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4th July 2016

Mine Subsidence Board
117 Bull Street
Newcastle West NSW 2302

For the attention of: Mr. Peter Evans, Manager of Development and Procurement

Dear Peter,

RE: Study into the Impacts of Co-existence of Urban Development and Longwall Mining at Tahmoor Colliery (Phase 1)

Mine Subsidence Engineering Consultants (MSEC) has been engaged by the Mine Subsidence Board (MSB) to study the impacts of co-existence of urban development and longwall mining at Tahmoor Colliery. This study comprises two phases that were outlined in the Request For Quotation (RFQ). This letter report summarises the findings from the first phase of the study.

The first phase of the study is to provide a "*high level understanding of the percentage of houses impacted by longwall mining. This analysis will be provided in two scenarios: 1 Percentage of houses impacted that are directly undermined; and 2. Percentage of houses impacted within the zone of influence. This is to be provided within one week of the contract being awarded*" (Section 12 of the RFQ).

The deliverables were outlined in Section 13 of the RFQ and have been reproduced below for the first stage of the study:

a. *Determine the number and percentage of houses that have been impacted (i.e. A claim that has been accepted with the following* [claim] *category; approved, refused, pending, or anticipated) due to the extraction of Longwalls 22 to 29 at Tahmoor Colliery. Provide a separate analysis for each claim category;*

b. *The percentages should be determined based on: 1) total number of houses located directly above mining; and 2) total number of houses located within the 'zone of influence', taken as the 26.5 degree angle of draw line;*

It is noted, that an angle of draw of 35° is generally adopted in the Southern Coalfield. The actual limit of vertical subsidence, taken as the measured 20 mm subsidence contour, has been reviewed at Tahmoor Colliery as part of Report No. MSEC355. The review of the ground monitoring data identified that the measured limit of vertical subsidence is equivalent to a 35° angle of draw adjacent to the ends of the longwalls and equivalent to a 40° angle of draw adjacent to the maingate and tailgate sides (above solid coal).

Whilst the measured limit of vertical subsidence is greater than the 35° angle of draw on the longwall sides (above solid coal), this comprises low level vertical movements that are not associated with measurable tilts, curvatures or strains. It has therefore been considered appropriate to define the zone of influence for mining at Tahmoor Colliery as the 35° angle of draw line.

The study has provided an analysis of the claims based on both the 26.5° angle of draw line (as per the RFQ) and the 35° angle of draw line (as per the experience at Tahmoor Colliery). It is recommended that the results based on the 35° angle of draw line are adopted as the zone of influence for mining at Tahmoor Colliery.

The analysis of claims has been based on the spreadsheet provided by the MSB called "*Copy of Summary of Tahmoor Precinct Claims ~ June 2016*". The file was originally received on the 24th June 2016 and was amended on the 27th June 2016 to include missing Lot/DP information. Further information was also provided by the MSB on the 30th June 2016 on the unit numbers for properties with strata plans.

The study has been based on the claims for the residential structures (i.e. houses and unit blocks) that are located directly above and within the zone of influence for Tahmoor Colliery Longwalls 22 to 29. These longwalls have been extracted from the Bulli Coal seam at depths of cover ranging between 420 m and 500 m. The overall void widths of these longwalls are 283 m and the chain pillar widths vary between 35 m and 40 m. Longwalls 22 to 29 were extracted between May 2004 and April 2016.

The south-eastern ends of Longwalls 22 to 28 are located directly beneath the urban area of Tahmoor. The north-western ends of Longwalls 23B to 26 are located adjacent to, and partially beneath, the urban area of Thirlmere. The urban areas represent approximately 25 % of the surface area directly above Longwalls 22 to 29 and approximately 43 % of the surface area that is located within the 35° angle of draw line.

The locations of the longwalls and the urban areas of Tahmoor and Thirlmere are shown in Figure 1.

The information on the residential structures within the zone of influence for Tahmoor Longwalls 22 to 29 has been gathered as part of the Section 138 and Subsidence Management Plan (SMP) Applications for these longwalls (Report Nos. WKA137, MSEC157 and MSEC355). This information has been updated during subsequent studies including modification applications and longwall end of panel reports.

The locations and sizes of the residential structures have been determined from aerial photographs of the area, the latest dated 2013. It is likely that additional structures have been constructed within the area since this aerial photograph and prior to the completion of Longwall 29 in April 2016. A review of the rate of house construction in the area was undertaken as part of Report No. MSEC355. It was found that in the six-year period prior to that report (i.e. 2003 to 2009), the rate of construction represented approximately 11 additional houses per year.

It is estimated therefore that in the order of 30 residential structures have been constructed in the area since the latest aerial photograph and prior to the completion of Longwall 29. These structures may or may not be located within the area of active subsidence during that period (i.e. 2013 to 2016). In any case, the estimated number of additional residential structures represents less than 2 % of the total number of structures that have been identified within the zone of influence for Longwalls 22 to 29.

The types of construction for the residential structures in the area have been determined from kerb side, pre-mining and post mining inspections. The locations and details of the structures located directly above and in the vicinity of the longwalls at Tahmoor Colliery is kept in a Graphical Information System (GIS) maintained by MSEC.

The data for the residential structures within GIS have been linked to the claims information spreadsheet provided by the MSB using the Lot and DP information. The units on properties with strata plans have been separated in the claims spreadsheet using the information provided by the MSB in the email dated 30th June 2016.

A summary of the total numbers of residential structures that are located directly above Longwalls 22 to 29 and within the zone of influence of mining is provided in Table 1. The number of structures within the zone of influence has been based on both the 26.5° and 35° angle of draw lines.

Table 1 Total Numbers of Residential Structures Located Directly Above Tahmoor Longwalls 22 to 29 and within the Zone of Influence of Mining

Location	Total Number of Residential Structures
Directly above Longwalls 22 to 29	1259
Within 26.5° angle of draw line for Longwalls 22 to 29	1760
Within 35° angle of draw line for Longwalls 22 to 29	1891

There is a total of 1259 residential structures located directly above Longwalls 22 to 29 comprising of 1212 houses and 47 unit blocks. There is a total of 1891 residential structures located with the 35° angle of draw line from mining comprising of 1813 houses and 78 unit blocks.

A summary of the numbers of residential structures that are located directly above each of the longwalls (including its tailgate chain pillar) is provided in Table 2.

Table 2 Number of Residential Structures Located Directly Above Each of Tahmoor Longwalls 22 to 29

Longwall	Number of Residential Structures
LW22	151
LW23A/B	212
LW24A/B	265
LW25	308
LW26	178
LW27	108
LW28	37
LW29	0

The total number of residential structures that have one or more claims associated with mining at Tahmoor Colliery is 1099 based on the spreadsheet provided by the MSB.

The claims within the spreadsheet provided by the MSB have been subcategorised (Column D) as: *accepted*, *being investigated*, *elimination of danger*, *preventative works*, *refused* and *yet to be investigated*. The deliverables outlined in Section 13 of the RFQ requested that claims be categorised into: approved, refused, pending and anticipated. The results have therefore been presented based on the subcategories: *accepted* (i.e. approved), *refused*, *being investigated* (i.e. pending) and *yet to be investigated* (i.e. anticipated).

A summary of the number of claims for the residential structures that are located directly above mining and within the zone of influence of mining based on each of the subcategories is provided in Table 3. It is recommended that the 35° angle of draw line should be adopted as the zone of influence for mining. It is noted, that the number of structures within the angles of draw lines also include the structures located directly above the longwalls.

Table 3 Number of Claims for the Residential Structures by Location and Subcategory

Claim Subcategory	Number of Structures		
	Directly above Longwalls 22 to 29	Within the 26.5° angle of draw line	Within the 35° angle of draw line
Accepted	549	625	626
Refused	119	180	192
Being Investigated	59	73	73
Yet to be investigated	0	1	1
Totals	727	879	892

The total number of residential structures located directly above the longwalls and within the 26.5° and 35° angles of draw lines are provided in Table 1. A summary of the percentage of the residential structures that have one or more claims based on each of the subcategories is provided in Table 4.

Table 4 Percentage of Claims for the Residential Structures by Subcategory

Claim Subcategory	Percentage of Structures		
	Directly above Longwalls 22 to 29	Within the 26.5° angle of draw line	Within the 35° angle of draw line
Accepted	44 %	36 %	33 %
Refused	9 %	10 %	10 %
Being Investigated	5 %	4 %	4 %
Yet to be investigated	0 %	0 %	0 %
Totals	58 %	50 %	47 %

As can be seen from Table 1, Table 3 and Table 4, there are 1259 residential structures located directly above the longwalls and 58 % have made a claim, of which 44 % have been accepted, and of which 5% are still being investigated. There are 1891 residential structures located within the 35° angle of draw line and 47 % have made a claim, of which 33% have been accepted, and of which 4% are still being investigated. It is noted, that the number of structures within the angle of draw also include the structures located directly above the longwalls.

There are 632 residential structures that are located outside of the longwalls but within the 35° angle of draw line, of which, 77 structures have a claim. The percentage of claims for residential structures located outside of the longwalls but within the 35° angle of draw line, therefore, is 12 %.

I trust that this information is of assistance. If you have any questions or require further information, please do not hesitate to call me on (02) 9413-3777.

Yours sincerely

James Barbato

James Barbato
Associate Director
Mine Subsidence Engineering Consultants

References

WKA137 (Oct 2003) – Tahmoor North Longwalls 22 and 23 – The Prediction of Subsidence Parameters and the Assessment of Subsidence Impacts on Natural Features and Surface Infrastructure (in Support of a Section 138 Application).

MSEC157 (Mar 2006) – Tahmoor Colliery Longwalls 24 to 26 – The Prediction of Subsidence Parameters and the Assessment of Mine Subsidence Impacts on Surface and Sub-Surface Features due to Mining of Longwalls 24 to 26 at Tahmoor Colliery in Support of an SMP Application.

MSEC355 (Jul 2009) – Tahmoor Colliery Longwalls 27 to 30 – The Prediction of Subsidence Parameters and the Assessment of Mine Subsidence Impacts on Natural Features and Items of Surface Infrastructure due to Mining Longwalls 27 to 30 at Tahmoor Colliery in Support of the SMP Application.

REPORT: SUBSIDENCE IMPACTS STUDY

THE MINE SUBSIDENCE BOARD:

Study into the Co-existence of Urban Development and Longwall Mining at Tahmoor Colliery

 | REPORT NUMBER: MSEC835-2 | REVISION A

DOCUMENT REGISTER

Revision	Description	Author	Checker	Date
01	Draft Issue	JB	AAW	27th Jul 16
02	Draft Issue	JB	AAW	23rd Sep 16
A	Final Issue	JB	AAW	18th Oct 16

Report produced for: The Mine Subsidence Board in support of the study into the co-existence of urban development and longwall mining at Tahmoor Colliery.

Associated reports: Letter Report MSEC835-1 (6th July 2016) – Study into the impacts of co-existence of urban development and longwall mining at Tahmoor Colliery (Phase 1).

EXECUTIVE SUMMARY

This report summarises the claim rates, claim costs and repair categories for the residential properties due to the mining of Tahmoor Longwalls 22 to 29. The results are based on the information provided by the Mine Subsidence Board (MSB) in the spreadsheet called "*Copy of Summary of Tahmoor Precinct Claims ~ June 2016"* and additional information provided in subsequent emails.

There are 1259 residential properties that are located directly above Tahmoor Longwalls 22 to 29 and 44 % have made a claim, of which, 30 % have been accepted, 6 % are being investigated and 1 % are yet to be investigated and 7 % have been refused (refer to Table 2.2). There are 1891 residential properties that are located within the 35° angle of draw line and 35 % have made a claim, of which, 22 % have been accepted, 4 % are being investigated, 1 % are yet to be investigated and 8 % have been refused (refer to Table 2.2).

It is likely that additional claims will be made due to the extraction of Tahmoor Longwalls 22 to 29 due to delayed submission. The anticipated claims have been estimated based on the previous experience at Tahmoor Colliery. It is estimated that an additional 3 % of properties located directly above the longwalls and 2 % of properties located within the 35° angle of draw line will submit late claims due to the mining of these longwalls.

If pending and anticipated claims are approved, as expected by the MSB, then 40 % of the residential properties located directly above Tahmoor Longwalls 22 to 29 and 30 % of properties located within the 35° angle of draw line of these longwalls would be approved.

The claims include those for the residential building structures (i.e. houses and unit blocks) as well as the other associated infrastructure on the private properties, such as pavements, fences, gates, pools and services. The claims for the residential building structures have not been separated from the claims for the other associated infrastructure on the properties.

It is likely that there are additional impacts on the residential properties that are not included in the claims data. It is possible that some of the approved claims were for damage that was not caused by mining. It is expected that most, if not all claims being investigated or yet to be investigated will be accepted.

The average total expenditures for the residential properties that have approved or pending claims are: $62,521 based on the properties located directly above the longwalls; and $60,395 based on properties located within the 35° angle of draw line (refer to Table 3.3). These total expenditures are equivalent Year 2016 costs based on 2.6 % annual inflation. It is noted that these expenditures include those for the building structure as well as the associated infrastructure on the private properties.

The rates of impact for the residential building structures (i.e. houses and unit blocks) that are located directly above Tahmoor Longwalls 22 to 29 comprise: 66.1 % that made no claim or had a refused claim, 1.3 % that had an R0 impact; 22.7 % that had an R1 or R2 impact; 8.3 % that had an R3 or R4 impact; and 1.6 % that had an R5 impact (refer to Table 3.7). The rates of impact for the residential properties that are located within the 35° angle of draw line comprise: 74.7 % that made no claim or had a refused claim, 0.8 % that had an R0 impact; 17.5 % that had an R1 or R2 impact; 5.9 % that had an R3 or R4 impact; and 1.1 % that had an R5 impact (refer to Table 3.7). These impact categories relate to the building structure only and the descriptions of the repair categories are provided in Table 3.5.

The average total expenditures for the residential properties located within the 35° angle of draw line and that have approved or pending claims are: $6,918 based a Category R0 impact; $30,272 based on Categories R1 and R2 impacts; $103,894 based on Categories R3 and R4 impacts; and $405,457 based on a Category R5 impact (refer to Table 3.10). The average total expenditures for the residential properties located directly above the longwalls are similar to those for the properties located within the 35° angle of draw line. These total expenditures are equivalent Year 2016 costs based on 2.6 % annual inflation. It is again noted, that these expenditures include those for the building structures as well as the associated infrastructure on the private properties.

The percentages of residential structures with minor or major repair categories (i.e. R1 to R5) have increased since the 2009 ACARP study. This increase is likely due to due to the time delay of claims since mining directly beneath the urban area of Tahmoor between 2006 and 2009. It appears from the data that the percentages of properties in each of these categories have started to level since the year ending 2013.

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Tables

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1.1. Introduction

Mine Subsidence Engineering Consultants (MSEC) has been engaged by the Mine Subsidence Board (MSB) to study the co-existence of urban development and longwall mining at Tahmoor Colliery. The objective of the study is to determine the rates of impact and the associated costs of repair for residential building structures due to longwall mining. It is anticipated that the findings from this study will provide an improved understanding of the effects of longwall mining on residential developments.

The deliverables for this study were outlined in Section 13 of the Request For Quotation (RFQ) and these have been reproduced below:

a) *Determine the number and percentage of houses that have been impacted (i.e. A claim that has been accepted with the following* [claim] *category; approved, refused, pending, or anticipated) due to the extraction of Longwalls 22 to 29 at Tahmoor Colliery. Provide a separate analysis for each claim category;*

b) *The percentages should be determined based on: 1) total number of houses located directly above mining; and 2) total number of houses located within the 'zone of influence', taken as the* [35°] *angle of draw line;*

c) *Determine the cost of these claims at Tahmoor Colliery, i.e. average cost based on: 1) total number of houses located directly above mining; and 2) total number of houses located within the 'zone of influence. Provide a standard deviation (or variance) for the average cost and a separate analysis for each claim category';*

d) *Determine the classification of claims (*[Nil] *to R5) based on the extent of repairs or value of the claim;*

e) *Trend the volume, percentage and cost of claims over time (by directly undermined and zone of influence); and*

f) *Provide a brief overview of infrastructure claims caused by Tahmoor mine excluded from the study.*

The analysis of claims has been based on the spreadsheet provided by the MSB called "*Copy of Summary of Tahmoor Precinct Claims ~ June 2016*". Further information has also been provided by the MSB in subsequent emails.

1.2. Residential buildings

The study has been based on the claims for the residential structures (i.e. houses and unit blocks) that are located directly above and within the zone of influence of Tahmoor Longwalls 22 to 29, i.e. within the 35° angle of draw line from mining. The longwalls have been extracted from the Bulli Coal seam at depths of cover ranging between 420 and 500 m. The overall void widths of these longwalls are 283 m and the chain pillar widths vary between 35 and 40 m. Longwalls 22 to 29 were extracted between May 2004 and April 2016.

The south-eastern ends of Longwalls 22 to 28 are located directly beneath the urban area of Tahmoor. The north-western ends of Longwalls 23B to 26 are located adjacent to, and partially beneath, the urban area of Thirlmere. The urban areas represent approximately 25 % of the surface area directly above Longwalls 22 to 29 and approximately 43 % of the surface area that is located within the 35° angle of draw line.

The locations of the longwalls, the 35° angle of draw line and the urban areas of Tahmoor and Thirlmere are shown in Fig. 1.1. The 35° angle of draw line is located at a distance of 0.7 times the depth of cover outside the perimeter of the longwalls and is, therefore, between 300 and 350 m outside the mining area.

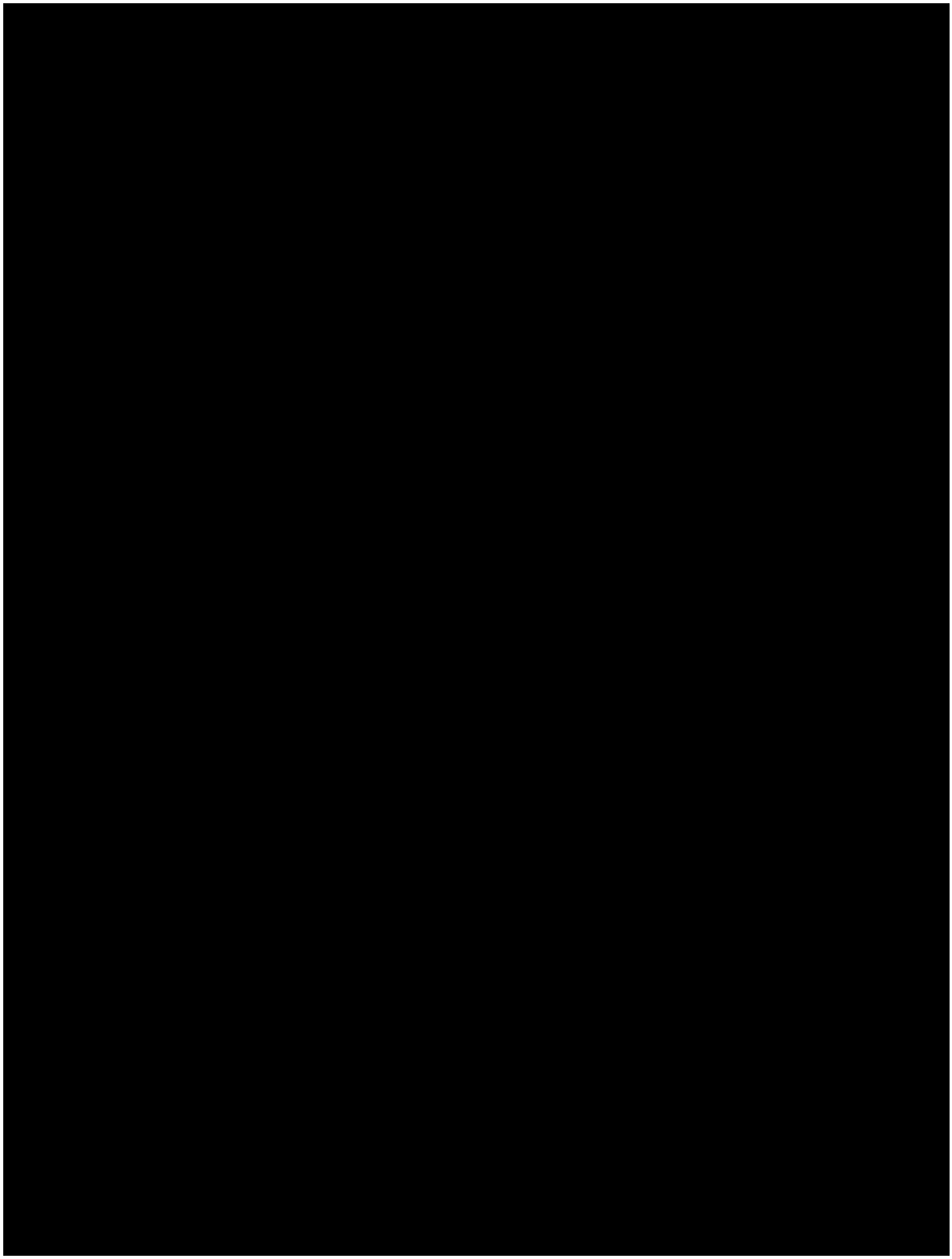

Fig. 1.1 Locations of Tahmoor Longwalls 22 to 29 and the Urban Areas of Tahmoor and Thirlmere

The information on the residential building structures within the zone of influence of Tahmoor Longwalls 22 to 29 has been gathered as part of the Section 138 and Subsidence Management Plan (SMP) Applications for these longwalls (Report Nos. WKA137, MSEC157 and MSEC355). This information has been updated during subsequent studies including modification applications and longwall end of panel reports.

The locations and sizes of the residential building structures have been determined from aerial photographs of the area, the latest dated 2013. It is likely that additional structures have been constructed within the area since this aerial photograph and prior to the completion of Longwall 29 in April 2016. A review of the rate of house construction in the area was undertaken as part of Report No. MSEC355. It was found that in the six-year period prior to that report (i.e. 2003 to 2009), the rate of construction represented approximately 11 additional houses per year.

It is estimated therefore that in the order of 30 residential structures have been constructed in the area since the latest aerial photograph and prior to the completion of Longwall 29. These structures may or may not be located within the area of active subsidence during that period (i.e. 2013 to 2016). In any case, the estimated number of additional residential structures represents less than 2 % of the total number of structures that have been identified within the zone of influence of Tahmoor Longwalls 22 to 29.

The types of construction for the residential structures in the area have been determined from kerb side, pre-mining and post mining inspections. The positions and details of the structures located directly above and in the vicinity of the longwalls at Tahmoor Colliery is kept in a database maintained by MSEC.

The data for the residential building structures within the database have been linked to the claims information spreadsheet provided by the MSB using the Lot and DP information. The units on properties with strata plans have been separated in the claims spreadsheet using the information provided by the MSB in the email dated 30th June 2016.

A summary of the total numbers of residential building structures (i.e. houses and unit blocks) that are located directly above Longwalls 22 to 29 and within the zone of influence of mining (i.e. 35° angle of draw line) is provided in Table 1.1.

Table 1.1 Total numbers of residential building structures located directly above Tahmoor Longwalls 22 to 29 and within the zone of influence of mining

Location	Total number of residential building structures
Directly above Longwalls 22 to 29	1259
Within 35° angle of draw line for Longwalls 22 to 29	1891

There is a total of 1259 residential building structures located directly above Longwalls 22 to 29 comprising 1212 houses and 47 unit blocks. There is a total of 1891 residential building structures located within the 35° angle of draw line comprising 1813 houses and 78 unit blocks.

A summary of the numbers of residential building structures that are located directly above each of the longwalls (including the tailgate chain pillars) is provided in Table 1.2.

Table 1.2 Number of residential building structures located directly above each of Tahmoor Longwalls 22 to 29

Longwall	Number of residential building structures
LW22	151
LW23A/B	212
LW24A/B	265
LW25	308
LW26	178
LW27	108
LW28	37
LW29	0
Total	**1259**

1.3. Number of residential claims

The total number of claims provided in the MSB spreadsheet is 1144. However, 55 of these claims are for non-residential built features, including public roads, pavements, bridges and railway infrastructure, or are for pre-mining inspections. The total number of claims for the residential properties therefore is 1089.

It is noted, that the 1089 claims include those for the residential building structures (i.e. houses and unit blocks) as well as the other associated infrastructure on the private properties, such as pavements, fences, gates, pools and services. The claims for the residential building structures have not been separated from the claims for the other associated infrastructure on the properties.

The claims within the spreadsheet provided by the MSB have been subcategorised (Column D) as: *accepted*, *elimination of danger*, *preventative works*, *being investigated*, *yet to be investigated*, *refused* and uncategorised. The deliverables outlined in Section 13 of the RFQ stated that claims be categorised into: approved (i.e. accepted, elimination of danger and preventive works), pending (i.e. being investigated and yet to be investigated), refused and anticipated.

A summary of the residential claims provided in the MSB spreadsheet is provided in Table 1.3. This table includes all claims for the properties that have made multiple claims.

Table 1.3 Summary of residential claims

Category (sub-category)		Number of residential claims	
		MSB spreadsheet	Within 35° angle of draw
Approved	Accepted	569	507
	Elimination of danger	7	0
	Preventive works	1	1
Pending	Being investigated	104	102
	Yet to be investigated	17	17
Refused		381	256
Uncategorised		10	8
Totals		**1089**	**891**

The total number of claims in the MSB spreadsheet of 1089 includes all residential properties (i.e. houses and unit blocks), i.e. including those located outside the 35° angle of draw line, such as those above earlier longwalls at the Colliery and other properties outside the mining area. There is a total of 577 residential claims that have been approved with a further 121 claims that are pending in the MSB spreadsheet. It is noted that these pending claims are expected to be approved.

1.4. Number of residential properties (with claims)

Some residential properties have made more than one claim and, therefore, the total number of unique properties that have a claim is less than 1089. The claims have been linked to each residential property based on the Lot and DP number and also the unit number in the case of strata plans. The total number of residential properties that have one or more claims associated with mining at Tahmoor Colliery is 826 based on the MSB spreadsheet.

A summary of the numbers of residential properties grouped by the number of claims is provided in Table 1.4. The claims include those for the residential building structures (i.e. houses and unit blocks) as well as the other associated infrastructure on the private properties. The claims in the MSB spreadsheet (i.e. middle column of the table) include those located outside the 35° angle of draw line, such as those above earlier longwalls at the Colliery and other properties outside the mining area.

Table 1.4 Number of residential properties with multiple claims

Number of claims per property	Number of residential properties (with claims)	
	MSB spreadsheet	Within 35° angle of draw
One	640	514
Two	129	113
Three	47	42
Four or more	10	5
Totals	**826**	**674**

A summary of the numbers of residential properties that have approved, pending and refused claims is provided in Table 1.5. The claims include those for the residential building structures (i.e. houses and unit blocks) as well as the other associated infrastructure on the private properties. The column called *MSB spreadsheet* represents the number of properties with at least one claim for each of the sub-categories. The number of claims in this column (i.e. 928) is greater than the number of residential properties (i.e. 826) as some properties have multiple claims and therefore are included in more than one sub-category.

The columns called *adjusted for multiple claims* and *adjusted within 35° angle of draw* account for the residential properties with multiple claims. The properties have been categorised once only in order of: *accepted*, *elimination of danger/preventive works*; *being investigated*; *yet to be investigated* and then *refused*. That is, if the property has: at least one accepted claim, then it is placed in this sub-category; if it has at least one claim for the elimination of danger or preventive works and no accepted claims, then it is placed in these sub-categories; and so forth for the pending and then refused claims. The residential properties are included in one sub-category only and, therefore, the number of claims in these columns are equal to the number of residential properties.

Table 1.5 Number of residential properties with approved, pending and refused claims

Category (sub-category)		Number of residential properties (with claims)		
		MSB spreadsheet	Adjusted for multiple claims	Adjusted within 35° angle of draw
Approved	Accepted	464	464	417
	Elimination of danger	7	4	0
	Preventive works	1	1	1
Pending	Being investigated	100	84	82
	Yet to be investigated	17	17	17
Refused		329	255	157
Uncategorised		10	1	0
Totals		**928**	**826**	**674**

The column *adjusted for multiple claims* comprises all claims in the MSB spreadsheet, including those located outside the 35° angle of draw line. There are 469 residential properties (i.e. 464 + 4 + 1) with at least one approved claim, of which, 418 properties (i.e. 417 + 1) are located within the 35° angle of draw line. Some of these properties have other claims that are pending or have been refused.

There are 101 properties (i.e. 84 + 17) that have pending claims and do not have previously approved claims, of which,.99 properties (i.e. 82 + 17) are located within the 35° angle of draw line. It is noted that these pending claims are expected to be approved.

The claims data comprises the properties where the owners have notified the MSB and have lodged a claim. It is possible that there are additional properties that have been impacted, but the owners have not made a claim, including vacant properties, properties where the impacts have not been noticed by the owner and tenanted properties.

It was identified in the 2009 ACARP study that there is a delay between impacts occurring and claims being lodged, due to the time for the owner to notice the impact, or the owner has waited for subsequent longwalls to be mined adjacent to the property before making the claim. It is likely, therefore, that there are additional impacts on the residential properties that are not included in the claims data. It is also possible that some of the approved claims were for damage that was not caused by mining.

The anticipated claims have been estimated based on the previous experience at Tahmoor Colliery. There were 97 residential properties that submitted claims due to the mining Longwall 26, of which, 7 claims (i.e. 7 %) were considered to have been made after the completion of active subsidence (i.e. late submissions).

A summary of the approved, pending and anticipated claims for the residential properties is provided in Table 1.6. The anticipated claims are based on 7 % of the currently approved and pending claims. The middle column *adjusted for multiple claims* comprises all claims in the MSB spreadsheet, including those located outside the 35° angle of draw line.

Table 1.6 Number of residential properties with approved, pending and anticipated claims

Category	Number of residential properties (with claims)	
	Adjusted for multiple claims	Adjusted within 35° angle of draw
Approved	469	418
Pending	101	99
Anticipated	40 (i.e. 7% of 570)	36 (i.e. 7% of 517)
Total	**610**	**553**

2.0 REVIEW OF THE RATES OF CLAIMS FOR RESIDENTIAL PROPERTIES

This section summarises the numbers and percentages of residential properties that have made a claim due to the extraction of Longwalls 22 to 29 at Tahmoor Colliery. Separate analyses have been provided based on the properties located directly above the longwalls and properties located within the zone of influence of mining, i.e. the 35° angle of draw line.

A summary of the number of claims for the residential properties (i.e. building structures and associated infrastructure) that are located directly above Tahmoor Longwalls 22 to 29 and within the 35° angle of draw line based on each of the sub-categories is provided in Table 2.1. The properties with multiple claims have been categorised once in order of: *accepted*, *elimination of danger/preventive works*; *being investigated*; *yet to be investigated* and then *refused*. In this way, each property is only included once in each of the columns. The anticipated claims have been estimated based on an additional 7 % of the currently approved and pending claims.

Table 2.1 Number of residential properties (with claims) by location and category

Category (sub-category)		Number of residential properties	
		Directly above Longwalls 22 to 29	Within the 35° angle of draw line
Approved	Accepted	378	417
	Elimination of danger	0	0
	Preventive works	1	1
Pending	Being investigated	70	82
	Yet to be investigated	14	17
Refused		93	157
Anticipated		32	36
Totals		**588**	**710**

There is a total of 674 properties (i.e. 417 + 1 + 82 + 17 + 157) located within the 35° angle of draw line that have claims that have been either been *approved*, *pending* or *refused*. It is also anticipated that a further 36 properties located within the 35° angle of draw line will submit late claims due to the mining of these longwalls. There are no properties with uncategorised claims that also have no approved, pending or refused claims within the 35° angle of draw line.

There are 152 additional residential properties that have made claims, but are located outside of the 35° angle of draw line and, therefore, have not been included in Table 2.1. The claims for these additional properties comprise 47 (i.e. 31 %) *accepted*, four (3 %) for *elimination of danger*, two (i.e. 1 %) *being investigated*, 98 (i.e. 64 %) *refused* and one (i.e. < 1 %) uncategorised.

There are 1259 residential properties located directly above Longwalls 22 to 29 and 1891 structures located within the 35° angle of draw line. A summary of the percentage of the residential properties (i.e. building structures and associated infrastructure) that have one or more claims based on each of the sub-categories is provided in Table 2.2. The properties with multiple claims have been categorised once in order of: *accepted*, *elimination of danger/preventive works*; *being investigated*; *yet to be investigated* and then *refused*. In this way, each property is only included once in each of the columns. The anticipated claims have been estimated based on an additional 7 % of the currently approved and pending claims.

Table 2.2 Percentage of residential properties (with claims) by location and category

Category (sub-category)		Number of residential properties	
		Directly above Longwalls 22 to 29	Within the 35° angle of draw line
Approved	Accepted	30 %	22 %
	Elimination of danger	0 %	0 %
	Preventive works	0 %	0 %
Pending	Being investigated	6 %	4 %
	Yet to be investigated	1 %	1 %
Refused		7 %	8 %
Anticipated		3 %	2 %
Totals		47 %	38 %

As can be seen from Table 1.1, Table 2.1 and Table 2.2, there are 1259 residential properties that are located directly above Tahmoor Longwalls 22 to 29 and 44 % have made a claim, of which, 30 % have been accepted, 6 % are being investigated, 1 % are yet to be investigated and 7 % have been refused. There are 1891 residential properties that are located within the 35° angle of draw line and 35 % have made a claim, of which, and 22 % have been accepted, 4 % are being investigated, 1 % are yet to be investigated and 8 % have been refused. It is noted that all pending claims are expected to be accepted. It is also anticipated that an additional 3 % of properties located above the longwalls and 2 % of properties located within the 35° angle of draw line will submit late claims due to the mining of these longwalls.

There are 632 residential properties that are located outside of the longwalls but within the 35° angle of draw line (i.e. above solid coal and within the zone of influence of mining). The total number of claims for the residential properties located above solid coal and within the zone of influence of mining is 118 (i.e. 19 %), of which, 39 (i.e. 6 %) have been *approved*, 12 (i.e. 2 %) are *being investigated*, 3 (i.e. < 1 %) are *yet to be investigated* and 64 (i.e. 10 %) have been *refused*.

There are 1130 residential properties that are located within the urban area of Tahmoor (refer to Fig. 1.1) and are also located directly above the longwalls. Hence, the residential properties that are located directly above the longwalls are 90 % within the urban area and 10 % within the rural area.

There are 510 residential properties that are located within the urban area and also directly above the longwalls that have made a claim (i.e. 45 % of the total), of which, 340 (i.e. 30 %) have been *approved*, 58 (i.e. 5 %) are *being investigated*, 12 (i.e. 1 %) are *yet to be investigated* and 100 (9 %) have been *refused*. These rates of claim are similar to those based on all residential properties located directly above Longwalls 22 to 29 (i.e. both urban and rural areas).

This section summarises the costs of the claims and the repair categories for the residential properties due to the extraction of Longwalls 22 to 29 at Tahmoor Colliery. Separate analyses have been provided based on the properties located directly above the longwalls and properties located within the zone of influence of mining, i.e. the 35° angle of draw line. The trends of the costs and the repair categories with time have also been provided.

3.1. Total expenditure for the claims

The total values of the claims are provided in the MSB claims spreadsheet in Column T, referred to as *total expenditure*. The total expenditure includes the values of the claims for the residential building structures (i.e. houses and unit blocks) as well as the other associated infrastructure on the private properties, such as pavements, fences, gates, pools and services. It is not possible to separate the values of the claims for the residential building structures from the associated infrastructure, based on the data provided by the MSB.

3.1.1. Total expenditure for the claims (actual values not adjusted for inflation)

The distribution of the total expenditure for approved and pending claims is provided in Fig. 3.1 for residential properties (i.e. houses, unit blocks and associated infrastructure) located directly above the longwalls and in Fig. 3.2 for properties located within the 35° angle of draw line. The claims have been shown up to $300,000, as there are only 13 claims (i.e. 3 %) that have values greater than this range.

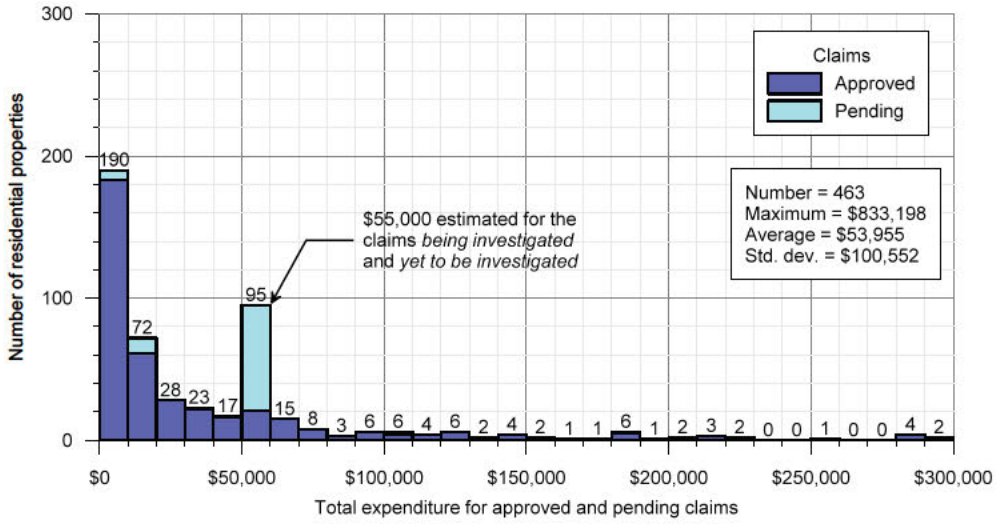

Fig. 3.1 Total expenditure for approved and pending claims for residential properties located directly above Tahmoor Longwalls 22 to 29

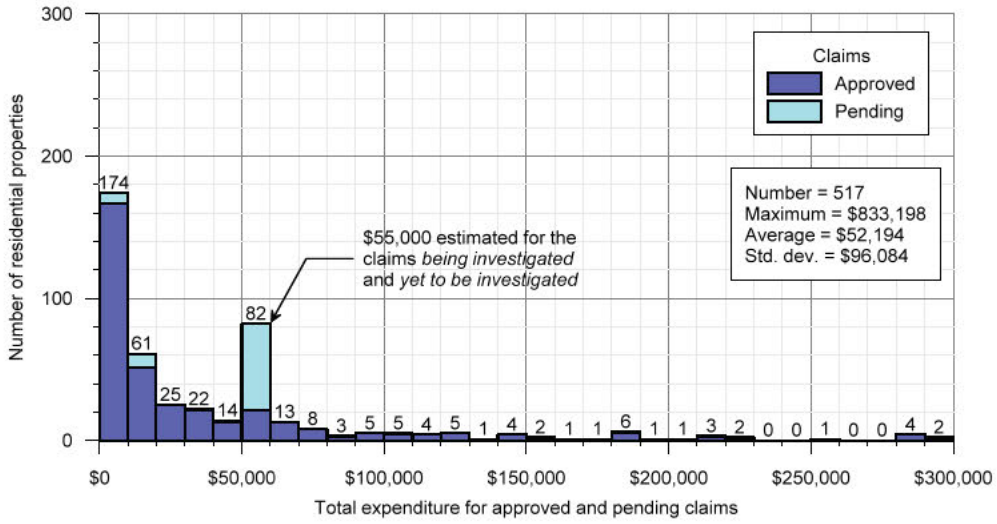

Fig. 3.2 Total expenditure for approved and pending claims for residential properties located within the 35° angle of draw line

There is a total of 463 residential properties located directly above the longwalls and 517 properties located within the 35° angle of draw line that have claims that have been either approved (i.e. accepted, for elimination of danger and preventive works) or are pending (i.e. being investigated or yet to be investigated). It is noted that all pending claims are expected to be accepted.

There are 330 residential properties located within the 35° angle of draw line that have approved or pending claims (i.e. 64 % of the claims) with total expenditures between zero and $50,000, 127 properties (i.e. 25 %) with claims between $50,000 and $100,000 and 60 properties (i.e. 12 %) with claims greater than $100,000. The spike of claims between $50,000 and $60,000 is due to the estimated value of $55,000 being adopted for claims that are being investigated and yet to be investigated.

It is noted that some of the higher claim costs comprise the purchase of properties that have been impacted by mining. However, the cost to repair these impacts may be less than the purchase price of the property and, therefore, there may be residual net value not accounted for in the claims data.

Summaries of the averages and standard deviations of the total expenditures for residential properties (i.e. houses, unit blocks and associated infrastructure) with approved and pending claims are provided in Table 3.1 and Table 3.2, respectively. The approved claims comprise those accepted, for elimination of danger and preventive works. The pending claims comprise those being investigated and yet to be investigated and these claims are expected to be accepted.

Table 3.1 Average cost per residential property (with approved or pending claims)

Claim category	Total expenditure for residential properties	
	Directly above Longwalls 22 to 29	Within the 35° angle of draw line
Approved	$52,386	$50,281
Pending	$61,030	$60,268
Approved and pending	$53,955	$52,194

Table 3.2 Standard deviation for the cost of residential properties (with approved or pending claims)

Claim category	Total expenditure for residential properties	
	Directly above Longwalls 22 to 29	Within the 35° angle of draw line
Approved	$102,959	$99,106
Pending	$88,923	$82,139
Approved and pending	$100,552	$96,084

3.1.2. Total expenditure for the claims (adjusted for inflation)

Tahmoor Longwalls 22 to 29 were extracted between May 2004 and April 2016. A separate cost analysis has therefore been undertaken with the values adjusted for inflation. The total expenditures have been increased to provide equivalent Year 2016 costs using 2.6 % annual inflation, based on the Sydney Residential PPI (Bureau of Statistics, 2016). The costs have therefore been increased by 1.36 times for claims during 2004 through to 1.0 times for claims during 2016.

Summaries of the averages and standard deviations of the adjusted total expenditures for residential properties (i.e. houses, unit blocks and associated infrastructure) for approved and pending claims are provided in Table 3.3 and Table 3.4, respectively. The total expenditures are equivalent Year 2016 costs based on 2.6 % annual inflation. The pending claims comprise those being investigated and yet to be investigated and these claims are expected to be accepted.

Table 3.3 Average total expenditure adjusted for inflation for the residential properties by location and subcategory based on Year 2016 costs

Claim category	Adjusted total expenditure for residential properties	
	Directly above Longwalls 22 to 29	Within the 35° angle of draw line
Approved	$61,546	$59,139
Pending	$66,925	$65,700
Approved and pending	$62,521	$60,395

Table 3.4 Standard deviation of total expenditure adjusted for inflation for the residential properties by location and subcategory based on Year 2016 costs

Claim category	Adjusted total expenditure for residential properties	
	Directly above Longwalls 22 to 29	Within the 35° angle of draw line
Approved	$126,596	$121,852
Pending	$99,600	$91,974
Approved and pending	$122,132	$116,714

The total expenditure based on Year 2016 costs compared with the actual costs for residential properties located within the zone of influence of mining (i.e. 35° angle of draw line) are 18 % greater for the approved claims and 9 % greater for the pending claims. The average total expenditure for all claims based on Year 2016 costs are approximately 16 % greater than the actual costs.

3.2. Repair categories for the residential building structures

The repair categories for each of the residential building structures (i.e. houses and unit blocks) have been determined in accordance with the recommendations of ACARP Research Project C12015 (Waddington, 2009). The impacts are classified as *Nil* (i.e. no claim) or repair categories R0 to R5. A description of the Repair Categories is provided in Table 3.5 (after Waddington, 2009).

Repair Category R0 represents minor adjustment of doors and windows, Categories R1 and R2 represent minor impacts that generally do not affect structural elements and Categories R3 and R4 are more substantial impacts that may affect some structural elements. Repair Category R5 represents the cases where the cost of repair exceeds the cost of replacement and the MSB and property owner have agreed to rebuild the house.

It is noted that Repair Category R0 differs from Impact Category 0, as defined in AS2870, which allows for several hairline cracks in one or more walls. In consequence, in this report, the Repair Category R1 is likely to be over represented and Repair Category R0 under represented when compared with the definitions of crack width defined in AS2870. It is therefore recommended that the definition of Repair Category R0 be updated to include "*cracks or movement < 1 mm in width in any external or internal wall claddings, linings, or finish*".

The repair categories for each of the residential building structures located within the zone of influence of mining were determined by reviewing the claims files at the Picton MSB office. The repair categories were determined and agreed to by a representative of MSEC and an inspector from the MSB. The classification of the repair categories was undertaken at the Picton MSB office on Thursday 14th July, Monday 18th July and Wednesday 20th July 2016.

Table 3.5 ACARP 2009 Classification based on Extent of Repairs

Repair Category	Extent of Repairs
Nil	No repairs required
R0 **Adjustment**	One or more of the following, where the damage does not require the removal or replacement of any external or internal claddings or linings: - **Door** or **window** jams or swings, or - Movement of **cornices**, or - Movement at external or internal **expansion joints**.
R1 **Very Minor Repair**	One or more of the following, where the damage can be repaired by filling, patching or painting without the removal or replacement of any external or internal brickwork, claddings or linings: - Cracks in **brick mortar** only, or isolated cracked, broken, or loose **bricks** in the external façade, or - Cracks or movement < 5 mm in width in any external or internal wall **claddings**, **linings**, or **finish**, or - Isolated cracked, loose, or drummy floor or wall **tiles**, or - Minor repairs to any **services** or **gutters**.
R2 **Minor Repair**	One or more of the following, where the damage affects a small proportion of external or internal claddings or linings, but does not affect the integrity of external brickwork or structural elements: - Continuous cracking in **bricks** < 5 mm in width in one or more locations in the total external façade, or - Slippage along the **damp proof course** of 2 to 5 mm anywhere in the total external façade, or - Cracks or movement ≥ 5 mm in width in any external or internal wall **claddings**, **linings**, **finish**, or - Several cracked, loose or drummy floor or wall **tiles**, or - Replacement of any **services**.
R3 **Substantial Repair**	One or more of the following, where the damage requires the removal or replacement of a large proportion of external brickwork, or affects the stability of isolated structural elements: - Continuous cracking in **bricks** of 5 to 15 mm in width in one or more locations in the total external façade, or - Slippage along the **damp proof course** of 5 to 15 mm anywhere in the total external façade, or - Loss of bearing to isolated walls, piers, columns, or other load-bearing elements, or - Loss of stability of isolated structural elements.
R4 **Extensive Repair**	One or more of the following, where the damage requires the removal or replacement of a large proportion of external brickwork, or the replacement or repair of several structural elements: - Continuous cracking in **bricks** > 15 mm in width in one or more locations in the total external façade, or - Slippage along the damp proof course of 15 mm or greater anywhere in the total external façade, or - Relevelling of building, or - Loss of stability of several structural elements.
R5 **Re-build**	Extensive damage to house where the MSB and the owner have agreed to rebuild as the cost of repair is greater than the cost of replacement.

3.2.1. Numbers of residential properties based on repair category

A summary of the repair categories for the residential properties (i.e. houses and unit blocks) that are located directly above Longwalls 22 to 29 and within the 35° angle of draw line is provided in Table 3.6. The repair categories have been grouped by: Nil or refused claim; R0 (i.e. minor adjustment only); R1 and R2 (i.e. minor impacts that generally do not affect structural elements); R3 and R4 (i.e. more substantial impacts that may affect some structural elements); and R5 (i.e. structure rebuilt).

Table 3.6 Number of residential properties by repair category

Location	Repair category				
	Nil or refused claim	R0	R1 or R2	R3 or R4	R5
Directly above Longwalls 22 to 29 (1259 properties)	833	16	286	104	20
Within the 35° angle of draw line (1891 properties)	1414	16	330	111	20

There are 1259 residential properties located directly above Longwalls 22 to 29 and 1891 structures located within the 35° angle of draw line. A summary of the percentage of the residential properties (i.e. houses and unit blocks) that are located directly above Longwalls 22 to 29 and within the 35° angle of draw line is provided in Table 3.7.

Table 3.7 Percentage of residential properties by repair category

Location	Repair category				
	Nil or refused claim	R0	R1 or R2	R3 or R4	R5
Directly above Longwalls 22 to 29 (1259 properties)	66.1 %	1.3 %	22.7 %	8.3 %	1.6 %
Within the 35° angle of draw line (1891 properties)	74.7 %	0.8 %	17.5 %	5.9 %	1.1 %

As can be seen from Table 3.6 and Table 3.7, there are 1259 residential properties located directly above the longwalls and that: 66.1 % either made no claim or had a refused claim;1.3 % had an R0 impact; 22.7 % had an R1 or R2 impact; 8.3 % had an R3 or R4 impact; and 1.6 % had an R5 impact. There are 1891 residential properties located within the 35° angle of draw line and: 74.7 % either made no claim or had a refused claim; 0.8 % had an R0 impact; 17.5 % had an R1 or R2 impact; 5.9 % had an R3 or R4 impact; and 1.1 % had an R5 impact. It is noted, that the number of properties within the 35° angle of draw line also includes the properties located directly above the longwalls.

In the 2009 ACARP study (Waddington, 2009) there were 669 residential building structures located directly above Tahmoor Longwalls 22 to 24A, of which, 546 properties (i.e. 82 %) made no claim or had an R0 impact, 84 properties (i.e. 13 %) had an R1 or R2 impact, 36 properties (i.e. 5 %) had an R3 or R4 impact and 3 properties (i.e. < 1 %) had an R5 impact. The impacts on the houses located directly above mining at Tahmoor Colliery therefore have increased since the 2009 ACARP study.

It was identified in the 2009 ACARP study that there is a time delay between longwall mining and the claims. This is partly due to the time for the owners to notice the impacts, or that impacts only developed after the extraction of subsequent longwalls beyond the property. Further discussions on the rate of claims with time are provided in Section 3.3.

3.2.2. Total expenditure based on repair category (actual values not adjusted for inflation)

Summaries of the average and standard deviation of the total expenditure for residential properties based on location and repair category are provided in Table 3.8 and Table 3.9, respectively. It is noted, that the total expenditure includes the approved and pending claims for the residential building structures (i.e. houses and unit blocks) as well as the other associated infrastructure on the private properties, such as pavements, fences, gates, pools and services. The repair categories are applicable only to the building structure itself.

Table 3.8 Average total expenditure for the residential properties by location and repair category

Location	Repair category			
	R0	R1 or R2	R3 or R4	R5
Directly above Longwalls 22 to 29	$6016	$26,030	$89,036	$343,868
Within the 35° angle of draw line	$6016	$26,609	$89,207	$343,868

Table 3.9 Standard deviation of total expenditure for the residential properties by location and repair category

Location	Repair category			
	R0	R1 or R2	R3 or R4	R5
Directly above Longwalls 22 to 29	$6,534	$34,217	$120,138	$195,376
Within the 35° angle of draw line	$6,534	$33,207	$117,414	$195,376

The average and standard deviation of the total expenditures for the residential properties located directly above mining are similar to those for the residential properties located within the 35° angle of draw line. The reason being, the majority of the impacts with high value claims are located directly above mining and, hence, within the angle of draw line.

3.2.3. Total expenditure based on repair category (adjusted for inflation)

A separate cost analysis has been undertaken with the values adjusted for inflation. The total expenditures have been increased to provide equivalent Year 2016 costs using 2.6 % annual inflation, based on the Sydney Residential PPI (Bureau of Statistics, 2016). The costs have therefore been increased by 1.36 times for claims during 2004 through to 1.0 times for claims during 2016.

Summaries of the average and standard deviation of the total expenditure for residential properties adjusted for Year 2016 costs based on location and repair category are provided in Table 3.10 and Table 3.11, respectively. It is noted, that the total expenditure includes the approved and pending claims for the residential building structures (i.e. houses and unit blocks) as well as the other associated infrastructure on the private properties, such as pavements, fences, gates, pools and services. The repair categories are applicable only to the building structure itself.

Table 3.10 Average total expenditure for the residential properties by location and repair category based on Year 2016 costs

Location	Repair category			
	R0	R1 or R2	R3 or R4	R5
Directly above Longwalls 22 to 29	$6,918	$29,810	$103,343	$405,457
Within the 35° angle of draw line	$6,918	$30,272	$103,894	$405,457

Table 3.11 Standard deviation of total expenditure for the residential properties by location and repair category based on Year 2016 costs

Location	Repair category			
	R0	R1 or R2	R3 or R4	R5
Directly above Longwalls 22 to 29	$7,252	$40,989	$149,782	$244,852
Within the 35° angle of draw line	$7,252	$39,440	$146,469	$244,852

Again, the average and standard deviation of the total expenditures for the residential properties located directly above mining are similar to those for the residential properties located within the 35° angle of draw line. The average total expenditure for all claims based on Year 2016 costs are approximately 14 % to 18 % greater than the actual costs.

3.3. Rates of claims with time

Tahmoor Longwalls 22 to 29 were extracted between May 2004 and April 2016. A summary of the progressive extents of Longwalls 22 to 29 and the numbers of residential properties located directly above mining and within the 35° angle of draw line is provided in Table 3.12.

Table 3.12 Extent of mining and numbers of residential properties located above mining and within the zone of influence of mining by year

Year ending	Active longwall	Length of extraction remaining (m)	Number of residential properties	
			Directly above the extracted longwalls	Within the 35° angle of draw line
2004	LW22	910	10	170
2005	LW23A	170	307	726
2006	LW24B	1740	490	971
2007	LW24A	710	587	1147
2008	LW25	2770	755	1413
2009	LW25	1380	918	1496
2010	LW25	170	939	1528
2011	LW26	1680	1101	1702
2012	LW27	2811	1161	1811
2013	LW27	410	1222	1849
2014	LW28	880	1258	1888
2015	LW29	690	1259	1890
2016*	LW29	0	1259	1891

Note: * denotes that the analysis includes the claims data up to the completion of Longwalls 29 in April 2016.

At the completion of Longwalls 22 to 29, there were 1259 residential properties located directly above Longwalls 22 to 29 and 1891 properties located within the 35° angle of draw line.

3.3.1. Total expenditure versus time

The accumulated expenditure for the residential properties (i.e. houses, unit blocks or associated infrastructure) with time is illustrated in Fig. 3.3. The yearly expenditure for these properties is illustrated in Fig. 3.4. These values are actual costs (i.e. no adjustment for inflation) for the residential properties located directly above the longwalls (blue lines) and within the 35° angle of draw (red lines).

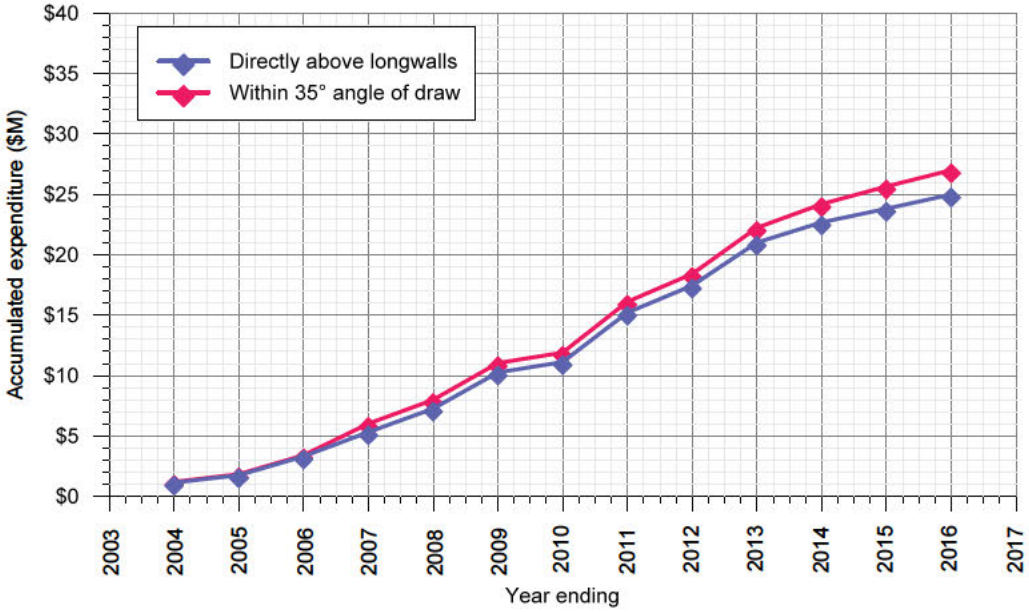

Fig. 3.3 Accumulated expenditure for claims for residential properties versus time

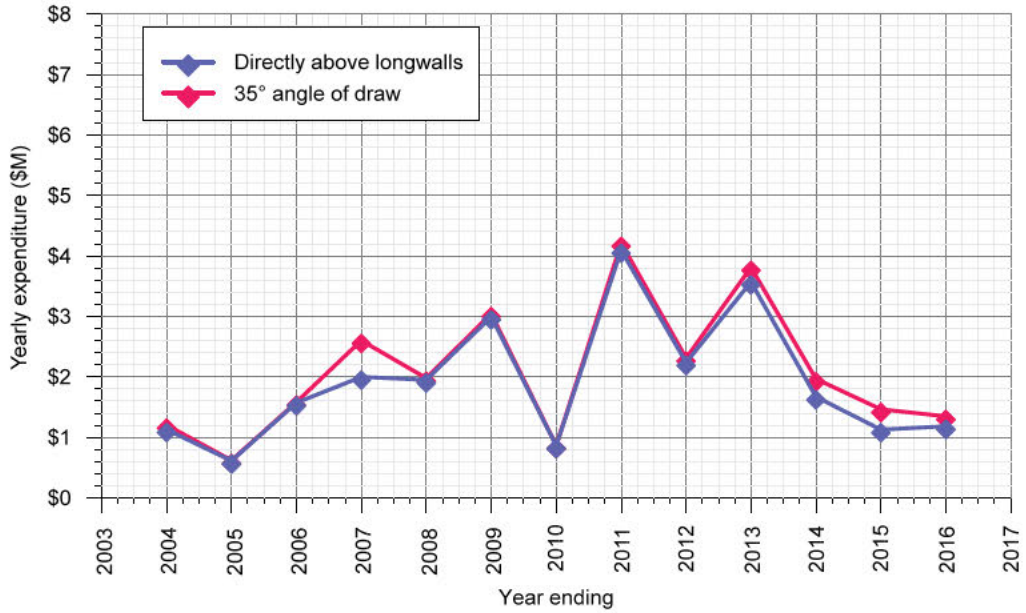

Fig. 3.4 Yearly expenditure for claims for residential properties versus time

The yearly expenditures for the residential properties generally increase from the year ending 2004 to the year ending 2011 and then generally decrease to the completion of Longwall 29 in April 2016. The longwalls were extracting beneath the urban area of Tahmoor between 2006 and 2013, which partially accounts for the increase and the decrease in the yearly claims.

A separate cost analysis has been undertaken with the total expenditures adjusted for inflation. The yearly expenditures have been increased to provide equivalent Year 2016 costs using 2.6 % annual inflation, based on the Sydney Residential PPI (Bureau of Statistics, 2016). The costs have therefore been increased by 1.36 times for claims during 2004 through to 1.0 times for claims during 2016. The yearly expenditure for the residential properties located directly above the longwalls (blue lines) and within the 35° angle of draw (red lines), adjusted for Year 2016 costs, is illustrated in Fig. 3.5.

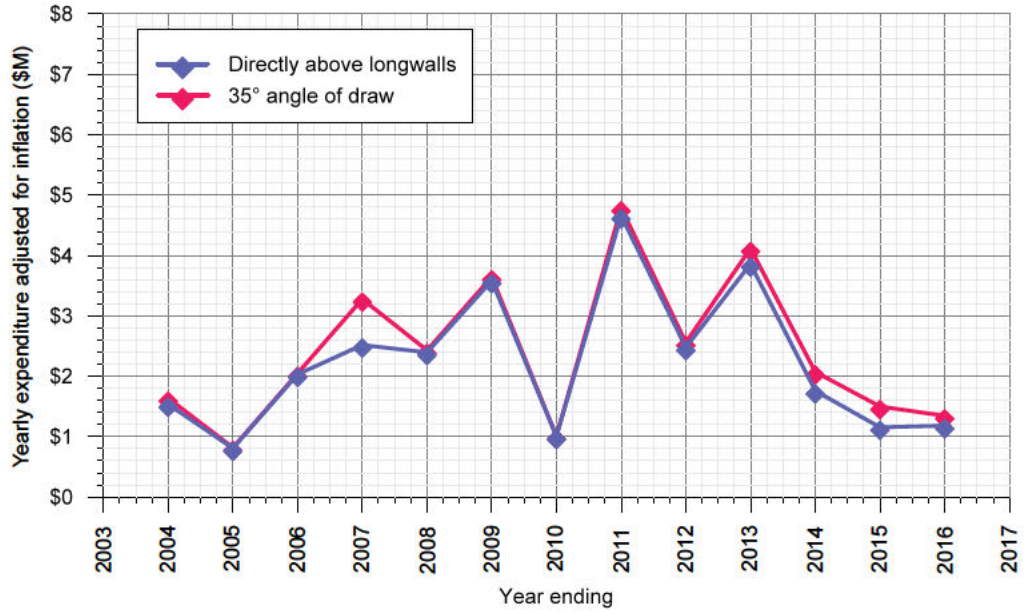

Fig. 3.5 Yearly expenditure for claims for residential properties based on Year 2016 costs

The yearly expenditures for residential properties adjusted for inflation (refer Fig. 3.5) have similar trends to the actual expenditures (refer Fig. 3.4). The adjusted yearly expenditures generally increase from the year ending 2004 to the year ending 2011 and then generally decrease to the completion of Longwall 29 in April 2016.

3.3.2. Repair categories versus time

The accumulated number of residential properties (i.e. houses and unit blocks) based on the repair category versus time are illustrated in: Fig. 3.6 based on properties located directly above the longwalls; and Fig. 3.7 based on properties located within the 35° angle of draw line. The properties with refused claims and no approved or pending claims have been included in the Nil Category.

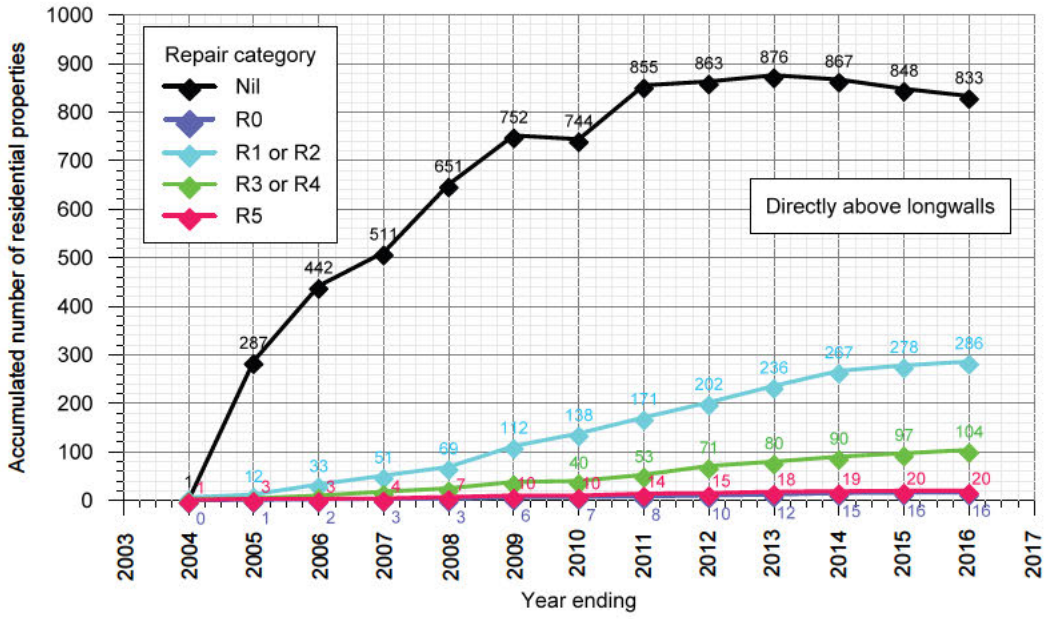

Fig. 3.6 Accumulated repair categories for residential properties located directly above the longwalls versus time

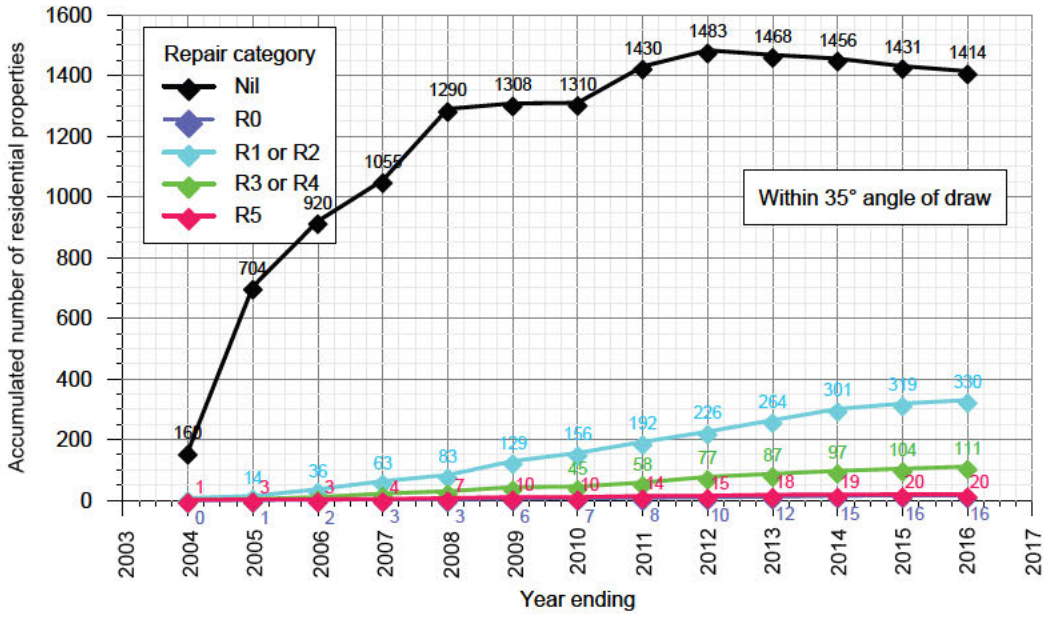

Fig. 3.7 Accumulated repair categories for residential properties located within the 35° angle of draw line versus time

The yearly number of residential properties (i.e. houses and unit blocks) based on the repair category versus time are illustrated in: Fig. 3.8 based on properties located directly above the longwalls; and Fig. 3.9 based on properties located within the 35° angle of draw line.

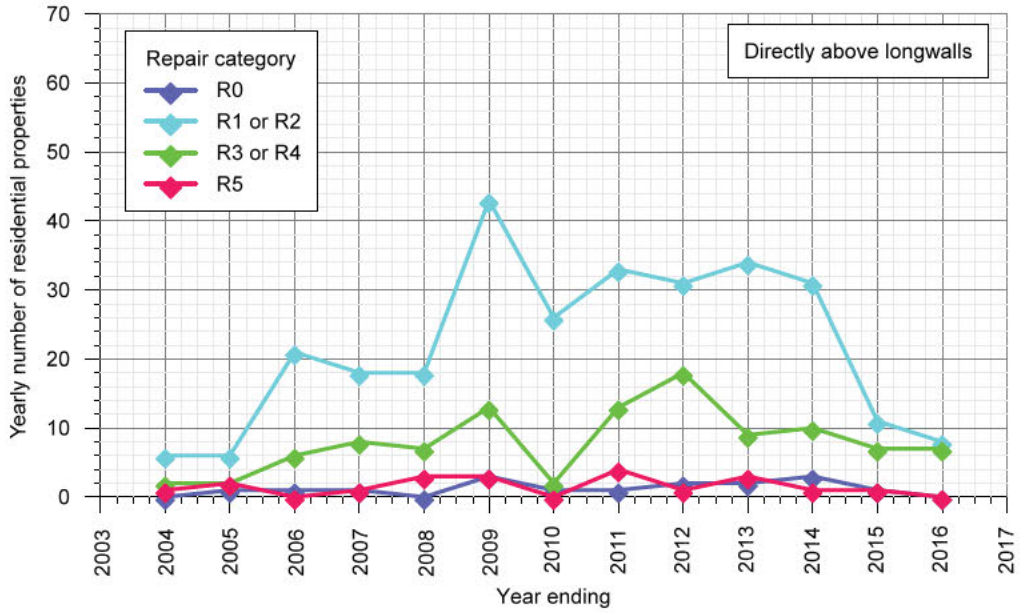

Fig. 3.8 Yearly repair categories for residential properties located directly above the longwalls versus time

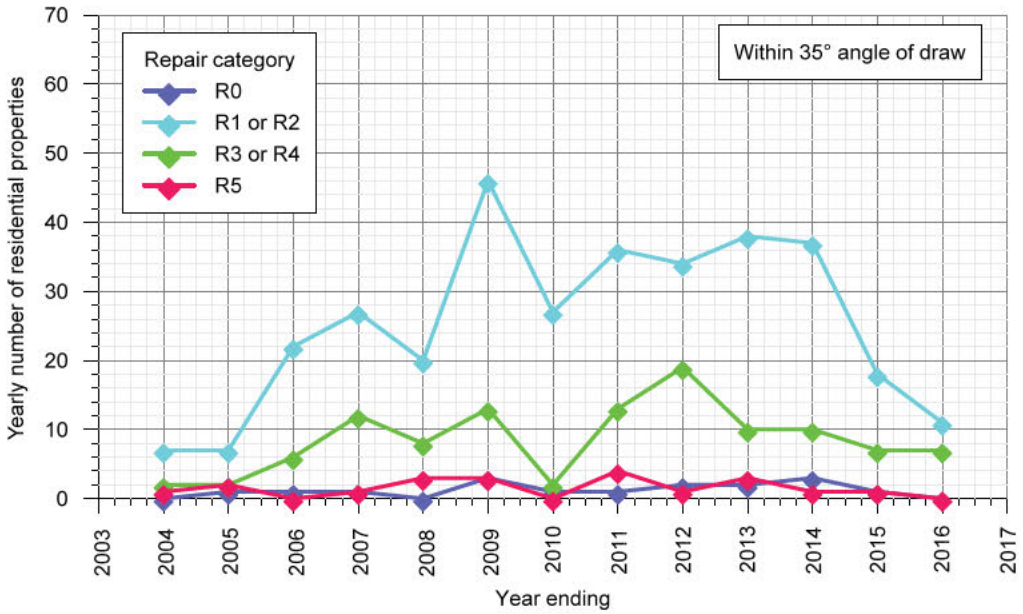

Fig. 3.9 Yearly repair categories for residential properties located within the 35° angle of draw line versus time

The yearly number of residential properties (i.e. houses and unit blocks) with minor repair categories (i.e. R0, R1 and R2) generally increase from the year ending 2004 to the year ending 2009, remain reasonably constant until the year ending 2014, and then generally decrease to the completion of Longwall 29 in April 2016. The yearly number of properties with major repair categories (i.e. R3, R4 and R5) generally increase from the year ending 2004 to the year ending 2012 and then generally decrease to the completion of mining.

The accumulated numbers of residential properties (i.e. houses and unit blocks) located directly above mining and within the 35° angle of draw line is summarised in Table 3.12. The accumulated percentages of residential properties, based on the repair category versus time, are illustrated in: Fig. 3.10 for properties located directly above the longwalls; and Fig. 3.11 based on properties located within the 35° angle of draw line. The properties with refused claims and no approved or pending claims have been included in the Nil Category.

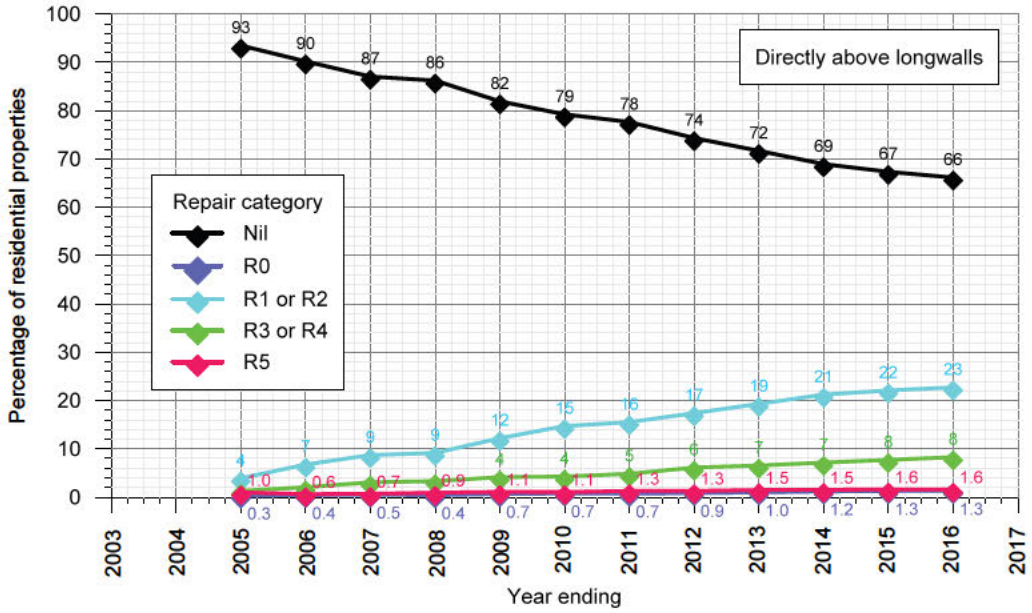

Fig. 3.10 Accumulated percentage of repair categories for residential properties located directly above the longwalls versus time

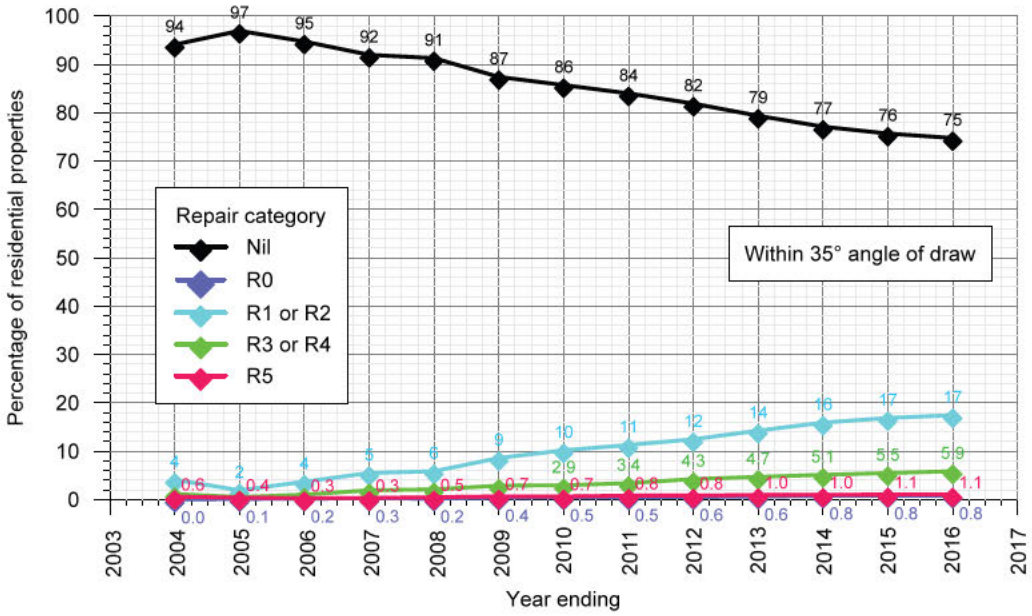

Fig. 3.11 Accumulated percentage of repair categories for residential properties located within the 35° angle of draw line versus time

The percentage of residential properties (i.e. houses and unit blocks) with minor or major impacts (i.e. R0 to R5) have generally increased with time and, in consequence, the number of properties with Nil impacts have decreased with time. It appears that the percentage of properties in each of the categories have started to level since the year ending 2013.

These figures illustrate that the percentage of residential structures with minor or major repair categories (i.e. R0 to R5) have increased since the 2009 ACARP study. This increase is likely due to due to the time delay of claims since mining directly beneath the urban area of Tahmoor between 2006 and 2009.

3.4. Claims for infrastructure

The total expenditure of claims for the residential properties in the MSB spreadsheet include those for the residential building structures (i.e. houses and unit blocks) as well as the other associated infrastructure on the private properties, such as pavements, fences, gates, pools and services. It is not possible to separate the claims for the residential building structures from the claims for the other associated infrastructure based on the data provided.

The claims for public infrastructure including the Main Southern Railway, the local roads and sewer were provided by the MSB in the email dated 22nd September 2016. A summary of the claims for these items of infrastructure are provided in Table 3.13. The approved claims represent the total costs to date associated with the mining of Longwalls 22 to 29. The anticipated claims represent the estimated future costs required to complete the works associated with these longwalls.

Table 3.13 Claims for Selected Instructure due to Tahmoor Longwalls 22 to 29

Infrastructure	Number of claims	Description	Total expenditure for selected infrastructure		
			Approved	Anticipated	Total
Main Southern Railway and associated infrastructure	18	Track maintenance and repairs, resurfacing, rail restressing and repairs to overbridges and culverts	$2.5 million	$4.5 million	$7.0 million
Local roads and bridges	11	Emergency repairs, road resurfacing, and repairs to bridges and culverts	$2.8 million	$1.5 million	$4.3 million
Sewer	5	Repair of pipelines and directional bore	$3.1 million	-	$3.1 million

The claims for other public infrastructure were analysed as part of the Technical Analysis in support of the review of the Mine Subsidence Compensation Act 1961 (Report No. MSEC823). The accumulated claims at Tahmoor Colliery since January 2000 are $1.1 million for commercial structures and less than $0.1 million for heavy industry.

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