right: fragments of a white wing and robe, part of an ermine cape with a yellow-stained border, and the fingers of a hand. One piece of flashed ruby. Early 14th-c and early 15th-c.

Fragments of multi-gabled **canopies**, some upside down or on their side. Some with severe paint loss. Early 15th-c.

At the foot and on the right and left edges fragments of early 14th-c running-trail and **oak-leaf quarries**.

2a.

Fragments, including six heads, possibly all angels, four with curly yellow hair, two with white caps fastened under the chin, the one on the right with elevated yellow wing. Below are feathered legs and bare feet. An

⁷ Whitaker 1816b, p. 318.

attempt has been made to marry the heads with the feet by means of flashed ruby and blue pot-metal. These are the remains of a window depicting the **Nine Orders of Angels**. To left and right fragments of garments, canopies, and a flowering plant shown upside down. Early 15th-c.

Assembled fragments of **canopies** with large yellow-stained crockets. Some paint loss. Three fragments of blue pot-metal, one showing feathers suggesting **Cherubim**. Early 15th-c.

In the upper foil are the faded head and shoulders of a **winged angel** holding a rod or wind instrument. Early 15th-c.

1b.

In the centre, a **large torse** of twisted white and yellow strands, which formerly encircled the arms of Frost in sII 1a.⁸ It now contains fragments showing bare feet on a brown ground, canopy-work, and ornamental pieces. At the edges are canopy fragments and pieces of garments, some with yellow-stained jewelled borders, one (to the left) with toes protruding from beneath a white garment. Early 15th-c; the torse can be dated to 1491.

Above are **thirteen assembled heads** above bodies, legs and feet (a brown habit with beaded girdle, bare legs and feet, legs wearing hose, and shoes standing on tiled floors). An attempt has been made to marry the latter with the former. Upper left is a nun facing to dexter; the rest of the heads, all apparently secular, are in groups of two or three. To the right a fragment of a woman with a crutch holding a loaf, almost certainly from a scene of **Feeding the Hungry**, from the Seven Corporal Acts of Mercy. Beneath there is what appears to be a bucket and pouring water, perhaps from a representation of **Giving Drink to the Thirsty**. Also the walls and ceiling of a room with square windows; pieces of canopies; and blue pot-metal.⁹ Early 15th-c.

2b.

The heads of **three angels** with white caps, as 2a. Yellow hair and wings, one wing fragment in blue. Surrounded by canopy-work, shafting, and a piece with bare feet amidst flowering plants. Early 15th-c.

Three buttressed **canopy gables**, white with crockets and finials in yellow. Three vertical strips of flashed ruby. Early 15th-c.

In the upper foil, an **angel's head** with white cap and elevated yellow wings. Early 15th-c.

A1. Fragments of **canopy**, with vaulting in yellow stain. Some paint loss. Early 15th-c.

h 0.51m, w 0.18m

A2. Fragments of **garments and canopies**, white with yellow-stain details. Some paint loss. One piece of pale blue/green. Early 15th-c.

h 0.51m, w 0.18m

A3. **Winged angel** standing in canopy parapet, playing a recorder or other wind instrument. Repair leads.

Canopy fragment in upper foil. Early 15th-c.

h 0.51m, w 0.18m

A4. **Winged angel** facing to dexter and playing a wind instrument. Severe paint loss, repair leads. Early 15th-c.

h 0.51m, w 0.18m

⁸ Jones 1971, pp. 117–18.

⁹ According to Whitaker, the window with the Seven Corporal Acts of Mercy was ‘the third window, eastward, on this [north] side [of the nave]’; it contained ‘three figures, of which one was naked, excepting a kind of vest about the waist, kneeling, and begging of a person nobly attired in scarlet [...]’ (Clothing the Naked), and in the same light was a figure ‘nobly habited in scarlet [...] with a servant sitting by, and stooping to a large wicker basket, whence he supplies his lord with largesses (of bread), which he distributes to the people around him’ (Feeding the Hungry). See Whitaker 1816b, p. 319. The descriptions correspond closely to those made of the Seven Corporal Acts of Mercy at All Saints, North Street, York, as noted by both Gee 1969, pp. 162–64, and Jones 1971, p. 116.

B1. **Three boys**, probably a donor's children, facing to dexter with hands in an attitude of prayer. Yellow hair, and grey and white robes, one with yellow decoration. Faded and worn, repair leads. Canopy fragment in upper foil. Early 15th-c.
h 0.51m, w 0.18m

C1-2, D1-2, E1. Eyelets with miscellaneous **fragments**."

Some of the smaller fragments of ground etc., are similar in technique and stylistically to nII

Condition

Lead matrix all C19; Structurally in reasonable condition, given age of leads and supports, with some movement on slight pressure. Leaded light cement reasonable, no significant leaching. As sIV, the tracery lights are distorted and bowing, for reasons given above; as sIV, all pieces appear secure within the lead comes at present.

There are two areas of *in situ* repairs in 2a, and a further single *in situ* painted insertion, all probably carried out by YGT c1980.

An unsecured multi-fractured piece of white glass was noted, damage due to impact prior to installation of guards. Further single fractures due to pressure were also noted in the main lights. As with sIV, it is possible that there are further breaks in the tracery lights which were not closely accessed. There are several reversed pieces throughout; the leaded panel with musician angel occupying tracery A3 is entirely reversed.

As sIV, the c15 white glass is generally in better condition than that of nII and other Savile Chapel glazing. In several pieces, the characteristic internal fracturing could be seen as noted above. There are discrete areas of visible corrosion varying in severity in the form of micropitting to the internal surface, and the painted detail is lost in these areas. Internal surface deposits appear to be loose dust and more adherent grime and soot. External surface not closely accessed.

There are several infill c19 painted pieces throughout, including a small area just below spring in a light, mullion side. It was not possible from our inspection to catalogue these definitively; this exercise should form part of the conservation record.

The c15 painted surface decoration varies in stability; there is also some loss of trace line in places where the paint has been applied more thickly. As north side windows, there is no detectable pattern to the paint loss. Elsewhere, the paintwork appears intact though it should be assumed unstable throughout.

Bars and support system; there is some superficial corrosion to the *ferramenta*, no damage to masonry was noted. Most of the copper ties which are adequate in number appear to be still secure. There are no supports in the tracery lights.

Recommendations

The recommendation for both windows is for conservation of the c15 glass and installation into an internally ventilated protective environment; the reversed pieces in sV provide supplementary reason for protection.

Outline method statement

Removal of all main and tracery lights from stone, crate and transport to the studio, temporary closure with 10 mm WPB to all main lights and traceries. Stainless steel guards to be removed and stored for reuse.

Full assessment of the condition of each panel: rubbings, photographs and diagrams to record fractures, paint condition etc

Distorted tracery lights: flattening by releasing solder joints and removal of leaded light cement.

c15 glass to be examined under microscope.

minimal appropriate cleaning methods determined to both faces and work carried out: from *in situ* inspection we anticipate that this can be limited to dusting to remove particles and controlled use of deionized water. Other treatments to be determined on the bench in consultation with client and other interested parties may include the replacement of intrusive mending leads with Araldite 20:20 infill, copper foiling or bespoke string leads.

Otherwise, possibility of reduction of mending lead sizes to improve clarity of main lead matrix

Edge bonding of cracked pieces with Araldite 20:20 or other appropriate conservation grade epoxy resin/silicone. [the use of moulded external plates for mechanical support is not anticipated]

Strengthening of solder joints as necessary

A. sV

Conserved glass to be framed in manganese bronze CZ136 'c' section:

12mm x 9mm x 2mm (main lights)

12mm x 5mm x 2mm (tracery lights)

Flexible phosphor bronze brackets 10mm width, 20 gauge, attached with non-ferrous machine screw fastenings and soldered to frame at not more than 18" intervals

bronze saddle bars soldered to frame in all original positions:

¾" - 1" lead light shield, attached front face of frame, as appropriate

External glazing of new kiln distorted sheet glass such as 4mm "Collins Curve" and installed in sections, each with perimeter leads to accommodate slight movement. Soft mortar mix – composition as for recent works at the church.

In situ treatment of *ferramenta* - derusting and application of rust-inhibiting paint-before reinstatement of glazing.¹⁰

Framed stained glass panels to be fixed to stone with brass screws. Given the profile of the window masonry, it is anticipated that an interspace of > 1½" depth can be achieved.

¹⁰ All c19 *ferramenta* at St Michael's have been regularly maintained with rust inhibiting paint. Having inspected all windows, including clerestory lights, and worked on several windows, no damage to the masonry from metalwork has been noted. At this point therefore we do not anticipate the need for removal.

B. sIV

Tracery lights all as sV above.

For the four areas of c15 stained glass in the main lights it is possible to create individual frames for the conserved glass as being a more cost effective option and for ease of maintenance. It would also permit removal of a single panel if required for exhibition purposes.¹¹

Dismantling of main lights to extract the stained glass and rebuilding to incorporate kiln distorted sheet glass such as Collins curve to occupy the present positions of the stained glass and replace the *in situ* quarry repairs. At reinstatement, the incorporation of four prepared new internal saddle bars to which the stained glass would be attached by means of non ferrous fastenings

Conserved glass to be framed as for sV tracery light.

A photographic, diagrammatic and written record of all work undertaken for deposit with the client and other bodies as required.

¹¹ this method has been adopted by the authors at Malpas (Diocese of Chester), Boughton Aluph (Diocese of Canterbury) Coates by Stow (Diocese of Lincoln) Wath (near Ripon: now Anglican Diocese of Leeds) and Samlesbury (Diocese of Blackburn)

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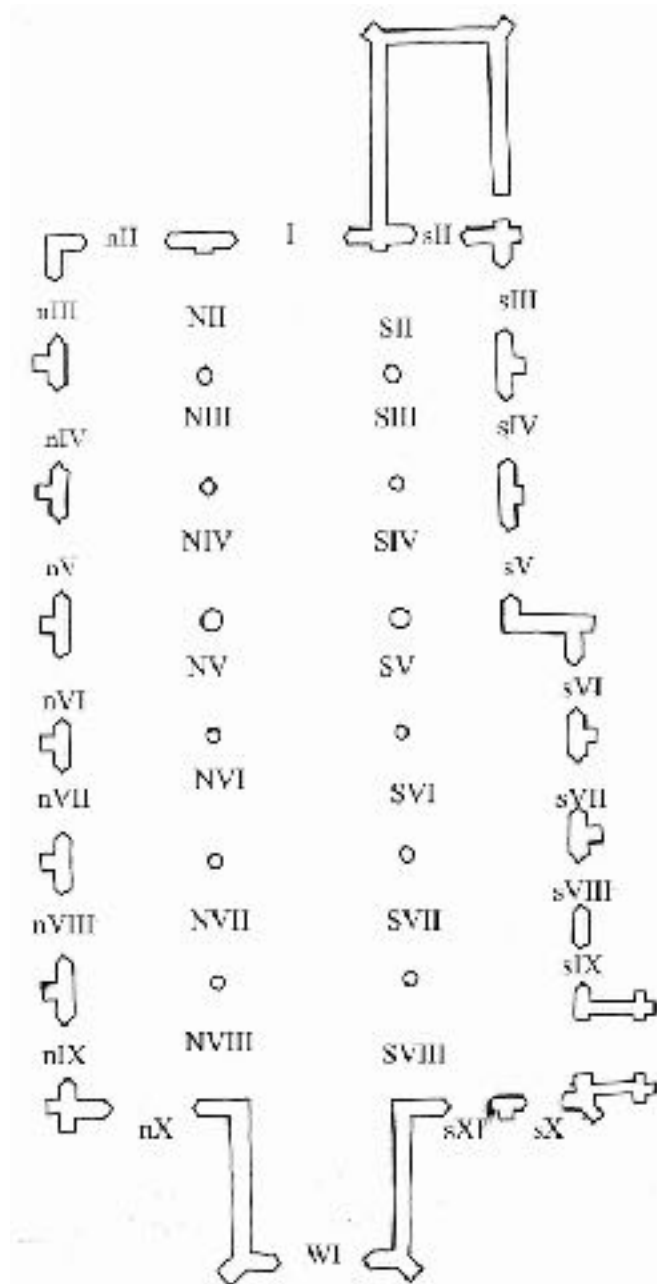
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Thornhill St Michael and All Angels
 ground plan showing window locations with CVMA numberings - not to scale
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sIV internal, external and tracery detail



sIV 1a detail



sIV 2b detail: internal fracturing visible to face of angel

sIV details 2a and 2b: pigment loss to trace lines and internal corrosion



sV internal, external and tracery detail



sV 1a detail: impact damage



sV 1a detail: pressure fractures



sV 2a detail



sV 2b detail: *in situ* repair to canopy and part of wing in orange stain at lower left



illustration of proposed framing /installation for sIV

