

### GAS MEMBRANE VALIDATION – BELLE VUE

**Project Name:** Belle Bue Stadium

**Project Number:** 12-123

**Client:** Countryside Properties

**Date:** 07-02-2023

**Project Manager:** S. Ellis

**E3P Engineer:** G. Calvert

**Ground Gas Risk Assessment:** Amber 1

**Plots:** 163-166

### OVERVIEW

The membrane comprised a Visqueen low permeability gas membrane (Yellow) resistant to radon, carbon dioxide and low methane levels. E3P can confirm there were no holes or rips at the inspection time. Upon being laid, the membrane is to be covered with a Celotex (closed Cell) floor insulation material which is considered to provide a high degree of protection.

E3P inspected all external joints, and E3P can confirm that the membrane was overlapped and double-taped. The membrane was taped using double-sided jointing tape. All the overlaps were then additionally taped using foil-backed girth tape.

Each unit has a service duct located at the front and outer edge of the property. E3P inspected each one and can confirm that the top hats have been adequately sealed against the membrane.

Based on the information provided within this report, the site inspections and validation checklists, E3P can confirm that Plots 163-166 have been installed with gas protection measures following Amber 1 to an acceptable level of workmanship.

A list of plots requiring validation and their associated validation letters is presented in Table 1.



Geo-Environmental



Acoustics



Remediation and  
Enabling Earthworks  
Design



Arboriculture



Compliance  
& Due Diligence



Ecology



Industrial Permitting

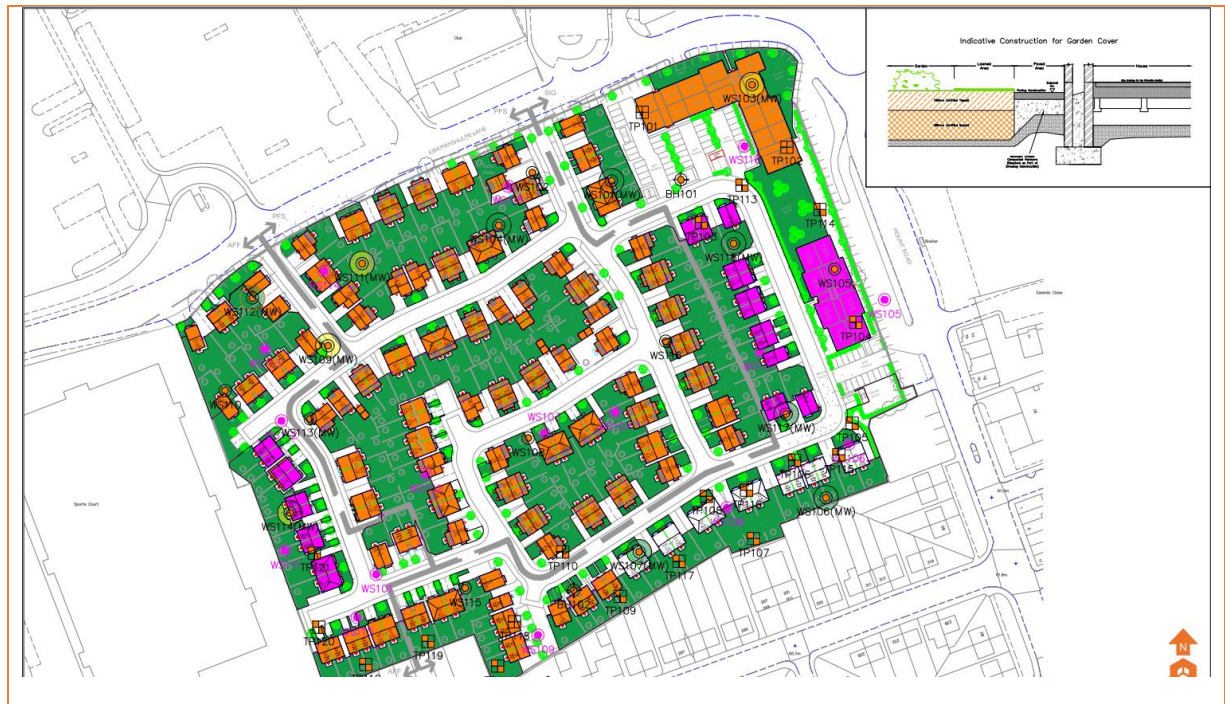


Geotechnical

## MEMBRANE SPECIFICATION: VISQUEEN GAS MEMBRANE (YELLOW)

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                       |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Technical Datasheet - Product Overview |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Technical support: +44 (0) 333 202 6800<br>Date Published: 18/10/2021 |
|                                        | <b>Visqueen Low Permeability Gas Membrane</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                       |
|                                        | <b>Features and benefits</b> <ul style="list-style-type: none"><li>• BBA certified - third party accreditation</li><li>• Complies with NHBC Amber 1 - suitable for low gas risk NHBC housing sites</li><li>• Flexible - easy to detail and install on site</li><li>• Supplied centre folded - reduces the risk of cracks in screed and limits creases</li><li>• Multi functional - also acts as a radon and damp proof membrane</li><li>• Dual jointing methods - lap joints can be taped or heat welded</li></ul>                                                                                                                                                           |                                                                       |
|                                        | <b>Product description</b> <p>Visqueen Low Permeability Gas Membrane is a robust co-polymer thermoplastic gas membrane, 0.5mm thick, yellow in colour and supplied 4m x 12.5m in a center folded roll.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                       |
|                                        | <b>Approvals and standards</b> <ul style="list-style-type: none"><li>• Third party accreditation (BBA 13/5069)</li><li>• Conforms to the specification requirements of NHBC Amber 1 applications</li><li>• Conforms to the specification requirements of BR 211:2015</li><li>• CE Mark EN 13967:2017</li><li>• Quality Management System ISO 9001:2015</li><li>• Occupational Health and Safety System ISO 45001:2018</li><li>• Environmental Management System ISO 14001:2015</li></ul>                                                                                                                                                                                     |                                                                       |
|                                        | <b>Usage</b> <p>Visqueen Low Permeability Gas Membrane is suitable to prevent the ingress of harmful levels of ground gases for housing applications where NHBC are the warranty provider and the site has been classified as Amber 1. In this application, the membrane is used above a precast suspended segmental ground floor system, for example a beam and block floor.</p> <p>The membrane can also be used as a high performance radon membrane and/or damp proof membrane positioned within the ground floor construction either above or below the structural floor.</p> <p>The product is not intended for use where there is a risk of hydrostatic pressure.</p> |                                                                       |
|                                        | <b>System components</b> <ul style="list-style-type: none"><li>• VisqueenPro Double Sided Jointing Tape, 50mm x 10m</li><li>• Visqueen Gas Resistant Foil Lap Tape, 75mm x 50m</li><li>• Visqueen Top Hat Units</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                       |

## GAS MITIGATION MEASURES PLAN



The gas membrane validation photographs are enclosed within this letter. For information, Table 1 includes references and validation dates of previously validated plots.

TABLE 1 – VALIDATION LETTER REFERENCE

| PLOT NUMBER | DATE                        | REPORT NUMBER |
|-------------|-----------------------------|---------------|
| 1           | 3 <sup>rd</sup> March 2022  | V4            |
| 2           | 3 <sup>rd</sup> March 2022  | V4            |
| 3           | 3 <sup>rd</sup> March 2022  | V4            |
| 4           | 29 <sup>th</sup> March 2022 | V5            |
| 5           | 29 <sup>th</sup> March 2022 | V5            |
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| 86 | 27 <sup>th</sup> May 2022 | V9 |
| 87 | 27 <sup>th</sup> May 2022 | V9 |
| 88 | 27 <sup>th</sup> May 2022 | V9 |
| 89 | 25 <sup>th</sup> May 2022 | V8 |

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| <b>90</b>  | 25 <sup>th</sup> May 2022  | V8  |
| <b>91</b>  | 25 <sup>th</sup> May 2022  | V8  |
| <b>92</b>  | 8 <sup>th</sup> June 2022  | V12 |
| <b>93</b>  | 8 <sup>th</sup> June 2022  | V12 |
| <b>94</b>  | 28 <sup>th</sup> June 2022 | V15 |
| <b>95</b>  | 28 <sup>th</sup> June 2022 | V15 |
| <b>96</b>  |                            |     |
| <b>97</b>  |                            |     |
| <b>98</b>  |                            |     |
| <b>99</b>  | 30 <sup>th</sup> May 2022  | V10 |
| <b>100</b> | 31 <sup>st</sup> May 2022  | V11 |
| <b>101</b> | 31 <sup>st</sup> May 2022  | V11 |
| <b>102</b> | 15 <sup>th</sup> June 2022 | V13 |
| <b>103</b> | 15 <sup>th</sup> June 2022 | V13 |
| <b>104</b> | 22 <sup>nd</sup> June 2022 | V14 |
| <b>105</b> | 22 <sup>nd</sup> June 2022 | V14 |
| <b>106</b> |                            |     |
| <b>107</b> |                            |     |
| <b>108</b> | 4 <sup>th</sup> July 2022  | V15 |
| <b>109</b> | 4 <sup>th</sup> July 2022  | V15 |
| <b>110</b> | 19 <sup>th</sup> July 2022 | V18 |
| <b>111</b> |                            |     |
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| <b>124</b> |                                 |     |
| <b>125</b> | 8 <sup>th</sup> September 2022  | V23 |
| <b>126</b> | 8 <sup>th</sup> September 2022  | V23 |
| <b>127</b> | 8 <sup>th</sup> September 2022  | V23 |
| <b>128</b> | 8 <sup>th</sup> September 2022  | V23 |
| <b>129</b> | 8 <sup>th</sup> September 2022  | V23 |
| <b>130</b> | 23 <sup>rd</sup> August 2022    | V20 |
| <b>131</b> | 23 <sup>rd</sup> August 2022    | V20 |
| <b>132</b> | 23 <sup>rd</sup> August 2022    | V20 |
| <b>133</b> | 23 <sup>rd</sup> August 2022    | V20 |
| <b>134</b> | 5 <sup>th</sup> September 2022  | V21 |
| <b>135</b> | 15 <sup>th</sup> September 2022 | V25 |

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| <b>136</b> | 23 <sup>rd</sup> August 2022 | V20 |
| <b>137</b> | 23 <sup>rd</sup> August 2022 | V20 |
| <b>138</b> | 23 <sup>rd</sup> August 2022 | V20 |
| <b>139</b> | 23 <sup>rd</sup> August 2022 | V20 |
| <b>140</b> | 4 <sup>th</sup> August 2022  | V19 |
| <b>141</b> | 15 <sup>th</sup> July 2022   | V17 |
| <b>142</b> | 15 <sup>th</sup> July 2022   | V17 |
| <b>143</b> | 11 <sup>th</sup> July 2022   | V16 |
| <b>144</b> | 11 <sup>th</sup> July 2022   | V16 |
| <b>145</b> | 11 <sup>th</sup> July 2022   | V16 |
| <b>146</b> | 9 <sup>th</sup> May 2022     | V6  |
| <b>147</b> | 9 <sup>th</sup> May 2022     | V6  |
| <b>148</b> | 9 <sup>th</sup> May 2022     | V6  |
| <b>149</b> | 9 <sup>th</sup> May 2022     | V6  |
| <b>150</b> | 13 <sup>th</sup> May 2022    | V7  |
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| <b>162</b> |                                                                 |            |
| <b>163</b> | 7 <sup>th</sup> February 2023                                   | V40        |
| <b>164</b> | 7 <sup>th</sup> February 2023                                   | V40        |
| <b>165</b> | 7 <sup>th</sup> February 2023                                   | V40        |
| <b>166</b> | 7 <sup>th</sup> February 2023                                   | V40        |
| <b>167</b> | 4 <sup>th</sup> November 2022                                   | V31        |
| <b>168</b> | 24 <sup>th</sup> September 2022                                 | V26        |
| <b>168</b> | 24 <sup>th</sup> September 2022                                 | V26        |
| <b>169</b> |                                                                 |            |
| <b>170</b> | 5 <sup>th</sup> October 2022                                    | V27        |
| <b>171</b> | 21 <sup>st</sup> November 2022                                  | V33        |
| <b>172</b> | 21 <sup>st</sup> November 2022                                  | V33        |
| <b>173</b> | 23 <sup>rd</sup> November 2022                                  | V34        |
| <b>174</b> | 12 <sup>th</sup> December 2022                                  | V35        |
| <b>175</b> | 12 <sup>th</sup> December 2022                                  | V35        |
| <b>176</b> | 15 <sup>th</sup> December 2022                                  | V36        |
| <b>177</b> | 15 <sup>th</sup> December 2022                                  | V36        |
| <b>178</b> | 4 <sup>th</sup> November 2022<br>10 <sup>th</sup> November 2022 | V31<br>V32 |
| <b>179</b> | 4 <sup>th</sup> November 2022                                   | V31        |
| <b>180</b> | 4 <sup>th</sup> November 2022                                   | V31        |

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| <b>181</b> | 27 <sup>th</sup> October 2022   | V30 |
| <b>182</b> | 27 <sup>th</sup> October 2022   | V30 |
| <b>183</b> | 27 <sup>th</sup> October 2022   | V30 |
| <b>184</b> | 24 <sup>th</sup> October 2022   | V29 |
| <b>185</b> | 24 <sup>th</sup> October 2022   | V29 |
| <b>186</b> | 24 <sup>th</sup> October 2022   | V29 |
| <b>187</b> | 24 <sup>th</sup> October 2022   | V29 |
| <b>188</b> |                                 |     |
| <b>189</b> | 21 <sup>st</sup> November 2022  | V33 |
| <b>190</b> | 21 <sup>st</sup> November 2022  | V33 |
| <b>191</b> | 1 <sup>st</sup> September 2022  | V22 |
| <b>192</b> | 1 <sup>st</sup> September 2022  | V22 |
| <b>193</b> | 1 <sup>st</sup> September 2022  | V22 |
| <b>194</b> | 22 <sup>nd</sup> September 2022 | V24 |
| <b>195</b> | 22 <sup>nd</sup> September 2022 | V24 |
| <b>196</b> | 24 <sup>th</sup> September 2022 | V26 |
| <b>197</b> | 24 <sup>th</sup> September 2022 | V26 |
| <b>198</b> | 12 <sup>th</sup> October 2022   | V28 |
| <b>199</b> | 12 <sup>th</sup> October 2022   | V28 |
| <b>200</b> | 24 <sup>th</sup> October 2022   | V29 |
| <b>201</b> | 24 <sup>th</sup> October 2022   | V29 |
| <b>202</b> | 24 <sup>th</sup> October 2022   | V29 |
| <b>203</b> | 24 <sup>th</sup> October 2022   | V29 |

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| 236 | 24 <sup>th</sup> Jan 2022      | V1 |
| 237 | 24 <sup>th</sup> Jan 2022      | V1 |
| 238 | 24 <sup>th</sup> Jan 2022      | V1 |
| 239 | 24 <sup>th</sup> Jan 2022      | V1 |
| 240 |                                |    |
| 241 |                                |    |
| 242 | 15 <sup>th</sup> February 2022 | V3 |
| 243 | 15 <sup>th</sup> February 2022 | V3 |
| 244 |                                |    |
| 245 |                                |    |
| 246 | 24 <sup>th</sup> January 2022  | V2 |
| 247 | 24 <sup>th</sup> January 2022  | V2 |
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| <b>250</b>                         |                                                                 |            |
| <b>Apartment Block 1</b>           | 15 <sup>th</sup> September 2022<br>5 <sup>th</sup> October 2022 | V25<br>V27 |
| <b>Apartment Block 1 Stairwell</b> | 19 <sup>th</sup> January 2023<br>20 <sup>th</sup> January 2023  | V38<br>V39 |
| <b>Apartment Block 2</b>           | 23 <sup>rd</sup> August 2022                                    | V20        |

**Plot - 163**

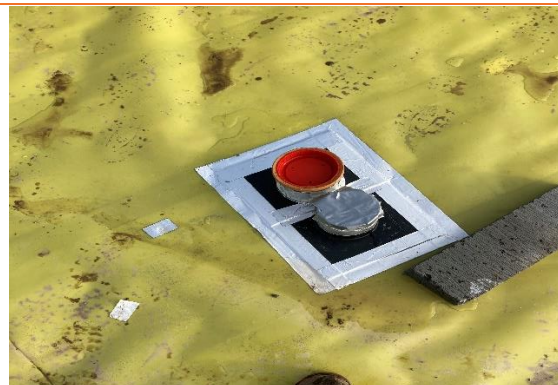
**General Condition of Membrane-Good Condition**



**Verification of Joints and Seals-Overlapped and sealed correctly**



**Verification of Service Penetrations-Good Condition**



**Verification of Ventilation-Good Condition**

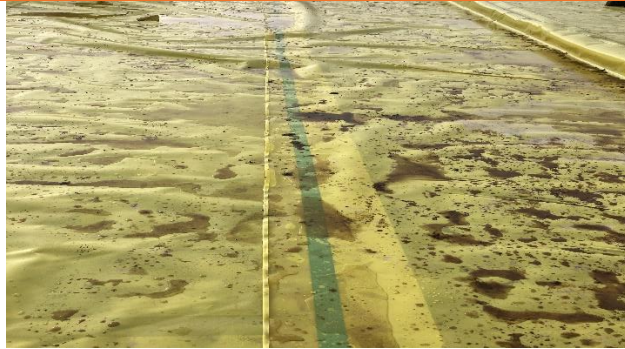


**Plot - 164**

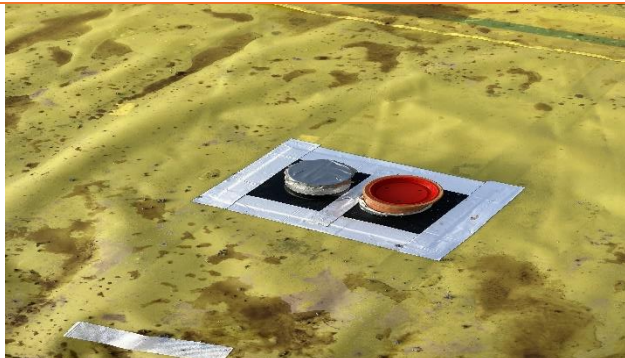
**General Condition of Membrane-Good Condition**



**Verification of Joints and Seals-Overlapped and sealed correctly**



**Verification of Service Penetrations-Good Condition**



**Verification of Ventilation-Good Condition**



**Plot - 165**

**General Condition of Membrane-Good Condition**



**Verification of Joints and Seals-Overlapped and sealed correctly**



**Verification of Service Penetrations-Good Condition**

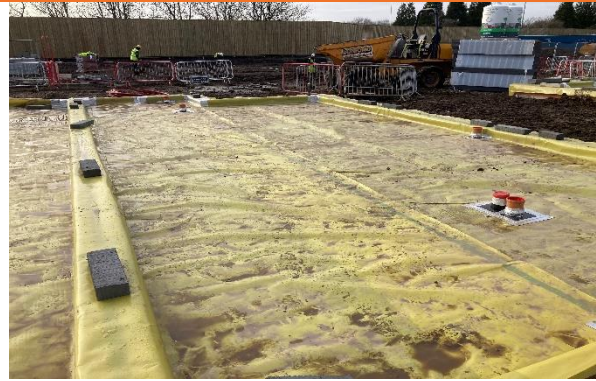


**Verification of Ventilation-Good Condition**



**Plot - 166**

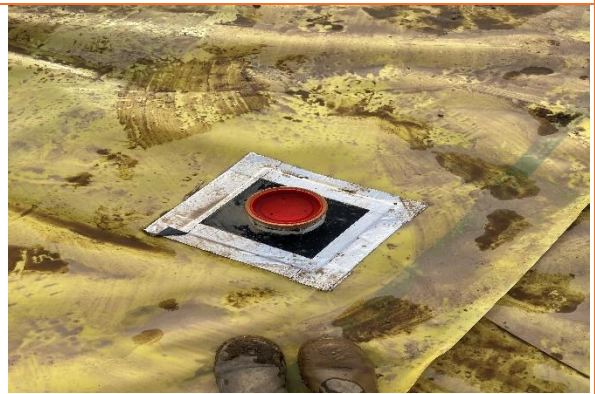
**General Condition of Membrane-Good Condition**



**Verification of Joints and Seals-Overlapped and sealed correctly**



**Verification of Service Penetrations-Good Condition**



**Verification of Ventilation-Good Condition**

