

# Bluejay Mining plc

United Kingdom / Mining  
 AIM (London); Frankfurt SE  
 Bloomberg: JAY LN  
 ISIN: GB00BFD3VF20

Site Visit to Dundas  
 Titanium Project

**RATING**  
**BUY**

**PRICE TARGET**  
**GBP 21.8**

Return Potential 118.4%  
 Risk Rating High

## HIGH GRADE, SIMPLE EXTRACTION, MULTI-DECADE MINE LIFE

We visited Bluejay's advanced-stage flagship Dundas Titanium Project in Northwest Greenland a few days ahead of the early September shipment of a 42,000 tonne bulk ilmenite sample (ilmenite is a titanium-containing mineral) to Canada for concentration and subsequent evaluation by potential customers including Rio Tinto. Later in September, Bluejay submitted a mining license application for the project, including a full pre-feasibility study, to the Greenlandic authorities. The homogeneous, high-grade, coarse-grained, unweathered nature of the ore body at Dundas simplifies extraction and suggests a bright future for the project despite the harsh high-arctic operating environment. Our recommendation is Buy with a price target of GBP21.80. In this initiation of coverage, we have not modelled any value, which could prove considerable, for either the Disko or Kangerluarsuk projects.

**Potential multi-decade mine life** Dundas has a JORC-compliant onshore resource estimate of 117m tonnes at 6.1% ilmenite. This is flanked by a JORC-compliant offshore exploration target of 300-530m tonnes at an average expected grade range of 0.4% to 4.8% ilmenite. According to the PFS, the onshore reserve is sufficient for a mine life of up to 11 years. However, additional ore identified elsewhere on the licence area as well as the shallow marine material will most likely add further decades of mine life.

**Good relations with supportive local authorities** The Greenlandic Government actively supports the development of the local mining industry as part of its drive to create jobs. The Greenland Government named the Dundas Project one of the most-well advanced mineral projects in the autonomous territory in its 2018 economic report. They also named Bluejay Prospector and Developer of the year for 2017.

**Value of Disko-Nuussuaq & Kangerluarsuk projects could exceed Dundas** Bluejay has identified twenty-eight large scale drill-ready targets at its 2,776km<sup>2</sup> Disko-Nuussuaq Magmatic Massive Sulphide Nickel-Copper-Platinum Project in West Greenland. The geology of the project is analogous to the Norilsk nickel mine in Siberia. Since early 2019 Anglo American has claimed 10,000 km<sup>2</sup> essentially surrounding Bluejay's holdings. The high grade mineralisation at the Kangerluarsuk zinc/lead/silver project (surface samples have shown over 50% metal) is thought to be very rare globally. Bluejay is planning extensive drilling at this project as well as at Disko during 2020, which if successful will add considerable further value to the share.

### FINANCIAL HISTORY & PROJECTIONS EXCLUDE

	2018	2019E	2020E	2021E	2022E	2023E
Revenue (GBP m)	0.00	0.00	0.00	0.00	53.95	80.93
Y-o-y growth	n.a.	n.a.	n.a.	n.a.	n.a.	50.0%
EBITDA (GBP m)	-1.67	-1.58	-2.25	-2.75	23.53	36.67
EBITDA margin	n.a.	n.a.	n.a.	n.a.	43.6%	45.3%
Net income (GBP m)	-10.78	-2.03	-2.82	-7.07	-23.45	-8.58
EPS (diluted) (GBP)	-1.3	0.0	0.0	-0.01	-0.02	-0.01
DPS (GBP)	0.00	0.00	0.00	0.00	0.00	0.00
FCF (GBP m)	-7.68	-5.87	-1.76	-8.82	-8.02	18.69
Net gearing	-34.0%	-10.4%	54.5%	344.1%	746.7%	1233.5%
Liquid assets (GBP m)	9.17	2.63	31.34	23.47	15.44	13.98

### RISKS

The main risk to our price target is that Bluejay fails to secure financing for the Dundas Titanium Project.

### COMPANY PROFILE

Bluejay's advanced-stage flagship Dundas Titanium Project, located in western Greenland, is based on the world's highest-grade ilmenite mineral sands deposit. Two other Bluejay projects in Greenland offer considerable further upside. The Disko-Nuussuaq Project is geologically analogous to the world's largest nickel/copper sulphide mine at Norilsk in Siberia while samples from the Kangerluarsuk zinc/lead/silver project show over 50% metal.

### MARKET DATA

	As of 10/23/2019
Closing Price	GBP 10.0
Shares outstanding	854.97m
Market Capitalisation	GBP 85.50m
52-week Range	5 / 15
Avg. Volume (12 Months)	2,730,915

Multiples	2021E	2022E	2023E
P/E	n.a.	n.a.	n.a.
EV/Sales	n.a.	1.46	0.97
EV/EBITDA	n.a.	3.34	2.14
Div. Yield	0.0%	0.0%	0.0%

### STOCK OVERVIEW



### COMPANY DATA

	As of 30 Jun 2019
Liquid Assets	GBP 6.51m
Current Assets	GBP 7.94m
Intangible Assets	GBP 17.35m
Total Assets	GBP 28.28m
Current Liabilities	GBP 0.54m
Shareholders' Equity	GBP 27.24m

### SHAREHOLDERS

Sand Grove Capital Management PLC	18%
Directors and senior management	14%
M&G PLC	12%
Hargreaves Lansdown Asset Man.	4%
Free float and other	52%



<b>CONTENTS</b>	<b>PAGE</b>
Bluejay Mining plc – Executive Summary .....	1
SWOT Analysis.....	3
Valuation.....	6
Company Profile .....	8
<i>The Dundas Titanium Project</i> .....	8
<i>DTP geology overview</i> .....	10
Financial Position.....	14
Management.....	15
Shareholders & Stock Information .....	17
Income Statement.....	18
Balance Sheet.....	19
Cash Flow Statement.....	20



## SWOT ANALYSIS

### STRENGTHS

---

- **World's highest grade ilmenite mineral sands project at advanced stage** Bluejay's advanced stage flagship Dundas Titanium Project is based on the world's highest-grade ilmenite mineral sands deposit. A summary of a full prefeasibility study was released in June and in mid-September Bluejay submitted a mining license application for the project, including the full pre-feasibility study, to the Greenlandic authorities.
- **Potential multi-decade mine life** Dundas has a JORC-compliant onshore resource estimate of 117m tonnes at 6.1% ilmenite. This resource is flanked by further JORC-compliant exploration targets including the offshore shallow marine exploration target of 300-530m tonnes at an average expected grade range of 0.4% to 4.8% ilmenite as well as additional targets of between 20-60mt in the Ilerlak Valley and potentially much larger unquantified volumes of material in the Ilerlak Delta itself. According to the PFS, the onshore reserve is sufficient for a mine life of nine years based on the resources identified at the end of 2018 along only 10km of the 30km long licence holding. Since that time Bluejay has made further significant discoveries along the licence area. This material coupled with the offshore ore could add several decades to the life of the mine.
- **Simple extraction, relative proximity to end-users help mitigate cost of operation in remote arctic location** Remote location and harsh climactic conditions during a large part of the year raise capital and operating costs at Dundas. However, these negatives are to a very large extent mitigated by the homogeneous, high-grade, coarse grained, unweathered ore at the project, which simplifies extraction methodology and lowers operating cost. Bluejay is also expected to benefit from 4 months of 24 hour daylight. The simple process flow sheet at Dundas includes both gravity and magnetic separation. Coarse grain size facilitates gravity separation while unweathered (high iron-content) ore is better amenable to magnetic separation. 90% of ilmenite is used in the production of white pigment. Shipping costs are an important factor in pigment feedstock production. Bluejay, through its location in Greenland, has a clear advantage in terms of proximity to Europe/North America over feedstock suppliers in the other four of the top five producing countries.
- **Generally low level of key of impurities** The level of impurities in Dundas ilmenite is generally low. The project is differentiated from other mineral sand ilmenites in that thorium and uranium levels are very low. Radioactivity is a growing issue in both feedstock handling and effluent disposal.
- **Good relations with supportive local authorities** The Greenlandic Government actively supports the development of the local mining industry as part of its drive to create jobs, raise citizens' living standards and reduce the block subsidy from the Danish state. The Greenland Government named the Dundas Project one of the most well- advanced mineral projects in the autonomous territory in its 2018 economic report and named Bluejay Prospector and Developer of the year for 2017. The Environmental Impact Assessment component of the mining license application submitted in September concluded that there are no major material or unmanageable environmental impacts arising from the development of the project while the Social Impact Assessment concluded net positive impact on the local community through significant employment opportunity as well as infrastructure and general economic development for the region.
- **Directors and Senior Management have substantial skin in the game** Bluejay's Directors and Senior Management are significant shareholders with a combined stake of 14%.



## WEAKNESSES

---

- **Harsh climactic conditions** The average monthly temperature is below zero for nine months of the year. However the climate at Dundas is moderated through the project's coastal location. Permafrost starts a little more than one metre below the surface of the beach. However, during our site visit we saw that it is possible to mine the permafrost year round. Year round mining will therefore be possible. Transport by ship to and from the project is only possible during five months of the year.
- **Remote location;** There are no roads to and from the Dundas Project. The nearest airport at Qaanaaq is about 70km away as the crow flies. Scheduled air services from the larger towns in Greenland to Qaanaaq take place only twice a week. The PFS envisages the construction of a small airstrip for connecting into this national network for transportation of personnel and consumables to and from the project.

## OPPORTUNITIES

---

- **Increasing interest** Intense focus by the United States and the rest of the world is recognition of the significance of Greenland's strategic location and bountiful resource endowment and validates Bluejay's business model. Bluejay is the dominant player in Greenland's mineral industry. With two other major mining prospects in its portfolio, Dundas may be the least of the company's assets in terms of potential value.
- **Bulk ilmenite sample shipment to customers could lead to offtake agreement** In early September Bluejay shipped a "proof of concept" 42,000 tonne bulk ilmenite sample from Moriusaq to Canada for concentration and subsequent evaluation by potential customers including Rio Tinto. This was touted as the most northern sealift of bulk material to have occurred anywhere in the world and is a direct result of extended shipping windows brought about by climate change.
- **Value of Disko-Nuussuaq project could exceed Dundas** Bluejay is not a one-project company. On the basis of its own exploration work and over USD50m worth of historical work completed by Cominco, Falconbridge and Vismand, Bluejay has identified twenty-eight large scale drill-ready targets at the Disko-Nuussuaq Magmatic Massive Sulphide Nickel-Copper-Platinum Project in west Greenland. The largest of these is more than 12km long and up to 2km wide. Management believes that the project's geology is analogous to that of the Norilsk nickel district in Siberia. Bluejay has increased the extent of its license holdings at the project from 194 km<sup>2</sup> at the time of acquisition in January 2017 to 2,776km<sup>2</sup> currently. Again, confirming the company's strategy at Disko since early 2019, competitor companies including global mining major Anglo American have claimed 10,000 km<sup>2</sup> of ground close to Bluejay's holdings.
- **Drilling at Kangerluarsuk and Disko planned for 2020** Kangerluarsuk has recently been identified by the company through recent stock exchange releases as having mineralisation that combined is more than 50% valuable metal. This type of high grade mineralisation is thought to be very rare globally and the company is planning extensive drilling at this project as well as Disko during 2020 which if successful will add considerable further value to Bluejay shares. These additional projects diversify risk without diluting shareholder value.
- **Bringing the majors home** Interestingly a second major mining company has shown interest in Bluejay's portfolio of major metal occurrences in Greenland, further reinforcing the appropriateness of the company's strategy with respect to its landholding of what it describes as globally significant assets. It is possible that the company could have two majors as partners on its two most advanced projects in the course of 2020.



## THREATS

---

- **Customers decide Dundas ilmenite does not meet their requirements** The pigment industry makes exacting demands of its feedstock suppliers. There is no guarantee that Bluejay's product will gain acceptance. However, work to date by both Bluejay and Rio Tinto demonstrates that this material is suitable for their smelters in Sorel. Completion of the bulk smelter test will resolve this issue during H1 2020.
- **Funding** Bluejay's H1 results showed a cash position of GBP 6.5m, indicating cash reach until next Spring. We would therefore expect the company to address capital requirements by early 2020. However, with their impressive pipeline of metal projects, increasing global interest in Greenland, and the nearness to the key awarding of the exploitation licence for Dundas, we anticipate that Bluejay will not have difficulty in raising funds as required.



## VALUATION

In June 2019 Bluejay published a summary PFS for the Dundas Titanium Project. The basis of the PFS is the indicated onshore resource at Moriusaq shown in Bluejay's December 2018 resource estimate i.e. 88m tonnes grading 6.5% ilmenite at a 0% TiO<sub>2</sub> cut-off grade. From this figure, SRK derives an ore reserve of 67.1m tonnes grading 7.3% or ca. 4.9m tonnes ilmenite in situ. The reserve number is based on a 1.6% TiO<sub>2</sub> cut-off grade. SRK further assumes recovery of 79.7% and loss of 4.1%. The base case scenario in the PFS envisages production of ca. 3.7 m tonnes of ilmenite spread over a mine life of nine years with annual production ramping from an initial 300,000 tonnes p.a. to 440,000 tonnes p.a.

Bluejay's current resource estimate was first published at the end of May 2019. It shows a JORC-compliant resource of 117m tonnes grading 6.1% at a 0% cut-off. At the same time, Bluejay also published a maiden JORC-compliant offshore exploration target showing 300-530m tonnes at an average expected grade range of 0.4% to 4.8% ilmenite.

The ore volume featured in the offshore exploration target is higher than in the onshore resource estimate firstly because the areal extent of the resource is greater and secondly because its thickness generally ranges from 2 to >10 metres. This compares with an estimated 2-3 metres for the onshore beaches. However, assessment of the likely scale of the offshore resource was hampered by loss of data. In addition, the maximum depth of the vibrocore holes was 1.9m at an average depth 0.7m and so the deposit was not tested to its full depth. Bluejay's management views the existing offshore exploration target as very conservative. Indeed, on the basis of high grade accumulations intersected in the course of offshore drilling in 2016, CEO Rod McIlree believes a figure of 700-1bn tonnes grading 10-15% ilmenite is realistic. In our valuation model, we use an adjusted offshore exploration target of 400m tonnes grading 6.1% ilmenite at a 0% TiO<sub>2</sub> cut-off (the same grade as the current resource estimate). In 2018 SRK set an exploration target of 20-60m tonnes grading 6-10% ilmenite for the Iterlak Valley target (the dry valley sediments up from the delta tideline). In our model, we assume 40m tonnes grading 6.1% ilmenite at a 0% cut-off. We further assume 50m tonnes for the potentially much larger Iterlak Delta target (also grading 6.1% ilmenite at a 0% cut-off). As figure 1 below shows, the sum of the current resource estimate, our adjusted offshore exploration target and our assumption for the Iterlak Valley and Iterlak Delta targets is a resource of 607m tonnes grading 6.1% ilmenite at a 0% TiO<sub>2</sub> cut-off.

**Figure 1: First Berlin resource assumption for Dundas titanium project (tonnes)**

	Tonnes	Ilmenite grade	TiO <sub>2</sub> cut-off
Existing resource estimate	117,000,000	6.10%	0.00%
Iterlak Valley	40,000,000	6.10%	0.00%
Iterlak Delta	50,000,000	6.10%	0.00%
Offshore	400,000,000	6.10%	0.00%
<b>Total</b>	<b>607,000,000</b>	<b>6.10%</b>	<b>0.00%</b>

Source: First Berlin Equity Research estimates, Bluejay Mining plc

The PFS reserve is based on a cut-off of 1.6% TiO<sub>2</sub>. This reduces the 88m tonne indicated ilmenite resource (0% TiO<sub>2</sub> cut-off) by 23.75% to a 67.1m reserve. We have reduced our 607m million tonne resource assumption by the same amount to arrive at an assumed reserve of 463m tonnes (1.6% TiO<sub>2</sub> cut-off). The assumption of an ilmenite grade of 7.3% (the same figure as used for the PFS reserve) yields an in situ ilmenite figure of 34m tonnes. To this number we apply loss and recovery rates of 4.1% and 85% respectively. Management tells us that recovery rates vary from 84.6% to 85.4% rather than the 79.7% used in the PFS. These numbers generate life of mine production of 27.5m tonnes of ilmenite. This is sufficient for over 30 years of mine life on the assumption that annual production ramps to 700,000 tonnes p.a.



The PFS envisages CAPEX of USD230m on the assumption of output of 440,000 tonnes p.a. We believe that raising production to 700,000 tonnes p.a. would require incremental CAPEX of USD26m. We assume the same level of operating cost as in the PFS, i.e. USD113 per tonne. As a consequence of Greenland's accelerated depreciation allowances, we do not model any taxes until the sixth year of the project's operation. We assume that site construction begins in mid-2020 and model first shipments in early 2002. Discounting future cashflows at a 10% discount rate produces a valuation for the DTP of USD243m (see figure 2). We assume a GBP10m equity raise in 2020 ahead of project financing and a further GBP20m as part of project financing. Along with assumed option exercise, this raises the proforma cash position and share count to GBP 17.6m and 957m respectively. As figure 3 shows, we value the Bluejay share at GBp21.8 per share. This valuation is based solely on the DTP. We have not modelled any value, which could prove considerable, for the Disko and Kangerluarsuk projects.

**Figure 2: Dundas titanium project valuation model\***

<b>Assumptions</b>									
Estimated ilmenite resource at 0.0% TiO <sub>2</sub> cut-off (kt)	607,000								
grade	6.1%								
Estimated ilmenite resource at 1.6% TiO <sub>2</sub> cut-off (kt)	462,838								
grade	7.3%								
Estimated ilmenite in situ (kt)	33,787								
Loss	4.1%								
Recovery	85.0%								
Estimated LOM ilmenite production (kt)	27,542								
<b>in USD 000s</b>	<b>2020E</b>	<b>2021E</b>	<b>2022E</b>	<b>2023E</b>	<b>2024E</b>	<b>2025E</b>	<b>2026E</b>	<b>2027E</b>	<b>2028E</b>
<b>Ilmenite shipped (kt)</b>			300	450	600	700	700	700	700
<b>Price per tonne ilmenite (USD)</b>			232	232	232	232	232	232	232
<b>Revenue</b>			69,600	104,400	139,200	162,400	162,400	162,400	162,400
Mining, processing, infrastructure, services, G&A			33,963	50,945	67,926	79,247	79,247	79,247	79,247
Royalties			1,740	2,610	3,480	4,060	4,060	4,060	4,060
<b>EBITDA</b>			33,897	50,846	67,794	79,093	79,093	79,093	79,093
Depreciation			46,073	46,073	51,273	51,273	51,273	5,200	5,200
Operating profit			-12,176	4,773	16,521	27,820	27,820	73,893	73,893
Tax								20,690	20,690
Net operating profit less tax			-12,176	4,773	16,521	27,820	27,820	53,203	53,203
Capital expenditure	-76,788	-153,576	0	-26,000	0	0	0	0	0
<b>Net cashflow</b>	<b>-76,788</b>	<b>-153,576</b>	<b>33,897</b>	<b>24,846</b>	<b>67,794</b>	<b>79,093</b>	<b>79,093</b>	<b>58,403</b>	<b>58,403</b>
<b>PV cashflows at 10% discount rate</b>	<b>-68,579</b>	<b>-124,688</b>	<b>25,019</b>	<b>16,671</b>	<b>41,354</b>	<b>43,860</b>	<b>39,873</b>	<b>26,766</b>	<b>24,333</b>
<b>Total project value</b>	<b>246,241</b>								

\*for layout purposes the model shows numbers only to 2028 but runs until 2061

Source: First Berlin Equity Research estimates

**Figure 3**

<b>Group valuation model (GBP 000s)</b>	
Dundas Titanium Project NPV (USD 000s)	246,241
Dundas Titanium Project NPV	190,884
Proforma net cash position	17,589
<b>Total equity value</b>	<b>208,473</b>
Proforma no shares (k)	956,522
<b>Value per share (GBp)</b>	<b>21.79</b>

Source: First Berlin Equity Research estimates



## COMPANY PROFILE

Bluejay's most advanced asset is the Dundas Titanium Project (DTP) in North West Greenland. The DTP is the highest grade ilmenite mineral sand project in the world with a JORC-compliant resource estimate of 117m tonnes grading 6.1%. Bluejay's predecessor and listed entity, FinnAust Mining plc (FinnAust) acquired an initial 60% in Bluejay Mining Limited (BML), the 100% owner of the DTP, in March 2016 through the issue of shares. At the same time FinnAust acquired an option exercisable by March 2020 to acquire the remaining 40% in BML for an additional GBP0.6m in shares. FinnAust exercised the option in February 2017 and subsequently changed its name to Bluejay Mining plc (Bluejay) to reflect the DTP's status as the most important asset in its portfolio.

In January 2017, FinnAust completed the acquisition of the 194km<sup>2</sup> Disko-Nuussuaq magmatic massive sulphide nickel-copper-platinum project and the 107km<sup>2</sup> Kangerluarsuk Sed-Ex lead-zinc-silver project from Capricorn Oil, a subsidiary of Cairn Energy PLC. The consideration was GBP0.5m payable in FinnAust shares.

The Geological Survey of Denmark and Greenland/Geological Survey of Greenland and resources companies such as Cominco, Falconbridge, Vismand and Cairn Energy explored the Disko-Nuussuaq property extensively over 60 years prior to its acquisition by Bluejay. This work confirmed a working sulphide system, and chemical assays in oxidised surface material returned 2.02% nickel, 0.8% copper and 0.2% cobalt. Additional handheld XRF sampling on fresh, polished material from the gossan zones showed average values of 4.6% - 9.3% nickel & 1.5% - 2.8% copper. Management believes that the project is analogous to the Norilsk nickel district in Siberia which has an estimated total resource of 1.3Bt@1.8% Ni, 3.6% Cu, 9.5 g/t PGE (platinum group elements). Bluejay has increased the extent of its license holdings at the project from 194 km<sup>2</sup> at the time of acquisition in January 2017 to 2,776 km<sup>2</sup> currently. Meanwhile since early 2019 competitor companies have claimed 10,000 km<sup>2</sup> of ground close to Bluejay's holdings.

The Kangerluarsuk Zinc-Lead-Silver Project is the third project in Bluejay's Greenlandic stable. The recently increased licence area of some 692km<sup>2</sup>, is located within the Karrat Group, a major Palaeoproterozoic sedimentary basin. The Karrat Group hosts the former Black Angel Zn-Pb-Ag mine, which produced 11 million tonnes at 12.6 % Zn, 4.1 % Pb and 29 g/t Ag during operation by Cominco (1973–1986) and subsequently Boliden (1986–1990). The mine is situated less than 20km south of Bluejay's Project area

In Finland, Bluejay has a strategic portfolio of three high-grade polymetallic assets which offer additional upside. These multi-element base metal deposits in southern Finland host commodities including Cu, Ni, Zn, Co, Cr, Fe, V. The projects are "cost sustainable" for the long term and Bluejay continues to assess the best ways in which to realise their value

### THE DUNDAS TITANIUM PROJECT

The DTP is located within the "Thule black sand province" (see figure 4) in North West Greenland (76°–78°N), which comprises several hundred kilometres of coastline containing both ilmenite and magnetite-rich regions between Kap Alexander in the north and Kap Edvard Holm in the south.



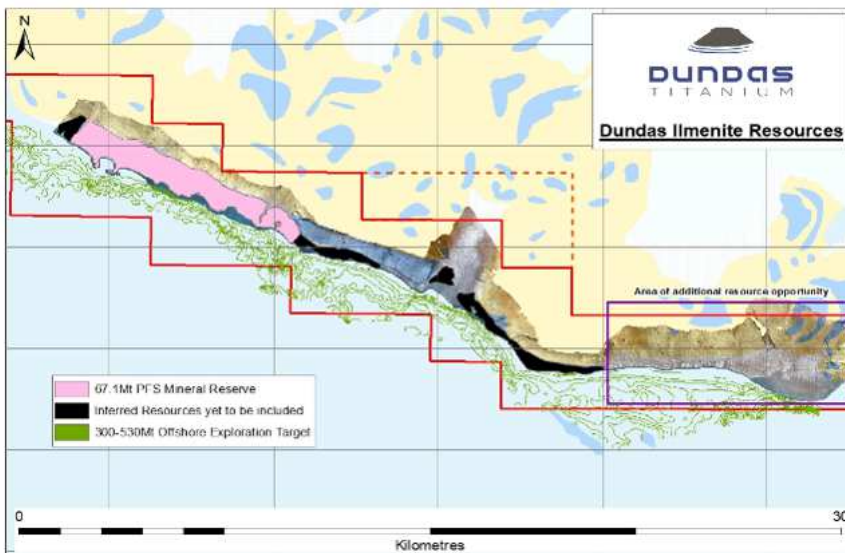
**Figure 4: The Thule black sand province**



Source: Geological Survey of Denmark and Greenland

To date, the highest-grade ilmenite in the region has been identified on Bluejay's licences which extend ca. 30km (see figure 5).

**Figure 5: Bluejay's licences**



Source: Bluejay Mining plc

**Ilmenite/titanium dioxide and the white pigment industry**

Ilmenite is the main source (ca. 90%) of titanium dioxide feedstock, 90% of which is used to produce white colour and brightness in paints, plastics, paper and inks. Only about 5% of titanium dioxide is used to produce titanium metal. About two thirds of ilmenite is sourced from mineral sand deposits such as Dundas.

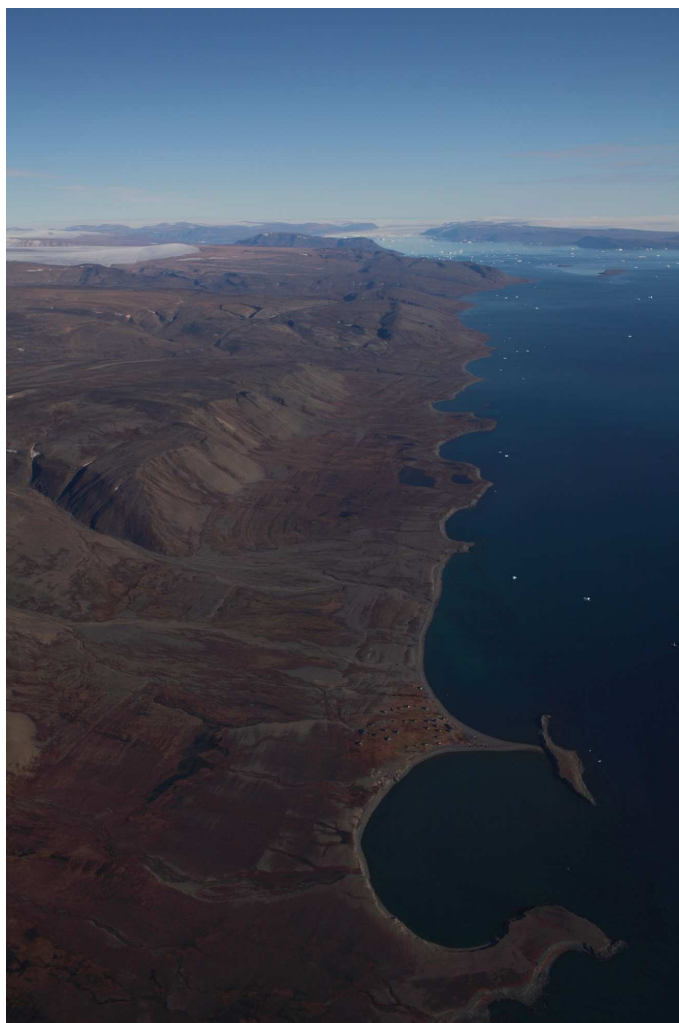
The remainder derives from hard rock deposits such as Rio Tinto's Lac Tio mine in Quebec and Kronos' Tellnes mine in Norway. Titanium dioxide is used to make white pigment through either the sulphate pigment process or the chloride pigment process. Worldwide demand for titanium dioxide pigment in 2018 was ca. 5.9m tonnes, of which ca. 60% was produced using the chloride process and 40% through the sulphate process. The chloride process is more capital and energy intensive than the sulphate process but produces a better quality product (superior brightness, bluer undertone).

One of the advantages of the Dundas deposit is that the titanium dioxide grade of the ilmenite is constant at 47%. This is because all the ilmenite on the deposit derives from a single source. Bluejay's material is suitable for sale as a raw material for the sulphate pigment process or for chloride, sulphate or upgraded slag production. Its titanium dioxide content is however too low for use in the chloride pigment process without upgrading.

The five leading titanium mineral concentrates (of which ilmenite accounts for nearly 90%) producing countries in 2017 were in order Australia, Canada, China, Mozambique and South Africa. 40% of world white pigment capacity is in China and one third in Europe/North America. The two latter geographies are the most likely markets for Bluejay's ilmenite concentrate.

## DTP GEOLOGY OVERVIEW

**Figure 6: View of the DTP looking southeast from Moriusaq towards Iterlak**



*Source: Geological Survey of Denmark and Greenland*



The ilmenite sand resource at the DTP is hosted on active, raised and submerged beaches. The sands are enriched in ilmenite derived from Neoproterozoic titanium-rich dolerite sills and dykes in the immediate hinterland of the beaches. Ilmenite was deposited on the beaches through erosion and fluvio-glacial transportation.

Modelling studies of glacial rebound performed in the vicinity of the DTP have shown a rapid fall of the relative sea level from deglaciation until c. 7,000 years BP (Before Present), followed by a rise in the relative sea level. At 7,000 years BP the relative sea level was 20 metres below present sea level at Iterlak. Exploration work carried out by Bluejay has demonstrated the presence of offshore placer deposits in the surf and nearshore zones at depths corresponding with the minimum level of the paleo-sea surface.

### Current resource estimate

Bluejay's current resource estimate was first published at the end of May 2019. It shows a JORC-compliant resource of 117m tonnes grading 6.1% at a 0% TiO<sub>2</sub> cut-off (see figure 7). The compilation of the resource estimate was overseen by SRK.

**Figure 7: Current resource estimate**

Classification	Location	Tonnes kt	>5mm (%)	>2mm (%)	<63µm (%)	THMs <sup>1</sup> (%)	In situ TiO <sub>2</sub> (%)	In situ TiO <sub>2</sub> kt	In situ <sup>2</sup> Ilmenite (%)	In situ Ilmenite kt	TiO <sub>2</sub> as % Ilmenite
Indicated	Moriusaq	88,000	27.5	36.1	4.2	27.0	3.1	2,728	6.5%	5,725	47.65%
Indicated	Iterlak East	19,500	15.3	24.0	12.8	22.2	2.2	429	4.6%	900	47.65%
Indicated	Iterlak West	4,800	23.2	32.4	13.8	11.9	1.0	48	2.1%	101	47.65%
<b>Total Indicated</b>		<b>112,300</b>	<b>25.2</b>	<b>33.9</b>	<b>6.1</b>	<b>25.5</b>	<b>2.8</b>	<b>3,205</b>	<b>5.9%</b>	<b>6,726</b>	<b>47.65%</b>
<b>Inferred</b>	<b>Moriusaq</b>	<b>5,000</b>	<b>15.7</b>	<b>23.0</b>	<b>5.7</b>	<b>34.2</b>	<b>4.4</b>	<b>222</b>	<b>9.3%</b>	<b>466</b>	<b>47.65%</b>
<b>Total resource</b>		<b>117,300</b>	<b>24.8</b>	<b>33.4</b>	<b>6.1</b>	<b>25.9</b>	<b>2.92%</b>	<b>3,427</b>	<b>6.1%</b>	<b>7,192</b>	<b>47.65%</b>

1. "THM" means Total Heavy Minerals

2. % Ilmenite in-situ assumes that all TiO<sub>2</sub> is within ilmenite and that the ilmenite contains 47.65% TiO<sub>2</sub>, based on historical exploration data.

Source: Bluejay Mining plc

The resource estimate also incorporated a maiden JORC-compliant offshore exploration target. The exploration target was derived from a work programme involving marine seismic, bathymetry, active and drowned beach sampling, as well as a digital thickness contour map (see figure 9).

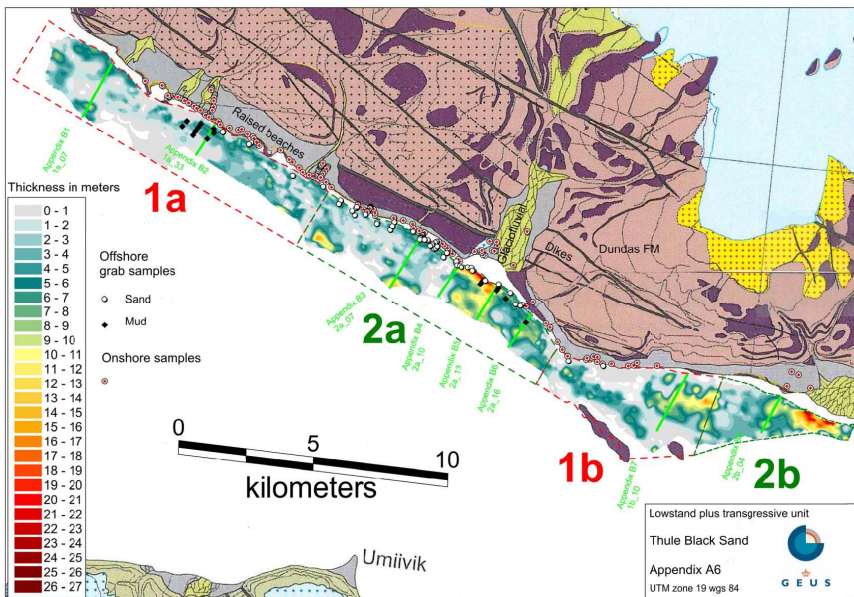
**Figure 8: Offshore exploration target**

Area	Tonnage range (Mt)	TiO <sub>2</sub> grade range (%)
North	60-100	1.0-2.3
Central	90-160	0.5-2.0
South	150-270	0.2-1.9
<b>Total</b>	<b>300-530</b>	<b>0.2-2.3</b>

Source: Bluejay Mining plc



**Figure 9: Thickness contour map of offshore mineral sands at DTP**



Source: Geological Survey of Denmark and Greenland

Figure 9 indicates why the ore volume featured in the offshore exploration target is so much higher than in the onshore resource estimate. Firstly the areal extent of the resource is greater. Secondly thickness generally ranges from 2 to >10 metres. This compares with an estimated 2-3 metres for the onshore beaches. Bluejay plans further offshore exploration. Existing offshore data is currently being reviewed with a view to better defining sediment units and total thicknesses. The review will be used to select areas best suited for follow-up magnetic and high-resolution sub-bottom profiling surveys scheduled for 2020. Testing of the resulting drill targets is scheduled for the summer of 2021.

**June 2019 summary PFS**

In June 2019 Bluejay published a summary PFS for the DTP. The PFS is based on the indicated onshore resource at Moriusaq shown in Bluejay’s December 2018 resource estimate (see figure 10 below) i.e. 88,000 tonnes grading 6.6% ilmenite. From this figure SRK derives an ore reserve of 67.1m tonnes grading 7.3% ilmenite (equivalent to 3.45% titanium dioxide). These figures are based on titanium dioxide recovery of 79.7% and loss and dilution of 4.1% and 4.3% respectively. The base case scenario in the PFS envisages production of 3.7 m tonnes of ilmenite spread over a mine life of nine years with annual production ramping from an initial 300,000 tpa to 440,000 tpa.

**Figure 10: December 2018 resource estimate (basis for PFS)**

Classification	Location	Tonnes kt	In situ TiO <sub>2</sub> (%)	In situ TiO <sub>2</sub> kt	In situ Ilmenite (%)	In situ Ilmenite kt	TiO <sub>2</sub> as % Ilmenite
Indicated	Moriusaq	88,000	3.1	2,763	6.6%	5,799	47.65%
Inferred	Moriusaq	5,000	4.4	222	9.3%	466	47.65%
Inferred	Ilerlak East	7,000	5.8	406	12.2%	852	47.65%
Inferred	Ilerlak West	1,000	2.9	29	6.1%	61	47.65%
<b>Total Inferred</b>		<b>13,000</b>	<b>5.1</b>	<b>657</b>	<b>10.6%</b>	<b>1,379</b>	<b>47.65%</b>
<b>Total resource</b>		<b>101,000</b>	<b>3.4</b>	<b>3,420</b>	<b>7.1%</b>	<b>7,178</b>	<b>47.65%</b>

Source: Bluejay Mining plc

The full PFS was included in the mining license application submitted to the Greenlandic authorities last month. The mining license application also incorporated an Environmental Impact Assessment and a Social Impact Assessment.

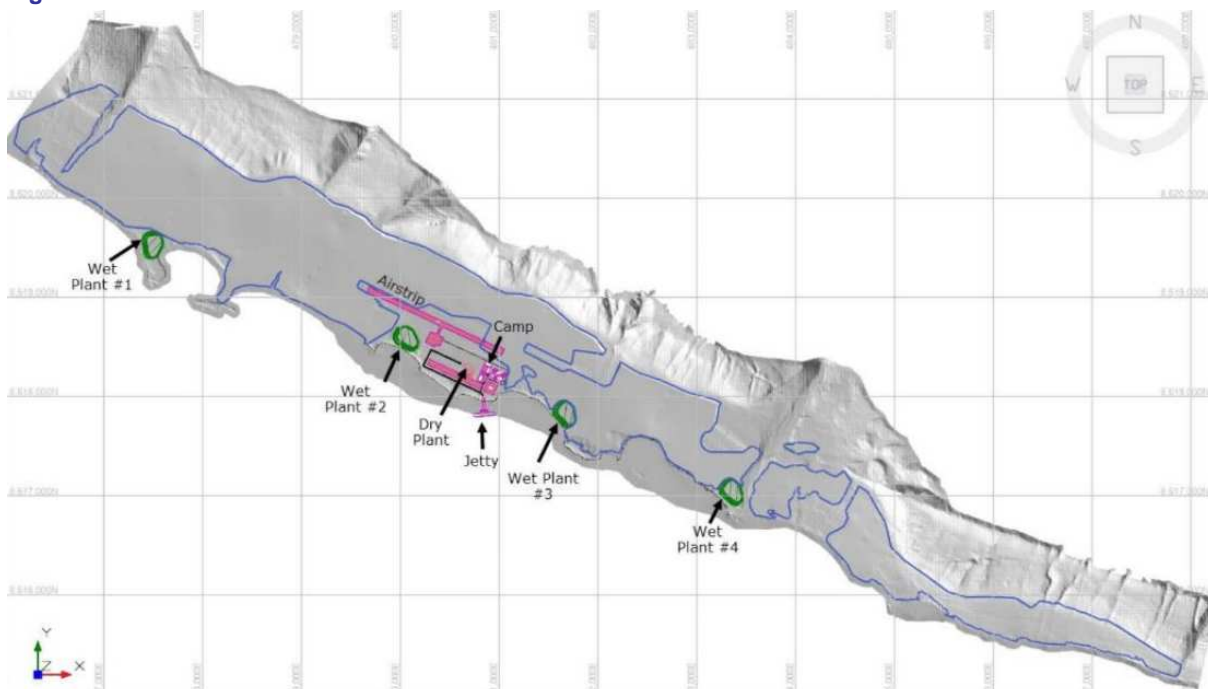
The former concluded that there are no major material or unmanageable environmental impacts arising from the development of the project while the latter identified significant employment opportunities for local communities and positive effects on regional economic development.

### DTP infrastructure

Infrastructure at the DTP will include onshore automated continuous surface miners, a wet plant, a dry plant, a small port, a ship-loading facility, an airstrip, workforce accommodation, concentrate storage, and general utilities such as power and water supply. The construction period is expected to be around 18 months.

At the wet plant the mined screen sand will be separated into two fractions through a two-stage gravity separation: one fraction with heavy minerals including the ilmenite (ca. 10% of the mined volume) and one fraction with light minerals (ca. 90% of the mined volume). The water used in gravity separation will be normal seawater which will be pumped back to the sea after use. The process requires no chemicals, crushing or liberation of the minerals. The wet plant will be mobile so that it can be relocated every 2-3 years to follow the operational area for the continuous surface miners.

Figure 11: DTP infrastructure



Source: Bluejay Mining plc



After beneficiation the light minerals will be transported back to the earlier mine cuttings which will be backfilled. The backfilled cuttings will later be covered with previously removed topsoil.

The heavy mineral concentrate (consisting of approximately 88% ilmenite and 12% magnetite and other heavy minerals) will be transported to the dry plant. Before entering the dry plant, the heavy mineral fraction material from the wet plant will be dried. The dry plant will be a fixed plant located close to the storage and port facilities. Using magnetic separation, the heavy minerals will be refined into a >99% clean premium ilmenite product, and a standard ilmenite product.

The ilmenite products will be stored in a large facility at the mining site. During the ice-free shipping window (June-October) the material will be shipped by bulk carriers to an international, all-year around open water, storage location or directly to customers.

The infrastructure will include a rock-filled steel piled berth and ship-loading facilities. In early September Bluejay shipped a 42,000 tonne bulk ilmenite sample from Moriusaq to Canada for concentration and subsequent evaluation by potential customers including Rio Tinto.

## FINANCIAL POSITION

Cash burn at Bluejay during H1/19 was GBP2.9m. Cash and cash equivalents at the end of June were GBP6.5m. We would therefore expect the company to address capital requirements by early 2020. However, with their impressive pipeline of metal projects, increasing global interest in Greenland, and the nearness to the key awarding of the exploitation licence for Dundas, we anticipate that Bluejay will not have difficulty in raising funds as required.



## MANAGEMENT

### **CEO - Rod McIlree**

Mr. McIlree is a corporate geologist. A graduate of Curtin University School of Mines, he has spent decades working in frontier locations during which time he has gained a global perspective of commodities. Having worked in Greenland for the last 11 years, Mr. McIlree was the founder of Greenland Gas & Oil, where he managed the licencing of Jameson, and the founding MD of Greenland Minerals and Energy Ltd, which worked successfully to overturn the multi-decade Danish / Greenlandic ban on uranium exploitation and exploration.

### **COO - Dr. Bo Møller Stensgaard**

Dr. Møller Stensgaard is a Danish national and preeminent geologist with extensive operational experience in Greenland. Dr. Møller Stensgaard was a senior research scientist at the Danish state survey and has advised multiple European federal and commercial entities in the field of commodity development.

### **COO (Finland) - Thomas Levin**

Mr. Levin is a Finnish geologist with more than 15 years of experience in exploration and project management. He graduated from Åbo Akademi University in 2003 and holds a M.Sc. degree in geology and mineralogy. After graduating, he worked as a researcher at the university before joining the geo-consulting company AB Scandinavian Geopool Ltd as project manager. In early 2010 Mr. Levin joined the Magnus Minerals Oy and Western Areas LTD joint venture team, forming the base of what today is FinnAust Mining Finland Oy, a company which is part of the Bluejay Mining plc group, managing the Finnish assets. During his more than 9 years with the group, Mr. Levin has held various positions and was appointed COO (Finland) in February 2019.

### **Managing Director Dundas Titanium A/S - Hans Jensen**

Mr. Jensen has more than 30 years of experience managing and operating in Greenland and has undertaken a variety of large logistical and supply chain operations, as well as international exploration. Mr. Jensen has previously held senior roles in the largest Greenlandic transportation and logistics companies such as Royal Arctic Line A/S and Leonhard Nilsen & Sønner A/S where he was marketing manager & vice-president in charge of Projects and Transportation. He also held a role as CEO in the largest Facility Service company in Greenland, ISS. Mr. Jensen is experienced in permitting regulations required by the various Ministries of Greenland regarding these types of activities.

### **Geology Manager - Eric Sondergaard**

Mr. Sondergaard is a graduate of the University of Calgary, has extensive experience in Greenland and has worked on similar sedimentary type projects in Canada. Mr. Sondergaard also managed the exploration team that uncovered the super-giant Kvanefjeld Rare Earth project in Greenland.

**Non-Executive Chairman - Mike Hutchinson**

*Member of the Audit, Remuneration and AIM Compliance Committees*

Mr. Hutchinson began his career at Metallgesellschaft Ltd where he worked for 25 years, ultimately becoming the managing director in 1985. Metallgesellschaft Ltd was a metal trading subsidiary of one of Germany's largest industrial conglomerates. Additionally, Mr Hutchinson was director between 1986-2008 of the world's largest market for industrial metals trading, the London Metals Exchange (LME). Since then he has held several notable board and management roles, including chairman of Metalloyd Ltd, a major supplier of steel and raw materials to traders, distributors and end-users, and chairman of Greenland Minerals & Energy Ltd, which successfully overturned the long-standing Danish and Greenlandic ban on uranium exploitation and exploration. He was also chairman of Wogen Ltd, a specialty metals trading house.

**Non-Executive Director, Company Secretary - Garth Palmer**

*Chairman of the AIM Compliance Committee and member of the Audit Committee*

Mr. Palmer holds a Bachelor of Commerce Degree and is a member of the Institute of Chartered Accountants in England & Wales. He began his career at Horwath Chartered Accountants in Perth (now part of BDO) in the audit and corporate services division before moving to KPMG's audit and risk advisory team. Mr. Palmer works with several AIM-quoted companies, predominantly within the mining and resources industries, providing corporate and financial consulting services. He is currently the finance director of AIM-quoted SigmaRoc plc.

**Non Executive Director - Peter Waugh**

*Chairman of the Remuneration Committee and member of the AIM Compliance Committee*

Mr. Waugh is an experienced technical director and consultant with more than 30 years' experience in the global titanium dioxide industry, including 24 years with Tioxide Group, followed by Huntsman Pigments. Peter's experience includes pigment plant management as well as leading teams in the delivery of global strategic improvement projects.

**Non Executive Director - Ian Henderson**

*Chairman of the Audit Committee and member of the Remuneration Committee*

Mr. Henderson spent over 20 years at JP Morgan during which time he ran both the UK Global Financials Fund and the Natural Resources funds, the latter of which, at their zenith, comprised of assets approaching US\$10 billion. Prior to this, Ian spent nine years as Director and Chief Investment Officer of Wardley Investment Services International and five years as an international portfolio manager in London and New York for Morgan Grenfell & Co. Mr. Henderson is currently a Non-executive Director of BMO Capital Markets Ltd, the London-based subsidiary of the Bank of Montreal. Mr. Henderson is a qualified accountant and graduated from Edinburgh University with an MA in Philosophy & Politics and an LLB in Scots Law.





## SHAREHOLDERS & STOCK INFORMATION

Stock Information	
ISIN	GB00BFD3VF20
WKN	A1W8Q8
Bloomberg ticker	JAY LN
No. of issued shares	854,969,397
Transparency Standard	AIM
Country	United Kingdom
Sector	Industrial Metals

Source: AIM, Börse Frankfurt

Shareholder Structure	
Sand Grove Capital Management PLC	18%
Directors and senior management	14%
M&G PLC	12%
Hargreaves Lansdown Asset Man.	4%
Free float and other	52%

Source: Bluejay Mining plc



## INCOME STATEMENT

All figures in GBP	2018	2019E	2020E	2021E	2022E	2023E
<b>Revenues</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>53,953,488</b>	<b>80,930,233</b>
Mining, processing, G&A, royalties	-1,550,256	-1,543,271	-2,250,000	-2,750,000	-30,426,744	-44,265,116
Other gains/(losses)	-93,111	-24,718	0	0	0	0
Foreign exchange	-23,757	-9,058	0	0	0	0
<b>EBITDA</b>	<b>-1,667,124</b>	<b>-1,577,047</b>	<b>-2,250,000</b>	<b>-2,750,000</b>	<b>23,526,744</b>	<b>36,665,116</b>
Depreciation and amortisation	-250,595	-437,665	-500,000	-550,000	-36,265,260	-36,315,260
Impairments	-8,873,585	0	0	0	0	0
<b>Operating profit (EBIT)</b>	<b>-10,791,304</b>	<b>-2,014,712</b>	<b>-2,750,000</b>	<b>-3,300,000</b>	<b>-12,738,516</b>	<b>349,856</b>
Finance income	12,209	-16,368	-65,561	-3,768,629	-10,706,949	-8,929,229
Other income	2,409					
<b>Pre-tax result (EBT)</b>	<b>-10,776,686</b>	<b>-2,031,080</b>	<b>-2,815,561</b>	<b>-7,068,629</b>	<b>-23,445,465</b>	<b>-8,579,373</b>
Income taxes	0	0	0	0	0	0
<b>Net income / loss</b>	<b>-10,776,686</b>	<b>-2,031,080</b>	<b>-2,815,561</b>	<b>-7,068,629</b>	<b>-23,445,465</b>	<b>-8,579,373</b>
<b>Diluted EPS (in GBp)</b>	<b>-1.279</b>	<b>-0.002</b>	<b>-0.003</b>	<b>-0.007</b>	<b>-0.022</b>	<b>-0.008</b>
<b>Ratios</b>						
EBITDA margin on revenues	n.m.	n.m.	n.m.	n.m.	43.6%	45.3%
EBIT margin on revenues	n.m.	n.m.	n.m.	n.m.	n.m.	0.4%
Net margin on revenues	n.m.	n.m.	n.m.	n.m.	n.m.	n.m.
Tax rate	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<b>Expenses as % of revenues</b>						
Mining, processing, G&A, royalties	n.m.	n.m.	n.m.	n.m.	56.4%	54.7%
<b>Y-Y Growth</b>						
Revenues	n.m.	n.m.	n.m.	n.m.	n.m.	50.0%
EBITDA	n.m.	n.m.	n.m.	n.m.	n.m.	55.8%
Operating income	n.m.	n.m.	n.m.	n.m.	n.m.	n.m.
Net income/ loss	n.m.	n.m.	n.m.	n.m.	n.m.	n.m.



## BALANCE SHEET

All figures in GBP	2018	2019E	2020E	2021E	2022E	2023E
<b>Assets</b>						
<b>Current assets, total</b>	<b>9,943,071</b>	<b>3,726,885</b>	<b>32,537,964</b>	<b>24,767,475</b>	<b>26,233,864</b>	<b>30,163,550</b>
Cash and cash equivalents	8,843,709	2,532,279	30,209,340	22,622,303	14,886,987	13,474,109
Financial assets at fair value through P&L	330,402	94,606	1,128,624	845,172	556,180	503,394
Receivables	768,960	1,100,000	1,200,000	1,300,000	10,790,698	16,186,047
<b>Non-current assets, total</b>	<b>18,324,337</b>	<b>22,737,920</b>	<b>86,763,353</b>	<b>210,264,220</b>	<b>178,998,960</b>	<b>167,838,739</b>
Property, plant & equipment	2,846,091	3,495,303	62,520,736	181,021,603	144,756,343	128,596,122
Intangible assets	15,478,246	19,242,617	24,242,617	29,242,617	34,242,617	39,242,617
Other assets	0	0	0	0	0	0
<b>Total assets</b>	<b>28,267,408</b>	<b>26,464,805</b>	<b>119,301,318</b>	<b>235,031,695</b>	<b>205,232,824</b>	<b>198,002,288</b>
<b>Shareholders' equity &amp; debt</b>						
<b>Current liabilities, total</b>	<b>783,836</b>	<b>600,000</b>	<b>6,252,074</b>	<b>9,051,080</b>	<b>2,697,674</b>	<b>4,046,512</b>
Short-term debt	0	0	0	0	0	0
Accounts payable	783,836	600,000	6,252,074	9,051,080	2,697,674	4,046,512
<b>Non-current liabilities</b>	<b>496,045</b>	<b>496,045</b>	<b>60,496,045</b>	<b>180,496,045</b>	<b>180,496,045</b>	<b>180,496,045</b>
Deferred tax liabilities	496,045	496,045	496,045	496,045	496,045	496,045
Long term debt	0	0	60,000,000	180,000,000	180,000,000	180,000,000
<b>Non-controlling interest</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Shareholders' equity</b>	<b>26,987,527</b>	<b>25,368,760</b>	<b>52,553,199</b>	<b>45,484,570</b>	<b>22,039,105</b>	<b>13,459,732</b>
<b>Total consolidated equity and debt</b>	<b>28,267,408</b>	<b>26,464,805</b>	<b>119,301,318</b>	<b>235,031,695</b>	<b>205,232,824</b>	<b>198,002,288</b>
<b>Ratios</b>						
Current ratio (x)	12.69	6.21	5.20	2.74	9.72	7.45
Quick ratio (x)	12.69	6.21	5.20	2.74	9.72	7.45
Net debt (cash)	-9,174,111	-2,626,885	28,662,036	156,532,525	164,556,834	166,022,497
Net gearing	-34.0%	-10.4%	54.5%	344.1%	746.7%	1233.5%



## CASH FLOW STATEMENT

All figures in GBP	2018	2019E	2020E	2021E	2022E	2023E
<b>Loss after taxation</b>	<b>-10,776,686</b>	<b>-2,031,080</b>	<b>-2,815,561</b>	<b>-7,068,629</b>	<b>-23,445,465</b>	<b>-8,579,373</b>
Depreciation and amortisation	9,124,175	437,665	500,000	550,000	36,265,260	36,315,260
Changes in working capital	115,777	-514,876	5,552,074	2,699,007	-15,844,103	-4,046,512
Share-based payments	45,000	0	0	0	0	0
Foreign exchange	-32,914	0	0	0	0	0
Other adjustments	96,573	0	0	0	0	0
<b>Operating cash flow</b>	<b>-1,428,075</b>	<b>-2,108,291</b>	<b>3,236,513</b>	<b>-3,819,623</b>	<b>-3,024,308</b>	<b>23,689,376</b>
Investments in intangibles	-6,251,969	-3,764,371	-5,000,000	-5,000,000	-5,000,000	-5,000,000
<b>Free cash flow</b>	<b>-7,680,044</b>	<b>-5,872,662</b>	<b>-1,763,487</b>	<b>-8,819,623</b>	<b>-8,024,308</b>	<b>18,689,376</b>
Investments in PP&E	-2,452,284	-1,086,877	-59,525,433	-119,050,867	0	-20,155,039
Other investments	-442,781	0	0	0	0	0
<b>Investment cash flow</b>	<b>-9,147,034</b>	<b>-4,851,248</b>	<b>-64,525,433</b>	<b>-124,050,867</b>	<b>-5,000,000</b>	<b>-25,155,039</b>
Debt financing, net	0	0	60,000,000	120,000,000	0	0
Equity financing, net	16,458,928	412,313	30,000,000	0	0	0
Other financing	0	0	0	0	0	0
<b>Financing cash flow</b>	<b>16,458,928</b>	<b>412,313</b>	<b>90,000,000</b>	<b>120,000,000</b>	<b>0</b>	<b>0</b>
FOREX & other effects	388,370	0	0	0	0	0
<b>Net cash flows</b>	<b>6,272,189</b>	<b>-6,547,226</b>	<b>28,711,079</b>	<b>-7,870,490</b>	<b>-8,024,308</b>	<b>-1,465,663</b>
Liquid assets, start of the year	2,901,922	9,174,111	2,626,885	31,337,964	23,467,475	15,443,166
<b>Liquid assets, end of the year</b>	<b>9,174,111</b>	<b>2,626,885</b>	<b>31,337,964</b>	<b>23,467,475</b>	<b>15,443,166</b>	<b>13,977,503</b>
<b>Y-Y Growth</b>						
Operating cash flow	n.m.	n.m.	n.m.	n.m.	n.m.	-883.3%
EBITDA/share	n.a.	n.m.	n.m.	n.m.	n.m.	55.8%

## FIRST BERLIN RECOMMENDATION & PRICE TARGET HISTORY

Report No.:	Date of publication	Previous day closing price	Recommendation	Price target
Initial Report	24 October 2019	GBp10.0	Buy	GBp 21.8

**Authored by: Simon Scholes, Analyst**

**Company responsible for preparation:**

**First Berlin Equity Research GmbH**  
 Mohrenstraße 34  
 10117 Berlin

Tel. +49 (0)30 - 80 96 93 94 Fax +49 (0)30 - 80 93 96 87

info@firstberlin.com  
 www.firstberlin.com

**Person responsible for forwarding or distributing this financial analysis: Martin Bailey**

**Copyright© 2019 First Berlin Equity Research GmbH** No part of this financial analysis may be copied, photocopied, duplicated or distributed in any form or media whatsoever without prior written permission from First Berlin Equity Research GmbH. First Berlin Equity Research GmbH shall be identified as the source in the case of quotations. Further information is available on request.

### INFORMATION PURSUANT TO SECTION 34B OF THE GERMAN SECURITIES TRADING ACT [WPHG], TO REGULATION (EU) NO 596/2014 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL OF APRIL 16, 2014, ON MARKET ABUSE (MARKET ABUSE REGULATION) AND TO THE GERMAN ORDINANCE ON THE ANALYSIS OF FINANCIAL INSTRUMENTS [FINANV]

First Berlin Equity Research GmbH (hereinafter referred to as: "First Berlin") prepares financial analyses while taking the relevant regulatory provisions, in particular the German Securities Trading Act [WpHG], Regulation (EU) No 596/2014 of the European Parliament and of the Council of April 16, 2014, on market abuse (market abuse regulation) and the German Ordinance on the Analysis of Financial Instruments [FinAnV] into consideration. In the following First Berlin provides investors with information about the statutory provisions that are to be observed in the preparation of financial analyses.

### CONFLICTS OF INTEREST

In accordance with Section 34b Paragraph 1 of the German Securities Trading Act [WpHG] and Regulation (EU) No 596/2014 of the European Parliament and of the Council of April 16, 2014, on market abuse (market abuse regulation) financial analyses may only be passed on or publicly distributed if circumstances or relations which may cause conflicts of interest among the authors, the legal entities responsible for such preparation or companies associated with them are disclosed along with the financial analysis.

First Berlin offers a range of services that go beyond the preparation of financial analyses. Although First Berlin strives to avoid conflicts of interest wherever possible, First Berlin may maintain the following relations with the analysed company, which in particular may constitute a potential conflict of interest (further information and data may be provided on request):

- The author, First Berlin, or a company associated with First Berlin holds an interest of more than five percent in the share capital of the analysed company;
- The author, First Berlin, or a company associated with First Berlin provided investment banking or consulting services for the analysed company within the past twelve months for which remuneration was or was to be paid;
- The author, First Berlin, or a company associated with First Berlin reached an agreement with the analysed company for preparation of a financial analysis for which remuneration is owed;
- The author, First Berlin, or a company associated with First Berlin has other significant financial interests in the analysed company;

First Berlin F.S.B. Investment-Beratungsgesellschaft mbH (hereafter FBIB), a company of the First Berlin Group, holds a stake of under 0.1% of the shares in the company which has been covered in this analysis. The analyst is not subject to any restrictions with regard to his recommendation and is therefore independent, so that we believe there is no conflict of interest

In order to avoid and, if necessary, manage possible conflicts of interest both the author of the financial analysis and First Berlin shall be obliged to neither hold nor in any way trade the securities of the company analyzed. The remuneration of the author of the financial analysis stands in no direct or indirect connection with the recommendations or opinions represented in the financial analysis. Furthermore, the remuneration of the author of the financial analysis is neither coupled directly to financial transactions nor to stock exchange trading volume or asset management fees.

If despite these measures one or more of the aforementioned conflicts of interest cannot be avoided on the part of the author or First Berlin, then reference shall be made to such conflict of interest.

### INFORMATION PURSUANT TO SECTION 64 OF THE GERMAN SECURITIES TRADING ACT [WPHG] (2ND FIMANOG) OF 23 JUNE 2017, DIRECTIVE 2014/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL OF 15 MAY 2014 ON MARKETS IN FINANCIAL INSTRUMENTS AND AMENDING DIRECTIVE 2002/92/EC AND DIRECTIVE 2011/61/EU, ACCOMPANIED BY THE MARKETS IN FINANCIAL INSTRUMENTS REGULATION (MIFIR, REG. EU NO. 600/2014)

First Berlin notes that it has concluded a contract with the issuer to prepare financial analyses and is paid for that by the issuer. First Berlin makes the financial analysis simultaneously available for all interested security financial services companies. First Berlin thus believes that it fulfils the requirements of section 64 WpHG for minor non-monetary benefits.

### PRICE TARGET DATES

Unless otherwise indicated, current prices refer to the closing prices of the previous trading day.

### AGREEMENT WITH THE ANALYSED COMPANY AND MAINTENANCE OF OBJECTIVITY

The present financial analysis is based on the author's own knowledge and research. The author prepared this study without any direct or indirect influence exerted on the part of the analysed company. Parts of the financial analysis were possibly provided to the analysed company prior to publication in order to avoid inaccuracies in the representation of facts. However, no substantial changes were made at the request of the analysed company following any such provision.

### ASSET VALUATION SYSTEM

First Berlin's system for asset valuation is divided into an asset recommendation and a risk assessment.

#### ASSET RECOMMENDATION

The recommendations determined in accordance with the share price trend anticipated by First Berlin in the respectively indicated investment period are as follows:

Category		1	2
Current market capitalisation (in €)		0 - 2 billion	> 2 billion
Strong Buy <sup>1</sup>	An expected favourable price trend of:	> 50%	> 30%
Buy	An expected favourable price trend of:	> 25%	> 15%
Add	An expected favourable price trend of:	0% to 25%	0% to 15%
Reduce	An expected negative price trend of:	0% to -15%	0% to -10%
Sell	An expected negative price trend of:	< -15%	< -10%

<sup>1</sup> The expected price trend is in combination with sizable confidence in the quality and forecast security of management.

Our recommendation system places each company into one of two market capitalisation categories. Category 1 companies have a market capitalisation of €0 – €2 billion, and Category 2 companies have a market capitalisation of > €2 billion. The expected return thresholds underlying our recommendation system are lower for Category 2 companies than for Category 1 companies. This reflects the generally lower level of risk associated with higher market capitalisation companies.

#### RISK ASSESSMENT

The First Berlin categories for risk assessment are low, average, high and speculative. They are determined by ten factors: Corporate governance, quality of earnings, management strength, balance sheet and financial risk, competitive position, standard of financial disclosure, regulatory and political uncertainty, strength of brandname, market capitalisation and free float. These risk factors are incorporated into the First Berlin valuation models and are thus included in the target prices. First Berlin customers may request the models.

#### INVESTMENT HORIZON

Unless otherwise stated in the financial analysis, the ratings refer to an investment period of twelve months.

#### UPDATES

At the time of publication of this financial analysis it is not certain whether, when and on what occasion an update will be provided. In general First Berlin strives to review the financial analysis for its topicality and, if required, to update it in a very timely manner in connection with the reporting obligations of the analysed company or on the occasion of ad hoc notifications.

#### SUBJECT TO CHANGE

The opinions contained in the financial analysis reflect the assessment of the author on the day of publication of the financial analysis. The author of the financial analysis reserves the right to change such opinion without prior notification.

#### Legally required information regarding

- key sources of information in the preparation of this research report
- valuation methods and principles
- sensitivity of valuation parameters

can be accessed through the following internet link: <http://firstberlin.com/disclaimer-english-link/>

**SUPERVISORY AUTHORITY: Bundesanstalt für Finanzdienstleistungsaufsicht (German Federal Financial Supervisory Authority) [BaFin], Graurheindorferstraße 108, 53117 Bonn and Lurgiallee 12, 60439 Frankfurt**

### EXCLUSION OF LIABILITY (DISCLAIMER)

#### RELIABILITY OF INFORMATION AND SOURCES OF INFORMATION

The information contained in this study is based on sources considered by the author to be reliable. Comprehensive verification of the accuracy and completeness of information and the reliability of sources of information has neither been carried out by the author nor by First Berlin. As a result no warranty of any kind whatsoever shall be assumed for the accuracy and completeness of information and the reliability of sources of information, and neither the author nor First Berlin, nor the person responsible for passing on or distributing the financial analysis shall be liable for any direct or indirect damage incurred through reliance on the accuracy and completeness of information and the reliability of sources of information.

#### RELIABILITY OF ESTIMATES AND FORECASTS

The author of the financial analysis made estimates and forecasts to the best of the author's knowledge. These estimates and forecasts reflect the author's personal opinion and judgement. The premises for estimates and forecasts as well as the author's perspective on such premises are subject to constant change. Expectations with regard to the future performance of a financial instrument are the result of a measurement at a single point in time and may change at any time. The result of a financial analysis always describes only one possible future development – the one that is most probable from the perspective of the author – of a number of possible future developments.

Any and all market values or target prices indicated for the company analysed in this financial analysis may not be achieved due to various risk factors, including but not limited to market volatility, sector volatility, the actions of the analysed company, economic climate, failure to achieve earnings and/or sales forecasts, unavailability of complete and precise information and/or a subsequently occurring event which affects the underlying assumptions of the author and/or other sources on which the author relies in this document. Past performance is not an indicator of future results; past values cannot be carried over into the future.

Consequently, no warranty of any kind whatsoever shall be assumed for the accuracy of estimates and forecasts, and neither the author nor First Berlin, nor the person responsible for passing on or distributing the financial analysis shall be liable for any direct or indirect damage incurred through reliance on the correctness of estimates and forecasts.

#### INFORMATION PURPOSES, NO RECOMMENDATION, SOLICITATION, NO OFFER FOR THE PURCHASE OF SECURITIES

The present financial analysis serves information purposes. It is intended to support institutional investors in making their own investment decisions; however in no way provide the investor with investment advice. Neither the author, nor First Berlin, nor the person responsible for passing on or distributing the financial analysis shall be considered to be acting as an investment

advisor or portfolio manager vis-à-vis an investor. Each investor must form his own independent opinion with regard to the suitability of an investment in view of his own investment objectives, experience, tax situation, financial position and other circumstances.

The financial analysis does not represent a recommendation or solicitation and is not an offer for the purchase of the security specified in this financial analysis. Consequently, neither the author nor First Berlin, nor the person responsible for passing on or distributing the financial analysis shall as a result be liable for losses incurred through direct or indirect employment or use of any kind whatsoever of information or statements arising out of this financial analysis.

A decision concerning an investment in securities should take place on the basis of independent investment analyses and procedures as well as other studies including, but not limited to, information memoranda, sales or issuing prospectuses and not on the basis of this document.

#### **NO ESTABLISHMENT OF CONTRACTUAL OBLIGATIONS**

By taking note of this financial analysis the recipient neither becomes a customer of First Berlin, nor does First Berlin incur any contractual, quasi-contractual or pre-contractual obligations and/or responsibilities toward the recipient. In particular no information contract shall be established between First Berlin and the recipient of this information.

#### **NO OBLIGATION TO UPDATE**

First Berlin, the author and/or the person responsible for passing on or distributing the financial analysis shall not be obliged to update the financial analysis. Investors must keep themselves informed about the current course of business and any changes in the current course of business of the analysed company.

#### **DUPLICATION**

Dispatch or duplication of this document is not permitted without the prior written consent of First Berlin.

#### **SEVERABILITY**

Should any provision of this disclaimer prove to be illegal, invalid or unenforceable under the respectively applicable law, then such provision shall be treated as if it were not an integral component of this disclaimer; in no way shall it affect the legality, validity or enforceability of the remaining provisions.

#### **APPLICABLE LAW, PLACE OF JURISDICTION**

The preparation of this financial analysis shall be subject to the law obtaining in the Federal Republic of Germany. The place of jurisdiction for any disputes shall be Berlin (Germany).

#### **NOTICE OF DISCLAIMER**

By taking note of this financial analysis the recipient confirms the binding nature of the above explanations.

By using this document or relying on it in any manner whatsoever the recipient accepts the above restrictions as binding for the recipient.

#### **QUALIFIED INSTITUTIONAL INVESTORS**

First Berlin financial analyses are intended exclusively for qualified institutional investors.

**This report is not intended for distribution in the USA and/or Canada.**