COMPETENT PERSON’S REPORT ON
PROSPECTING LICENCES
HELD IN THE REPUBLIC OF IRELAND

Prepared for
IMC Exploration

Dr. Deirdre Lewis, PhD EurGeol PGeo
February 2018
BASIS OF REPORT

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The Directors
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Competent Persons Report on Prospecting Licences held by IMC Exploration in the Republic of Ireland

SCOPE AND PURPOSE OF THE REPORT

SLR Environmental Consulting (Ireland) Limited ('SLR') of 7 Dundrum Business Park, Windy Arbour, Dublin 14, Ireland, has been commissioned by IMC Exploration Group PLC ('IMC') to complete a Competent Persons Report (the 'February 2018 CPR') on IMC’s exploration properties in Ireland.

The January 2016 CPR has been prepared on behalf of SLR of 7 Dundrum Business Park, Windy Arbour, Dublin 14, Ireland by Dr Deirdre Lewis, PhD EurGeol PGeo. Dr Lewis is a Technical Director of SLR Consulting Ireland with more than 28 years of professional experience in the exploration and minerals industry internationally. She manages precious and base metals exploration and feasibility projects in Ireland, Australia, South America, Africa and Mongolia. She has project managed a range of multi-disciplinary projects for EU and World Bank throughout Africa and other developing countries to build institutional capacity in minerals and resources management. She prepares independent Competent Person’s Reports and valuations of exploration projects for stock exchange listings. She contributed to the United Nations World Investment Report (2007) on transnational corporation activity in the extractive industries and impacts on development. Her brief includes promotion of responsible development of natural resources; social impact assessment and stakeholder engagement for development projects.

Dr Lewis’s experience includes:

- Mineral exploration, Ireland, Europe, Africa, South America, Mongolia, PNG;
- Gold, base metals, critical minerals project appraisal & assessment;
- Independent Valuation & CPR of range of precious and base metal projects for AIM / 43-101 markets CPR (Serbia/India/ Europe/ Africa/ Ireland, private);
- Valuation of exploration property portfolios (international);
- Gold exploration in Lake Victoria Goldfields and Lupa Goldfields of Tanzania; and
- Management of porphyry copper-gold PNG / copper-molybdenum projects Ireland.

SLR Consulting (Ireland) Ltd. has extensive experience of independent expert studies and has completed Expert Reports and Valuations for listings on the London, Copenhagen, Dublin, Vancouver, Luxembourg and Australian Stock Exchanges.

Pursuant to its engagement, SLR has relied upon and assumed the accuracy and fair representation of all third party geological notes, reports and information supplied by IMC, many of which come from publically available
sources. Subject to the exercise of professional judgement and except as expressly described herein, SLR has not verified the original data compiled in these reports.

INDEPENDENCE OF SLR

Other than for the purposes of completing the February 2018 CPR, neither SLR nor any SLR staff involved in its preparation has any commercial interest in IMC. Neither SLR nor any SLR staff will receive any interest in IMC or its associated companies as a result of undertaking the February 2018 CPR. SLR will be paid normal professional rates for preparing the February 2018 CPR for IMC as laid down in SLR Assignment Quotation P44287 and SLR Project Number 501.00231.00003. Fees paid to SLR will not be influenced by the content of the February 2018 CPR.

Yours faithfully

SLR Consulting Ireland

Dr Deirdre Lewis PhD EurGeol PGeo
Technical Director
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1.0 Executive Summary

IMC Exploration Group PLC (IMC) holds seven prospecting licences (PLs), issued by the Exploration and Mining Division (EMD) of the Department of Communications, Climate Action and Environment (DCCAE) of the Irish Government. Five of these are licensed for base metal and gold exploration in southeast Ireland and the remaining two licences for base metal exploration in the Irish Midlands.

IMC has undertaken an exploration programme that includes a comprehensive historical data compilation and review, geochemical sampling, geophysical data capture/processing and drilling based on analysis of the aforementioned datasets. The company has conducted a review of historic mineral exploration data utilising the extensive experience, knowledge and expertise of the team. IMC considers their licences to be amongst the most prospective exploration licences currently available in Ireland. This Competent Person’s Report (CPR) reviews and outlines the conclusions and criteria used by IMC in the selection of prospecting licences.

Gold

IMC’s five gold prospecting licences are in the southeast of Ireland. Four of these are within the well-known Avoca volcanogenic massive sulphide (VMS) mineralised belt in Co. Wicklow, an area having highly anomalous gold (Au) values in bedrock and stream sediments. Historic extraction of alluvial gold was undertaken in this area and gold occurrences have been found in trenching with grades of up to 42.5g/t Au. It is therefore considered that this area has excellent exploration potential.

The fifth licence for gold exploration is located in north Co. Wexford, where a mineralised quartz vein 0.6m in width is present, which returned an analytical value of 18.24g/t Au (Irish Marine Oil, 1999). Historic drilling has intersected vein quartz with visible gold at 26m depth which assayed 35.04g/t Au over 0.7m (Deevy, 2002) and drilling by IMC has intersected exceptionally high grade gold over potentially mineable widths (1.5m grading 354g/t Au).

Base Metals

IMC’s base metal licences are situated within the world class Irish Base Metal Province which hosts a number of world class zinc-lead (Zn-Pb) mines such as Navan and Lisheen, as well as the more recently discovered Kilbricken and Pallasgreen deposits.

In conclusion, given the exploration friendly policies promoted by the Irish Government, the country’s infrastructure, the previous success of other operators in Ireland together with the materials, criteria and rationale used by IMC for the selection of these prospecting licences, it is considered that these licences have sound and proper potential for the discovery of economic base metal deposits.
2.0 Introduction and Scope

This report updates the 2016 CPR prepared for IMC by SLR (the 2016 SLR CPR) and includes work completed by IMC up until the end of 2017. This report should be read in conjunction with the earlier report (Earls, 2016). At the time of writing this report, IMC had surrendered eight PLs since 2016, and had focused attention on the Avoca Block (see Section 8.2), where it believes that there is potential for a reprocessing operation on the spoil heaps of the historic Avoca copper mine.

Ireland is a stable Republic where the government encourages mineral exploration through security of tenure, simple regulatory framework, low regulatory overheads and the provision of free historical exploration data through an online ‘open file’ system. This is recognised by the annual independent survey by Canada’s Fraser Institute, where Ireland consistently ranks in the top ten international jurisdictions for mining investment and in the top three for exploration policy1.

Ireland has a long mining tradition that continues to the present day, with a diverse geology and excellent mineral potential, together with a highly developed infrastructure.

IMC holds seven Prospecting Licences (PLs), issued by EMD. Five are licensed for base metal, barytes, silver and gold exploration and two are licenced for base metal, barytes and silver exploration. IMC has been undertaking an exploration programme that includes historical data compilation and review, geochemical soil sampling, geophysical data capture/processing and drilling based on interpretation of the aforementioned datasets.

Since the 2016 SLR CPR, IMC entered into a prospective joint venture (JV) with Koza Ltd. (Koza) on the five licences permitted for gold exploration. IMC reports that the JV has since been set aside. IMC also reports that both parties are in ongoing discussions regarding future arrangements. As this review is technical in nature, a legal review of the JV and subsequent arrangement between IMC and Koza is outside the scope of the report.

Ireland is host to one of the great base metal ore fields of the world. Since 1960, 16 significant zinc-lead (Zn-Pb) deposits of greater than 1 million tonnes (>1 Mt) have been discovered in the Carboniferous carbonate succession of the Irish Midlands. Ireland is ranked first in the world in terms of zinc discovered per square kilometre, and second in the world with respect to lead. Large tracts of Ireland are also underlain by metasediments and metavolcanics of Proterozoic and Lower Palaeozoic age which contain significant volcanogenic massive sulphide (VMS) mineralization, (e.g. Avoca, 16Mt grading 0.6% Cu; Williams et. al., 1986) and auriferous mesothermal quartz veins.

The suitability of Ireland for mineral exploration and development is proven by the discovery and development of five world class and numerous other smaller base metal deposits since the early 1960s.

Data verification of the work carried out since the SLR 2016 CPR has taken place as follows:

- Koza work reports have been reviewed and drill logs compared with the drill cores, all of which are retained by IMC; and
- A selection of assay results from IMC’s database has been compared with the certified assay results provided by ALS laboratories in Galway.

The drill core from the Tulla drillhole was reviewed.

No discrepancies were noted.

The following sections present a review of the technical exploration programme carried out over the term of IMC's licences to the end of 2017.
3.0 Geography and Infrastructure

Ireland is, in logistical terms, a relatively easy jurisdiction in which to conduct exploration, given its climate, terrain and infrastructure.

3.1 Physical Features

The Republic of Ireland is located in Western Europe, occupying five-sixths of the island of Ireland in the North Atlantic Ocean, west of Great Britain. The total area is 70,273km$^2$, comprising 68,883km$^2$ land and 1,390km$^2$ water. Elevation ranges from Atlantic sea level to the summit of Carrauntoohil in the southwest at 1,041m.

The Irish Base Metal Province is characterised by a terrain that is a level to rolling interior plain. This land is mostly in use for agriculture and peat harvesting. This plain is surrounded by rugged hills and low mountains in which the Irish Gold Province is located. All areas are easily accessed by a well-developed road system.

3.2 Climate

Ireland’s climate is classified as temperate maritime; modified by the North Atlantic Gulf Stream with mild winters and cool summers; consistently humid and overcast about half the time.

The mean annual temperature is around 10°C. The temperature drops below freezing only intermittently during winter, and snow is scarce. The coldest months are January and February, when daily temperatures range from 4° to 8°C, with 7°C the average. In summer, temperatures during the day are a comfortable 15° to 20°C. During the warmest months, July and August, the average is 16°C. There are about 18 hours of daylight daily during June and July.

Ireland receives significant precipitation, some areas having as many as 270 days of rain during the year. The southeast is the driest, enjoying a more continental climate.

3.3 Transportation

Ireland is situated in a strategic location on major air and sea routes between North America and northern Europe. The island is easily accessible internationally on a daily basis.

Ireland has 40 airports, 16 having paved runways and 24 unpaved, the majority of the latter being less than 900m long. All base metal licences areas in the west are easily accessible through Shannon airport, while gold licences in the east can be easily accessed through Dublin airport.

Transportation is facilitated by:

- An excellent road network with over 96,000km of paved roadways. Individual licence areas have good road access;
- Three principal ports, from where ore and infrastructure can be shipped, include Cork in the south, Dublin in the east and Shannon Foynes in the west;
- Over 3000km of railways, the majority of which are broad gauge.
3.4 Communications

The Irish telephone system is a modern digital system using cable and microwave radio relay. Ireland has 2.02 million main line telephones in use with 4.9 million mobile phones.

Increasing levels of broadband access totals 3.9 million users connected directly to the internet. Ireland is the landing point for the Hibernia-Atlantic submarine cable with links to the US, Canada, and UK.
4.0 Exploration and Development Licensing Regulations

Exploration and mining legislation in Ireland is clear, and the Mining Development Act enacted in 2017 has consolidated previous legislation and regulatory conditions to provide further clarity.

4.1 Prospecting Licences

Prospecting Licences (PLs) are issued for a period of six years for specified minerals with a required minimum expenditure. A minimum work programme is required, the details of which are agreed by the DCCAE with the licensee. Work reports are required every two years, and are held confidentially for six years or until surrender of the licence (if earlier). Third party insurance is required for the period of the licence, but need not be licence specific in that the same insurance policy may cover all ground held by the licensee.

4.2 Fees

Fees are payable as part of the permitting process;

- there is an application fee of €190 for each PL area; and
- For each six year licence, a Consideration Fee (holding charge) is payable in installments of between €375 and €1,500.

4.3 Permitting of Minerals Development

Minerals can be in State ownership or privately owned. Regardless of ownership, minerals development requires a State Mining Facility from the Minister. As a matter of policy, the Minister will only accept an application for a State Mining Licence or Permission from the holder of a valid PL over the area in question.

4.4 Environmental & Social Issues

The Irish system has evolved over many years following a typical progression from concern mainly with economic development to a greater consideration of the need for environmental and social protection.

It is emphasised in the Minerals Development Regulations, as set out by the Minister for Communications, Climate Action and Environment, that environmental issues are a priority during exploration and extraction of minerals.

All development of minerals governed by the Minerals Development Acts is subject to environmental impact assessment through the planning process. Therefore, any Planning Applications for such developments must be accompanied by an Environmental Impact Statement. In addition, all mining developments require an Integrated Pollution Prevention and Control Licence which is obtained from the Environmental Protection Agency. Increasingly, under the Minerals Development Acts, there is a requirement for appropriate stakeholder engagement in advance of exploration or mine development, in accordance with the principles of the international Aarhus Convention, of which Ireland is a signatory.
5.0 Mineral Exploration in Ireland

The Republic of Ireland has a notably diverse geology that is prospective for a range of mineral deposits (Figure 1).

The Lower Carboniferous carbonate rocks of the Irish Midlands are host to one of the great ore fields of the world (the Irish Base Metal Province). Since 1960, 17 significant (recorded tonnage >1Mt) Zn-Pb deposits have been discovered, including the world-class ore body at Navan (>112Mt grading 9.8% Zn+Pb; Ashton et al., 2016). Ireland is ranked first in the world in terms of zinc discovered per square kilometre, and second in the world with respect to lead. The high grade, shallow occurrence and clean metallurgy of the ore bodies result in a relatively low cost of mining for the Irish-type Zn-Pb deposits.

Large tracts of Ireland are underlain by metasediments and metavolcanics of Proterozoic and Lower Palaeozoic age. These lithologies contain significant VMS mineralization (e.g. Avoca, 16Mt grading 0.6% Cu) and auriferous mesothermal quartz veins.

The latter style of mineralization has been the focus of extensive exploration efforts across the island of Ireland and in 1999, an opencast gold mine associated with shear-hosted quartz veins, was established at Cavanacaw in Co. Tyrone. The most recent JORC-compliant resource at Cavanacaw is 78,000t grading 6.35g/t Au (Measured), 463,000t grading 5.02g/t Au (Indicated) and 1,229,000t grading 8.23g/t Au (Inferred)\(^3\).

The Curraghinalt deposit in Co. Tyrone has NI 43-101 - compliant proven and probable reserves of 5.24 Mt at 8.54g/t Au and 3.9g/t Ag\(^4\).

The Clontibret deposit in Co. Monaghan has JORC-compliant resources of 4.9 Mt grading 1.64 g/t Au and 6.8 Mt grading 1.56 g/t (Inferred)\(^5\).

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\(^2\) Compliance with mineral reporting codes not stated

\(^3\) www.galantas.com

\(^4\) www.dalradian.com

\(^5\) www.conroygoldandnaturalresources.com
Figure 5.1: Geology of Ireland showing Mineral Deposits (Exploration and Mining Division, DCCAE, Ireland).

Note the Galmoy and Lisheen ‘active’ mines are now closed (since 2012, 2015, respectively).
6.0 GEOLOGY OF IRISH GOLD MINERALISATION

In 1795, the discovery of gold nuggets near Woodenbridge in Co. Wicklow precipitated Ireland’s only indigenous gold rush. The Exploration and Mining Division (EMD) of the DCCAE records that some 9,600 ounces of gold were recovered from the gravels of what became known as the Gold Mines River. The most prolific location was below Ballinagore Bridge at the ‘Red Hole’. Gold was recovered here from an ancient river channel exposed beneath a capping of glacially derived material. Prospectors failed to find a convincing bedrock source.

Exploration companies have found many gold occurrences throughout Ireland since the mid-1980s. Up to 300 gold occurrences are documented by the Geological Survey of Ireland (GSI)’s ‘Minlocs’ database.

6.1 Gold Occurrences

Gold has been known in Ireland since the Neolithic period, and occurs mainly in the coastal regions.

6.1.1 Southeast Ireland

In the Lower Palaeozoic rocks of southeast Ireland, gold is associated both with VMS mineralization in Co. Wicklow and with metasedimentary and metavolcanic sequences in Co. Wexford. IMC is currently focussing on the gold potential of this region. Drilling in Ordovician metasediments at Kilmacoo, adjacent to Avoca, has confirmed the existence of significant bedrock gold. Although no compliant resource has been published, up to 0.5Mt grading 1.5 to 2g/t Au over a strike length of 125m has been suggested by geologists (Milner and McArdle, 1992).

6.1.2 West of Ireland

In the Lower Palaeozoic rocks of the west of Ireland, in Co. Mayo, gold is found both in quartz veins at Lecanvey and in a major shear zone at Cregganbaun. The east-west trending Cregganbaun Shear Zone in south Co. Mayo crosses tuffs and metasediments of Ordovician age. Gold has been found at many localities along the 33km length of the structure following the discovery of gold in bedrock in 1988. Drilling at the western end of the Shear Zone has indicated 0.53Mt grading 6g/t Au, to a depth of 80m (Gold in Ireland, EMD publication 2003).

At Bohaun, northwest of Galway, visible gold with values of 40 - 190g/t Au over widths of up to one metre have been found in a silicified breccia in Silurian metasediments. In the same area, an intersection of 0.17oz/t Au over 4.6m (15 feet) was drilled in massive pyrrhotite amphibolite pods in a Dalradian volcano-sedimentary sequence (Ovoca Gold, 1987, Gold in Ireland, EMD publication 2003).

6.1.3 County Monaghan

At Clontibret in Co. Monaghan, gold is found associated with arsenopyrite-stibnite veining in Lower Palaeozoic greywackes. The most recent JORC compliant resource is 4.9 Mt grading 1.64 g/t Au and 6.8 Mt grading 1.56 g/t (Inferred) totalling 601,104 oz Au (Conroy Gold & Natural Resources).

6 Compliance with mineral reporting codes has not been checked by SLR
Significant gold mineralisation occurring in a sequence of argillites and arenites with quartz stockwork has been discovered in a drilling programme north east of Clontibret at Clay Lake, Co. Armagh, with 98.6m grading 0.57 g/t Au (including 11.5m grading 1.44g/t Au) reported (Conroy Gold & Natural Resources).

6.1.4 County Kildare

In Co. Kildare, the 1993 discovery of visible gold in quartz float, southwest of Dublin, has stimulated interest in this new target area of Lower Palaeozoic greywackes. Drilling intersected a number of auriferous shear zones, the best being 1.3m grading 3.33 g/t Au at 52m depth (Colthurst, 1999).

6.1.5 Northern Ireland

Exploration has proved the presence of bedrock gold in two different geological terrains. Attention has largely been focused on (i) vein-hosted quartz veins and shear zone targets in Dalradian (Pre-Cambrian) metasediments. The discovery of gold deposits at Curraghinalt in Co. Tyrone in 1983 and Cavanacaw in 1987 resulted in an upsurge of gold exploration. (ii) Significant gold values also occur in the Ordovician volcanic rocks of Co. Tyrone (3.63m grading 30.51g/t Au; Clifford et al 2002).

The most recent JORC compliant resource at Cavanacaw is 78,000t at 6.35g/t Au (Measured), 463,000t at 5.02g/t Au (Indicated) and 1,229,000t at 8.23g/t Au (Inferred). The Curraghinalt deposit in Co. Tyrone has NI 43-101 - compliant proven and probable reserves of 5.24 Mt at 8.54g/t Au and 3.9g/t Ag.
7.0 Geology of Irish Base Metal Mineralisation

Within the Irish Midlands, the Lower Carboniferous carbonate rocks occur in a number of sub-basins where mineralisation exhibits well-constrained stratigraphic and structural controls. Figure 7.1 presents the associations between the main mineralisation-containing sequences and their regional occurrence.

A summary of the main host Carboniferous formations and their key deposits is presented in the following section.

The figures and many of the resource estimates in this section are from the EMD publication “Zinc and Lead in Ireland”.

7.1 Stratigraphic Controls

Shallow-water carbonates of the Navan Group (50-400m thick) host the Navan deposit and several sub-economic deposits in the northern part of the Irish Base Metal Province.

The Waulsortian limestone is a carbonate mudbank complex up to 1,500m thick, which thins to the north into isolated units, set in an argillaceous bioclastic limestone envelope. The Waulsortian is host to the Tynagh, Silvermines, Galmoy, Lisheen, Kilbricken, Pallasgreen and Harberton Bridge deposits, respectively. Significant mineralisation has also been found in underlying sub-Waulsortian strata (Silvermines, Lisheen).

The overlying shelf limestone facies of the supra-Waulsortian strata, host cross-cutting deposits at Harberton Bridge.
Figure 7.1: Schematic Cross-Section through the Carbonate Stratigraphy of the Irish Midlands
7.2 Structural Controls

The structural pattern of widespread normal faulting is favourable, in that the majority of the deposits are associated with NE-SW (Caledonian) trending fault systems. The latter appear to have acted as conduits for hydrothermal fluids and are interpreted to be controlled by deep basement lineaments. Other regions, such as the Lower Carboniferous Northwest Basin, also have potentially favourable geological settings.

7.3 Mineralisation

The two most significant styles of mineralization are:

- **stratabound (and stratiform)** deposits, hosted in the Navan Group and Waulsortian limestone (the so-called ‘Irish type’). The stratabound deposits are preferentially located in the stratigraphically lowest, non-argillaceous, carbonate strata. At Navan the mineralization occurs as stacked stratabound lenses, while the Waulsortian-hosted deposits have a variety of forms, with regular (*Lisheen, Garrycam*) or irregular tabular lenses (*Galmoy, Upper Silvermines*), cross-cutting epigenetic zones (*Lower Silvermines*) or discrete pods (*Tynagh, Ballinalack*). Enhanced zones of mineralization are associated with NE or ENE trending faults or mineralized fractures; and

- **cross-cutting deposits**, typically found in the Waulsortian and supra-Waulsortian lithologies. The form of the deposits varies from tabular, dome, or pipe style, but typically occur in tabular bodies at the base of the Waulsortian, which in some cases extend up to 500m into overlying strata.

7.4 Individual Base Metal Deposits

In the modern era, five base metal deposits have been brought into production in Ireland (see Table 7.1)

<table>
<thead>
<tr>
<th>Deposit</th>
<th>Year of Discovery</th>
<th>Tonnage (Mt)</th>
<th>Grade (Zn+Pb)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navan</td>
<td>1970</td>
<td>112.0</td>
<td>9.8%</td>
<td>Operating Underground</td>
</tr>
<tr>
<td>Lisheen</td>
<td>1990</td>
<td>22.8</td>
<td>14.10%</td>
<td>Closed Underground</td>
</tr>
<tr>
<td>Galmoy</td>
<td>1986</td>
<td>9.7</td>
<td>16.2%</td>
<td>Closed Underground</td>
</tr>
<tr>
<td>Silvermines</td>
<td>1963</td>
<td>17.7</td>
<td>8.90%</td>
<td>Closed Underground</td>
</tr>
<tr>
<td>Tynagh</td>
<td>1961</td>
<td>9.2</td>
<td>11.2%</td>
<td>Closed Pit/Underground</td>
</tr>
</tbody>
</table>

7.4.1 Galmoy

The *Galmoy* Zn-Pb deposit was discovered in 1986. Production commenced in early 1997 and the mine closed in 2012. Production from 1997 to end March 2005 was 4.57 Mt grading 11.1% Zn and 2.1% Pb. Reserves (at end March 2005) were 4.02Mt grading 13.6% Zn and 4.0% Pb.

The Zn-Pb orebodies occur approximately 70m below surface and are hosted in basal (Lower Carboniferous) Waulsortian limestones. The host rock has been extensively dolomitized and
brecciated. The mineralisation is regarded as being replacive and stratabound. There are several areas of high-grade mineralization with the G-orebody being a classic “Irish type” deposit occurring in the hanging wall of a major NE fault.

7.4.2 Lisheen

The carbonate-hosted Zn-Pb deposit at Lisheen was discovered in 1990 and closed in 2015. The most recent figures show that since mining was initiated in 1999, approximately 21.04Mt grading 11.82% Zn and 1.98% Pb had been mined at Lisheen. The last official Resource and Reserve Statement issued by Lisheen in March 2014 showed remaining reserves amounting to 1.67Mt at 10.46% Zn and 1.72% Pb, with additional resources of 2.07Mt grading 14.26% Zn and 2.40% Pb (EMD).

Mineralisation occurs as massive stratiform sulphide lenses at the base of dolomitized (Lower Carboniferous) Waulsortian in the hanging wall of an ENE trending fault zone (see Figure 7.2).

![Figure 7.2: Cross-section through the Lisheen Deposit](image)

(red zones represent zinc-lead sulphide mineralisation)

7.4.3 Silvermines

In 1963, a drilling programme intersected ore-grade Zn-Pb mineralisation in Lower Carboniferous carbonates in the hanging wall of a northerly-downthrown, east trending fault zone at Silvermines, Co Tipperary. The mine produced some 17.7Mt grading 8.9% Zn+Pb until closure in 1982.

Mineralisation occurs as both stratabound lenses and as cross cutting veins. The stratabound lenses typically occur at the base of the Waulsortian.

There is also an underlying epigenetic zone (veins, breccias) representing a feeder to the upper mineralised zone. The upper zone contained 12.94Mt grading 6.78% Zn and 2.55% Pb, while the lower zone contained 4.74Mt grading 5.49% Zn and 2.44% Pb.
7.4.4 Tynagh

This Lower Carboniferous, carbonate-hosted, stratiform lead-zinc-copper-silver-barite orebody at Tynagh, Co Galway, was found in 1961, using conventional shallow soil geochemistry and geophysics (EM and IP). The mine commenced production in 1965 and the orebody was worked out by 1980. The deposit contained approximately 9.2Mt grading 11.2% Pb+Zn.

The primary sulphide mineralisation (galena, sphalerite and chalcopryite) was hosted mainly as lenticular bodies in Waulsortian limestone in the hanging-wall of an east trending fault. The higher grades of mineralisation were found adjacent to the fault and towards the base of the Waulsortian limestone.

7.4.5 Navan

The Navan deposit, the largest zinc mine in Europe and the eighth largest in the world, was discovered in 1970. It is estimated that the total pre-mining resource, as currently known, was in excess of 112Mt grading 7.9% Zn and 1.9% Pb. At the end of 2014, JORC classified Mineral Resources comprised 11Mt grading 6.3% Zn and 2.1% Pb and Ore Reserves comprised an additional 15.3Mt grading 6.6%Zn and 1.5% Pb (Ashton et al., 2016).

This deposit is hosted in basal Carboniferous shallow-water carbonates and comprises a stacked series of massive stratiform and stratabound sulphide lenses aligned approximately NE and parallel with major faulting (see Figure 7.3).
Figure 7.3: Cross Section through the Navan Deposit

(red zones represent zinc-lead sulphide mineralisation)
8.0 Prospecting Licence areas currently held by IMC

IMC currently holds seven PLs in Ireland. Five of these are in southeast Ireland, licensing exploration for base metals, barytes, gold and silver, while the remaining two licences are in the Irish Midlands, licensing exploration for ores of base metals, barytes and silver.

The following table and maps show the location of IMC’s PLs with reference numbers (PL area No.) as defined by the EMD, together with exploration blocks (groups of licences) as defined by IMC (see Table 8.1).

Table 8.1: IMC licences in Ireland (source: EMD & IMC)

<table>
<thead>
<tr>
<th>PL No</th>
<th>Block</th>
<th>County</th>
<th>Km²</th>
<th>Centre X</th>
<th>Centre Y</th>
<th>Commodity</th>
<th>Issue Date</th>
<th>Renewal Date</th>
<th>€ Expenditure requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>3849</td>
<td>Avoca</td>
<td>Wicklow</td>
<td>45.3</td>
<td>324291</td>
<td>184059</td>
<td>Bm, b, s, g</td>
<td>07/02/2013</td>
<td>06/02/2019</td>
<td>60k</td>
</tr>
<tr>
<td>3850</td>
<td>Avoca</td>
<td>Wicklow</td>
<td>27.6</td>
<td>320661</td>
<td>182961</td>
<td>Bm, b, s, g</td>
<td>07/02/2013</td>
<td>06/02/2019</td>
<td>60k</td>
</tr>
<tr>
<td>2239</td>
<td>Goldmines River</td>
<td>Wicklow</td>
<td>27.6</td>
<td>320409</td>
<td>173283</td>
<td>Bm, b, s, g</td>
<td>12/05/2011</td>
<td>11/05/2023</td>
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<tr>
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<td>Wicklow</td>
<td>49.9</td>
<td>315075</td>
<td>176136</td>
<td>Bm, b, s, g</td>
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<td>11/05/2023</td>
<td>30k</td>
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<tr>
<td>2551</td>
<td>Kilmichael</td>
<td>Wexford</td>
<td>36.8</td>
<td>308340</td>
<td>159731</td>
<td>Bm, b, s, g</td>
<td>12/05/2011</td>
<td>11/05/2023</td>
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<tr>
<td>3644</td>
<td>Shannon</td>
<td>Clare</td>
<td>23.3</td>
<td>137393</td>
<td>162364</td>
<td>Bm, b, s</td>
<td>12/05/2011</td>
<td>13/05/2023</td>
<td>30k+15k</td>
</tr>
<tr>
<td>3729</td>
<td>Tulla</td>
<td>Clare</td>
<td>30.8</td>
<td>154773</td>
<td>184413</td>
<td>Bm, b, s</td>
<td>20/04/2011</td>
<td>19/04/2023</td>
<td>40k</td>
</tr>
</tbody>
</table>

Bm: Base Metals; b: Barytes; s: Silver; g: Gold

Figure 8.1 shows the position of the PL areas relative to major Irish cities and topographical features, while Figure 8.2 shows the PL areas overlain on a simplified bedrock geological map (EMD, 2003).
Figure 8.1: Location Map of the PLs currently held by IMC Exploration Ltd

Figure 8.2: Location of PLs currently held by IMC relative to simplified bedrock Geology of Irish Midlands
8.1 Drilling by IMC post January 2016

IMC has drilled six drillholes (totalling 1086.9m) on two licences since the issuance of the previous SLR CPR (January, 2016) and this current update (February, 2018), see Table 8.2, below, for details.

Table 8.2 Drillhole location and depths drilled by IMC (January 2016 – February 2018).

<table>
<thead>
<tr>
<th>Hole ID</th>
<th>Block</th>
<th>PL</th>
<th>GR</th>
<th>Easting</th>
<th>Northing</th>
<th>Azi</th>
<th>Dip (deg)</th>
<th>Depth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-3729-05</td>
<td>Tulla</td>
<td>3729</td>
<td>IG</td>
<td>154615</td>
<td>182880</td>
<td>0</td>
<td>-90</td>
<td>161</td>
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<tr>
<td>15-3850-03</td>
<td>Avoca</td>
<td>3850</td>
<td>IG</td>
<td>321476</td>
<td>183908</td>
<td>309</td>
<td>-55</td>
<td>217.95</td>
</tr>
<tr>
<td>15-3850-04</td>
<td>Avoca</td>
<td>3850</td>
<td>IG</td>
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<td>183821</td>
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<td>-55</td>
<td>189.1</td>
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<td>15-3850-05</td>
<td>Avoca</td>
<td>3850</td>
<td>IG</td>
<td>321271</td>
<td>184013</td>
<td>129</td>
<td>-50</td>
<td>201</td>
</tr>
<tr>
<td>15-3850-06</td>
<td>Avoca</td>
<td>3850</td>
<td>IG</td>
<td>321134</td>
<td>182969</td>
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<td>-55</td>
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<tr>
<td>15-3850-07</td>
<td>Avoca</td>
<td>3850</td>
<td>IG</td>
<td>321478</td>
<td>183947</td>
<td>309</td>
<td>-55</td>
<td>186</td>
</tr>
</tbody>
</table>

Goldmines River Valley
8.2 Avoca Block - Prospecting Licences 3849 & 3850

The Avoca Block, consisting of PLs 3849 and 3850 (Figure 8.3) is located wholly in Co. Wicklow. The licences cover the historic Avoca copper mine and associated mine structures, workings and spoil heaps.

In the opinion of IMC, the licences have untested potential for primary gold mineralisation. Since the SLR 2016 CPR, IMC have completed five drillholes, to the northeast of the historic mine site. The drillholes intersected significant base metal mineralisation.

IMC has also undertaken preliminary grab-sampling of the waste piles at the Avoca mine site, confirming the presence of gold, silver, lead, copper and zinc. In IMC’s opinion, there is potential for a reprocessing project which would extract much of the remaining metal from the waste piles. IMC believes that this option is deserving of further investigation, particularly as it could have the added benefit of reducing the environmental hazard on the historic mine site.

A review by SLR of documentation held by IMC demonstrated that the Avoca Block licences are in good standing. The Avoca Block was included in the now set-aside Koza joint-venture project.

**Figure 8.3 Geology of the Avoca Block, Co Wicklow**

8.2.1 Avoca Block Geology/ Structure

The primary stratigraphic and structural features of the Avoca Block are as follows:

- the licence block lies on the Avoca mineralised belt, and on its interpreted SW extension located in the core of the Caledonian para-tectonic belt of SE Ireland;
the Lower Palaeozoic rocks of the region were deposited in the major NE trending Leinster depositional basin;

the rocks of the Avoca district have undergone a complex structural history, largely or exclusively during the Caledonian Orogeny of late Silurian to early Devonian age;

the dominant geological structure present is a penetrative cleavage which affects all lithologies and is accompanied by low grade regional metamorphism which attains greenschist facies in many places;

the potential exists for vein, shear-hosted and stratabound gold mineralisation; and

the gold mineralisation is associated with tuff units of mid-Ordovician age, consisting of chloritic tuffs, sericitic tuffs and coarse pyritic/chalcopyritic felsic tuffs.

8.2.2 Avoca Block Mineralisation

In the opinion of IMC, the anomalous bedrock zones of interest have considerable untested strike potential. The mineralisation in the block is summarised below:

- grab samples from trenches returned values of between 3.45 to 42.5g/t Au.
- Rock chip sampling of two zones of primary gold mineralisation at the McLaren zone resulted in various values in the range 1.18g/t Au to 12.55g/t Au. (McKilen, Tyler and Associates, 2009); and
- Two shallow holes, DDH1 to 46.2m and DDH2 to 32.0m, were drilled. Neither of these holes reached their target due to equipment failure (Brotzen, 1999).

8.2.3 Avoca Block Mineralisation – IMC Work Highlights

An independent expert report (Sheppard, 2013) on PL 3850 in the northeast of the area at Kilmacoo, confirmed the reports of very significant previous drill intersections including:

- 19.8m grading 5.03g/t Au in drillhole KG01
- 10.0m grading 12.95g/t Au in drillhole KG08
- 10.2m grading 3.31g/t Au in drillhole KG12

Base metal massive sulphide drill intersections include:

- 8.3m grading 10.1% Zn, 5.73% Pb, 0.48% Cu and 284g/t Ag in drillhole KG08
- 4.15m grading 15.91% Zn, 7.47% Pb, 0.75% Cu and 64g/t Ag in drillhole KG11

The report concluded that significant potential for exploration success remains within the Kilmacoo area, particularly to the southwest of the previous intersections.

- Drillhole 15-3850-01 intersected a 11m zone (26m - 37m) grading 3.16g/t Au including a 6m interval (31m-37m) grading 4.4g/t Au and a 1m interval (31m -32m) grading 12g/t Au.
- Eight drillholes tested parts of PL 3857 to a maximum depth of 192.0m (Figure 7). Selected sections of each drillhole were sampled and analysed. The best value returned was 1.8m grading 0.04g/t Au (12-3857–01; 44.20- 46.00m)

Drilling since 2016

Since the Sheppard report above (2013), Koza drilled five further holes in the vicinity of the historic Avoca mine (see Figure 8.4) as part of the IMC JV. Monthly reports were submitted by Koza to IMC
from May to November 2015, with the exception of October. Summary drillhole logs included in the reports show some significant mineralised intersections, summarised in Table 8.3, below.

Table 8.3 Summary visual estimates and assays for Avoca drilling.

<table>
<thead>
<tr>
<th>Drillhole</th>
<th>From</th>
<th>To</th>
<th>Cpy %</th>
<th>Gal %</th>
<th>Sph %</th>
<th>Au g/t</th>
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</thead>
<tbody>
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<td>15-3850-03</td>
<td>73</td>
<td>80</td>
<td>1.5</td>
<td>1.0</td>
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<tr>
<td>15-3850-03</td>
<td>155</td>
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<td>3</td>
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<td></td>
<td></td>
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<td>15-3850-03</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>15-3850-03</td>
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<td>193</td>
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<td>15-3850-04</td>
<td>72</td>
<td>87</td>
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<tr>
<td>15-3850-04</td>
<td>114</td>
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<td>0.5 - 3.0</td>
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<td></td>
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<tr>
<td>15-3850-04</td>
<td>116</td>
<td>120</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-3850-05</td>
<td>80</td>
<td>95</td>
<td>0.4 - 2.0</td>
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<td></td>
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<tr>
<td>15-3850-05</td>
<td>91</td>
<td>99</td>
<td>1.0 - 5.0</td>
<td>0 - 2.0</td>
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<td>15-3850-06</td>
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<td>110</td>
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<td>15-3850-07</td>
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<td>15-3850-07</td>
<td>73</td>
<td>75</td>
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</tbody>
</table>

Chalcopyrite (Cpy), Galena (Gal) and Sphalerite (Sph) grades are visual estimates. Gold (Au) is an assayed value. Au values were not yet available for drillholes other than 15-3850-03 at the time the Koza reports were written. Data for this table were summarised from Koza reports to IMC (Grieve 2015a & Grieve 2015b).
Geophysics since 2016

Koza completed a ground magnetic survey across both prospecting licences in the Avoca Block (Grieve, 2015b). A map showing the coverage and magnetic values reduced to pole is presented in Figure 8.5, below.
Figure 8.5 Overview of magnetic surveying carried out on the Avoca Block

Figure taken from the Koza November 2015 Report (Grieve, 2015b). A legend was not supplied with the map. It is assumed, based on standard practice, that red indicates relatively high magnetic values and blue, low.

Shallow Soil Geochemical Surveying

Koza conducted a detailed shallow soil geochemical survey on both of the Avoca PLs. Highlights of the sampling include:

- up to 0.57 ppm Au, southeast and northeast of the historic mine workings (see Figure 8.6);
- up to 2360 ppm Cu, southeast of the historic mine workings; and
- up to 13,900 ppm Pb, southeast and north of the historic mine workings.
Figure 8.6 Shallow soil geochemical results at the Avoca Block (Au)
Waste Pile Sampling

The sampling of the waste piles at Avoca returned significant values for both gold (up to 5.1g/t Au) and lead (up to 3.8% Pb). It is worth noting that the samples were all subjective ‘grab samples’ and the waste piles were not sampled at depth.

IMC believes that due to weathering and leaching, there is potential for increased gold values in the lowermost parts of the waste piles. IMC intends to conduct a follow-up sampling programme which will sample the waste piles at depth (3-5m). See Figure 8.7 and Table 8.4 for details of the waste pile sampling.
Table 8.4 Assay results for Avoca Waste Pile Sampling

<table>
<thead>
<tr>
<th>SAMPLE No</th>
<th>X_ING</th>
<th>Y_ING</th>
<th>Au g/t</th>
<th>Cu %</th>
<th>Pb %</th>
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<td>EA01</td>
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</table>
8.3 The Goldmines River Block – PLs 2239 & 3857

The Goldmines River Block (see Figure 8.8), consisting of PLs 2239 and 3857, is located wholly in Co. Wicklow. The licences cover some of the areas of historic alluvial gold production in Ireland. Historical records indicate that up to 9,600 ounces of gold were extracted in the late nineteenth century from the East and West Gold Mines Rivers (EMD, 2003).

Since the SLR 2016 CPR, IMC has completed a programme of shallow soil geochemical sampling, for a total of 122 samples. The block was included in the (now set-aside) Koza joint-venture project.

In the opinion of IMC, the licences have untested potential for primary gold mineralisation.

![Figure 8.8 Geology of the Goldmines River Block](image)

The Goldmines River block is contiguous with, and immediately to the south of, the Avoca Block. The geology of the block is the same as that of the Avoca Block and is described in Section 8.2.1, above.

8.3.1 Goldmines River Block Mineralisation – IMC Work Highlights

The shallow soil geochemical survey returned gold values up to 0.003ppm Au (see Figure 8.9).

Since the SLR CPR of 2016, there has been a comprehensive review of work carried out on the licence by geological consultant Robert Healy, of Orr Geo Consulting, Australia (Healy, 2017). The review indicates that while the geological setting appears favourable, shallow soil geochemical surveying to date has not returned particularly significant gold values. An electron microprobe study
on gold nuggets found in the valley is recommended, to determine whether the gold is orogenic in nature. If the gold is demonstrated to have an orogenic signature, further exploration would likely be warranted (Healy, 2017).

Figure 8.9 Au results from shallow soil geochemical sampling on PL 3857

Figure taken from Koza Report (Grieve, 2015a).
8.4 The Kilmichael Licence – PL 2551

PL 2551 (Figure 8.10) is located in north Co. Wexford, 4km west of Gorey town and some 10km southwest of the Avoca block. Following assessment of historic data, it was apparent to IMC that the licence clearly had untested potential for primary gold mineralisation. Drilling and float sampling indicates that the Kilmichael area contains significant gold grades in a structurally complex setting (Deevy, 2002). IMC has completed six drillholes with highly positive results.

Since the SLR CPR of 2016, there has been a comprehensive review of work carried out on the licence by geological consultant Robert Healy, of Orr Geo Consulting, Australia (Healy, 2017).

![Figure 8.10: Geology of the Kilmichael Licence](image)

8.4.1 Kilmichael Licence Geology/Structure

The licences are underlain mainly by the Ribband Group metasediments of Tremadoc Arenig age (Lower Ordovician). The Group is named after the ribbon-like banding which can be seen in many outcrops on the property. The banding is intensely folded and crenulated in many of the outcrops and in drill core. The Ribband Group (Middle Cambrian – Llandeilo) consists of a succession of distal turbidites, mainly siltstones with minor intermediate and basic volcanics. Several subdivisions of the Ribband Group are present on the licence.

The regional trend is the northeast/southwest Caledonian trend, with the rocks younging to the southeast and the Leinster Granite lying to the west of the project area.
8.4.2 Kilmichael Licence Mineralisation

Mineralisation in the licence is described as follows:

- previous operators completed three drillholes, totalling approximately 275m at Kilmichael (Deevy, 2002);
- sampling at Kilmichael demonstrated values at surface following the discovery of a mineralised quartz vein 0.6m in width, which graded 18.24g/t Au (Irish Marine Oil, 1999);
- drilling (DDH 2551-1) intersected a quartz vein with visible gold at 26m depth which assayed 35.04g/t Au over 0.7m (Deevy, 2002);
- DDH 2551-2 intersected a shallow (15.6m – 16.3m) quartz vein, assaying 3.81g/t Au over 1.3m (Deevy, 2002); and
- an earlier drillhole (BGD-1) drilled in the Ballygarrett area reported an intersection (117.45m – 118.17m) of 10gAu/t over 0.72m (Tear, 1992).

8.4.3 Kilmichael Licence Mineralisation – IMC Work Highlights

The highlights of work carried out to date are:

- prospecting located samples assaying up to 76.8g/t Au, from grab samples in late 2011;
- a study by Brighton University determined range of sizes and angularity of abundant gold grains recovered in the lower reaches of the Ballygarret Stream, suggesting a nearby upstream bedrock source of gold-bearing vein type rather than disseminated bedrock gold mineralization. In contrast, grains from an upstream site have a similar size range, but are angular to sub-angular, indicating a longer transport distance;
- gold grains recovered from the Ballygarrett Stream suggest a range of transport distances supporting interpretation that the Ballygarrett Stream appears to cut across multiple sources of gold; and
- Healy (2017) identifies three significant prospects within the licence, named as Target Area 2, Boley and Knockbrandon:
  - Target Area 2 is described as a ‘high tenor geochem footprint with elevated Au, Sb and As with accompanying advanced phyllic alteration’;
  - the Boley Prospect is ‘interpreted as a zone of high K hydrothermal alteration, possibly associated with intersection of NE-SW gold trend and NW-SE trending regional faults’. The prospect contains well-developed phyllic alteration; and
  - the Knockbrandon prospect is described as being low-priority. Surface geophysical surveys are recommended, with magnetics and radiometrics the preferred methods.

IMC has completed six drillholes on the Kilmichael licence. No drilling has been carried out since the SLR CPR of 2016. Drilling to date is summarised below:

- drillhole 1 intersected 2.85m averaging 1.68g/t Au, including a 1.05m section at 3.09g/t Au;
- drillhole 2 intersected 5.80m averaging 1.08g/t Au, including 1.15m at 1.37g/t, 0.74m at 2.49g/t and 1.00m at 2.38g/t. In addition to this a 4.50m interval at a deeper level in the same hole has intersected base metal and associated 0.18g/t Au;
- drillhole 3 intersected 0.25m at 9.64g/t Au and 3.7g/t Ag;
- drillhole 12-2551-04 intersected 354g/t Au from 11.50 to 13.00m. Core from this interval comprises vuggy vein quartz and oxidized siltstone;
- Further work identified three mineralised zones in drillhole 12-2551-04
  - Zone 1: 4.50m (10.00m-14.50m), including 1.50m grading 354g/t Au; 1.50m grading 2.32g/t Au and 1.50m grading 1.13g/t Au.
o Zone 2: 5.00m (18.50m-23.50m), including 0.50m grading 6.16g/t Au and 1.50m grading 2.97g/t Au.

o Zone 3: 7.10m (149.60m-156.70m), including 0.80m grading 2.39 g/t Au and 1.00m grading 1.63g/t Au;

- drillhole 12-2551-05 intersected a maximum value of 0.69 g/t Au; and
- drillhole 12-2551-06 intersected a 6.80m interval (52.20m - 59.00m) grading 2.05m @ 0.23g/t Au, 0.50m @ 6.43g/t Au and 1.00m @ 0.23g/t Au.

It is SLR’s opinion that IMC’s work has significantly upgraded the gold potential of the licence. It is considered that there is strong support for the presence of a zone of major gold mineralization trending NE to ENE through the townlands of Boley, Ballygarret and Kilmichael.
8.5 The Tulla Licence - PL 3729

PL 3729 is located in southeast Co. Clare, in the south-western part of the Slieve Aughty Mountains, about 2.5km northeast of Tulla and on the northern margin of the East Clare Syncline (Figure 11). It lies on the north-eastern margin of a block of licences that have produced significant exploration results by other operators. The Kilbricken deposit, c. 15 km to the southwest and held by Hannon Metals, has an NI 43-101-compliant resource of 2.7Mt at 8.8% zinc equivalent (indicated) and 1.7Mt at 8.2% zinc equivalent\(^7\) (inferred).

Since the 2016 SLR CPR, IMC has drilled one drillhole (17-3729-05) on the licence, for a total of 161m.

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8.5.1 Tulla Licence Lithostratigraphy

The mapped geology, younging to the south, shows Old Red Sandstone, Lower Limestone Shales, Sub-Waulsortian (ABL) and Waulsortian (Emo, 2001).

A simplified geological succession is as follows (Emo, 2001):

- **Waulsortian**: 250-300m;
- **Ballysteen Limestone**: 130m;
- **Lower Limestone Shale**: 85m;
- **Old Red Sandstone**: 250m.

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\(^7\) [www.hannanmetals.com](http://www.hannanmetals.com)
8.5.2 Tulla Licence Structure

- PL 3729 lies within a regional zone of ENE striking structures. An ENE striking structure has been reported as associated with occurrences of lead, barite and silver.
- A previous structural study used geological mapping and geophysical data including the following:
  - Gravity (Dias);
  - Huntings Aeromagnetic Data (GSI);
  - Geotem and Magnetics (Geoterrex);
  - SMARTem/IP (GPX Australia).
- The structural study identified a structural target zone on the southern part of the PL 3729 (Emo, 2005). This zone remains untested.
- It is IMC’s opinion that a marked structural swing observed in the geophysical data together with a discreet break in gravity data to the north suggests major structural interactions in the vicinity of PL 3729.

8.5.3 Tulla Licence Mineralisation, Alteration and Lithogeochemistry

- An ore genesis study that included the relogging of four drillholes across the East Clare Syncline concluded that the style of mineralisation present was extremely rare in Ireland and thought to indicate proximity to a potentially economic sulphide body (Belmore Resources).
- The local association between the mineralisation and large calcite veins in the area was thought to indicate some similarities with other prospects elsewhere in the Irish Base Metal Province.
- The base of the Waulsortian is the most likely horizon to contain significant Zn-Pb mineralisation similar to that at Milltown and the Lower Limestone Shale has the potential to contain significant copper showings like that present at Ballyvergin, 7km to the west.

8.5.4 Tulla Licence Mineralisation – IMC Work Highlights

IMC drilled a total of four drillholes in the licence as a result of encouraging indications from drillhole 11-3729-01, drilling three more holes (12-3729-02, -03 and -04) in order to further understand and confirm this area’s exploration potential. The style of alteration encountered is recognised as often associated with mineralising systems in the Irish Base Metal Province.

The basal part of the Waulsortian in 11-3729-01 has brecciation and replacive pyrite (c. 25% in places). The breccias are interpreted as similar to those associated with some of the Irish base metal deposits.

Dr J. Kelly PGeo EurGeol of SLR reported (Kelly, 2012) that, "In addition to the hydrothermal dolomitic breccias intersected in drillhole 11-3729-01, drill-holes 12-3729-03 and 12-3729-04 intersected significant haematisation of Waulsortian limestones and alteration of sub-Waulsortian shales from black/grey to green. Such haematisation and shale alteration has been recorded as being associated with base-metal mineralisation at the Tynagh, Silvermines, Lisheen and Crinkill base-metal deposits."

In his conclusion, Dr. Kelly stated, "The presence of haematisation in Waulsortian limestones in drillholes 12-3729-03 and 12-3729-04, in conjunction with the hydrothermal breccias intersected in
Drilling since January 2016

Drillhole 17-3529-05 was drilled as a step-out from drillhole 11-3529-01 (see Figure 8.12). The drillhole did not intersect significant mineralisation or brecciation, although it is noted that there is an unusually thick transition from the Waulsortian to the underlying shales. The drillhole also appears to have intersected a reverse fault just above the base of the hole.

Figure 8.12 Tulla licence drillhole locations
8.6 The Shannon Licence - PL 3644

PL 3644 is situated in south Co. Clare (Figure 15). Shannon Airport is located on the southern part of the licence area.

8.6.1 Shannon Licence Lithostratigraphy

PL 3644 is underlain by the prospective Waulsortian limestone in the northern half and Courceyan the sub Waulsortian Argillaceous Bioclastic Limestone (ABL) in the southern half. Both Shannon town and Shannon airport are underlain by the ABL. The prospective area of Waulsortian limestones lies to the north of Shannon airport.

8.6.2 Shannon Licence Structure

The PL lies adjacent to the intersection of the Fergus and Quin Shear Zones (Coller, 1984). The ENE trending, ‘Quin Shear Zone’ has been interpreted as a dextral structure (Coller 1984). The NNE trending 'Fergus Shear Zone' extends from the Fergus estuary and is interpreted as a sinistral structure to the west of PL 3644. Both 'shear zones' are up to 1km in width.

PL 3644 lies 15km to the southwest of Silvermines along strike on the SW projection of the ENE trending Silvermines Fault. This highly prospective ENE striking structure would have been dilatational and may represent a structure acting as a favourable conduit for mineralising fluids at the time of mineralisation.

Based on structural modelling by IMC, the NNE trending Fergus Shear Zone, together with the prospective ENE striking Silvermines Fault, is similar to the regional configuration proposed for the
structural setting of deposits in the Rathdowney Trend (Lisheen and Galmoy) and is considered an important control in that area.

8.6.3 Shannon licence Mineralisation, Alteration and Lithogeochemistry

The mineralisation, alteration and lithogeochemical results on the Shannon licence are summarised as follows:

• the base of Waulsortian within PL 3644 is haematised and slightly chloritized;
• the most intense areas of alteration are in the west of PL 3644 where minor disseminated pyrite appears to be associated with the haematisation;
• in the upper part of the ABL in PL 3644 disseminated pyrite and calcite-pyrite-filled vugs are present;
• there is a general trend for the intensity of alteration to decrease stratigraphically upwards from the Waulsortian-ABL contact;
• this coherent area of alteration is similar in style to that seen at Crinkill, Tynagh and Ballinasloe where the haematisation is interpreted to be related to hydrothermal activity;
• in the opinion of IMC, the distribution of the alteration may be spatially related to the presence and number of potential feeder structures; and
• IMC drilled one drillhole (12-3644-01) in the Shannon block.
9.0 References & Bibliography


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9.1 Acknowledgements

Information presented in this document has been compiled from many sources, as listed above, as well as open file data and publications by the Exploration and Mining Division (EMD) of the Department of Communications, Climate Action and the Environment, Ireland (http://www.mineralsireland.ie/).
## 10.0 Glossary and Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>Weight percent</td>
</tr>
<tr>
<td>ABL</td>
<td>Argillaceous bioclastic limestone, a rock unit containing clay, carbonate and fossil debris. Lies stratigraphically below the Waulsortian.</td>
</tr>
<tr>
<td>Alteration</td>
<td>The conversion of the mineralogy of a rock unit.</td>
</tr>
<tr>
<td>Arenite</td>
<td>Sedimentary rocks with particle size between 0.06 and 2mm diameter</td>
</tr>
<tr>
<td>Argenaceous</td>
<td>A rock or sediment containing clay minerals</td>
</tr>
<tr>
<td>Arsenopyrite</td>
<td>An iron arsenic sulphide, FeAsS.</td>
</tr>
<tr>
<td>Arundian</td>
<td>A period of time within the Lower Carboniferous which post-dates the Chadian.</td>
</tr>
<tr>
<td>Auriferous</td>
<td>Contains gold</td>
</tr>
<tr>
<td>Barite</td>
<td>The ore bearing mineral of Barium</td>
</tr>
<tr>
<td>Basin</td>
<td>In geological terms, a regional scale topographical depression filled with sediments</td>
</tr>
<tr>
<td>Basinal</td>
<td>Pertaining to a Basin</td>
</tr>
<tr>
<td>Biomicrite</td>
<td>A micrite containing fossil fragments.</td>
</tr>
<tr>
<td>Black Matrix Breccia</td>
<td>Often termed “BMB” Broken rock units containing fine grained dolomite between the rock fragments. Often intimately associated with base metal mineralisation.</td>
</tr>
<tr>
<td>c.</td>
<td>Circa (approximately)</td>
</tr>
<tr>
<td>Calp</td>
<td>Fine-grained bedded limestone of Lower Carboniferous age.</td>
</tr>
<tr>
<td>Carbonate</td>
<td>A rock or sediment containing carbonate minerals</td>
</tr>
<tr>
<td>Chadian</td>
<td>A period of time within the Lower Carboniferous which post-dates the Courceyan.</td>
</tr>
<tr>
<td>Chalcopyrite</td>
<td>An ore bearing mineral of copper</td>
</tr>
<tr>
<td>Chert</td>
<td>Very fine grained silica forming layers or nodules within a rock unit.</td>
</tr>
<tr>
<td>Cu</td>
<td>The chemical symbol for copper</td>
</tr>
<tr>
<td>Dextral</td>
<td>Movement on a fault in which the opposite side of the fault has moved to the right.</td>
</tr>
<tr>
<td>Diamond drill</td>
<td>Annular drill faced with boart diamonds and used for rock boring</td>
</tr>
<tr>
<td>Dinantian</td>
<td>European term for the Lower Carboniferous time period</td>
</tr>
<tr>
<td>Dipole- dipole</td>
<td>A type of IP survey</td>
</tr>
<tr>
<td>Dolomite</td>
<td>A mineral containing magnesium and carbonate</td>
</tr>
<tr>
<td>Dolomisation</td>
<td>The conversion to dolomite of other carbonate minerals in rock units. Often associated with base metal mineralisation</td>
</tr>
<tr>
<td>facies (sedimentary)</td>
<td>The aspects of a rock unit reflecting the conditions of its origin.</td>
</tr>
<tr>
<td>facies (metamorphic)</td>
<td>The aspects of a rock unit reflecting the conditions of its metamorphic history.</td>
</tr>
<tr>
<td>Fault</td>
<td>A planar fracture or discontinuity in a volume of rock, along which there has been movement</td>
</tr>
<tr>
<td>Float</td>
<td>Boulders on surface likely to have moved from their bedrock source</td>
</tr>
<tr>
<td>Fluid</td>
<td>In this report, the term fluid refers to hydrothermal fluid, a deep seated fluid which has flowed through rocks and can often form metal deposits</td>
</tr>
<tr>
<td>g/t</td>
<td>grammes per tonne</td>
</tr>
<tr>
<td><strong>Galena</strong></td>
<td>The ore bearing mineral of Lead</td>
</tr>
<tr>
<td>---</td>
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</tr>
<tr>
<td><strong>Geochemistry</strong></td>
<td>the study of the earth’s chemical properties and of the chemical processes acting upon, above, and within the earth</td>
</tr>
<tr>
<td><strong>Geophysics</strong></td>
<td>the study of the earth’s physical properties and of the physical processes acting upon, above, and within the earth</td>
</tr>
<tr>
<td><strong>Grab Samples</strong></td>
<td>Rock samples taken without relationship to a grid</td>
</tr>
<tr>
<td><strong>Gradient Array</strong></td>
<td>A type of IP survey</td>
</tr>
<tr>
<td><strong>Greywacke</strong></td>
<td>Immature arenaceous rock mostly found in turbidites</td>
</tr>
<tr>
<td><strong>Gravity</strong></td>
<td>In this report, the term gravity refers to a type of geophysical survey which measures the gravitational signature of the geology in an area.</td>
</tr>
<tr>
<td><strong>Greenschist facies</strong></td>
<td>A type of metamorphism which has been caused by low temperatures and pressures.</td>
</tr>
<tr>
<td><strong>Haematisation</strong></td>
<td>To change exiting minerals within a rock unit into Iron Oxide minerals, or to introduce Iron oxide minerals.</td>
</tr>
<tr>
<td><strong>Horizon</strong></td>
<td>A specific level in the stratigraphy.</td>
</tr>
<tr>
<td><strong>Hydrothermal</strong></td>
<td>Of, relating to, or denoting the action of heated water in the earth’s crust.</td>
</tr>
<tr>
<td><strong>Igneous</strong></td>
<td>Rocks formed from magma (molten rock below the earths surface) or lava (molten rock above the earths surface)</td>
</tr>
<tr>
<td><strong>Inlier</strong></td>
<td>An area of rock formations surrounded by rock formations of a younger age.</td>
</tr>
<tr>
<td><strong>IP</strong></td>
<td>“Induced polarisation” A type of geophysical survey which measures the conductivity and chargeability of rock units.</td>
</tr>
<tr>
<td><strong>Linear</strong></td>
<td>A lineation interpreted from geophysical surveys</td>
</tr>
<tr>
<td><strong>Lithogeochemical</strong></td>
<td>Pertaining to the chemical composition of rock.</td>
</tr>
<tr>
<td><strong>Lithostratigraphy</strong></td>
<td>The order and relative position of rock units.</td>
</tr>
<tr>
<td><strong>Lower Carboniferous</strong></td>
<td>Belonging to, or denoting a geologic division of the Paleozoic Era following the Devonian and preceding the Permian, including the Dinantian Period.</td>
</tr>
<tr>
<td><strong>Lower Palaeozoic rocks</strong></td>
<td>Denoting, or relating to an era of geological time that began 600 million years ago with the Cambrian period and lasted until the Devonian period.</td>
</tr>
<tr>
<td><strong>m</strong></td>
<td>metres</td>
</tr>
<tr>
<td><strong>Mt</strong></td>
<td>Million tonnes</td>
</tr>
<tr>
<td><strong>Magnetic</strong></td>
<td>In this report, the term magnetic refers to a type of geophysical survey which measures the magnetic signature of the geology in an area.</td>
</tr>
<tr>
<td><strong>Metamorphism</strong></td>
<td>Alteration of the composition or structure of a rock</td>
</tr>
<tr>
<td><strong>Metasedimentary</strong></td>
<td>Sedimentary rocks which have experienced mineralogy changes</td>
</tr>
<tr>
<td><strong>Metavolcanic</strong></td>
<td>Volcanic rocks which have experience mineralogy changes</td>
</tr>
<tr>
<td><strong>Micrite</strong></td>
<td>A limestone constituent formed of calcareous particles formed by the recrystallisation of lime mud.</td>
</tr>
<tr>
<td><strong>Mineralisation</strong></td>
<td>The formation of minerals, in this report the term mineralisation refers to the formation of base metal, and iron bearing minerals, and of free gold.</td>
</tr>
<tr>
<td><strong>Mt</strong></td>
<td>Million Tonnes</td>
</tr>
<tr>
<td><strong>Navan Group</strong></td>
<td>The sequence of rocks which host the Navan deposit</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Ordovician</strong></td>
<td>Belonging to the geologic time, system of rocks, or sedimentary deposits of the second period of the Paleozoic Era, characterized by the appearance of primitive fishes.</td>
</tr>
<tr>
<td><strong>Oz</strong></td>
<td>Ounce</td>
</tr>
<tr>
<td><strong>Pb</strong></td>
<td>The chemical symbol for lead</td>
</tr>
<tr>
<td><strong>PL</strong></td>
<td>Prospecting Licence</td>
</tr>
<tr>
<td><strong>Pyrite</strong></td>
<td>A mineral formed from Iron and Sulphur, often related to base metal mineralisation</td>
</tr>
<tr>
<td><strong>Primary gold mineralisation</strong></td>
<td>Gold in bedrock</td>
</tr>
<tr>
<td><strong>Reef</strong></td>
<td>See Waulsortian</td>
</tr>
<tr>
<td><strong>Regional dolomite</strong></td>
<td>The conversion to dolomite of other carbonate minerals in a rock unit over a large area.</td>
</tr>
<tr>
<td><strong>Shear</strong></td>
<td>Fracturing and deformation of rock due to the movement of adjacent rock units.</td>
</tr>
<tr>
<td><strong>Shelf</strong></td>
<td>A gently sloping shallow-water marine platform.</td>
</tr>
<tr>
<td><strong>Silicification</strong></td>
<td>To convert into or to impregnate with silica</td>
</tr>
<tr>
<td><strong>Sinistral</strong></td>
<td>Movement on a fault or shear-zone, in which the opposite side of the structure has moved to the left.</td>
</tr>
<tr>
<td><strong>Sphalerite</strong></td>
<td>The ore bearing mineral of Zinc, formed from zinc and sulphur</td>
</tr>
<tr>
<td><strong>Stibnite</strong></td>
<td>Antimony sulphide ore</td>
</tr>
<tr>
<td><strong>Sulphide</strong></td>
<td>A metallic compound of sulphur</td>
</tr>
<tr>
<td><strong>Stratigraphy</strong></td>
<td>The branch of geology concerned with the order and relative position of strata and their relationship to the geological time scale.</td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td>Layers of sedimentary rocks which have been displaced from their normal horizontal position by the forces of nature into folds, fractures and faults</td>
</tr>
<tr>
<td><strong>Throw</strong></td>
<td>The displacement along a fault</td>
</tr>
<tr>
<td><strong>Trend</strong></td>
<td>A postulated alignment of mineral deposits.</td>
</tr>
<tr>
<td><strong>Tuff</strong></td>
<td>rock formed from volcanic ash</td>
</tr>
<tr>
<td><strong>Turbidite</strong></td>
<td>Sedimentary rocks formed by deposition from rapidly moving turbidity currents resulting in thick graded sequences of arenaceous and argillaceous rocks</td>
</tr>
<tr>
<td><strong>VMS</strong></td>
<td>Volcanogenic Massive Sulphide. A type of base metal deposit associated with Volcanic rocks.</td>
</tr>
<tr>
<td><strong>Waulsortian</strong></td>
<td>Mud mounds of carbonate material, and associated sediments, formed during the upper Courceyan period. This formation hosts the majority of the Irish Type base metal deposits.</td>
</tr>
<tr>
<td><strong>Zn</strong></td>
<td>The chemical symbol for Zinc</td>
</tr>
</tbody>
</table>
11.0 Closure

This report has been prepared by SLR Environmental Consulting (Ireland) Limited (SLR) with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

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